Effects of mobile phone attachment and forced exposure on attitudes towards the ad and the perceived intrusiveness of online advertisements

This dissertation is submitted for the degree of Doctor of Philosophy

2021

Eamonn O'Raghallaigh

I. DECLARATION

I declare that this thesis has not been submitted as an exercise for a degree at this or any other university and it is entirely my own work.

I agree to deposit this thesis in the University's open access institutional repository or allow the Library to do so on my behalf, subject to Irish Copyright Legislation and Trinity College Library conditions of use and acknowledgement.

I consent to the examiner retaining a copy of the thesis beyond the examining period, should they so wish (EU GDPR May 2018).

II. ABSTRACT

Numerous studies on advertising intrusiveness can be found in the literature and have demonstrated that there is a link between disruptive and forced exposure advertising and intrusiveness as well as negative emotional and behavioural responses. However, a gap in the literature exists in understanding these relationships in the mobile context and specifically through the lens of mobile attachment. As mobile penetration grows to become the dominant mode of accessing the internet and as we move towards a mobile-first society, understanding the theoretical and managerial implications of these factors impacting mobile advertising is an important and necessary contribution of this research.

This study investigated factors affecting participants' perception of intrusiveness and attitudes towards advertisements in different experimental conditions in an online field experiment with a special focus on mobile phone attachment. The factors under study include a forced exposure advertising condition and a cognitive intensity condition. Scale measures of mobile phone attachment (MPA) in three subscales (anxious attachment, addictive attachment and useful attachment) as well as device type data were collected to test for direct and indirect effects on perceived intrusiveness and attitude towards the ad.

The field experiment was designed as a website where participants were randomly assigned to the eight different experiment conditions in a 2x2x2 factorial design - (a) high / low cognitive intensity, (b) forced popup / unforced static banner exposure and (c) mobile / desktop device type. At the end of the exposure test, participants completed scales measuring perceived intrusiveness, attitude toward the ad (meaningfulness) and mobile phone attachment. A valid sample of 846 participants was drawn using quota / convenience sampling from a sampling frame provided by a market research company representing the general population of the Republic of Ireland. Data was analysed using covariance-based structural equation modelling techniques and included exploratory factor analysis, construct validity testing, confirmatory factor analysis and structural model testing.

Results observed included a direct positive effect of forced exposure on perceived intrusiveness (Beta= 0.458, 95% CI [0.399, 0.513] ***(p<0.001)), a direct negative effect of perceived intrusiveness on attitude towards the ad (Beta= -0.290, 95% CI [-0.383, -0.202] ***(p<0.001)) and a direct negative effect of forced exposure on attitude towards the ad (Beta= -0.087, 95% CI [-0.162. -0.005] *(p<0.05)). For the dimensions of mobile phone attachment, a direct negative effect of useful mobile phone attachment on perceived intrusiveness Beta= -0.193, 95% CI [-0.316, -0.073] **(p<0.01)) and a direct positive effect of addictive mobile phone attachment on perceived intrusiveness (Beta= 0.160, 95% CI [0.027, 0.306] *(p<0.05)) was

observed. Furthermore, a direct positive effect of useful mobile phone attachment on attitude towards the ad (Beta= 0.211, 95% CI [0.083, 0.346] ***(p<0.001)) and a direct negative effect of addictive mobile phone attachment on attitude towards the ad (Beta= -0.180, 95% CI [-0.335, -0.035] *(p<0.05)) was observed. Anxious mobile phone attachment did not show any significant effects on perceived intrusiveness or attitude towards the ad. Perceived intrusiveness was also shown to mediate the effect of forced exposure on attitudes towards the ad (Beta = -0.345, 95% CI [-0.474, -0.235], *** (p<0.001)). Device type and task cognitive intensity showed weak or no multigroup or interaction effects in this field experiment.

The results demonstrate that mobile phone attachment has an important role to play in understanding how users interact with online advertising. Users exhibiting useful mobile phone attachment tend to perceive ads as less intrusive and have more positive attitudes towards the meaningfulness of ads, whereas, conversely, users exhibiting addictive mobile phone attachment tend to perceive ads as more intrusive and have a more negative attitude towards the ad. It was also observed that anxious attachment did not have significant effects on perceived intrusiveness or attitude towards the ad. Furthermore, perceived intrusiveness has a role to play in mediating the effects of forced exposure on negative attitudes towards advertising. Neither device type or task intensity was shown not to have any moderating effects on perceived intrusiveness or attitude towards the ad.

From a theoretical viewpoint, reactance theory in combination with attachment theory is proposed as the mechanism as to why addictively attached users experience high levels of intrusiveness and more negative attitudes towards the ad, while the technology acceptance model is proposed as a mechanism as to why the opposite is observed for users who exhibit useful attachment.

As addictive and problematic mobile phone attachment becomes a growing problem in today’s ever more connected world, this study reminds advertisers of the negative effects of intrusive advertising and the necessity to juxtapose the fine balance of seeking more advertising impressions and user attention with the negative counterproductive effects forced exposure advertising has in triggering ad avoidance and negative attitudes, ultimately leading to reduced advertising effectiveness. Our study suggests that advertising practitioners should avoid forced exposure advertising in placements where there is a high potential for the user to exhibit addictive attachment, such as gaming and social media, and focus their attention on using forced exposure formats in situations and audience segments where the user is more likely to be accepting of technology and thus accepting of advertising.

III. ACKNOWLEDGEMENTS

I would like to express my sincerest gratitude and appreciation for Prof. Laurent Muzellec whose guidance, support and encouragement has been invaluable throughout this programme of study.

I also wish to thank the team and faculty at Trinity Business School, whose encouragement and guidance was valuable and inspiring in progressing my studies. In particular, I would like to mention Prof. Joe McDonagh, who has been a major influence in supporting and guiding me through this process. I would also like to thank Prof. Martin Fellenz, Dr. Derek Brawn and Prof. Helen Marks whose guidance, direction and support in the early stages of this work was appreciated and valued. I would also like to thank Prof. Xiaoning Liang, whose support and direction was greatly appreciated. I would also like to extend thanks to Prof. Mairead Brady and Prof. Kristian Myrseth whose critique and guidance through confirmation was valued and Prof. Norah Campbell, Prof. Michael Haenlein and Dr. Farhoodeh Zamani whose support assisted greatly in helping me to prepare for my viva voce. I would also like to thank my examiners, Prof. Kristine De Valck and Prof. Radu Dimitriu for taking the time and effort to critique this work.

I would like to thank my family and friends whose support throughout has kept me motivated. Finally, I would like to express my appreciation to my late parents, Patrick & Breda, who always believed in me and strived to ensure I had the best start in life by encouraging and facilitating my development and education. I hope I have made them proud.

Table of Contents

IV. LIST OF TABLES

V. LIST OF FIGURES

VI. GLOSSARY OF TERMS

Mobile Device: In the context of this research, a mobile device refers to a mobile phone with internet connectivity and a browser capable of viewing websites.

Smartphone: A newer generation mobile device that performs many of the functions of a computer, typically having a touchscreen interface, Internet access, and an operating system capable of running downloaded apps. is designed to run internet applications

Modal Ad: An advertisement that appears on top of a site's content. The ad must be closed before you can interact with the site content, forcing the users attention.

Popup Ad: An ad that displays in a new browser window, generally obscuring content. In recent years, popup ads have fallen out of favour as most web browsers block them by default. Some practitioners still use the term popup interchangeably with modal and interstitial ads, even though this is not technically correct.

Interstitial Ad: A full-screen ad format covering the interface of an app or website and appearing at natural transition points in the user journey. Many practitioners still refer to modal and interstitial ads as pop-ups ads, although not strictly correct.

Banner Ad: A static advertising unit that can appear to the side or across the top of a webpage. Generally banner ads do not obscure the content on the page and are in-line with the content. Regarded as the most benign and passive form of display advertising as they are not interruptive and do not obscure the users view of content.

Task Cognitive Intensity: In the context of this study, task cognitive intensity refers to the level of effort and concentration required to complete a task. High intensity tasks require more concentration than low intensity tasks.

Device Type: In the context of this research device type refers to the distinction between a desktop device and a mobile device.

Forced Exposure: Refers to the act of involuntarily subjecting a user to view and/or interact with an object. In the context of this research, forced exposure refers to exposure to modal ads which obscure the user's view of the content and requires them to wait for a specified time delay before having the ability to dismiss the advertisement.

Mobile Phone Attachment: is defined as the bond between a user and their mobile phone which can vary in strength and nature. Mobile phone attachment can be productive where a user has a positive relationship with their device and may find it useful or problematic where the user has a negative relationship with their device and may exhibit anxious or addictive behaviours.

Perceived Intrusiveness: Is a state that arises when a user experiences a negative emotional reaction following an intrusive, interrupting, disturbing or invasive act or behaviour by another.

Generation Z: The generation reaching adulthood in the second decade of the 21st century, perceived as being familiar with the Internet from a very young age.

Millennials: Also termed Generation Y, is the generation reaching adulthood in the early 21st century

Chapter 1

INTRODUCTION

1.1. RESEARCH BACKGROUND

1.1.1. Aim of This Study

Improvements in online advertising technologies and their accessibility by brands has given rise to a proliferation of advertising in the digital ecosystem. The online display advertising market has evolved beyond traditional banner ads to include many visual and audio features that make ads more intrusive, obtrusive and invasive and thus, more difficult to avoid (McCoy *et al.*, 2017; Morimoto, 2017) . Consumers are increasingly being exposed to a wider variety of advertising formats across multiple devices on the web. New formats of advertising, notably on mobile devices, can be perceived as obtrusive if the user's experience is interrupted, triggering ad avoidance.

This focus of this research study is to build on previous empirical evidence and expand the current body of knowledge by investigating online advertising in the context of a field experiment and to test antecedents of perceived intrusiveness and attitude towards the ads and to examine if causal relationships exist between forced exposure to advertising, mobile phone attachment, perceived intrusiveness and attitude towards the ad. Building on the extant literature, the study will look to explain how advertisements may be perceived as intrusive by website users and how users form attitudes towards advertisements in forced exposure conditions. It will probe the effects of mobile phone attachment, an evolving phenomenon, on the levels of perceived intrusiveness towards advertising experienced by users and attitudes towards the ad, adding a new dimension to the literature on negative reactions to advertising by users. It will also investigate if there is a difference between the level of perceived intrusiveness elicited by modal ad formats on both mobile and desktop devices, helping us to understand if device type influences negative emotional reactions and if user attachment to mobile devices have a role to play. There is scant research into the differences, if any, between these elicited emotional reactions on different device types. Finally, the study will look at the differences in perceived intrusiveness and attitudes towards the ad between tasks that elicit varying levels of cognitive intensity.

1.1.2. Organisational Structure of this Thesis

This thesis is structured into a number of distinct chapters which follow a logical progression. The broad background of the thesis is outlined in the introduction chapter as well as a synopsis of the research topic as well as a presentation of the expected contribution of the research to the overall body of knowledge.

The second chapter forms a literature review of the relevant evidence and knowledge that this body of research focuses on. In the first part of the literature review an overview of the formats of online advertising is introduced as well as a general overview of the industry. The second part of the literature review introduces factors that affect emotional responses to advertising including ad formats, controllability, exposure frequency, task cognitive intensity and personalisation. The next section of the literature review discusses the consequences of emotional reactions to advertising including advertising intrusiveness, ad irritation, ad avoidance and consumer attitudes towards advertising. The literature review then progresses to discuss mobile advertising and the phenomenon of mobile phone attachment. In the penultimate part of the chapter an overview and discussion of some of the relevant theoretical frameworks in advertising is discussed and the chapter concludes with the presentation of the main research questions and hypotheses examined in this research project.

The third chapter entails a comprehensive presentation of the research methodology used in this research study. It begins with an introduction discussing the research philosophy, approach, design, setting and methodological choice as well as including definitions of relevant elements in the context of this research. The chapter continues with a section focusing on the research sample including an outline of the sampling method, size and power, sample characteristics as well as ethical considerations. The next section of the chapter deals with the research tools utilised in this research study and describes the experimental website platform that was developed, how the advertising creatives were designed as well as the instruments and scales used to measure latent constructs. The next section of the chapter introduces the pilot study that was undertaken to validate the methods. The pilot study had value in the fact that the research tools could be tested and validated prior to scaling. Following the pilot study, the methodology for the field experiment was detailed and included a summary of the previously stated research questions and hypotheses, the conceptual model and a discussion of the design of the experiment. Following this the independent variables are introduced as well as the relevant experimental conditions. The next section deals with the latent constructs used in this study and the chapter concluded with a description of the data collection methods.

The next chapter in the thesis gives a comprehensive outline of the data analysis procedures applied in this thesis. The first section of the chapter looks specifically at how the data was coded and processed for analysis. Following this a description of the procedures for case screening for missing data and outliers are presented as well as dataset characteristics including skewness and kurtosis. The chapter goes on to describe the first stage in structural equation modelling, namely the exploratory factor analysis and dimension reduction and gives measures of adequacy, validity and reliability. The second stage of structural equation modelling is then described as the confirmatory factor analysis or measurement model. This section includes a cursory model fit followed by validity and invariance testing, common method bias analysis and concludes with the presentation of a final measurement model. The penultimate section of the chapter presents the main structural model and describes hypothesis testing for direct, mediated and moderated effects. The chapter concludes with a discussion on potential limitations of the analysis.

The next chapter in the thesis presents the results from the main field experiment. For clarity, the preliminary results from the pilot study results were not presented in this chapter as the sampling size was too small to give sufficient adequacy for independent measures groups. These results were outlined in Appendix VI, section 9.6.7. The results from the main field experiment are presented and each hypothesis is tested and the result declared. The final sections of the chapter outline and discuss the steps taken in the validation of the data, constructs and a discussion of the model used in this study.

The penultimate chapter in this thesis is the discussion. The chapter begins with an outline of the main findings from the research and they are discussed in detail in the context of relevant theory and extant literature. Following this a discussion of the key managerial implications associated with the research is presented, which is of relevance to practitioners in digital marketing and online advertising. The chapter goes on to discuss identified limitations in the research and avenues for future research. The thesis concludes with a conclusion chapter which summarises the thesis as a whole and discusses implications, contribution and future research.

1.2. RESEARCH TOPIC

The overarching research topic of this thesis is the investigation of the behavioural and cognitive effects of forced exposure to advertising in the online environment with a special focus on the phenomenon of emotional attachment to mobile devices.

The key topics to be explored focus on:

(a) examination of the direct effects of forced exposure to advertising on the perceived intrusiveness of advertising and attitude towards the ad,

(b) investigation of the direct effects of mobile phone attachment, and it's sub-dimensions, on the perceived intrusiveness of advertising and attitude towards the ad,

(c) examination of the mediating role of perceived intrusiveness on the relationship between forced exposure and attitude towards the ad,

(d) examination of any potential moderating effects of mobile phone attachment on the observed relationships within the model, and,

(e) the direct effects of independent variables device type and task intensity on the perceived intrusiveness and attitude towards the ad through multigroup analysis.

Internet advertising has progressed significantly in the past 10 years; from basic static type banner display ads to the more complex modals, interstitials, popups and animated formats of ads we see today. Furthermore, there has been a significant paradigm shift away from desktop and laptop devices as the primary mode of accessing information on the internet towards a more mobile-first society. These factors combined with the advent of more digitally native consumer audiences in Generation Z and Millennials makes research into advertising in the context of mobile devices of significant interest in the current framework.

One of the most anecdotally noted phenomena in the field of internet advertising is the irritation reported by users following exposure to certain types of advertising. Many authors have studied the phenomenon to understand the core triggers involved in eliciting these negative emotional responses and have identified factors including ad format (obscuring, uncontrollable), frequency, personalisation and interruptive nature during tasks to name but a few (Edwards *et al.*, 2002; McCoy *et al.*, 2008; Truong and Simmons, 2010; Van Doorn and Hoekstra, 2013). These factors can be regarded as antecedents to the latent construct of perceived intrusiveness, which can be conceptualised as the user experiencing a negative emotional state following an intrusive, interrupting, disturbing or invasive act or behaviour by another. Advertising intrusiveness has been widely studied in the literature and the construct itself can be viewed as a factor in driving negative attitudes towards advertising and brand equity (McCoy *et al.*, 2008; Tan *et al.*, 2019).

An emerging topic of study in multidisciplinary domains including psychology, marketing and human-computer interaction is the phenomenon of mobile phone attachment. This can be defined as a bond between a person's self and a mobile phone that varies in strength (Meschtscherjakov *et al.*, 2014). Mobile phone attachment can have many dimensions including anxious attachment, addictive attachment, useful attachment and obsessive attachment as discussed by Bock et al. (2016) in the development of the mobile phone attachment scale (MPAS) (Bock, Thind, *et al.*, 2016). A topic of debate is whether perceived intrusiveness and consumer attitudes to advertising are influenced by the degree to which one is attached to their mobile phone and what, if any, are the nature of these relationships. One of the key hypotheses in this current study is whether mobile phone attachment influences a users' experience of perceived intrusiveness and attitudes towards the ad.

The topic is of interest for study for a number of reasons; (a) mobile phone attachment is quickly becoming a common phenomenon as smartphone penetration rises globally, hence the effects of this phenomenon on the field of advertising and marketing is not well understood, (b) the mobile phone has surpassed other devices as the primary mode for accessing information on the internet and (c) mobile advertising is expected to continue to grow rapidly over the coming years as penetration increases and adoption of social networks rise. These factors, when taken together, highlight the importance and interest of the current research study for both academic and practitioner communities.

1.3. RESEARCH CONTRIBUTION

This research is expected to contribute to the body of knowledge across the fields of digital marketing, online advertising and human-computer interaction. Grounding the research in relevant theoretical frameworks in advertising, this study will examine the relationships between constructs of emotional reactions to advertising and apply theory to inform and explain these interactions. This study will empirically contribute to the body of knowledge in the field by expanding on previous research in the field of advertising, specifically the mobile environment and to look for new relationships and interactions previously unexplored. The concept of mobile attachment is an emerging topic in human-computer interaction and the literature is sparse in terms of how this might influence consumer's responses to advertising. Furthermore, there are significant practical contributions expected from this research in terms of how practitioners in the field of digital marketing and advertising execute advertising. It is hoped that the insights gained from this research will help improve the user experience for internet users by helping advertisers create less intrusive ads which in turn will improve overall attitudes towards advertising and purchase intentions.

The key contribution this research study provides is empirical, informed by theory with practical implications. Much work has been done previously identifying factors affecting and consequences of perceived intrusiveness (Edwards *et al.*, 2002; McCoy *et al.*, 2008; Truong and Simmons, 2010; Wehmeyer, 2007a), however the new dimension of mobile attachment has not been studied in context of perceived intrusiveness and attitude towards the ad. It is envisaged that the empirical data and insights garnered in this research will add to the growing body of knowledge in the field of intrusiveness in online advertising and help direct further research streams. The experimental design has included other key factors including task cognitive load of the user during exposure and is defined in two independent groups of mobile and desktop which will help us derive empirical data with regards to the effects of these independent variables on perceived intrusiveness and attitude towards the ad in the context of mobile attachment.

This research study aims to draw on theoretical frameworks in advertising to help to inform hypotheses and explain the relationships observed. Core theories that will be applied include reactance theory, which in part may explain why users find advertising that is interruptive in nature intrusive and the technology acceptance model may explain why some users become tolerant to the effects of advertising as it is an acceptable part of daily life on the internet in current times.

Attachment theory is also expected to play a role in understanding the mechanism of how mobile attachment interacts with perceived intrusiveness and attitude towards the ad. Classical conditioning theory also plays a key role in explaining the behaviour of users when presented with the new format of ads that required the user to wait to hit a close button after a specific wait time, that are ubiquitous now.

For conditioned users, they may not have a negative attitude towards the ad overtly, 'the ad is just the ad' and they may in fact have a neutral attitude towards it because of their conditioning and in line with social norms theory, it's an accepted part of everyday life. The technology acceptance model framework may also be at work in this context, especially for users who are highly attached to their mobile device in a useful context, and these users may find advertising less irritating and are more likely to accept the inherent value exchange for content that publishers demand. The role of each of these theories in informing our research questions and hypothesis will be explored in detail in section 2.6.

This research hopes to make it possible to highlight significant contributions to the advertising industry and relevant practitioners. As publishers and advertisers strive endlessly to grow revenues from advertising, it is important to understand the ever-changing consumer behaviours and attitudes towards advertising. In the constant battle for consumer's attention in an increasingly overcrowded internet advertising space, it is too easy for publishers and advertisers to become complacent and clutter the internet ecosystem with ever-increasingly disruptive and intrusive ads in a misguided effort to get noticed.

This research will add to the current literature in terms of the effects of these disruptive ad formats giving practitioners and publishers an understanding of the possible negative effects of these types of advertising on the consumer's emotional state which can have a cascading negative effect on the advertiser’s ultimate goal, revenue. The more intrusive the ads, the less the consumer's attitude towards that ad will be and consumer attitudes to advertising has been shown to have a negative effect on attitude towards the brand and purchase intention (Tan *et al.*, 2019).

Another dimension of the practical contribution of this research to the advertising community is the actionable insights derived from understanding the role of mobile in the current advertising paradigm. Mobile attachment is a relatively new phenomenon and understanding the impact of this on the effectiveness of advertising and how it affects emotional responses may be of benefit in terms of delivering advertising which elicits less negative attitudes by consumers.

It is hoped that this research will be of value in helping publishers and advertisers to improve the online user experience for end users by designing and executing less disruptive and intrusive advertising, while concomitantly improving the effectiveness of advertising, improving consumer attitudes and ultimately revenue generation for publishers and advertisers.

Chapter 2

LITERATURE REVIEW

2.1. INTRODUCTION

This chapter will focus on reviewing the literature in the field of online advertising, intrusiveness and mobile attachment. The chapter begins with an overview of the field of online advertising and discusses the literature in terms of current developments and research within the field. The second section reviews the current literature with reference to known factors that affect emotional responses to advertising, while the next section looks at the consequences of negative emotional responses to advertising including perceived intrusiveness and ad irritation. The next section focuses on the area of mobile advertising and reviews the current literature with special reference to mobile attachment. The final section of the chapter looks at the relevant theoretical frameworks in online advertising and establishes the foundations for the research questions to follow.

A key gap identified in the literature presented in this review is detail on the impact of the perceived intrusiveness of advertising in a mobile context. Furthermore, the literature is sparse on the emerging phenomenon of mobile phone attachment and its implications for mobile advertising. This is especially relevant in the current internet advertising environment where mobile is dominant and social networks are accelerating device attachment. One of the key empirical contributions of this research is to try to address this gap in the literature.

2.2. OVERVIEW OF ONLINE ADVERTISING

Online advertising is regarded as one of the major business models on the Internet. Publishers and service providers offer content and free services to users in exchange for their attention and the advertising revenue this value-exchange generates. This exchange, when balanced, works very effectively and is one of the main reasons as to the success and unprecedented growth of the online advertising space. In recent years, however, there has been resistance from consumers because of the growing tendency for advertisements to be more frequent, intrusive, irritating and pervasive in nature. Nowadays, it is difficult to imagine a world where one is not interrupted, poked at, asked to stay or followed by advertisements on the internet. In 2019, worldwide digital ad spend grew by 17.6% to $333.25 billion, accounting for 53% of the overall global advertising media spend. For the first time, digital now accounts for more than half of the global ad market ("Global Digital Ad Spending", 2019).

Advertisers, in a mistaken attempt to constantly drive effectiveness and meet targets, continue to expose consumers to intrusive and irritating advertising in the hope that this constant barrage of stimuli will have positive effects on brand recall, saliency and ultimately sales. One might imagine a feedback loop: consumer exposed to irritating ads - consumer experiences intrusiveness - consumer exhibits ad avoidance - advertisement effectiveness reduced - advertiser increases exposure to compensate for reduced effectiveness - consumer exposed to more intrusive ads - ad avoidance increases and so on. Enthusiastic advertisers keen to capitalise on the huge benefits online advertising brings, may in fact, be contributing to the rise of ad avoidance, notably demonstrated by the significant rise in the adoption of ad blocking technologies by end users (Belanche, 2019).

Research by McCoy et al. (2007b) has shown that consumers' first impressions and attitudes are made in the opening moments of a website visit and by the degree to which that visit may be intruded upon by pop-ups, modals and banner ads (McCoy *et al.*, 2007a). This could be conceptualised in the real world as the first impression a consumer could have if they entered a shop with a specific goal in mind and a salesperson interrupted them immediately to try to push the consumer to purchase a special offer for something the consumer didn't need. The vast majority of consumers would feel intruded upon and their impression of that particular shop, the salesperson as well as the brand could all be affected negatively. Advertisements that do not meet the needs and desires of consumers during their online journey will in most instances elicit a negative reaction resulting in the consumer perceiving the advertisement as intrusive, leading to ad avoidance (Edwards et al., 2002; McCoy et al., 2008). An idea discussed by Rejón-Guardia & Martínez-López (2013) is the concept of 'advertising clutter'. This describes the cacophony of advertising that is pervasive across all communications media and as a whole may cause users to perceive the aggressive competition between advertisers as well as to feel overwhelmed by the intrusiveness of their advertisements. According to the authors, perceived intrusiveness is proposed as the main component of advertising clutter and the literature has shown that advertising clutter (and it's antecedents) can elicit aberrant behaviours such as ad avoidance and irritation and well as negative attitudes and outcomes contrary to what the advertiser originally hoped to achieve. Furthermore, advertising clutter has been shown to result in decreased advertising effectiveness in the context of salience and consumer memory as well as degraded attitudes towards both the brand and the ad and ultimately lower purchase intentions among consumers. (Rejón-Guardia & Martínez-López 2013). As discussed later in section 2.6.1, reactance theory may provide an underlying mechanism to explain why individuals find advertising intrusive and leads to ad avoidance (Brehm, 1966).

As online advertising becomes more and more important to the advertising industry and also to publishers in supporting the ability for them to offer free content, advertisers are constantly striving to create imaginative and novel ad formats to capture users' attention. Furthermore, the migration to mobile as the primary online device for many users in their interaction with the internet adds complexity to the new advertising paradigm. Thus, it is critical to understand how these new formats and device preferences impact users' cognitive processing, reactions, emotions, attitudes towards online advertisements as well as to understand the impact that the novel phenomenon of mobile phone attachment may have on these constructs. The research questions and hypotheses developed and tested in this study aim to shed light on these relationships, as outlined in section 2.7.2. To examine the effects of new formats and execution styles of online advertising, we test the effects of forced exposure to online advertising on perceived intrusiveness (RQ1a) and attitudes towards the meaningfulness of the ad (RQ1c) as well as examining the relationship between perceived intrusiveness and attitude towards the ad (RQ1b). The second research question aims to test the effects of mobile phone attachment (and individually, its productive and problematic subdimensions) on perceived intrusiveness and attitudes towards the ad while the third research question examines the mediating role of perceived intrusiveness on the effect of forced exposure on attitude towards the ad.

2.2.1. Online Ad Formats & Media

In spite of the large extent and variety of online ads, their effects on users are largely unknown. Although the diversity of ads on the web is staggering, and new types spring up all the time, their properties can be abstracted to a relatively small number of important generic features. These characteristics include whether they obscure content and whether users have the control to remove them.

A number of different formats in online advertising exist and these can be delivered across multiple media and content channels including display, video, in-app and embedded natively in content. These include banner ads, pop-up ads (floating banners), modal ads, video ads as well as the newer, emerging formats including interactive ads. Traditionally, banner ads were the flagship of display advertising on the internet and are what people normally think of when referring to display advertising.

Pop-up ads are ads that open in a new window and generally consume the vast majority of the viewer's screen (termed obscuring) and force users to interact by clicking the close button (controllable ads) or the ad remains on the screen for a specified length of time forcing the user's attention (non-controllable). Controllable pop-up ads allow the user to close the advertisements at any point by clicking on the 'x' in the top right corner. Non-controllable pop-up or modal ads do not allow the user to close the advertisements and this is termed forced exposure. They must wait for a specified length of time (generally 5 - 30 seconds) before the advertisement disappears or they can click the close button to terminate the ad and continue with their session. Studies on the popup ad format are well represented in the literature (Chatterjee, 2008; Edwards *et al.*, 2002; Li and Meeds, 2005; McCoy *et* *al.*, 2004), however many of these studies relate to the legacy treatment of pop-up ads where they open in a new window and an interesting aspect of this current research is to examine if pop-up and modal ads (newer versions of popups, where they don't open in a new window. but appear in a floating element obscuring the screen within a webpage) can be transposed from these earlier studies. The first research question examines the effects of forced exposure (where the forced exposure condition is a modal ad that cannot be closed for at least five seconds) on perceived intrusiveness, which was previously examined in the context of legacy pop-up ads by Edwards et al. (2002) nearly 20 years ago.

Traditionally, advertising ethics was focussed on ad format and content and the targeting of vulnerable audiences. However, recent arguments put forward by Belanche (2019) have proposed that ad format intrusiveness should be included when considering ethics in online advertising. In line with current approaches to advertising ethics, the author argues that intrusive ads should be restricted not only for the practical reasons but also for overstepping the ethical thresholds of users as well as for social responsibility and the common good (Belanche, 2019).

Banner Ads

Banner ads are static or animated (dynamic) graphical ads which are delivered on a web page. Different formats of banner advertising seem to demonstrate different levels of effectiveness. A comparative study by Kuneinen (2013) explored different online banner advertising types and shapes' effect on click-through-rate and conversion using the Google Display Network. The author found that static banner types outperformed dynamic types in all areas and the best performing shape for click-through-rate was square and the best converting shape was rectangle (Kuneinen, 2013).

As is the case with all advertising, exposure to banner advertisements is a necessary prerequisite for the ad to be effective, however exposure does not guarantee the attention of the user. A study by Lee and Ahn (2012) examined user's attention to banner ads on a website using eye-tracking technology and measured if the level of attention during ad exposure, both in static and animated (dynamic) banner ads, influenced the user's conscious and unconscious affective state. The authors found that animation in banner ads not only attracts less attention than static ads but also reduces the positive effect of attention on memory. Furthermore, they found that animated banner ads were unconsciously processed and did influence attitudes towards the brand, in essence, even if users did not notice the advertisement, their attitude towards the brand was influenced (Lee and Ahn, 2012). This raises interesting questions into the nature of this influence; if the ad is perceived as irritating or intrusive, it is logical to postulate that the subconscious influence could be negative.

These findings from Kuneinen (2013) and Lee and Ahn (2012) both diverge from what must be perceived by advertisers as the most effective format considering the constant evolution and adoption of newer interactive and animated ad formats by advertising practitioners as they migrate away from static banner ads. It is possible that this constant evolution represents an artefact in that practitioners must appear to be constantly evolving to be considered relevant in their fields of expertise and as such they have over-engineered what a best practice advertisement should be without considering the potential negative consequences of constructs such as perceived intrusiveness, ad avoidance and ad irritation.

A study by Chatterjee (2008) looked at the role of online advertisement size and ad exposure format (intrusive vs. voluntary) on immediate and delayed brand recall, ad recognition and brand attitude. In contrast to Kuneinen (2013) and Lee and Ahn (2012), they found that exposure to static ad formats like banners are more likely to be cognitively avoided since it is an automatic subconscious process that occurs concurrently with browsing activity and does not require action by the user. It is interesting to highlight the possibility of the technology acceptance model (Davis *et al.*, 1989), discussed in section 2.6.3, as an underlying theoretical mechanism for this subconscious behaviour. In contrast, intrusive ad formats like pop-ups and modals that interrupt browsing activity and require the user to take action are more likely to be physically avoided by closing them for which reactance theory formulated by Brehm (1966), discussed in section 2.6.1, may provide a theoretical mechanism. Chatterjee (2008) concludes that gains from using intrusive ads accrue when ad sizes are small and the negative impact of intrusiveness decay over time (Chatterjee, 2008). It is interesting to note the juxtaposition between ad recognition, recall and attention and intrusive advertisements; although the intrusive ad is recalled more and persists in memory, it is the nature of the attitude of the user toward the brand which is important and if the negative impact of intrusiveness does indeed decay over time and what, if any, is the impact of this decay on longer term attitudes towards the brand.

Pop-Up, Floating Banner & Modal Ads

A pop-up ad is a window used for advertising, primarily on a website, however they are used in other media such as apps and games. When the advertisement is initiated by some user action, such as a mouse click or a mouseover, progression from a previous page or after a specified time trigger, a window containing the advertisement appears in the foreground of the graphical user interface. Although pop-up ads generally do not consume the full screen, newer floating banner and modal formats tend to obscure up to sixty percent of the screen on desktop devices (and considerably more on mobile devices) and can be considered disruptive as these newer formats prevent the user from continuing their session (by making the rest of the screen behind the popup ad unresponsive, forcing the user to switch their cognitive attention to the ad). The forced exposure condition used in the experimental design of this research study (section 3.5.1) utilises this newer modal ad format, where the screen is obscured and the participant is forced to wait for five seconds before they can dismiss the ad.

Pop-up and modal advertisements are ubiquitous in the online environment and are often misguidedly overused by online advertisers in the endless pursuit to attract the user's attention, even if only for a moment. Historically, the most common uses of pop-up advertisements were to deliver content and more recently their use has evolved to formats where there is an attempt to capture user's details for future marketing, most notably via email and social media communications.

In recent years traditional pop-up ads have fallen out of favour, mainly due to advances in browser technology which now blocks the majority of pop-up windows from rendering. To circumvent attempts by users to avoid disruptive ads by the use of browser extensions and ad blocking applications, newer formats of popup ads (and their variants termed modals or interstitials), do not render in a new window, so there is a migration towards this format because they are not automatically blocked by modern browsers.

A study by Li & Meeds (2005) demonstrated that interstitials (floating banners / modals) were perceived to be more intrusive than traditional pop-up ads and tended to generate better brand memory than pop-up ads. Furthermore, no significant difference was observed on attitudes toward the ad between pop-up ads and modals (Li and Meeds, 2005). In transposing the research from the historical focus on pop-up formats to the newer modal and interstitial formats, it is logical to assume that antecedents of perceived intrusiveness rendered by pop-up ads can be also applied to interstitial (floating banner) and modal ads. In the context of this research we make the assumption that traditional popup ads and the newer modal ad formats can be regarded as interchangeable as their underlying mechanics are very similar, the key difference is whether the ad is delivered in a new window or in a modal element on the website. The actual appearance of the ad is very difficult to discriminate between the variants.

Pop-up advertisements have been shown to be very effective in capturing a user's attention. In a study by Constantin (2007), the effects of pop-up ads presence on the extent and nature of information processing on a webpage was examined. Measurements of free recall and recognition of the content on the web page where pop-ups appeared were used to indicate the extent and nature of information processing while facial electromyography, skin conductance responses and heartrate measures were used to assess the interruptive nature of the pop-up ads. The findings suggest that pop-up ads direct users' attention towards a specific location on the screen, and that information located in their vicinity benefits from this movement of the attentional focus (Constantin, 2007).

Although it is noted that pop-up ads are effective in focussing the user's attention, it has also been established that they can be perceived as intrusive, leading to important effects on user perception and cognition. In a study by McCoy et al., (2004) the effects of exposure to pop-up ads was examined, with a focus on two key ad characteristics - ad placement (whether in-line or pop-up) and ad congruence (whether matching the site's content or not). The results indicated that intention to return was impaired by ads; retention of website information was higher when ads were in-line (i.e. static ads presented in-line with the content on the page) or when ads were not congruent with website content; and retention of ad content was higher for in-line ads and those that were not congruent to the content of the website. However, contrary to expectations, intentions to return were not affected by ad placement, retention of site content was not affected by the existence of ads, and intrusiveness of ads was not affected by ad congruence. Similar to the research by Kuneinen (2013) and Lee and Ahn (2012) discussed previously, in-line (or static) banner ads tended to perform better than more disruptive popup ad formats in that both ad content and website content retention was higher. One hypothetical explanation for these findings is that the disruption the popup ad creates in the users cognitive processing of the information may also disrupt the user's processing of that information into memory. This may form an interesting avenue for future research.

Video Ads

Video advertising refers to online display advertisements that have video within them, however in more recent times the convention is video advertising refers to advertising that occurs before, during and/or after a video stream on the internet, with the primary platform being YouTube. Current industry reports indicate that video makes up just under 20% of total digital ad spend and of this mobile accounts for just under 50% ("Prime-ing the Digital Ad Market", 2020). In the coming years, mobile is expected to be the biggest online advertising market, while video is expected to be the fastest growing and pre-roll video advertising the most commonly used form (Gallagher, 2017; Kusse, 2013). A study by Hegner et al. (2016) looked at comparisons between TV and online video ads and the authors found that online video ads showed a higher impact on recall and ad likeability than TV ads, highlighting the opportunity for advertisers to increase advertising effectiveness and engagement by consumers using this new channel as the migration to online streaming and content consumption quickens pace and traditional TV sunsets (Hegner et al., 2016).

With the ascension into ubiquity of mobile devices and video platforms like Youtube, advertisers have been quick to capitalise on the new opportunities to capture users' attention that these platforms present with new advertising formats, most notably pre-roll advertising. Pre-roll advertising is a form of online video advertising that provides consumers with an option to skip the advertisement after exposure to a short section of the complete ad, usually five seconds. Pre-roll ads fill the void left from the decline in users' level of exposure to TV advertisements and are distinct from other forms of online advertising because pre-roll ads force exposure in exactly the space in which consumers are expecting to view their intended content. Most online content on platforms like YouTube now have not only pre-roll, but also mid-roll (where the ad plays at a point or multiple points during the content) and post-roll (where the ad plays at the end of the content).

A study by Campbell et al. (2017) looked at potential differences between the levels of irritation and ad avoidance experienced by users in this new advertising format. They found that the interruptive nature of pre-roll advertising, delivered at the exact moment a user expected to see their selected content, not only heightened consumer irritation but also caused attention-getting tactics, which are redundant in a highly attentive state, to be counter-productive. They postulated that this process was augmenting ad avoidance and questioned the applicability of attention-getting advertising approaches in the novel pre-roll environment (Campbell et al., 2017).

A study by Kusse (2013) examined the implications of the goal-orientated nature of consumers using the online video medium and forced exposure to pre-roll advertising. The author hypothesized that due to the higher goal-orientation of users in this scenario, involuntary exposure to advertisements could lead the ads to be perceived as more intrusive than ads in other media and this interruption could lead to negative attitudes and ad avoidance. The author tested scenarios to overcome the perceived intrusiveness and found when the emotional appeal of the advertisement is high, the perceived intrusiveness is significantly lower and the attitude toward the ad is significantly more positive. The length of the pre-roll advertisement (15 seconds vs. 60 seconds) showed no significant difference in perceived intrusiveness (Kusse, 2013). Kusse’s (2013) study has two implications for this current research study - the length of exposure does not appear to impact the level of perceived intrusiveness experienced by the user, so the five second forced exposure treatment (discussed in section 3.5.2) is appropriate. Secondly ads with high emotive appeal tend to dampen intrusiveness, so the creative design and the content of the ads used in this experiment are given consideration in this context, ensuring congruence with the site content (in line with McCoy et al. (2004)) and neutral emotive appeal as discussed in section 3.3.2.

A study by Goodrich et al. (2015) examined the effects of video advertisement characteristics including length, humor, and informativeness on perceived ad intrusiveness and the resultant marketing outcomes for both advertisers and host websites. They found that intrusive advertisements negatively affected attitudes and intentions toward both the advertiser brand and the host website. Furthermore, they found that informative and humorous video advertisements, as well as longer advertisements, were perceived as less intrusive (Goodrich *et al.*, 2015)

The findings from Campbell et al. (2017) , Goodrich et al. (2015) and Kusse (2013) above highlight the importance of goal orientation and task intensity at the point of forced exposure to advertising. It is evident from these studies that this forced exposure during a goal-directed activity leads to higher levels of perceived intrusiveness and ad irritation which can then lead to negative attitudes towards advertising and resultant negative sequelae. The fourth research question in this study, discussed in section 2.7.2 examines, in part, the effects of task cognitive intensity on perceived intrusiveness and attitudes towards the ad. It will be interesting to examine if the findings in the context of video ads from the aforementioned authors are consistent with the findings from this current research study in the context of modal ads. The task cognitive intensity experimental condition is discussed in section 3.5.2.

2.3. FACTORS AFFECTING EMOTIONAL RESPONSES TO ADS

This section reviews the literature with respect to the factors that elicit emotional responses to advertising. There has been a steady stream of research on the subject from the first decade of the 21st century, a period when online advertising first began to penetrate the market significantly. Around this period, online advertising was in its infancy, with the first banner ads appearing only a couple of years previous and Google AdWords, the most popular online advertising platform, launching in early 2000. Much of the research during this period focussed on key factors and attributes of online ads including controllability and forced exposure to advertising (Edwards *et al.*, 2002; Li and Meeds, 2005; Li *et al.*, 2002), ad exposure frequency and repetition (Li and Meeds, 2007; McCoy *et al.*, 2004), goal-orientation and task intensity during exposure (Cho and Cheon, 2004), personalisation and customisation of advertising (White *et al.*, 2008) and page loading delays due to advertising (Galletta *et al.*, 2004; Rose *et al.*, 2001). Much of this early research is dated, especially in the context of an ever-changing dynamic internet ecosystem and mobile-first environment. The currently prominent digitally native generation were mere toddlers during this period and the findings from this early research must be taken in the context of an evolving advertising landscape where the population was in an early adoption phase of the internet. Furthermore, mobile internet was not widely available, hence a majority of the research focussed on desktop computers. These facts form the basis of the rationale for reexamining perceived intrusiveness and attitude towards the ad in novel forced exposure conditions as per the first research question and why it is important to look for differences between mobile and desktop devices in these phenomena which is examined, in part, in the fourth research question, discussed in section 2.7.2.

2.3.1. Ad Controllability and Forced Exposure

Forced exposure occurs in many advertising formats including traditional popup, floating banner interstitial, modal and video ads. These ads disrupt the user's journey as they start to consume content on a website, with the ad appearing after a specified delay, when a user takes an action, when a user scrolls down the page or if they intend to move away from the page. The controllability factor is imparted by the advertiser omitting the ability for the user to dismiss the advertisement, nearly always rendering the webpage behind the ad unresponsive, and the ad only disappearing after a specified length of time. A number of research studies have shown that forced exposure to advertisements is a fundamental factor in the development of feelings of perceived intrusiveness and as a consequence, negative consumer attitudes, behaviours and advertising outcomes (Edwards *et al.*, 2002; Kusse, 2013; Li and Meeds, 2007; McCoy *et al.*, 2007a). The first research question in this current research reexamines perceived intrusiveness and attitude towards the ad in forced exposure conditions in light of the changing internet landscape as discussed in the previous section.

Edwards et al. (2002) examined the effects of forced exposure to advertising in their seminal paper in 2002, where they hypothesised perceived intrusiveness as an underlying mechanism for the process leading to negative consumer attitudes and advertiser outcomes. In their study, they found that the key antecedents of perceived intrusiveness in forced exposure conditions were (a) the congruency of the advertisement with the surrounding content and (b) the cognitive intensity of the task at the time of exposure. the latter we explore in the fourth research question in this thesis. The authors found that the consequences of intrusiveness were shown to be caused by feelings of irritation and ad avoidance (Edwards *et al.*, 2002).

Research by Li & Meeds (2007) examined factors affecting consumers' information processing of online advertisements including exposure condition, psychological reactance and exposure frequency. The authors found that forced exposure conditions elicited higher perceptions of intrusiveness, lower brand recall, a more negative attitude towards the ad and higher ad avoidance compared to the non-forced exposure condition. The authors also reported interaction effects between reactance and exposure frequency on perceived intrusiveness, ad attitude and ad avoidance, with high reactant participants exhibiting a higher perception of ad intrusiveness than low reactant individuals when the ad message was repeated (Li and Meeds, 2007). Another relevant study by Kim (2017) found that customisation of advertising content was shown to generate a greater sense of relevance, increased brand recall and more positive attitudes towards the ad in forced exposure conditions (Kim, 2017). Thus even in conditions where intrusiveness is triggered, it is possible to moderate this effect by offering the consumer a level of control, albeit not over exposure to the advertising.

The level of forced exposure to an advertisement has also been shown to impact negative emotional responses by users. A study by Jung Ok Jeon et al (2009) examined different intensity levels of forced exposure to banner ads and how this may affect consumer's negative feelings, ad avoidance, and ad attitude. The authors found significant effects of the different levels on ad avoidance and attitudes towards the ad, while feelings of annoyance significantly induced both cognitive and physical avoidance and feelings of irritation induced cognitive avoidance only (Jung Ok Jeon *et al.*, 2009). Li and Meeds (2005) also examined this topic, investigating the effects of different forced-exposure levels of advertising by comparing pop-up and interstitial ads. Their findings showed that interstitials were perceived to be more intrusive than pop-up ads since viewers have less control on them (traditional popup ads were controllable in the fact that it was feasible to close the popup window, while interstitials forced the user to wait before they could proceed with their session). Furthermore, interstitials tended to generate better brand memory than pop-up ads (Li and Meeds, 2005).

These findings, taken together, point to an overall negative effect of forced exposure on users' cognitive state. The key question for practitioners is why is there a growing preference for these types of ads by advertisers given the growing dislike of these types of formats by consumers, giving rise to a disconnect between brands and consumer’s end goals. Furthermore, given that forced exposure ads do enhance brand memory, is it wise for advertisers to be associating, through conditioning, the negative emotional responses to forced exposure ads with attitudes to the ad and brand. This is a dangerous game for brands, who may in fact, not be in control of the actual mechanics and intricacies of ad execution by their advertising agencies. One of the aims of this research is to explore the practical implications of findings from the examination of forced exposure to advertising and perceived intrusiveness and attitude towards the ad. These managerial and practical implications will be discussed further in section 6.3.

2.3.2. Ad Exposure Frequency and Repetition

A contentious issue in online advertising is if repeated exposure to advertisements enhances advertising effectiveness or if it elicits feelings of intrusiveness and consequently negative attitudes and outcomes. The juxtaposition of effectiveness and intrusiveness has evolved with the changing nature of advertising. In traditional advertising models, as in TV, and consistent with Berlyne's (1970) two-factor model, repeated exposure was shown to enhance brand recall and memory of the ad and was consistently viewed as a valid and effective advertising strategy (Berlyne, 1970; Rethans *et al.*, 1986).

Recent research by Nettlehorst et al. (2020) examined online viewers' choices with regards to the duration of exposure to ads as well as preferences regarding ad exposure frequency. Using an online experiment, the authors found that participants made choices that minimised the total length of exposure time to advertising and when limiting exposure duration was not possible, participants minimised the number of exposures instead (Nettelhorst *et al.*, 2020). It is evident from the research that users will choose options with minimal exposure frequency where they have been the option to do so.

In recent times, with the penetration of online advertising, repeated exposure to online advertisements was shown to influence both the attitude held toward an advertisement and the perceived intrusiveness of the ad. The negative outcomes associated with repeated exposure to ads in the online environment may be explained by reactance theory and the more goal-directed nature of user behaviour in the online environment, with interruptions in this context leading to higher levels of perceived intrusiveness (McCoy *et al.*, 2017).

In a further study, McCoy et al. (2007) found that repetition degraded perceptions except for subjects who started with positive perceptions of the ad. Negative perceptions of the ads degraded website-related attitudes and intentions when the number of ad impressions rose (McCoy *et al.*, 2017). A similar study by Li & Meeds (2007) looked further at repeated exposure to advertisements and intrusiveness. They found that high reactant consumers, that is users who have a high propensity to experience psychological reactance, generated a higher perception of ad intrusiveness than low reactant individuals when the ad message was repeated (Li and Meeds, 2007).

A key theory which has been used to explain the effects of repetition in advertising is Berlyne's (1970) two-factor theory. Two-factor theory, or sometimes referred to as wear-in/wear-out in advertising, suggests that repetition has a positive effect for a period, and then starts to have a negative effect as exposure repetition continues. During the first phase, called wear-in, repetition of an ad allows consumers to become familiar with the brand and repetition can overcome consumer reluctance to purchase a new product or brand. As the repetition continues, consumers become accustomed to the brand and may enter a second phase, called wear-out. In the wear-out phase, consumers become tired of the brand and continued repetition of ads can cause consumers to stop buying the product or brand (Berlyne, 1970).

A key application of advertising repetition in the online environment is the phenomenon of retargeting. Retargeting is a technique where advertisers tag consumers who visit their website by installing an advertising cookie on their browser and then subsequently target repeated advertisements at them as they browse the web with the ads showing on websites within the participating advertising network. A study by Lambrecht & Tucker (2013) examined whether retargeted advertisements are more effective than simply showing generic brand ads. Surprisingly, the authors found that dynamic retargeted ads are, on average, less effective than their generic equivalents. However, in circumstances where consumers exhibit browsing behaviour that suggests their path to purchase has evolved, for example visiting review websites, the retargeted ads no longer underperform. The authors explain this finding by theorising that at the start of a product search (termed the zero moment of truth), their preferences are at a very high level and they will not respond positively to narrowly targeted advertising. As their consumer journey to purchase evolves and their preferences narrow they are likely to respond better to targeted ads with a higher level of detail (Lambrecht and Tucker, 2013).

As discussed previously, advertisements that do not meet the expectations of users can be perceived as intrusive and result in negative brand attitudes and it is logical to assume that narrowly construed adverts targeted (and repeatedly exposed) at users who are more receptive to ads that have higher-level preferences congruent with their position in the consumer path to purchase may not only be ineffective, but more significantly may elicit negative attitudes toward a brand and host website as well as impairing purchase intentions.

Given these findings it is important to emphasise that repeat exposure is a multidimensional factor that can have both positive and negative effects in multiple different scenarios. As Berlyne (1970) demonstrated in his two factor theory model, there is an inflection point at which the initial attitudinal benefit from repeat exposure reverses to become a negative effect, driven by avoidance, irritation and intrusiveness. Furthermore, as Lambrecht and Tucker (2013) concluded, the timing of the repeat exposure along the consumer's journey is critical in driving advertising effectiveness. Repeat exposure ads, as in retargeting, delivered at the wrong touchpoint in the journey, can be counterproductive and have negative outcomes for advertisers and brands.

In this current research study, repeat exposure to advertisements was examined as a variable in the pilot study, however it was not selected for inclusion in the main field experiment. The rationale for this choice was based on the fact that it has been studied in detail previously and also in recent years (McCoy *et al.*, 2017). The expected value and contribution in this study was questionable, given the existing body of empirical evidence and the pressing need to reduce the number of variables for the mean field experiment to avoid confounding the results with a complex factorial design. Furthermore, as of late 2020, the main practical implication of repeat exposure, namely retargeted advertising, is under threat as a viable medium in the European Union due to the enforcement of the General Data Protection Regulations (GDPR), which forces advertisers to obtain explicit permission via opt in for retargeted advertisements to be served to users. This is expected to severely impact the reach of the technology and is expected to roll out globally over time.

2.3.3. Ad Exposure and Cognition and Memory

An important research theme in online advertising is the effects of exposure to advertisements on cognitive processing, memory and brand recall. Chatterjee (2008) looked at the impact of advertisement size and if forced exposure conditions on immediate and delayed brand recall and ad recognition. The author argued that formats not involving forced exposure conditions (such as banners and text ads) are more likely to be avoided cognitively as they do not require the user to take action and they do not impose themselves on the users attentional lens. However, ads that require user attentional focus, such as interstitial, modal and pop-up ads are more likely to be physically avoided by closing them (Chatterjee, 2008).

Lewandowska and Jankowski (2017) in a recent study demonstrated that intensive online marketing resulted in a negative impact on web user's cognitive processes and degraded user experience. Their study examined the effects of visual ad characteristics such as vividness, flicker frequency and intensive call-to-action messages on cognition and attitudes and found that these characteristics interrupted cognitive processes and influenced web user attitudes towards the online environment. Flicker frequencies above 4Hz elicited strong feelings of intrusiveness (Lewandowska and Jankowski, 2017). In another study, Constantin (2007) looked at the effects of different intrusive pop-up ad formats on cognitive processing of information within the area adjacent to the ad. Interestingly, the author found that pop-ups direct users' attention towards a specific location on the screen, and that information located in their vicinity benefits from this movement of the attentional spotlight (Constantin, 2007). Although this attentional focus may be beneficial in drawing a users attention to the ad and the content in the vicinity, what is not clear is that if the ad is intrusive in nature, and hence irritant, will this negative attitude instilled in the user be carried over and applied to the content in the vicinity. The positive effects of attentional focus must be balanced with the potential for negative effects elicited by intrusive advertisements.

Research on the effects of online advertising on user cognitive processes has primarily focused on monitoring activity in the simulated environments or using declarative responses given by users in prepared scales and questionnaires. A study by Rejer & Jankowski (2017) took a more direct real-time approach to measure the effects of interruption by advertising on cognition by studying the activity of the brain using electroencephalography (EEG). Brain activity patterns associated with interruptions of the cognitive process by advertisements during a text-reading task were examined and the authors discovered a drop in activity in the frontal and prefrontal cortical areas as well as significant changes in the frontal/prefrontal asymmetry index. The prefrontal cortex is associated with executive function and these changes are consistent with a degradation in concentration (Rejer and Jankowski, 2017).

Zanjani et al. (2011) looked at the effects of congruity between an ad and its context and whether this proximity improved ad memory. Their results showed that ad-context congruity increases ad recognition for users seeking specific information (i.e. in a goal-directed task), whereas it does not have any effect for those just browsing content with no specific goal in mind (Zanjani *et al.*, 2011). The implications of this finding in the context of online advertising are crucial to effective advertising as well as brand equity and attitude; it is critically important to consider which consumer moment is contemporaneous when targeting advertisements as users respond quite differently (and most notably negatively) if the ad is not aligned with their preferences and expectations at that consumer moment.

A study by Goldstein et al. (2014) attempted to address the issues of economic cost of intrusive advertising for publishers and the effects of such advertising on users' cognitive processing. In terms of cognitive processing, the authors found that users seem to notice annoying ads and complain about them and were more likely to abandon sites on which they were present. In addition, in the presence of annoying ads, people were less accurate on questions pertaining to what they had read. Thus intrusive and irritating advertisements have significant negative effects on the cognitive processing of information by users and thus lead to negative outcomes for advertisers and publishers. Furthermore, the authors found that in the context of economic impact, the practice of running intrusive ads can cost more money than it earns for a publisher in the short-term. There are potential longer-term effects also, where users upon dropping off the website, users may decide never to return to a site that annoyed them and thus more significant negative outcomes for the publisher ensue (Goldstein *et al.*, 2014).

As highlighted by Rejer & Jankowski (2017), intrusive advertising has been scientifically shown with EEG studies to degrade concentration and interrupt the user's cognitive flow. This finding, taken together with other research outcomes points to a significant overall effect of intrusive advertising on user's cognition and memory. The distinction between cognitive and physical ad avoidance found by Chatterjee et al. (2008) is also important in terms of the consequences of these different processes for consumer attitude towards the ad and emotional responses. Physical avoidance requires an interruption in the user's behaviour, leading to negative emotional responses, while cognitive avoidance is much more passive and intrusive. As demonstrated by Lewandowska and Jankowski (2017), aggressive advertising tactics including flicker and ad vividness interrupted cognitive processes and degraded user experience, leading to negative response by the user. Although Constantin (2007) showed that this interruption focussed the users attention on the area of the advertisement, and that adjacent content benefited from this increased attention, it is unclear as to whether the negative emotional responses triggered by the interruption also transposes to the adjacent content. As Goldstein et al. (2014) pointed out the positive effects of enhanced attention and outweighed by the negative effects the interruption imbues, giving rise to an overall negative outcome for the advertiser.

2.3.4. Ad Exposure and Task Cognitive Intensity

An important factor in determining if an advertisement will be viewed as intrusive, irritating or annoying is the intensity of the task the user is performing at the time of exposure (Yoon *et al.*, 2011). A number of studies have shown that exposure during high intensity tasks leads to higher perceptions of intrusiveness and negative attitudes (Bang and Wojdynski, 2016; Edwards *et al.*, 2002; Hershberger and Costea, 2009; Huang and Chen, 2017; McCoy *et al.*, 2017). Interruptions to cognitive processing and concentration during high-intensity tasks is alluded to as an underlying mechanism (Rejer and Jankowski, 2017) and the resultant irritation and feelings of perceived intrusiveness can lead to negative outcomes for advertisers. Edwards et al. (2002) looked at antecedents of perceived intrusiveness and found that users perceived ads as intrusive if the cognitive intensity of the task was high at the time of interruption by the ad. The authors hypothesised that the consequences of intrusiveness, namely negative attitudes and ad avoidance, were caused by feelings of irritation (Edwards *et al.*, 2002). An eye-tracking study by Bang

& Wojdynski (2016) examined the effects of banner ad personalization and the interaction with task cognitive intensity on visual attention to the advertisement. They found that task cognitive intensity was shown to moderate the effects of personalization on attention; the personalized advertisement was much more effective in attracting consumers' attention than the non-personalized advertisement when people were engaged in a highly cognitively demanding task. Surprisingly, no significant interactions between personalization and cognitive demand of task were found on perceived goal impediment and attitude toward the advertisement (Bang and Wojdynski, 2016).

Huang & Chen (2017) also examined the relationship between cognitive engagement and ad intrusiveness using attentional inertia theory as a framework. Attentional inertia describes the progressive increase in the attentional engagement as a look is sustained (Richards and Anderson, 2004). The authors found that as users viewing a webpage generate attentional inertia and as they become more engaged with the webpage content, cognitive processing is intensified and any interruption of the users browsing task increases the viewer's perception of the intrusiveness of the ad (Huang and Chen, 2017). Hershberger & Costea (2009) similarly looked at the relationship between task orientation of an advertising exposure situation and ad recall. They found that degradation of ad recall in high-intensity scenarios was mediated by ad avoidance behaviors and that ad avoidance leads to lower recall, and that task orientation during web browsing leads to more ad avoidance behavior (Hershberger and Costea, 2009; Huang and Chen, 2017).

One interesting avenue of investigation in this current research study is to examine the nature of the effect, if any, of task cognitive intensity on the constructs of perceived intrusiveness and attitude towards the ad in the current experimental model. We explore this in the fourth research question in section 2.7.2. Bang & Wojdynski (2016) observed a moderating effect of task intensity on the relationship between ad personalisation and attention, it will be interesting to examine if task intensity has a moderating effect on the relationship between perceived intrusiveness and attitude towards the ad and if differences exist at a group level in this current research study.

2.3.5. Ad Personalisation and Customisation

With advances in technology advertisers now have the capability to customise the advertising message and deliver personalised advertising to consumers. The advent on this new paradigm in advertising has led to what is being termed the 'personalisation paradox', where higher levels of personalization generally increases utility, relevance and customer adoption, however paradoxically, it also may increase customers' sense of vulnerability and lower adoption rates (Aguirre *et al.*, 2015). Albeit personalisation and customisation of advertising and its impact on consumer's perceptions and attitudes towards advertising is outside of the scope of this current study, it is important to discuss in the overall context of online advertising.

A field study by Aguirre et al. (2015) demonstrated sharp drops in click-through rates on ads when customers realized their personal information has been collected without their consent. However, when advertisers engaged in overt information collection, participants exhibited greater click-through intentions in response to more personalized advertisements. In contrast their reaction was the opposite when advertisers collected information covertly, explained by the consumer experiencing feelings of vulnerability (Aguirre *et al.*, 2015).

Retargeting, as discussed previously in the context of the repetition of ads, is also a form of personalisation as advertisers personalise the ad based on the consumers previous behaviour on their website and their inferred interests. It is logical to assume that personalization should make ads more effective, however in a field study Bleier & Eisenbeiss (2015) found that the effectiveness of retargeting is dependent on consumers' trust in a respective website. In their study the authors aimed to investigate the moderating effect of trust in a particular retailer on the impact of ad personalisation using a two-dimensional conceptualisation of ad personalisation; 'personalisation depth' reflects how closely the ad reflects a consumer's interests while 'personalization breadth' determines how completely the banner reflects these interests. The authors found that for trusted retailers a combination of high depth and narrow breadth of personalisation did not increase reactance or privacy concerns. Conversely, for less trusted retailers, banners with high depth were perceived as less useful and triggered reactance and privacy concerns, regardless of the personalisation breadth (Bleier and Eisenbeiss, 2015). Firms looking to increase purchase intentions or enhance lead generation should not use personalisation until a level of trust has been established, which takes time.

The personalisation paradox has also been observed in other media including email communications. White et al. (2008) explored how email personalization influenced click-through intentions and found that consumers experienced personalization reactance in response to highly personalized messages when the fit between the offer in the message and consumers' personal characteristics was not explicitly justified by firms. Thus, the service utility is crucial when using personalised messaging; communications with higher perceived utility are less likely to elicit reactance (White *et al.*, 2008).

Van Doorn & Hoekstra (2013) demonstrated that higher degrees of personalization, such as adding personal identification or transaction information to browsing data, increased feelings of intrusiveness, and negatively affected purchase intentions. The authors went on to find that these negative effects were not compensated for by offering discounts, however can be partly mitigated by presenting an ad with a high fit to consumers' current needs. High fit to a consumer's need at that moment can lead to higher purchase intentions however this is offset by higher levels of perceived intrusiveness (Van Doorn and Hoekstra, 2013). Similar to ads delivered during times of high cognitive intensity, it is evident that a key factor in the consumer's perception of personalised advertising is the timing and utility of the advertisement. Advertisements which do not address the needs of the consumer and are not relevant to them at that moment in their consumer journey will likely elicit negative reactions and outcomes.

2.3.6. Advertising Induced Page Load Delays

A potential gap in the literature, and important factor in online advertising and negative emotional responses by consumer's, is the slow loading of websites due to the bloat of code required to run some ads and track consumers, especially to facilitate newer technologies such as personalisation and advanced animated ad formats. Research has shown that delays in human-computer interactions of two seconds or more can induce a loss of efficacy in communication (Miller, 1968), albeit this research is historical and may not be fully transposable to the modern web environment. Furthermore, it has been established that users will leave a site if page load times become too long (Rose *et al.*, 2001). A study by Galetta et al. (2004) looked at a range of page loading delay times and performance, attitudes, and behavioral intentions of users. The authors found that decreases in performance and behavioral intentions begin to flatten when the delays extend to four seconds or longer, and attitudes flatten when the delays extend to eight seconds or longer. The authors highlight that relatively small increases in delay can have a profound impact on how users react to web sites. The recommendation for practitioners from this research was to ensure that page load times of less than four seconds are optimal to keep a user engaged, while page load times of less than eight seconds are optimal to ensure positive website attitudes (Galletta *et al.*, 2004).

Advances in web technology such as asynchronous loading of tracking and advertising scripts may present a new dimension in the effects of page load time on users' perceptions and attitudes. With asynchronous scripting, the page will load independent of the tracking codes and ads, meaning that users will see the page load however will also be aware that any ads on the page are also attempting to load, usually depicted by an icon and an image placeholder. The awareness of the slow loading of the page could theoretically be attributed to the ads in this scenario and may trigger negative reactions to the ad including irritation and ad avoidance.

This section of the thesis has reviewed the extant literature in terms of the factors leading to negative emotional responses to advertising. The research points to a number of critical factors that elicit negative responses by users and poor outcomes for advertisers including forced exposure, prolonged repeat exposure, interruption during tasks involving high cognitive load and personalisation. Two key factors where the literature is not robust is if mobile device type (as opposed to desktop) and mobile emotional attachment have a role to play in influencing how users react to advertising. Many of the studies in the field were conducted prior to widespread penetration of usable mobile internet technologies and as such did not consider mobile-specific aspects in their research. A core theme of this current research is to examine the perceptions and attitudes towards advertising through a mobile device lens to elucidate if mobile device type and the emerging phenomenon of mobile device attachment have a significant role to play in influencing users attitudes and perceptions. The second research question in this current study examines the role of mobile device attachment while parts of research question four examine if effects differ between mobile and desktop devices. It is hypothesised that mobile attachment impacts perceived intrusiveness, with productive dimensions decreasing intrusiveness and positively affecting attitudes towards the ad while problematic dimensions of mobile phone attachment are hypothesised to increase intrusiveness and negatively impact attitudes towards the ad. Research questions and hypotheses are discussed further in section 2.7.2.

2.4. CONSEQUENCES OF EMOTIONAL REACTIONS TO ADS

2.4.1. Ad Irritation

Irritation is defined as a feeling of annoyance, especially when something is happening that you cannot easily stop or control. In the context of online advertising, ad irritation is a reaction to advertisements which cause annoyance to users. In television advertising, the antecedents of irritation have been studied and factors associated with increased include the use of contrived, phony, or overdramatized situations; personal criticism in terms of appearance, knowledge, or sophistication;

and threats to an important relationship, while good story lines; the creation of a light, happy mood; and attempts at amusement were associated with reduced irritation (Aaker and Bruzzone, 1985).

Research in the online advertising context by Edwards et al. (2002) examined the forced viewing of advertisements to understand better how viewers come to define ads as irritating. The authors hypothesised that perceived intrusiveness was the underlying mechanism by which the process occurs and the consequences of intrusiveness were shown to be caused by feelings of irritation and ad avoidance (Edwards *et al.*, 2002). As discussed previously, in an economic context the practice of running irritating ads can cost more money than it earns (Goldstein *et al.*, 2014). In this current research study, forced exposure to advertising is also hypothesised to increase levels of perceived intrusiveness and decrease attitudes towards the ad as discussed in the first research question. In contrast to Edwards et al. (2002), the exposure is examined with the addition of a mobile dimension and also the impact of mobile attachment is assessed. Significant improvements and changes in the internet landscape have occurred since the early 2000's, hence a reexamination of this phenomenon is warranted.

A study by Morimoto & Chang (2006) investigated consumer attitudes towards unsolicited commercial email and postal direct mail, with a focus on audience perceptions of advertising intrusiveness, perceived loss of control and irritation. The results indicated that recipients perceived unsolicited emails as more intrusive and irritating than postal direct mail (Morimoto and Chang, 2006). It is interesting to note that irritation in this context is more pronounced in the online environment and may indicate differences in reactivity between online and offline environments. Potential differences in age and gender have also been explored by research. A paper by Smith (2011) examined various marketing strategies that are commonly used in digital media to ascertain which ones are preferred by Millennials and found that Millennials do not like pop-up or intrusive advertising and that they react differently to certain types of digital marketing strategies (Smith, 2011). A study by Chakrabarty et al (2004) looked at gender differences in information processing, investigating whether the effects of ad irritation on brand attitudes are different for men and women. Results provide mixed support for the notion that men and women perceive different levels of ad irritation and this in turn affects their brand attitudes (Chakrabarty *et al.*, 2004), however no clear delineation was observed.

2.4.2. Ad Intrusiveness

According to Edwards et al., (2002), intrusiveness is defined as a psychological reaction to ads that interfere with a consumer's ongoing cognitive processes. In a study by the aforementioned authors, measures of intrusiveness were identified that affect the perception of ads and lead users to view them as interruptions, including congruence of the advertisement content with the current task and intensity of cognition at the moment the ad exposure occurs (Edwards *et al.*, 2002). The authors theorised that as long as the ads interfere with cognitive processing, the perception of the ads as intrusive is possible. The consequences of intrusiveness were shown to be caused by feelings of irritation and ad avoidance. With the growth of advertising utilizing digital media, negative consumer perceptions relating to intrusiveness are believed to be challenging the claimed added-value of this medium over traditional media (Truong and Simmons, 2010).

The effects of forced exposure to popup ads (modal ads) forms the basis of the first key research question in this thesis. Although it has been previously studied, there is an empirical contribution to be made in updating the somewhat dated research in the context of the current mobile-first internet ecosystem. The first research question asks 'does forced exposure to modal ads elicit higher feelings of perceived intrusiveness than passive exposure to banner ads? The working hypothesis is that forced exposure to modal ads elicits higher levels of perceived intrusiveness than static banner ads and we discuss Brehm's (1966) reactance theory may be used to explain the mechanisms behind this effect should it be observed experimentally.

Three core drivers of advertising intrusiveness were proposed in a recent review by Riedel et al. (2018) - temporal disruption, visual disruption and flow disruption as well as three consequences - cognitive response, behavioural response and emotional response. The authors put forward a conceptual model which expanded the drivers of advertising intrusiveness: (a) temporal disruption included the components of time-wasting (where the user must expend time to wait to exit or watch the advertisement) and forced (where the user is forced to be exposed to the advertisement without having the ability to exit), (b) visual disruption which comprised obtrusiveness (where the ad is large and takes up a significant proportion of the screen) and distracting (where the ad has high visual and aural properties) and (c) flow disruption, made up of interruptive (where the advertisement cuts through the flow of the task the user is performing) and irrelevance (where the ad is irrelevant to the user). When considering the consequences of advertising intrusiveness, the authors put forward the following dimensions: (a) behavioural responses including the components of avoidance behaviour (where the users attempts to avoid interacting or engaging with the ad) and cessation of activity (where the user stops their active task to exit from the advertisement), (b) emotional responses including components of frustration (where the user becomes frustrated by not being able to continue the task unhindered) and annoyance (where the user becomes annoyed because their task orientation is disrupted) and (c) cognitive responses including the components of lack of attention (where the user pays minimal attention to the intrusive advertisement) and lack of memory (where the user retains minimal memory for the brand promoted in the intrusive advertisement) (Riedel *et al.*, 2018).

A study by Ying et al. (2009) looked at aspects of ad value, ad placement and ad execution and found that these factors influenced perceived intrusiveness, specifically in interstitial ads. Interstitial ads which are congruent with the content of the host website were perceived as less intrusive than those containing irrelevant information. Furthermore, ads that appeared with low frequency were perceived as less intrusive than ads that appear with high frequency (Ying *et al.*, 2009).

Research findings have suggested that intrusive advertisements have a significant effect on the retention of users on websites and also on the advertiser's brand, indicating that not only the brand that the ad is affected by negative cognitions, but also the website where the ad is hosted (McCoy *et al.*, 2007b). Repeated exposure to advertisements were shown to influence both the attitude held toward an advertisement and the perceived intrusiveness of the ad. Using reactance theory as an underlying framework the authors explained users' emotional reactions, including their formation of attitudes and the resultant behaviours, when they are interrupted by intrusive ad messages while working toward a goal (McCoy *et al.*, 2017).

Previous research by Troung and Simmons (2010) has found a possible relationship between the level of perceived intrusiveness and device type. In the study, participants all highlighted the intrusive nature of advertisements displayed on their mobile devices. The smaller size of the screen was raised as an issue that made participants more sensitive to intrusive advertising formats on their mobile phones, as compared with other digital receiving devices such as computers (Truong and Simmons, 2010). This preliminary finding is interesting in the context of this current research study as it points to device type having a role to play in influencing perceived intrusiveness and attitudes towards the ad and this hypothesis will be tested in the field experiment. Research questions four and five explore the effects of device type on dimensions of intrusiveness and ad attitude in section 2.7.2.

A key challenge in the context of online advertising is the elucidation of the characterististics of the emotional responses a user exhibits when exposed to situations where perceived intrusiveness is elicited and what, if any, are the consequences of this on the user's behaviour and attitude. A study by Neben & Schneider (2015) examined the effects of ad characteristics in terms of how easily they are perceived and if they remain in conscious perception. They further examined the effects of an advertisement’s interference on users' perceived attentional and behavioral control, attentional and behavioral intrusiveness, and ultimately, stress. Their findings supported their hypotheses and suggests an influential effect of ad characteristics on affective responses (Neben and Schneider, 2015). As Neben and Schneider (2015) found, advertisements that are perceived as intrusive can lead to the elicitation of stress, especially when the ads are highly perceptually salient. The implications of this finding for advertisers and publishers are important in terms of user attitude to the brand and website; intrusive advertising can be not only annoying and irritating, it can, in fact, lead to emotive states of heightened stress in users.

Social media has added a significant new dimension to the online display advertising space with new formats and executions available. Intrusiveness is not confined to solely ads served on content websites but has extended into the social network. A study Lin & Kim (2016) looked at the effects of user perception of privacy risk, perceived intrusiveness and the utility of sponsored advertising on consumer attitudes and purchase intent. The authors found that privacy and intrusiveness concerns predict the perceived usefulness of sponsored ads as well as having an effect on the attitudes toward sponsored ads. However, they found that privacy concerns alone had an influence on product purchase intentions in relation to sponsored ads (Lin and Kim, 2016). This has implications for advertisers and publishers as technologies evolve in the mainstream advertising exchange ecosystem to enhance targeting and personalisation of advertisements, with technologies such as programmatic advertising, the potential privacy concerns of consumers, combined with already established perceived intrusiveness could lead to far greater negative outcomes from advertising efforts as well as having negative effects for both brands and host websites.

A study by Zha & Wu (2014) looked at the effect that disruptive advertisements have on users' information processing, feelings of intrusiveness and the credibility of news content websites. Their results showed that unlike other studies, disruptive ads were not shown to significantly interfere with the cognitive processing of information, however they did find that disruptive ads were perceived as intrusive and annoying, leading to negative affective attitudes. The authors further reported a trend toward disruptive ads having a negative effect on the credibility of the news website where they were delivered, raising interesting questions about the potential damage intrusive advertising has not only on brand and host website as mentioned above, but also on the credibility of the content on the website (Zha and Wu, 2014).

2.4.3. Ad Avoidance

Avoidance refers to a conscious state when the user intentionally seeks to avoid a stimulus. Avoidance in the context of advertising is defined as the actions performed by a user that prevents the user from being exposed to advertisements (Speck and Elliott, 1997). A growing risk for advertisers is the general tendency for consumers to avoid advertising (Aromaki, 2011; Cho and Cheon, 2004; Rau *et al.*, 2013; Seyedghorban *et al.*, 2016). As consumers are becoming increasingly oblivious to banner advertising on the internet and as click-through rates dwindle, publishers and advertisers must take action to protect revenue streams from this 'banner blindness'. A study by Cho & Cheon (2004) investigated latent variables of online ad avoidance: perceived goal impediment, perceived ad clutter and prior negative experience. The authors found that these constructs successfully explain why people cognitively, affectively, and behaviorally avoid advertising messages online. Furthermore, in this study perceived goal impediment was found to be the most significant antecedent explaining advertising avoidance in the online environment (Cho and Cheon, 2004).

An extension to Cho & Cheon's study was undertaken by Seyedghorban et al. (2016) where the previous research was externally validated and extended to include user mode. User mode, as described by the web motivation inventory classification framework, specifies how user activity on the internet can fall into four distinct motives: researching, shopping, surfing, and communicating (Rodgers *et al.*, 2007). Seyedghorban et al. found that the relationship of perceived goal impediment, perceived ad clutter, and prior negative experience with ad avoidance was moderated by user mode (Seyedghorban *et al.*, 2016).

Baek & Morimoto (2012) looked to identify the determinants of advertising avoidance in the context of personalized advertising media, including unsolicited commercial email, postal direct mail, telemarketing and text messaging. The authors reported that ad skepticism partially mediates the relationship between ad avoidance and its three determinants (perceived personalization, privacy concerns, and ad irritation). However, both privacy concerns and ad irritation have a direct positive effect on ad avoidance. Contrary to some recent research in the online context, they found that increased perceived personalization leads directly to decreased ad avoidance (Baek and Morimoto, 2012).

Ad avoidance has also been studied in the context of social media, a medium where intense and novel advertising formats are proliferating. Ferreira et al. (2017) looked at potential factors influencing consumers' decisions to avoid controversial ads on social media. The authors' results show that perceptions of adverts as controversial result in ad avoidance, but this effect is moderated by individual factors, such as ethical judgement (Ferreira *et al.*, 2017). Furthermore, differences are observed in the degree of ad avoidance between traditional and online media. Kim & Seo (2017) compared ad avoidance between television and online video channels and found that, on comparison, YouTube advertisements were more problematic than TV commercial breaks, leading to high advertising avoidance on the part of consumer's (Kim and Seo, 2017). Previous research by Rojas-Méndez et al. (2009) looked at universal differences in advertising avoidance and found that males generally use more mechanical avoidance methods (e.g switching channels on TV), whereas females use more behavioral avoidance methods (e.g. talking to someone while watching TV). More educated people generally report higher behavioral avoidance. A negative overall attitude towards advertising is important generally in explaining mechanical avoidance. Behavioral avoidance is more important and is best explained by a combination of demographic and attitudinal factors (Rojas-Méndez *et al.*, 2009). A study by Koshksaray et al. (2015) looked at the effects of e-lifestyle of online users and their avoidance of online advertising. E-lifestyle describes a set of values, attitudes, beliefs and behavioural patterns of consumers. The authors reported that e-lifestyle does not have a significant effect on online advertising avoidance (Koshksaray *et al.*, 2015).

Ad avoidance has also been examined in the context of online behavioural advertising, that is, advertising that tracks an individual's online behavior in order to deliver advertising tailored to the user's interests. Li & Huang (2016) examined the constructs of goal impediment, perceived personalization and privacy concern and ad avoidance in online behavioural advertising. The authors reported that goal impediment and privacy concern lead to significantly higher rates of online behavioural advertising avoidance, while conversely, perceived personalisation of online behavioural ads leads to lower rates of ad avoidance (Li and Huang, 2016).

2.4.4. Adoption of Ad Blocking Technology

The emergence of ad blockers is a recent phenomenon and presents a major challenge for advertisers and publishers alike. Ad blockers are software applications that function to block ads on a page from loading, preventing users from seeing the ads. There has been a steady and worrying (for advertisers) increase in ad blocker adoption in the past few years and the trend is not abating (Cortland, 2017). Ad blockers can be viewed as a tangible manifestation of ad avoidance and one factor found to create switching intentions to the use of ad blockers is dissatisfaction with online ads (Mattke *et al.*, 2017). Mattke et al. (2017) found that individuals develop switching intentions based on factors that pull individuals to use ad blockers or push them away from not using ad blockers, drawn from migration theory. The authors identified relative user experience, increased performance, improved privacy protection and improved security as pull factors and dissatisfaction with online ads as a push factor (Mattke *et al.*, 2017). There is some evidence that points to higher ad blocker adoption in younger demographics and lower ad blocker usage in more educated segments (Young, 2016).

Although the adoption of ad blocking technologies has been relatively high on desktop devices in the top ad spending countries, mobile ad blocking has not yet seen the same level of adoption, albeit, adoption is accelerating rapidly in developing and asia-pacific regions (Cortland, 2017). This significant rise in the use of browser based ad blocking technology has initiated a counter ad blocking movement by websites and publishers. Nithyanand et al. (2016) reported in a recent study that 6.7% of the top 5,000 websites globally, measured by the Alexa website traffic index, used anti-ad blocking scripts and technologies (Nithyanand *et al.*, 2016).

In February 2018, Google announced that it had launched an integrated ad-blocking feature in it's flagship browser, Google Chrome, which dominates with 57.4% of the global browser market share (Google, 2018; StatCounter, 2018). The implications of this charge are significant as Google will be natively blocking ads with a poor user experience at source, in a bid to improve the overall attitude towards advertising for users. Future research on the negative implications of advertising in the online environment will need to focus on formats that are permitted by the coalition for better ads (an industry body tasked with improving user experience with online advertising) and native ad blockers.

2.4.5. Attitude Towards Advertising

A key factor in the field of online advertising is the attitude of consumers towards advertising in general, to individual ads, to the brands ads represent and to the platform or website where ads are served. Advertising is ubiquitous in nature and penetrates all aspects of our lives and an important undertaking is to understand the impact of intrusive advertising on consumer attitudes across the spectrum of actors. Kim & Seo (2017) developed a general advertising avoidance model based on the belief-attitude-behavior hierarchy and found that certain beliefs about advertising have direct effects on advertising avoidance behavior as well as on the attitude toward advertising (Kim and Seo, 2017), demonstrating that negative reactions to advertising is directly correlated with negative attitudes, leading to avoidance and negative advertiser outcomes.

Early research in the field of attitudes towards advertising showed that consumer attitudes are dynamic and shift with the times (Zanot, 1984). With the proliferation and nature of online advertising, it is logical to propose that consumer attitudes continue to shift as newer and more pervasive and intrusive formats infiltrate the online environment. In light of this, it is important to reexamine research in the fields of perceived intrusiveness and attitudes towards the ad in this current mobile-focussed research model as much of the key empirical data is dated and the internet has evolved significantly since the first research was conducted.

Souiden et al. (2017) examined how general consumer attitudes toward advertising affected their attitudes toward online advertising. The authors found that general attitudes towards advertising had a significant impact on attitude toward online advertising, inferring that construed at a high level, attitudes toward advertising are medium independent. However, the authors further examined the moderating role of personality on this relationship and found that extroversion was a key moderating factor, while introversion was not (Souiden *et al.*, 2017).

2.4.6. Attitude Towards the Ad and Brand

One of the key constructs discussed widely in the literature is attitude towards the ad (Aad). According to Lutz (1985), attitude toward the ad is defined as "a predisposition to respond in a favorable or unfavorable manner to a particular advertising stimulus during a particular exposure occasion" (Lutz, 1985). Early research by Mitchell and Olson (1981) as well as Shimp (1981) highlighted the importance of the Aad construct and laid the foundations for research on the causal relationships among Aad and other measures of advertising effectiveness (Mitchell and Olson, 1981; Shimp, 1981). Aad is generally believed to act as a moderator with influence on a number of latent variables including brand attitude, purchase intentions and perceived intrusiveness. Four alternative models were suggested to explain these causal relationships, however subsequent work by MacKenzie et al. (1986) pointed to a dual mediation hypothesis, which postulates that Aad influences brand attitude both directly and indirectly through its effect on brand cognitions. The authors argued that this hypothesis is superior to the other three models under the particular set of conditions in their pretest setting (MacKenzie *et al.*, 1986).

Attitude towards the ad has also been shown to impact brand choice. A study by Biehal et al. (1992) examined Aad and brand choice, investigating the applicability of two contrasting perspectives - an independent or direct effects model and a mediated or indirect effects model. The authors' results support the presence of an independent effect of Aad on brand choice (Biehal *et al.*, 1992). A further study by Tan et al. (2019) looked at the interrelated effects of respect, ad intrusiveness, and ad interactivity on attitudes toward brands and the publishers that serve online ads. The authors found that ad formats that are perceived as respectful to viewers result in more favorable attitudes toward both the brand and publisher site, while ads that are perceived as intrusive negatively impact attitudes (Tan *et al.*, 2019).

Evidence suggests that attitude towards the ad also influences consumer attitudes towards brand extensions. Early research by Lee (1995) examined the role of consumers' attitude toward the ad on the accessibility and perceived appropriateness of the brand attributes in their perception of a brand extension and found that positive Aad significantly increases both the accessibility and the perceived appropriateness of the brand attributes. Additional analysis indicates that Aad strongly influences consumers' overall attitude toward a brand extension, with the effect being greater for a moderately non-comparable extension than for a comparable extension (Lee, 1995).

Core to this current research study is understanding how forced exposure to advertising may have a negative effect on perceived intrusiveness and attitude towards the ad and what, if any, are the effects of device type, task intensity and mobile attachment on these relationships. As Mitchell and Olson (1981) and Shimp (1981) described, attitude towards the ad is believed to act as a moderator with influence on a number of latent variables including brand attitude and purchase intentions, giving rise to the important downstream effects of forced exposure to advertisements. Brands may not immediately be cognizant of the fact that interruptive and intrusive ads may not only irritate users, but this irritation leads to a cascade of negative emotional sequelae which ultimately transfer negative attitudes onto the brand and can lead to negative effects on purchase intentions and ultimately economic outcomes.

It is in this context that it is important to formulate a research question in this current study examining the effects of perceived intrusiveness on consumer attitudes to the ad. In the current research model, the latent construct of attitude towards the ad (meaningfulness) (Lehnert *et al.*, 2014) was selected due to its favourable citation count and it's high internal consistency and construct reliability. Meaningfulness as a concept can be defined as the appropriateness of an item for the consumer, whether it is logical and meaningful, as opposed to irrelevant or pointless. Cronbach's alpha for each scale item was found to be above 0.9 and convergent and discriminant validity was established in three validation studies. The scale has been widely used in recent studies of the effects of online advertising and attitudes towards the ad (Bachnik *et al.*, 2018; Feng *et al.*, 2019; Izian Idris *et al.*, 2020; Pochun *et al.*, 2018).

The working hypothesis is that the level of perceived intrusiveness a user experiences from advertising exposure negatively affects the user's attitude towards the meaningfulness of the ad. This will allow for the development of a research model that includes forced exposure, perceived intrusiveness and attitude towards the ad as a primary pathway and allow for the examination of the effects of the second key construct of mobile attachment to be studied in terms of its effect (by sub dimension) on the overall relationships in the pathway. As Tan (2019) and Shimp (1981) found, attitude towards the ad is a key moderator in the development of attitudes towards the brand, attitudes towards the site and purchase intentions, so examining the effects of mobile attachment on attitude towards that ad in this research will allow the inference of these other downstream effects on brand attitudes.

2.4.7. Summary of Key Literature

Reference	Dependent Variables	Independent Variables	Relationships Investigated	Findings	Theories	Compare & Contrast
LI, H., EDWARDS, S. M. & LEE, J.-H. (2002) Measuring the intrusiveness of advertisements: Scale development and validation. *Journal of advertising,* 31**,** 37-47.	Ad Avoidance Ad Irritation	Ad Intrusiveness	Ad Intrusiveness - > Ad Avoidance Ad Intrusiveness - > Ad Irritation	Ad Intrusiveness significantly affects Ad Irritation (beta=0.7, P,0.05) and Ad Avoidance (beta=0.34, p<0.05)	Reactance Theory (Brehm, 1966)	Findings are in line with current study in that ad intrusiveness has a significant impact on constructs of ad avoidance and irritation which aligns with attitudes towards the ad
MCCOY, S., EVERARD, A., POLAK, P. & GALLETTA, D. F. (2008) An experimental study of antecedents and consequences of online ad intrusiveness. *Intl. Journal of Human Computer Interaction,* 24**,** 672-699.	Ad Format (Pop up) Ad Intrusiveness Ad Irritation	Attitudes Towards the Site Ad Recognition Behavioural Intentions	Ad Format -> Ad Intrusiveness Ad Intrusiveness -> Ad Recognition Ad Intrusiveness -< Ad Irritation Ad Irritation -> Attitudes towards the site Attitudes ->Behavioural Intentions	Ad Format -> Ad Intrusiveness / Supported (p < .001) Ad Intrusiveness -> Ad Recognition / Supported (R2 = 0.106) Ad Intrusiveness -> Ad Irritation / Supported (R2 = .627) Ad Irritation -> Attitudes towards the site / Supported (R2 = .116) Attitudes ->Behavioural Intentions / Supported (R2 = .281)	Reactance Theory (Brehm, 1966)	Findings are in line with current study as significant effect of popup ad format on perceived intrusiveness is observed
MCCOY, S., EVERARD, A., GALLETTA, D. F. & MOODY, G. D. (2017) Here we go again! The impact of website ad repetition on recall, intrusiveness, attitudes, and site revisit intentions. *Information & Management,* 54**,** 14-24.	Ad Intrusiveness Ad Recognition Website Attitude Ad Attitude	Exposure Repetition Ad intrusiveness Website Attitude	Exposure repetition -> Attitude toward the ad Exposure repetition -> Ad intrusiveness Exposure repetition -> Ad recognition Ad intrusiveness -> Ad recognition Ad intrusiveness -> Website attitude Website attitude -> Website-related intentions	Exposure repetition -> Attitude toward the ad / Supported (p<0.001) Exposure repetition -> Ad intrusiveness / Supported (p<0.001) Exposure repetition -> Ad recognition / Supported (p<0.001) Ad intrusiveness -> Ad recognition / Not Supported Ad intrusiveness -> Website attitude / Supported (p<0.001) Website attitude -> Website-related intentions / Supported (p<0.001)	Reactance Theory (Brehm, 1966)	Findings show that perceived intrusiveness has a significant effect on attitudes towards the website. This current study measures the effects of perceived intrusiveness on a similar, yet distinct measure of attitude - attitude towards the ad

TRUONG, Y. & SIMMONS, G. (2010) Perceived intrusiveness in digital advertising: strategic marketing implications. *Journal of Strategic Marketing,* 18**,** 239-256.	Perceptions of intrusiveness in mobile advertising Perceptions of intrusiveness in online/internet advertising	Qualitative	Perceptions of intrusiveness in mobile advertising Perceptions of intrusiveness in online/internet advertising	Perceptions of intrusiveness in mobile advertising - Negative Perceptions of intrusiveness in online/internet advertising - Neutral	Reactance Theory (Brehm, 1966)	This qualitative study by Truong & Simmons looked at the differences in perception of intrusiveness between online and mobile advertising. They found differences in perception with mobile advertising perceived as more intrusiveness.
LI, C. & MEEDS, R. (2007) Factors affecting information processing of internet advertisements: a test on exposure condition, psychological reactance, and advertising frequency. *American Academy of Advertising. Conference. Proceedings (Online).* American Academy of Advertising.	Brand Memory Ad Intrusiveness Attitude Towards the Ad	Ad Format Reactance Advertising Frequency	Ad Format -> Ad Intrusiveness Ad Format -> Brand Memory Ad Format -> Attitudes towards the Ad Ad Frequency - > Ad Intrusiveness	Ad Format -> Ad Intrusiveness / Supported ($p < .001$) Ad Format -> Brand Memory / Supported ($p < .05$) Ad Format -> Attitudes towards the Ad / Supported ($p < .01$) Ad Frequency - > Ad Intrusiveness / Not Supported	Reactance Theory (Brehm, 1966)	This study demonstrated that popup ads had a direct significant effect on both PI and attitude towards the ad, correlating the findings in this current study
MCCOY, S., EVERARD, A., POLAK, P. & GALLETTA, D. F. (2007) The effects of online advertising. *Communications of the ACM,* 50**,** 84-88.	Perceived Intrusiveness Behavioural Intentions Retention of Site Content	Ad Format (Type) Ad Congruence	Ad Format -> Ad Intrusiveness Ad Format -> Behavioural Intentions Ad Format -> Content Retention Ad Congruence - >Behavioural Intentions	Ad Format -> Ad Intrusiveness / Supported ($p<0.001$) Ad Format -> Behavioural Intentions / Supported ($p<0.01$) Ad Format -> Content Retention / Not Supported Ad Congruency - >Behavioural Intentions / Supported ($p<0.005$)	Dual Process Theory Reactance Theory	This study demonstrated that popups ads were perceived as significantly more intrusive than static ads and reduced visitors' intention to return.
TAN, B. J., BROWN, M. & POPE, N. (2016) The role of respect in the effects of perceived ad interactivity and intrusiveness on brand and site. *Journal of Marketing Communications***,** 1-19.	Attitude Towards the Site Attitude Towards The Brand	Perceived Intrusiveness Perceived Interactivity Perceived Respect	Perceived Intrusiveness - > Attitude to Brand Perceived Intrusiveness - > Attitude to Site Perceived Interactivity - > Attitude to Brand Perceived Interactivity- > Attitude to Site	Perceived Intrusiveness - > Attitude to Brand / Supported ($p<0.05$) Perceived Intrusiveness - > Attitude to Site / Supported ($p<0.01$) Perceived Interactivity - > Attitude to Brand / Supported ($p<0.01$ Perceived Interactivity- > Attitude to Site / Supported ($p<0.01$	Reactance Theory (Brehm, 1966)	This study demonstrated that perceived intrusiveness has a significant effect on attitude towards the brand and site. The experimental design and data analysis matched closely the current study.

2.5. MOBILE ADVERTISING AND DEVICE ATTACHMENT

2.5.1. Overview of Mobile Advertising

As mobile devices become ubiquitous and the primary mode of internet browsing, it will be important in this current study to build on the body of research into any device-specific effects on the level of perceived intrusiveness of mobile variant advertisements and in mobile environments. Furthermore, broadening our knowledge of the effects of perceived intrusiveness on consumer attitudes towards advertisements will be important as well as understanding what impact the emerging phenomenon of mobile device attachment has on these constructs.

Mobile advertising is one of the fastest-growing advertising formats. In 2017, mobile ad spending worldwide totalled $142.78 billion, up 33.6% from 2016. This represents nearly one-quarter of total media ad spending (McNair, 2017). The rise of mobile advertising has been facilitated by significant innovation and adoption over the past number of years, driven by the technology's inherent advantages. These advantages include the perceived personal touch, tailor-made to suit individuals, and hence considerable cost-effectiveness. Mobile advertising can reach the target customers anywhere anytime, and this proximity to the consumer is a major competitive advantage over other media (Mital, 2008).

However, paradoxically, the personal nature of mobile advertising may in fact be construed as a disadvantage in the context of the perceived intrusiveness of advertising and privacy concerns. Advertisers might applaud the increased effectiveness of targeted advertising through mobile devices, conversely consumers may react negatively to such invasive targeting. Conversely, the utility provided by mobile phones may provide a basis for a more positive attitude towards mobile advertising as users regard them as an inherent part of the overall internet ecosystem and accept online advertising as part of everyday life. There is a growing trend in the phenomenon of paywalls on editorial content (Adithya Pattabhiramaiah *et al.*, 2019), whereby the user must pay for access to ad-free content, triggered, in part, by the increasing penetration of ad-blocking technologies. Publishers saw a steep decline in advertising revenues following the concomitant rise in the adoption of ad blockers by users. Many users now accept the concept of 'value-exchange', where they exchange their cognitive attention in return for free content. Social norms may also play a role in how users perceive mobile advertising as it is ubiquitous now on platforms such as Instagram and Facebook and accepted as an inherent part of these platforms as well as the role of influencers whose business model is in promotional activities of brands.

The most prevalent type of mobile advertising is mobile display advertising, which takes the form of banners and modals (floating banners) on mobile web pages and applications. In the context of this research study a distinction is made between mobile internet advertising and SMS advertising, the latter being outside of the scope of this study. Technological advances have made it possible for novel ad formats to arise, including modal ads or sometimes termed 'popups' or 'floating banner ads', where the user must close the ad by clicking a button, whilst the content is hidden, and pull-down ads, where the ad obscures the full screen and follows the users as they scroll down, eventually disappearing. There is controversy as to whether these newer ad formats are effective and there is minimal research due to the novelty of the formats. One study by Shin & Rhee (2017) is looking to examine cognitive and emotional response to floating advertisements on smartphones by using eye tracking and EEG simultaneously in a laboratory environment. The authors have postulated that when a user is presented with a floating banner, they will only look at the close button and not process the content of the advertisement. This is explained in part by Pavlovian classical conditioning theory (Pavlov, 1927) as the user is conditioned to avoid the advertisement by searching for and clicking the close button as soon as possible (Shin and Rhee, 2017).

A distinction can be made between advertising on mobile apps and advertising on mobile websites. Recent research by Park and Park (2020) compared consumer's advertising recognition and willingness to purchase new products on both branded mobile apps and mobile websites. Their research found that advertising on branded apps led to higher advertising recognition and a greater willingness to buy new products than on mobile websites (Park and Park, 2020). In the context of this research, the focus is on mobile websites as this was the methodological choice when designing the field experiment. Mobile websites are growing in popularity because of the cost effectiveness of the solution, the agility to make changes and the lack of dependence on third party directories such as Google Play Store or Apple Store to allow users to access content.

Attitudes towards mobile advertising have been found to be influenced by a number of factors including culture (Altuna and Konuk, 2009), informativeness and perceived usefulness (Bart *et al.*, 2014), age group (Unal *et al.*, 2011), permission (Noor *et al.*, 2013), social norms (Soroa-Koury and Yang, 2010) and advertisement format (Park and Ohm, 2014).

A study by Bart et al. (2014) examined product characteristics that were likely to be associated with increased consumer attitude towards products and purchase intentions. They found that mobile display advertising campaigns significantly increased consumers' favorable attitudes and purchase intentions only when the campaigns advertised products that were higher (vs. lower) involvement and utilitarian (vs. hedonic). The authors explained this finding using established theories of information processing and persuasion and suggest that when mobile display advertisements work effectively, they do so by triggering consumers to recall and process previously stored product information (Bart *et al.*, 2014).

Mobile advertising has been shown to increase value for both consumers and retailers. Shopping facilitated by mobile devices and the consumers' use of mobile devices while shopping is shown to be an extension of consumers' existing shopping behaviours and potentially leads to the development of new behaviours based on a mobile devices' uniquely integrated features such as camera, scanners and GPS (Strom *et al.*, 2014).

Evidence also exists that there are cultural differences in consumers' attitudes to mobile advertising. A study by Altuna & Konak (2009) examined the attitudes of United States and Turkish consumers toward mobile advertising and behavioural intentions. The authors found that the attitudes of Turkish and United States respondents are different regarding mobile advertisements; United States attitudes are more positive than Turkish attitudes, demonstrating cultural differences in consumer's attitudes towards mobile advertising. (Altuna and Konuk, 2009).

A study by Soroa-Koury & Yang (2010) examined whether misperceptions of social norms of mobile advertising played a role in predicting consumers' responses to mobile advertising. The study demonstrated that misperceptions of social norms predicted consumers' perceived usefulness and perceived ease of use of mobile advertising. The study also found that perceived usefulness predicted attitude towards mobile advertising, whereas perceived ease-of-use did not predict attitude towards mobile advertising. Lastly, the attitude towards mobile advertising significantly predicted the intention to adopt mobile advertising (Soroa-Koury and Yang, 2010).

An interesting question which is highly relevant in the current environment is whether there is a difference between the attitudes of youth and adult segments towards mobile advertising. A study by Unal et al. (2011) examined the attitudes of youth and adult segments towards mobile advertising and whether there was a difference between their acceptance-rejection behaviors regarding mobile advertising. The results found that if an advertisement is construed as being entertaining, informative, reliable, personalized, and if it is being sent with permission, this had a positive effect on attitudes towards mobile advertisements. A difference was also found between the attitudes, intentions and behaviors of youth and adult segments towards mobile advertisements (Unal *et al.*, 2011). This finding concurs with the findings of Smith (2011) where Millennials were found to dislike non-permissive forms of advertising.

A study by Noor et al. (2013) examined consumer attitudes towards mobile advertising in the context of factors including subjective norms, perceived behavioral control and permission. The results demonstrated significant relationships between the consumers' attitude towards mobile advertising, subjective norms, perceived behavioral control and their intention to purchase products and services. Furthermore, the dimension of permission was found to partially mediate the relationship between attitude and purchase intention. (Noor *et al.*, 2013).

Advertising format and features have also been found to affect consumer attitudes to mobile advertising and purchase intentions. A study by Park & Ohm (2014) examined the relationships between the features of mobile advertisements, including media type, exposure type and placement, and users' attitudes and purchase intention. The results indicated that bottom-located motion picture mobile advertisements elicited more positive attitudes regarding advertisements and purchase intention and in a subsequent experiment, pop-up motion picture mobile advertisements elicited more positive attitudes and purchase intention (Park and Ohm, 2014).

A number of studies have examined perceived intrusiveness in mobile advertising (Rau *et al.*, 2013; Wehmeyer, 2007a). A key hypothesis in this thesis is the potential moderating effect of device factors, specifically mobile, on the perceived intrusiveness of advertising. Wehmeyer (2007b) looked at the effects of message type and situation on the perceived intrusiveness of mobile advertisements. Message type did not significantly affect mobile ad intrusiveness, while the situation demonstrated a highly significant effect (Wehmeyer, 2007a). A study by Rau et al. (2013) examined a conceptual model of ad avoidance and perceived intrusiveness. Ad relevance was shown to significantly affect advertising avoidance by reducing perceived intrusiveness and by increasing advertising recall and advertising attitude. Furthermore, exposure contexts with high-cognitive workload were found to lead to significantly shorter advertising reading time and recall, higher perceived intrusiveness, behavioural avoidance and reactance. (Rau *et al.*, 2013).

In the context of the current internet paradigm, where we are moving rapidly towards a mobile-first society, it will be important to understand key research questions regarding the impact of advertising through mobile channels. Much of the previous research discussed above could be described as dated in the fast-moving domain of mobile advertising and as users become more accustomed to the utility of mobile phones, the inevitable emergence of the value-exchange of users attention for free content and the impact of a more savvy, mobile native demographic. The fourth and first research questions in this thesis examines the moderating and multigroup effects of mobile device type on perceived intrusiveness and attitudes towards the ad, while the second research question in this thesis examines the impact of mobile phone attachment and its subdimensions on the perceived intrusiveness and attitudes towards advertising. These factors are important to our understanding of the impact and effectiveness of mobile advertising in today's mobile-first and highly device-dependent society.

2.5.2. Mobile Advertising as Distinct from Online Advertising

An interesting avenue for exploration in this research study is the examination of the potentially distinct effects of advertising on mobile devices and internet advertising in general. There is rationale for the effects of advertising to be different on mobile devices as most users have established a strong personal relationship and connectedness with their mobile phone, viewing it as a private place within their environment and as an extension of the self. Attachment theory could possibly play a role in understanding the theoretical underpinnings of the phenomenon, drawing from extensions in the theory to object attachment (Bowlby, 1969). Li & Stoller (2007) described how a consumer's form this strong personalised relationship with their mobile phone due to factors including their near constant proximity to their mobile phone and the fact that it connects them to their social ecosystem and community (Li and Stoller, 2007). This strong bond between the user and their mobile device has the potential to heighten their negative responses and levels of irritation when exposed to intrusive advertising (Heinonen and Strandvik, 2003).

Truong and Simmons (2010) examined the differences in the perceptions of intrusiveness of online and mobile advertising in a qualitative study. They found that there was an overall neutral perception of the intrusiveness of online advertising amongst participants, however they observed an overall negative perception towards mobile advertising (Truong and Simmons, 2010). The observations from this study highlighted possible differences in the perceptions of intrusiveness between internet and mobile advertising which are examined in this current study quantitatively. Furthermore, a number of other studies have highlighted the potential negative effects of intrusiveness specifically in mobile advertising which add weight to the rationale for exploring this research question (Ferris, 2007; Maneesoonthorn and Fortin, 2006; Merisavo *et al.*, 2007).

2.5.3. Smartphone Devices and Emotional Attachment

The smartphone has become an essential and ubiquitous part of daily life, so much so that many users view them as a highly personal object and often form strong and deep relationships with them, and many regard them as an extension of the self. This observation has led to the development of the concept of user-device attachment to describe the relationship between users and their mobile devices. The concept draws its foundations from diverse domains including marketing, psychology, human-computer interaction as well as sociology and is described under three key dimensions; symbolism, aesthetics and perceived necessity (Wehmeyer, 2007b). User-device attachment may be seen as a mediating factor in the presentation of the modern-age neurosis termed nomophobia, i.e., the fear of being without mobile phone contact. A study by Yildirim (2014) looked to describe the dimensions of this new presentation of anxiety in humans, often viewed as a byproduct of our interaction with technology, and identified four dimensions of nomophobia; not being able to communicate, losing connectedness, not being able to access information and giving up convenience (Yildirim, 2014). The identification of these dimensions of both user-device attachment and nomophobia have opened the door for a broad range of research streams looking to understand the consumer's interaction with the mobile phone. In the context of this thesis, the investigation of the interaction between user-device attachment and the perceived intrusiveness of advertising and any subsequent antecedents including attitudes toward advertising are of significant interest.

Smartphones have been investigated as an object of behavioural addiction. Meschtscherjakov et al. (2014) undertook a study which examined the prevalence of characteristics of a smartphone addiction among a university student population along with possible predictors of high frequency use. The results indicated that social anxiety and addiction-proneness are significant predictors of frequent smartphone use. Interestingly, anxiety only increased when participants had their phone sitting in front of them and were instructed not to use it (Meschtscherjakov *et al.*, 2014).

Much research in the area has framed mobile device addiction in the context of possessional attachment, some authors have found that anxious smartphone addiction has its pathophysiology in human attachment, where users are more likely to generalize their attachment to communication devices. Bodford et al. (2017) found support for this hypothesis and demonstrated that anxious smartphone addiction predicted (a) anthropomorphic beliefs (the interpretation of nonhuman things or events in terms of human characteristics), (b) reliance on smartphones, and (c) a seemingly compulsive urge to answer one's phone, even in dangerous situations (e.g., while driving) (Bodford *et al.*, 2017).

Hong et al. (2012) investigated the relationship between user's psychological characteristics, mobile phone addiction and use of mobile phones. The authors found that social extraversion and anxiety have positive effects on mobile phone addiction, while self-esteem has negative effects on mobile phone addiction. Furthermore, they found that mobile phone addiction had a positive predictive effect on mobile phone usage behavior (Hong *et al.*, 2012).

Research by Kolsaker & Drakatos (2009) examined whether emotional attachment to mobile phones influenced mobile users' receptiveness to mobile advertising. Their research found that users with a strong sense of attachment were more receptive to mobile adverts, however overall users generally found the adverts irritating. The authors postulated that consumer receptiveness might improve by targeting users who are strongly attached to their mobile devices (Kolsaker and

Drakatos, 2009). However, this finding may be challenged by this current research as the nature of the attachment was not investigated and the second key research question in this study looks at the effects of mobile phone attachment and its sub-dimensions on the perceived intrusiveness of advertising, which can be classified using the multidimensional mobile attachment scale developed by Bock et al. (2016). A number of hypotheses are proposed based on each sub-dimensions (see section 2.7.2) - firstly, the level of useful (productive) attachment a user has towards their mobile device has a direct negative effect on perceived intrusiveness, secondly, the level of anxious (unproductive) attachment a user has towards their mobile device has a direct positive effect on perceived intrusiveness and finally, the level of addictive (unproductive) attachment a user has towards their mobile device has a direct positive effect on perceived intrusiveness. Although Kolsaker and Drakatos (2009) observed that attached users were more receptive to advertising, this current research study will propose that this effect is dependent on the nature of the attachment, whether problematic (where the user may be less receptive and find ads more intrusive) and productive (where the user may be more receptive and find ads less intrusive).

Interestingly, research by Rodriguez-Torrico et al. (2019) following the stimulus-organism-response model, demonstrated how certain stimuli (travellers' addiction to their device, perceived control, perceived entertainment, and subjective norms) influenced travellers' mobile phone attachment and intention to purchase travel products and services using their device. Mobile phone attachment was found to positively influence intention toward mobile shopping for travel-related purchases (Rodriguez-Torrico *et al.*, 2019). It is feasible that users in this scenario may be more productively/positively attached to their mobile phone as their relationship with this device is more utilitarian and functional.

One of the hypotheses to be expanded later in this chapter is how this type of productive mobile attachment mindset (usefulness) may actually have positive effects on consumer attitudes towards advertisements, while the more unproductive attachment practices (anxious / addictive attachment) may have negative effects. In a recent study by Hu et al (2020), an attentional bias by users exhibiting addictive attachment toward more negative emotional information was discovered using behavioural experiments. In a follow-up study using eye-tracking techniques, the authors found that users with high levels of mobile phone addiction tended to fixate first and significantly more on negative faces than on positive faces (Hu *et al.*, 2020). Thus, it is plausible that users with high levels of problematic mobile phone attachment may amplify the negative emotional responses elicited by forced exposure to advertising, leading to diminished attitudes towards advertisements.

Research has identified a number of predictors for higher indices of mobile attachment. A study by Haug et al (2015) identified relationships between longer daily smartphone use, shorter time to first daily use and the declaration by a user that social networking is the most personally relevant smartphone function and smartphone attachment (Haug *et al.*, 2015). Van Duersen et al. (2015) further observed that habitual smartphone use is an important contributor to addictive smartphone behavior and that people who extensively use their smartphones for social purposes develop smartphone habits faster, which in turn might lead to addictive smartphone behavior (van Deursen *et al.*, 2015). Choi et al. (2015) also identified risk factors for smartphone addiction including female gender, Internet use, alcohol use, and anxiety, while the protective factors were depression and temperance (Choi *et al.*, 2015), while Pearson and Hussain (2017) in their study demonstrated that higher narcissism scores and neuroticism levels were linked to addiction (Pearson and Hussain, 2017).

Results of several studies have suggested that smartphone addiction has negative effects on mental health and well-being. A study by Samaha and Hawi (2016) found that smartphone addiction risk was positively related to perceived stress and negatively related to academic performance (Samaha and Hawi, 2016). Research by Bian and Leung (2015) also demonstrated that users scoring higher on measures of loneliness and shyness had a higher likelihood to exhibit addictive attachment to their smartphone (Bian and Leung, 2015), while research by Lee et al. (2014) found that the compulsive use of smartphones was positively related to psychological traits including locus of control, social interaction anxiety, materialism and the need for touch (Lee *et al.*, 2014). However, negative attachment is not the only dimension of mobile attachment - there are utilitarian aspects to the phenomenon also, with usefulness and utility playing a role in mobile attachment. The mobile phone attachment scale developed by Bock et al. (2016) captures this range of dimensions to a considerable extent, including sub-scales of usefulness, anxious attachment, addiction and 24/7. Considering Kolsaker and Drakatos (2009), it is plausible to hypothesise that there may be a positive relationship between the useful dimension (productive attachment) and attitude towards the ads, while conversely a negative relationship between anxious and addiction dimensions (unproductive attachment) and attitude towards the ads.

A systematic review of the literature into the area of problematic smartphone use was recently conducted by Harris et al. (2020). The authors reviewed a total of 293 studies on the topic and suggested that the young, female gender and higher education levels were all linked with higher proneness to problematic smartphone usage. The most frequent consequence of problematic smartphone use was found to be emotional health issues. The authors further explored some interesting areas of future research, where they identified gaps in the current literature. Firstly, they noted that the vast majority of the research focussed on the younger age segments and they proposed that future research should look to expand the demographic targeting to a broader spectrum of age segments. However the authors noted that possible age effects may fall away as digital nativity becomes more prevalent across future generations. A second pertinent question they proposed was around the current classification of normative smartphone use. The authors cited recent research by Liu et al. (2018) that found that high levels of smartphone use would not necessarily mean that the user will experience problematic consequences (Liu *et al.*, 2018). Thus, the authors proposed that problematic smartphone usage should not be only based on time spent on the device and that a more appropriate classification looking at smartphone usage across different contexts should be investigated. One limitation highlighted in their review was the lack of country and culture specific analyses of the studies; thus cultural aspects may be an important avenue for future research (Harris *et al.*, 2020).

Recent research by Melumad and Pham (2020) has suggested that in addition to obvious functional benefits, consumers derive emotional benefits from their smartphone, notably feelings of psychological comfort and, if needed, actual stress relief. Results from their studies have shown that in moments of stress, consumers exhibit a greater tendency to seek out their smartphone and that engaging with one's smartphone provides greater stress relief than engaging in the same activity with a comparable device such as one's laptop or a similar smartphone belonging to someone else. Some of the properties of the smartphone that gave rise to the sense of psychological comfort included it's personal nature, its portability and the subjective sense of privacy experienced while on the device (Melumad and Pham, 2020). These findings suggest that there is a highly personal bond between the user and their smartphone and that the emotional benefits derived from the device's proximity may drive the underlying mechanisms of attachment. Furthermore, considering the personal nature and subject sense of privacy a user experiences with their smartphone, it is logical to postulate that advertising considered as intrusive would have more of a pronounced effect on those users who have a strong sense of attachment in the context of deriving psychological comfort from their smartphone.

Further research by Nie et al. (2020) has highlighted the types of smartphone activity that leads to separation anxiety in those with smartphone attachment. Similar to Melumad and Pham (2020), the authors found that use of a computer did not alleviate the separation anxiety experienced when the user could not use their smartphone. Furthermore, the anxiety experienced was found to be dependent on the type of activity being disrupted; with anxiety when disrupting online activities more due to the unavailability of an internet connection and conversely anxiety associated with stopping offline activities due to the phone having no power (Nie *et al.*, 2020). This research points to an important aspect in understanding mobile device attachment - a distinction should be drawn between the specific activity, and the disruption of that activity, which is a driver of separation anxiety and anxious attachment. Given this, one could postulate that there is possibly a high degree of correlation between smartphone attachment and social media addiction, as anxiety still presented when the internet connection was removed, pointing to more than just the smartphone in itself as the object of the attachment. The finding by Malumad and Pham (2020) that substitution with another person's mobile phone during separation did not provide psychological comfort also supports this theory.

Moving beyond addiction as the primary dimension of smartphone addiction, recent research by Parent and Shapka (2020) argues that some degree of dependency on smartphones seems to be a normative phenomenon as opposed to a disorder and that the current medical-addiction model has raised concerns regarding how well it reflects the current paradigm of mobile phone attachment. The authors proposed a novel attachment theory framework as an alternative (Parent and Shapka, 2020). In the context of this current body of research, this raises an important point. It is evident that exclusively looking at mobile attachment as a problematic phenomenon does not reflect the reality of people's lives. Reflecting on the research discussed previously by Kolsaker and Drakatos (2009) where attachment was linked with some degree of receptiveness to advertising in the mobile environment as well as Bock et al. (2016) where useful attachment to mobile devices was observed, it is clear that a more holistic approach to understanding mobile phone attachment must be considered.

This literature review has examined the breadth and depth of literature concerned with the antecedents and consequences of perceived intrusiveness in advertising, with a special focus on mobile advertising and the phenomenon of mobile attachment. As outlined in this chapter, the key factors involved in the development of intrusiveness include ad format, controllability, obscuring nature, goal impediment, repetition, privacy concerns and personalisation and the key aim of this research is to probe a selection of these factors in the mobile attachment context to understand the effects of this emerging phenomenon on established factors leading to negative emotional reactions to advertising and attitudes.

2.6. THEORETICAL FRAMEWORKS

2.6.1. Reactance Theory

Reactance theory may explain why intrusive advertising can be ineffective. Psychological reactance theory looks at how consumers react to threatened or eliminated freedoms of choice (Brehm, 1966). Consumers are habitualised to the expression of freedom of choice; whether choosing what products to buy or how and when they browse the web. Reactance describes the motivational state of the person whose freedom is threatened. Promotional influence, manipulative advertisements, product unavailability, and government regulations are all cast as potentially freedom-threatening events and a theory of psychological reactance details the consumer's reply to reductions in freedom (Clee and Wicklund, 1980).

Psychological reactance was historically considered to be a motivational state that was immeasurable. In countenance to this, Dillard and Shen (2005) proposed that reactance can be conceptualized as a latent construct, developing models to test following a meta-analytic review of reactance research. They found that the indicators of anger and counterargument fitted the model best (Dillard and Shen, 2005).

Threats to freedom of choice are described as either interpersonal or impersonal. Interpersonal threats focus on influence attempts and include pressure from advertisers to purchase specific products, while impersonal threats do not involve influence attempts, as in the case of advertising tag bloat on a website slowing the user experience. When reactance is triggered in individuals, the resultant effect is generally a reassertion of freedom. When the trigger of reactance is interpersonal, the individual will tend to move in the opposite direction of the influence attempt, termed the 'boomerang effect' (Clee and Wicklund, 1980). In the example of advertising that is perceived to be intrusive, it is logical to assume that when such ads trigger reactance (a negative emotional reaction), a boomerang effect may occur and the user moves in the opposite direction of the attempted influence, and the advertisement has the opposite effect, with the user not clicking or purchasing as a matter of principle or leaving the website due to irritation.

Psychological reactance provides a theoretical framework for understanding why certain types of advertising that interrupt a user's goal directed activities in an online environment, can lead to feelings of perceived intrusiveness and negative attitudes toward advertising. Popup or modal ads are overtly disruptive; forcing the user to stop and focus attention on the ad, interrupting their task-orientation, which can trigger reactance and the resultant sequelae. Conversely, static banner ads which display in-line on the screen, are not overtly disruptive, do not require the user to compulsorily divert cognitive attention to them and thus are not expected to trigger the same level of reactance, perceived intrusiveness and negative attitudes towards the ad.

Psychological reactance in the context of advertising on social media platforms has been studied by Youn and Kim (2019). The authors explored how young millennials understand and respond to native news feed advertising on Facebook and focussed the covert nature of the ad format. The authors observed that participants showed a high level of persuasion knowledge of how Facebook news feed ads work and presented strong negative responses, which were often accompanied by reactance and ad avoidance. A number of key themes emerged from their research regarding the negative experience of advertising on social media including ad intrusiveness, goal impediment and covertness (Youn and Kim, 2019). In considering mobile attachment and the high level of addictive attachment inherent in social media platforms where the user behaviour is primarily focused on automatic and conditioned scrolling though the news feed, it is not surprising that the authors observed these negative responses given that addictive behaviours can be seen as a goal directed activity. In the context of this current research, reactance theory provides an important theoretical framework for understanding why individuals may find forced exposure ad formats intrusive, form negative attitudes towards them and also why addictive dimensions of mobile phone attachment are proposed to increase perceptions of advertising intrusiveness. The threats to freedom of choice that forced exposure to advertising precipitates, not only by the disruptive nature of their execution, the obscuring nature of their delivery and the requirement for the individual to switch attention to the advertisement all embody the fundamental tenets of reactance in individuals. Reactance as an underlying mechanism not only explains the induction of perceived intrusiveness, but may also explain any mediating effects of perceived intrusiveness on attitudes towards the ad.

2.6.2. Classical Conditioning Theory

According to Pavlov (1927), classical conditioning theory may also be useful in attempting to explain a user's behaviour when reacting to stimuli. Pavlov's model is based on two pairs of elements. The first is an unconditioned stimulus and unconditioned response and the second is a conditional stimulus and conditional response. When a stimulus is paired with an unconditioned stimulus and this results in a new experience, this stimulus is termed a conditional stimulus and the subsequent response learned is termed a conditional response. The stronger the affective experience, the stronger the response. Responses conditioned through this original conditioning can in turn create new conditional responses in a process termed higher order conditioning. This can be conceptualised as the user learning the connection between the two events and then processing this in their memory in preparation for a future event. This conditional response can then be paired with a new event and the user can learn to associate the original stimuli with the terminal response (Pavlov, 1927).

Classical conditioning theory has been applied to internet advertising as a means to explain attitude towards advertising and brands. Gresham and Shrimp (1985) demonstrated that the effect elucidated by television commercials had an effect on the viewers attitude towards the brand (Gresham and Shimp, 1985). Classical conditioning theory has also been used to explain the phenomenon of banner blindness, which can be defined as a state of cognitive avoidance of advertisements. An ongoing study by Shin and Rhee (2017) is investigating this phenomenon using eye tracking methodology to observe a user’s reactions to popup advertisements and the authors have proposed the expected results to be that users will focus solely on the close button and not pay any attention to the content of the advertisement (Shin and Rhee, 2017).

This form of conditioned response is important in the current context of internet advertising - it is plausible that users have developed, or can quickly develop, a conditioned response to advertising, especially when the advertisement is perceived as irritating, disruptive or intrusive (Hervet *et al.*, 2011; Resnick and Albert, 2013). In the context of this current research study, classical conditioning provides a theoretical framework to explain the mechanisms, in conjunction with reactance theory, as to why individuals develop negative attitudes towards advertising when perceived intrusiveness is present. It is plausible that individuals have become conditioned to their exposure to advertising, and when forced exposure is present and the ad is perceived as intrusive, the individual will develop a conditioned response to close or dismiss the advertisement as soon as possible and develop a negative attitude towards it. This may explain, in conjunction with reactance theory, why perceived intrusiveness can lead to negative attitudes toward advertising and subsequently towards the brand.

Classical conditioning may also play a role in understanding why users who have a positive and useful relationship with their phone may find ads less intrusive. These users may develop a positive conditioned response to advertisements, working in conjunction with the technology acceptance model proposed by Davis et al. (1989), and thus develop immunity to the negative consequences of intrusive advertising as they are receptive to and accept advertising as a necessary component of the internet and part of their technology stack that they find utility from. The two-factor nature of classical conditioning in the current research model is interesting, insofar as it may provide an underlying mechanism in understanding emotional reactions to advertising in both positive and negative attachment scenarios, working in conjunction with other mechanistic theoretical frameworks.

2.6.3. Technology Acceptance Model

Users perceive advertisements in different ways; some may find advertisements beneficial, for reasons including the timing of the advertisement is in line with their current goal-directed activities, the advertisement is attractive or it may provide a welcome diversion. Conversely, advertisements that interrupt a user’s train of thought, requiring them to expend additional cognitive effort to process the information during the interruption instead of focusing on their goal-directed activity, tend to be perceived more negatively (McCoy *et al.*, 2012). Reactance theory and classical conditioning theory may effectively explain some of the negative reactions to advertising, however they do not explain why some users do not react to advertisements in such negative ways. It is possible to hypothesise that some users accept advertising or view advertisements in a more receptive manner because they accept advertising as part of the inherent value exchange of content for attention and regard them as a necessary component of the internet system as a whole. As a consumer within this system and as they derive benefit from it, it could be construed as an implied social contract (Milne and Gordon, 1993). It could be argued that an internet without advertising would be an internet without rich content as the vast majority of internet publishers rely on advertising revenues to be sustainable financially.

Based on the Theory of Reasoned Action (Flanders *et al.*, 1975), The Technology Acceptance Model (TAM) proposed by Davis et al. (1989) conceptualises how users come to accept and use technology. The model's key concept is focused on two key factors that influence the users decision - (a) the perceived usefulness of the technology and (b) perceived ease of use of the technology (Davis *et al.*, 1989). The model has undergone two significant upgrades with the introduction of the technology acceptance model 2 (TAM2) (Venkatesh and Davis, 2000) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al.*, 2003). Based on the theory, users are more likely to adopt a technology when the technology and the services the technology provides are perceived as useful and are easy to use. The technology acceptance model has been applied in the context of online advertising. A study by Lin and Kim (2016) examined how the technology acceptance model predicted user responses to advertising on the Facebook social media platform and found that perceived attitudes of social media advertising did influence consumer attitudes and purchase intentions. The authors discussed how some users could be viewed as utilitarian and are more accepting of advertising as the platform is perceived as useful to them. It is possible that some users, especially among the younger generations, have become highly accustomed to advertising, via a technology acceptance framework, and thus have less pronounced negative responses to online advertising (Lin and Kim, 2016).

The current research proposes an extension to this explanation by Lin and Kim (2016) where it extends past the acceptance of advertising on the platform (e.g. Facebook) to the acceptance of advertising on their device. Drawing on the technology acceptance model and in the context of this research study, it is possible to postulate that users with a high level of positively-orientated mobile phone attachment (usefulness) may have a less negative view of advertising on the internet. However, users with a more negative mobile phone attachment (anxious, addictive, compulsive) may be more prone to intrusiveness and irritation and have a more negative view of advertising. The technology acceptance model may explain why there is a level of protection against the negative effects of intrusive advertising in individuals who may be more accepting of technology and perceive their relationship with their mobile phone as useful. This can be viewed as an implied social contract between the user and the marketer. This concept was first proposed by Milne and Gordon (1993) in the context of direct mail, however in the context of mobile and social advertising, an implicit social contract can be seen to exist between the platform / advertiser and the consumer and the consumer agrees to accept advertising in return for access to the platform and/or device and the benefits it proffers (Milne and Gordon, 1993). Chen and Mei (2017) highlighted some of the factors that positively affected the acceptance of mobile advertising in their study of college students including the perceived entertainment of the mobile internet advertising and social influence, extending beyond the traditional explanations of perceived usefulness and ease of use inherent in the technology acceptance model (Chen and Mei, 2017). A study by Zhao and Wang (2020) also looked at the willingness to accept advertising on social media platforms through the lens of the technology acceptance model and examined the antecedents of social interaction, intrusiveness, informativeness, and relevance and their effect on attitudes towards the ad, perceived ease of use and purchase intentions. All four factors were found to have a significant effect and the technology acceptance model was proposed as a key theoretical framework underpinning the observations (Zhao and Wang, 2020). The technology acceptance model was also examined in the context of social media platforms by Kong et al. (2020). The authors sought to verify the applicability of the technology acceptance model in the context of social media and affirmed their hypotheses and observed that perceived usefulness, perceived ease of use, attitude, and intention to use mobile social media were positively related to actual use behavior among Chinese college students (Kong *et al.*, 2020).

The technology acceptance model is an important underlying theoretical framework in understanding the use, attitudes and behaviours on mobile devices. Mobile technology and social media are inextricably linked, with many social media platforms only available through mobile applications (including Instagram, Snapchat and TikTok). A number of factors are key to understanding how mobile advertising is viewed and can be effective in this medium including ease of use, social influence, social connection, perceived entertainment as well limiting perceived intrusiveness and irritation. In the context of the current study, mobile attachment adds a new dimension into the overall body of knowledge in terms of how users interact with mobile devices and in light of the inherent connection between mobile and social media, it is fair to expect that any observations regarding attachment and mobile devices can be applied in the social media context also. The technology acceptance model will be key in explaining the underlying mechanisms of hypothesis 2a1 in this study, where it is proposed that the level of useful (productive) attachment a user has towards their mobile device has a direct negative effect on perceived intrusiveness. Based on the current progress in the application and understanding of the technology acceptance model, useful attachment will attenuate the negative effects of perceived intrusiveness on attitudes towards the ad, with the user accepting advertising though their acceptance of the technology, the platform, through a implied social contract as well as an overall value exchange.

2.6.4. Attachment Theory

Attachment theory, first developed by Bowlby (1969) is regarded as one of the leading theoretical frameworks in the understanding of how close relationships form and in the social development of humans. The framework sets out the theoretical foundations of the bonding quality and describes a model of relatedness between individuals, with the requirement to form bonds viewed as a fundamental human need. Attachment can be viewed as a persistent motivational system that serves human survival needs through protecting the individual from psychological and physical harm (Bowlby, 1969). Albeit attachment theory was first proposed to explain bonding relationships between individuals, it has since been applied to explain the bonding relationships between individuals and objects (Myers, 1985; Yap *et al.*, 2020). In object attachment, the object represents a source of comfort to the individual and helps to alleviate psychological stress and while the vast majority of the literature focuses on object attachment in childhood, the theory provides a framework for understanding how object attachment can present in adulthood (Passman, 1987). Thus, the smartphone can be seen as an object that provides psychological comfort, and attachment theory explains this phenomenon in the context of adult object attachment. Parent and Shapka (2020) proposed a new framework for understanding how attachment to one's smartphone can be explained as a extension of childhood object attachment, arguing that just as children develop attachment towards their primary attachment figure as a source of comfort and reassurance during times of distress, similarly adults develop attachment to their smartphone as a source of security and psychological comfort, consistent with the findings of Malumad and Pham (2020).

Attachment has been studied in the context of mobile and social media. A paper by Wu et al. (2017) used attachment theory to explore antecedents of active usage of mobile instant messaging and proposed two mechanisms, emotional attachment and functional dependence, to explain the factors that influence active usage of mobile instant messaging from a user-device attachment perspective. Interestingly, self-congruence was observed to influence emotional attachment significantly (Wu *et al.*, 2017). A study by Hart et al. (2015) also proposed that attachment theory is a particularly useful framework through which to study the influence of personality on social-media behavior, leading one to the view that attachment theory is an important underlying mechanism driving many of the attitudes and behaviours on social media, and implicitly, on mobile devices (Hart *et al.*, 2015).

Taking self-congruence and the strong attachment many users feel for their devices, and the platforms and apps the device makes accessible, one can consider the mobile device as an extension of the self. Hein et al. (2011) argued this point that in ethnographic research the mobile device has become an powerful prosthetic, allowing the researcher to effectively and efficiently practice their research (Hein *et al.*, 2011). As the human species evolves, it is natural for the species to form bonds with objects within their environment that enhance their social wellbeing and functional performance and the mobile phone, specifically the smartphone, is one such item that can now be viewed as an extension of the self. Muzellec and O'Raghallaigh (2018) discussed the concept of the smartphone as an extension of the self and how the smartphone is now ubiquitous in the consumer's daily life and how we are moving towards a society where the moments of truth on the consumer journey can be so temporally proximal in many instances that they can be viewed as implicitly instantaneous, forming a ubiquitous moment of truth (Muzellec and O'Raghallaigh, 2018). Viewing the mobile phone as an extension of the self and explaining the phenomenon in the context of attachment theory provides the researcher with a strong theoretical mechanism as to why some users may find situations where the enjoyment of the exclusivity of the bond between the user and their device (and, as explained, a quasi-internal bond with a part of the self) is threatened, distracted or manipulated can lead to conflict and will result in the user defending their position as could also strengthen or act in concert with other negative emotional responses such as reactance.

Grounding this research project in attachment theory, it is logical to theorise that mobile phone attachment may have an effect on an individual's emotional reactions to advertising, especially when the dimension of attachment is negative, such as in the anxious or addictive spectrums. As attachment theory explains, individuals form strong bonds with their object of attachment and in the context of mobile phone attachment, threats to their freedom to enjoy that attachment and derive the psychological benefits it proffers could result in negative reactions. Thus, intrusive advertising, which reactance theory (discussed in section 2.6.1) explains may be viewed as a threat to freedom, may trigger increased levels of perceived intrusiveness and lower levels of attitudes towards advertising when the individual exhibits higher levels of problematic object attachment to their mobile phone.

2.7. RESEARCH QUESTIONS AND HYPOTHESES

2.7.1. Overview

In this thesis the research questions were developed following a review of the literature around the areas of perceived intrusiveness of advertising, mobile advertising and mobile phone attachment. The research questions were informed through a number of theoretical frameworks including reactance theory, classical conditioning theory, the technology acceptance model and attachment theory. Although some dimensions of the perceived intrusiveness of advertising have been previously studied (Edwards *et al.*, 2002; McCoy *et al.*, 2008, 2017; Truong and Simmons, 2010), research is limited in the specific area of the impact of intrusive advertising in the mobile context. Furthermore, the novel dimension of mobile phone attachment and any effects this may have on the level of intrusiveness experienced by users as well as consumer attitudes towards the ad has not been studied. In the current 'mobile first' online environment, where the majority of users in western countries spend most of their time on mobile devices, it is important to understand, from a managerial and practical standpoint, if there are differences in the level of perceived elicited on mobile devices versus the traditionally dominant desktop device type. Furthermore, as mobile phone attachment is growing as a dimension in the online environment and as penetration increases, what if any does this phenomenon directly impact or moderate the levels of perceived intrusiveness or attitude towards online advertising. Theoretically, this study will help to advance our understanding of the interplay of reactance theory, attachment theory, classical conditioning and technology acceptance on users behavioural and emotional responses to online advertising in the mobile environment.

Table 1. Summary of Research Questions

Research Q	1a, 1b, 1c	2a, 2b	3	4a-4i	5a, 5b
Testing	Direct Effects	Direct Effects	Indirect Effects (Mediation)	Interaction Effects (Moderation)	Between Groups (Multigroup)
Dependent Variables	Perceived Intrusiveness, Aad	Perceived Intrusiveness, Aad	Attitude towards the Ad (Aad)	Perceived Intrusiveness, Aad	Perceived Intrusiveness, Aad
Independent Variables	Forced Exposure	Mobile Phone Attachment	Forced Exposure	Forced Exposure	Forced Exposure,
Mediator / Moderator / Groups	n/a	n/a	Perceived Intrusiveness	Mobile Phone Attachment	Device Type, Cognitive Intensity

The first research question focuses on the constructs of perceived intrusiveness and attitudes towards the ad and the effects the forced exposure has on these constructs in a field experiment. A number of previous studies have shown that forced exposure to advertisements is a key factor in the development advertising intrusiveness and as a consequence, negative consumer attitudes, behaviours and advertising outcomes (Edwards *et al.*, 2002; Kusse, 2013; Li and Meeds, 2007; McCoy *et al.*, 2007a). However, the key gap to be addressed in the literature is the examination of these effects in a mobile context. The current research model re-examines these relationships through the lens of mobile attachment and its sub dimensions (second research question) and also looks for differences between mobile and desktop devices (fifth research question), as well as the effects during tasks of differing cognitive intensity (previously examined by McCoy et al. (2017) and Edwards et al. (2002), but not in a mobile context and not examining interaction effects). Although previous research by Troung and Simmons (2010) found an anecdotal relationship between the level of perceived intrusiveness and device type, their research was not conclusive and it is important to clarify this finding, if it exists. The third research question looks at the mediating effect of perceived intrusiveness on the relationship between forced exposure and attitude towards the ad and some previous research has identified similar mediating effects of perceived intrusiveness on consumer attitudes (Edwards *et al.*, 2002), the examination of this mediation in a mobile context has not been examined. The fourth research question examines interaction effects between the variables in the model. Although a number of other antecedents of advertising intrusiveness was discussed in the literature including controllability (Edwards *et al.*, 2002; Li and Meeds, 2005; Li *et al.*, 2002)) and ad exposure frequency and repetition (Li and Meeds, 2007; McCoy *et al.*, 2004), following a pilot study (section 3.4) examining these variables a decision was taken to focus on an obscuring forced exposure condition as the mechanism to study perceived intrusiveness in the model.

2.7.2. Research Questions and Hypotheses

Direct Effect of Forced Exposure on Perceived Intrusiveness

The first component of research question one examines the levels of perceived intrusiveness experienced by users following forced exposure to advertising. The hypothesis will be tested by exposing users to two different formats of advertisement, modal (forced exposure / obscuring modal) and a static in-line banner (passive exposure). Modal ads obstruct the user's screen and force attention to be switched to the advertisement, while banner ads are presented in-line with the content on the webpage do not obstruct the user’s session.

Although previous studies by McCoy et al. (2004, 2007b) have demonstrated that forced exposure ads result in higher levels of perceived intrusiveness than other ad formats, including banner ads (McCoy *et al.*, 2004, 2007b), the progress of time in a highly dynamic and evolving online advertising system with a greater emphasis on mobile devices means this research can contribute by updating and advancing our knowledge in line with current developments. Brehm's (1966) reactance theory, discussed previously in section 2.6.1, provides a mechanism to explain why forced exposure to advertising can lead to feelings of intrusiveness by individuals. The findings from this hypothesis, should it fail to reject the null hypothesis, will validate and confirm the empirical findings from previous studies by McCoy et al. (2004) and Edwards et al. (2002) and create the necessary conditions within the model to study the effects of mobile attachment on the construct of perceived intrusiveness. Thus, the first research question is formulated as:

> *Research Question 1a:* Does forced exposure to modal ads elicit higher feelings of perceived intrusiveness than passive exposure to banner ads?

- *Hypothesis 1a:* Forced exposure to modal ads elicits higher levels of perceived intrusiveness than static banner ads.

Direct Effect of Perceived Intrusiveness on Attitude Towards the Ad

The second component of research question one asks whether the perceived intrusiveness of advertising has an effect on consumer attitudes towards the ad. Research has demonstrated a relationship between perceived intrusiveness and attitude towards the ad (Tan *et al.*, 2016), however it is important to validate this relationship in the context of this current research model and in the context of the specific attitude towards the ad (meaningfulness) scale. This established relationship is important in the understanding of perceived intrusiveness in advertising and examining through the lens of mobile devices will add to the body of knowledge and empirical data. This will also assist in the identification of any mediation effects from the independent variables, via perceived intrusiveness, on attitudes towards the ad.

Research Question 1b: What are the effects of perceived intrusiveness on consumer attitudes to the meaningfulness of an ad

- *Hypothesis 1b:* The level of perceived intrusiveness a user experiences from advertising exposure negatively affects the user's attitude towards the meaningfulness of the ad

Direct Effect of Forced Exposure on Attitude Towards the Ad

The third component of research question one looks to question if forced exposure has an independent effect on consumer attitudes toward the meaningfulness of an advertisement. Previous research has demonstrated that certain ad formats can impact attitudes towards advertising (Tan *et al.*, 2016), and some authors have demonstrated a mediating effect of intrusive ad formats on consumer attitudes and behaviours (Edwards *et al.*, 2002; Kusse, 2013; Li and Meeds, 2007; McCoy *et al.*, 2007a).

To test the independent effect the following research question is formulated:

Research Question 1c: What are the effects of forced exposure to modal ads on consumer attitudes towards the meaningfulness of an ad

- *Hypothesis 1c:* Forced exposure to modal advertisements negatively affects the user's attitude towards meaningfulness of the ad

Direct Effect of Mobile Phone Attachment on Perceived Intrusiveness

It will be important to explore the direct effects between mobile phone attachment (and the multiple dimensions of this construct including anxious, addictive and useful attachment, which can be broadly classified as productive and unproductive attachment), and the latent construct of perceived intrusiveness. This leads us to examine the following research question and associated sub-hypotheses:

> *Research Question 2a:* Does the level of attachment a user has towards their mobile device directly affect the user's level of perceived intrusiveness experienced?

- *Hypothesis 2a1:* The level of useful (productive) attachment a user has towards their mobile device has a direct negative effect on perceived intrusiveness
- *Hypothesis 2a2:* The level of anxious (unproductive) attachment a user has towards their mobile device has a direct positive effect on perceived intrusiveness
- *Hypothesis 2a3:* The level of addictive (unproductive) attachment a user has towards their mobile device has a direct positive effect on perceived intrusiveness

Direct Effect of Mobile Phone Attachment on Attitude Towards the Ad

As discussed earlier, mobile attachment has multiple dimensions including anxious, addictive and useful attachment, which can be broadly classified as productive and unproductive attachment. It will be important to understand the nature of the relationship between mobile attachment (and each of its sub-dimensions) and attitude towards the ad. This leads us to examine the following research question and associated sub-hypotheses:

> *Research Question 2b:* Does the level of attachment a user has towards their mobile device directly affect the user's attitude towards the ad?

- *Hypothesis 2b1:* The level of useful (productive) attachment a user has towards their mobile device has a direct positive effect consumer attitudes towards the ad
- *Hypothesis 2b2:* The level of anxious (unproductive) attachment a user has towards their mobile device has a direct negative effect on consumer attitudes towards the ad
- *Hypothesis 2b3:* The level of addictive (unproductive) attachment a user has towards their mobile device has a direct negative effect on consumer attitudes towards the ad

Mediating Effect of Perceived Intrusiveness on the Relationship Between Forced Exposure and Attitude Towards the Ad

Following from the previous research question, It will be important to understand the mediating effect, if any, of perceived intrusiveness between forced exposure and attitudes toward the advertisement. If it can be demonstrated that forced exposure and perceived intrusiveness both independently influence attitude towards the ad, it will be interesting to ascertain whether perceived intrusiveness acts as a mediator.

> *Research Question 3:* Does perceived intrusiveness mediate the effect of forced exposure to modal ads on consumer attitudes to the meaningfulness of an ad
>
> - *Hypothesis 3:* Perceived intrusiveness mediates the effect of forced exposure to modal ads on consumer attitudes to the meaningfulness of an ad

Moderating Effect of Mobile Phone Attachment on the Relationship Between Perceived Intrusiveness and Attitude Towards the Ad

Following from the previous research question, it will be important to understand if the relationship this research aims to establish between perceived intrusiveness and attitude towards the ad is moderated by mobile phone attachment. Again, it will be useful to examine this potential effect in the context of each dimension of mobile phone attachment, as unproductive attachment may strengthen the negative effect, while productive attachment may dampen the negative effect. This leads us to examine the following research question:

> *Research Question 4a:* Does mobile phone attachment moderate the effect of perceived intrusiveness on consumer attitudes to the meaningfulness of an ad
>
> - *Hypothesis 4a1:* The level of useful (productive) attachment a user has towards their mobile device dampens the negative

relationship between perceived intrusiveness and consumer attitudes to the meaningfulness of an ad

- *Hypothesis 4a2:* The level of anxious (unproductive) attachment a user has towards their mobile device strengthens the negative relationship between perceived intrusiveness and consumer attitudes to the meaningfulness of an ad
- *Hypothesis 4a3:* The level of addictive (unproductive) attachment a user has towards their mobile device strengthens the negative relationship between perceived intrusiveness and consumer attitudes to the meaningfulness of an ad

Moderating Effect of Mobile Phone Attachment on the Relationship Between Forced Exposure and Consumer Attitudes to the Meaningfulness of an Ad

Following from the previous research question, it will be important to understand if the relationship this research aims to establish between forced exposure and attitudes towards the ad is moderated by mobile phone attachment. Again, it will be useful to examine this potential effect in the context of each dimension of mobile phone attachment, as unproductive attachment may strengthen the negative effect, while productive attachment may dampen the negative effect. This leads us to examine the following research question:

> *Research Question 4b:* Does mobile phone attachment moderate the relationship between forced exposure and attitude towards the ad

- *Hypothesis 4b1:* The level of useful (productive) attachment a user has towards their mobile device dampens the negative relationship between forced exposure and consumer attitudes to the meaningfulness of an ad

- *Hypothesis 4b2:* The level of anxious (unproductive) attachment a user has towards their mobile device strengthens the negative relationship between forced exposure and consumer attitudes to the meaningfulness of an ad
- *Hypothesis 4b3:* The level of addictive (unproductive) attachment a user has towards their mobile device strengthens the negative relationship between forced exposure and consumer attitudes to the meaningfulness of an ad

Moderating Effect of Mobile Phone Attachment on the Relationship Between Forced Exposure and Perceived Intrusiveness

Another interesting line of inquiry will be to understand if mobile attachment (and each of its sub-dimensions) moderates the relationships between forced exposure to modal ads and perceived intrusiveness. This gives rise to the following research question:

> *Research Question 4c:* Does mobile phone attachment moderate the relationship between forced exposure to modal ads and perceived intrusiveness

- *Hypothesis 4c1:* The level of useful (productive) attachment a user has towards their mobile device dampens the positive relationship between forced exposure to modal ads and perceived intrusiveness
- *Hypothesis 4c2:* The level of anxious (unproductive) attachment a user has towards their mobile device strengthens the positive relationship between forced exposure to modal ads and perceived intrusiveness

- *Hypothesis 4c3:* The level of addictive (unproductive) attachment a user has towards their mobile device strengthens the positive relationship between forced exposure to modal ads and perceived intrusiveness

Multigroup effects of Device Type on the Overall Model

The independently grouped nature of the dataset makes it feasible to test for differences between different groups. A chi-square difference test between the mobile and desktop device type groups will be performed to test for differences at the group level for the structural model.

Research Question 5a: Are differences at the model level observed between mobile and desktop device types.

- *Hypothesis 5a:* There will be a difference observed at the model level between mobile and desktop groups.

Multigroup effects of Task Intensity on the Overall Model

Similar to the device type groupings, cognitive task intensity is also independently grouped, making it feasible to test for differences between different groups. A chi-square difference test between the high cognitive intensity and low cognitive intensity groups will be performed to test for differences at the group level for the structural model.

Research Question 5b: Are differences at the model level observed between high-cognitive intensity and low cognitive intensity groups.

- *Hypothesis 5b:* There will be a difference observed at the model level-high cognitive intensity and low cognitive intensity groups.

2.7.3. Conceptual Model

The following conceptual model shown in figure 1 was developed based on the research questions and hypotheses. The triangular core of the model is the relationship between forced exposure and the constructs of perceived intrusiveness and attitude towards the ad. Other elements in the model are the independent variables cognitive intensity and device type as well as the construct mobile phone attachment (which has multiple dimensions including useful attachment, anxious attachment and addictive attachment).

The hypotheses test direct relationships between the variables forced exposure and mobile attachment and the constructs of perceived intrusiveness and attitude towards the ad. Furthermore, a mediating effect of perceived intrusiveness on the relationship between forced exposure and attitude towards the ad is tested as well as possible moderating effects of cognitive intensity, device type and mobile attachment on the relationship between perceived intrusiveness and attitude towards the ad. Finally, the moderating effect of mobile attachment is tested on the relationship between forced exposure and perceived intrusiveness as well as the relationship between forced exposure and attitude towards the ad. From a theoretical standpoint, the aim is to explain the relationships hypothesised in the model based on a combination of reactance theory, classical conditioning theory, technology acceptance model and attachment theory.

As discussed previously, reactance theory may explain why forced exposure to modal ads triggers feelings of intrusiveness in individuals, while classical conditioning theory may help explain why perceived intrusiveness could have a negative impact on an individual's attitude towards the ad. Furthermore, attachment theory may explain why individuals with problematic attachment to their mobile devices may experience higher levels of perceived intrusiveness and more negative attitudes toward the ad following forced exposure to modal ads.

Figure 1. Conceptual Model

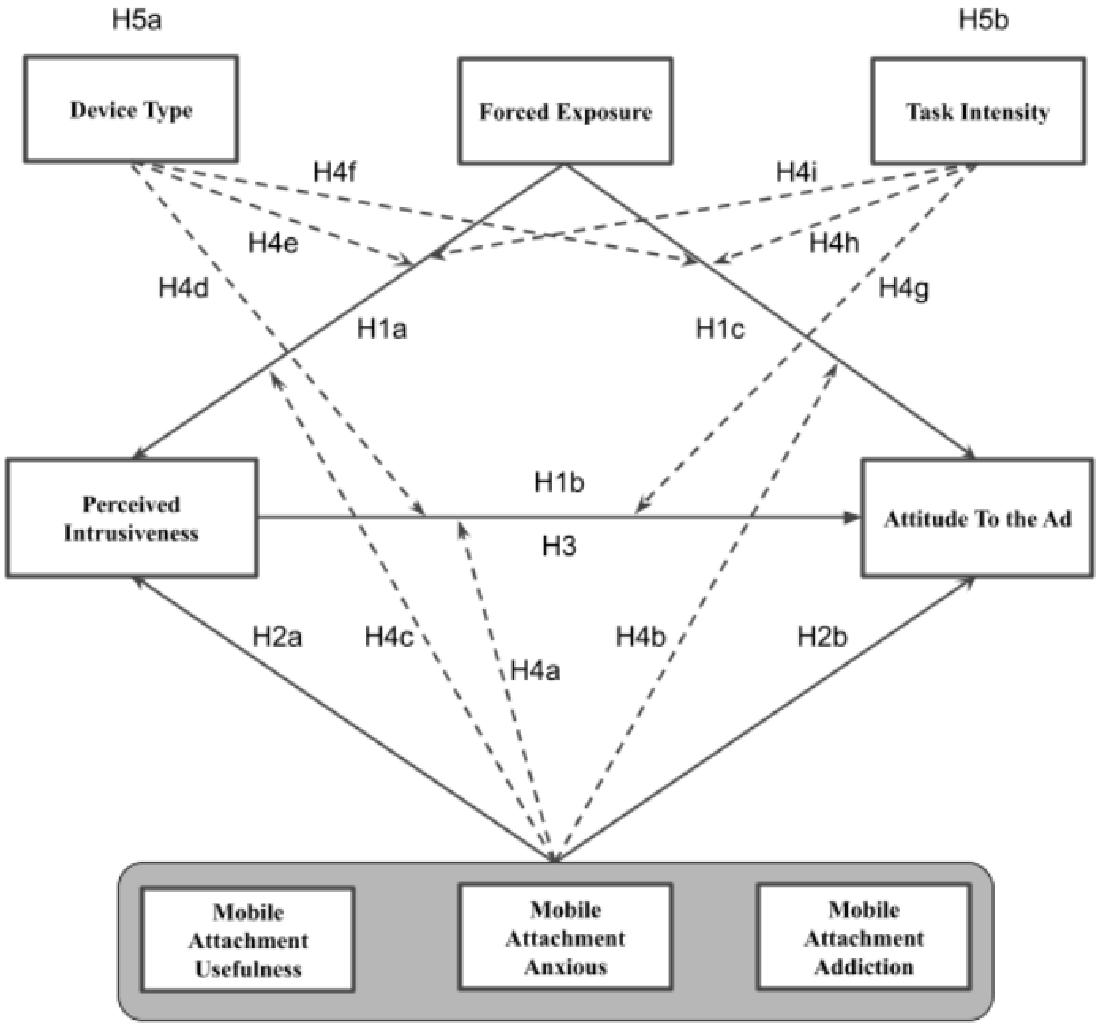


Figure 1 shows the conceptual model presenting the hypothesised relationships in the research model. Individual paths from the sub-dimensions of mobile attachment are not shown to reduce complexity.

The technology acceptance model may explain why users with more productive and/or positive attachment with their mobile phone may be protected from the negative effects of forced exposure to modal ads and experience lower levels of perceived intrusiveness and less negative attitudes towards the ad.

Hypothesis testing in the subsequent chapter is expected to shed light on these proposed relationships and theoretical mechanisms.

Chapter 3

RESEARCH METHODS

3.1. INTRODUCTION

3.1.1. Chapter Overview

This chapter outlines the research methodology used in this thesis. It begins with an introductory section which gives an overview of the research philosophy adopted by this research and a synopsis of the overall research approach. Then follows details of the methodological choices made with regards to this research, the research design and other details including time horizon and any pertinent definitions of terms used to set the context of the research.

The second section outlines the research questions, associated hypotheses and conceptual model with reference to the overall research approach of a pilot exploratory study followed by the main field experiment. Following the pilot exploratory study, the decision was made to reduce the number of factors in the field experiment which meant that the conceptual model was updated from the exploratory study to the field experiment.

The third section of this chapter focuses on the tools used in this research and the different independent and dependent variables for both the pilot test and the main field experiment. As this is a field experiment, a website was created to expose users to different experiment conditions and details of the design and technology used will be discussed. Details of the instruments used to assess the dependent variables of perceived intrusiveness, mobile phone attachment and attitude towards the ad will also be discussed as well as the technology platform used to gather responses and the design of the advertisement creatives users were exposed to.

In the penultimate section of this chapter, details of sampling and data collection are discussed for both the pilot study and the field experiment. This includes the data collection procedures, sampling methodology and the rationale behind the choice of sampling, details of the power and size of the sample, a description of the sample characteristics and details of ethical considerations with regards to this research.

The final section of this chapter describes the data analysis techniques used in this research including the coding of the raw data, warehousing and cleansing procedures to create an appropriate dataset, the rationale behind the selection and use of statistical tests and the relevant software used for analysis, calling out any sources of error and biases in the dataset.

3.1.2. Research Philosophy

This research adopts the positivist philosophical standpoint. Positivism generally adopts the philosophical stance of a natural scientist (Saunders *et al.*, 2009) and uses existing theory to develop research questions and hypotheses. Positivism is a philosophical system that only recognises data that is capable of logical or mathematical proof, where results can be quantified and tested. The positivist paradigm deals with quantitative data that is appropriate for a statistical analysis (Holden and Lynch, 2004). The most commonly used research methods and forms of data analysis are experiments, questionnaires, instruments and statistical analysis. Therefore, it is clear that this research follows a positivist research philosophy since it uses an experimental setting and instruments to collect data followed by statistical analyses of the data to test hypotheses and draw conclusions. Positivism seems appropriate in general to internet-based research, as results can be objectively measured. This is an important characteristic of positivism, in that the researcher is independent and the data tells the story (Remenyi *et al.*, 1998).

3.1.3. Research Approach

This research follows a hypothetico-deductive approach. This approach uses previous empirical research and relevant theoretical frameworks to formulate hypotheses regarding the research questions of a study. The hypotheses formulated are in a form that can be falsifiable using tests on observed data where the outcome is unknown. A test outcome which is found to be contrary to the predictions of the hypothesis is taken as falsification of the hypothesis, while a test outcome that does not run contrary to the predictions of the hypothesis is regarded as verifying the hypothesis. The hypothetico-deductive approach is a scientific method and allows for the formulation of hypotheses that can be tested through experimentation and the direct observation of results which can either reject or fail to reject the null hypothesis. As the current research study depended on actual exposure conditions to advertising, this approach was deemed most suitable as a field experiment could be designed to execute the research.

3.1.4. Methodological Choice

Saunders (2009) highlights three approaches regarding methodological choices: quantitative, qualitative or mixed-methods. This body of research follows a quantitative methodological choice, which relates to the techniques and procedures which generate numerical data and aims to establish potential relationships between these numerical variables, analysed with graphical and statistical techniques.

In the business context, quantitative methodology has been described as the traditional focus of social science research, applying a natural science approach and as such tends to base philosophical assumptions aligned to those of the researcher (McManus *et al.*, 2017). In the context of this current research, quantitative methodology is the appropriate choice as numerical primary data is collected by empirical techniques, in this case from an experimental test on a website and using validated instruments to measure latent constructs including perceived intrusiveness, attitude towards the ad and mobile phone attachment. Analysis of this data allows for a statistical representation of the phenomena under study in a rigorous manner, using measures of reliability and validity, and categorisation of the observations into measurable and repeatable data. Quantitative methodologies tend to adopt an ontology of objectivism (where the scientific enquiry should be objective and value-free, its methods should be independent of the researcher, repeatable and reliable) and a positivist epistemological approach to research (which asserts that knowledge should be based on direct comprehension of the objective world via empirically verified causal explanations), especially when used with predetermined, hard, measurable results with highly structured data collection techniques (Cole *et al.*, 2011; Saunders *et al.*, 2009).

3.1.5. Research Design

The research programme will be carried out in two phases. The first phase will be an exploratory online pilot study which will review current constructs in online advertising and validate experimental design and platform for a second large-scale field experiment. Experimental methodology is applicable in social science research when determining causal relationships amongst variables. This research is focused on examining the causal relationships between independent and dependent variables through random assignment of observations in an online field experiment to different groups. To this end, an experimental design is deemed most appropriate to test these causal relationships. Field experiment was chosen as a strategy as it mimicked closely the natural exposure environment to online advertisements and is generally seen as a way to overcome the artificiality of other types of experiments, such as laboratory-based experimentation ("Cambridge Handbook of Experimental Political Science", 2011). This experiment uses a between-subjects design where participants are randomly assigned to distinct groups. In between-subjects design, independent measures are required to ensure validity and as such a separate distinct group will be required for each (Saunders *et al.*, 2009). Furthermore, random assignment as a technique enables the formulation of the appropriate comparisons and means that each group should be similar in all aspects with the only difference being whether they received the intervention or not, in this case exposure to modal ad. A key question on the nature of the control group is also apparent; whether the control group should have no ad exposure or whether the control group should be exposed to an advertisement which is deemed to be non-intrusive. A pilot field experiment was conducted to validate the experimental platform and to develop the control group conditions, insofar as testing different ad formats and assessing the relative levels of perceived intrusiveness. A control group that was exposed to a standard banner ad was chosen as results showed that this format of advertising was viewed as non-intrusive.

3.1.6. Research Setting

The research setting in the context of this research study is a bespoke-developed website programmed to run the experiment on the internet. The internet was chosen as the setting for the research due to the inexorable fact that the design choice was a field experiment, and as such the setting of the internet is the primary environment where users are exposed to advertisements on their devices. Key advantages of this choice of setting included an increase in sample heterogeneity, better generalisability of findings, reduction in factors such as drop-out, dishonesty and deliberate fictitious responding due to the voluntary nature of participation as well as the flexibility and scalability in the design of the experimental platform. Some authors propose there are key disadvantages associated with the use of the internet as a research setting including technical issues with the platform and internet connections, multiple submissions of data, complexity and costs involved in coding websites as well as potential bias in sampling (Gardner, 2007). Strategies to counteract these potential disadvantages were given significant thought and protections put in place to ensure minimisation of risk of any of these factors affecting the validity of the research. The primary researcher was professionally skilled in web development and user-experience design and rigorous testing of the functionality and user experience on the experimental platform was undertaken during the initial pilot study to ensure consistency of data in the field experiment. Similarly, the data collection procedures were rigorous, with responses limited to one response per user, using unique identifiers including email address and ip address (which were not collected), limiting the risk of repeat or duplicate responses.

3.1.7. Time Horizon

This research will be cross-sectional, conducting the experiment in a specific time horizon. The data for the exploratory study was collected in a four-week period between October 2018 and November 2018, while the data for the online field experiment was collected over a four-week period from December 2019 to January 2020.

3.2. RESEARCH SAMPLE

The research sample for the online field study was acquired from Qualtrics Inc., a specialist research company, and was drawn from a broad quota matched sampling frame of the Irish adult population. The total number of participants in the research sample was one thousand nine hundred and ten (n=1,910). Of this, one thousand and four (n=1,004) were excluded due to either (a) an incomplete response, (b) a complete response not meeting the minimum acceptable time to complete the test (t=100 seconds, colloquially referred to as speeders) and (c) responses where the participant was deemed unengaged, selecting similar values for all scale items (colloquially referred to as flatliners). A total number of nine hundred and six valid participants were obtained (n=906). The final research sample for the field experiment was eight hundred and forty-six participants (n=846). Further exclusions from the sample were made following outlier analyses and will be discussed in section 5.1.1.

3.2.1. Sampling Method

Participants were recruited from a broad matched sampling frame. The sample was drawn from a research panel where participants were invited to participate in the field experiment. Quotas were applied to match the sample to represent a generalised sample of the Irish adult population, based on age & gender from the census data of Ireland in 2016.

The target quotas were as follows:

Table 2. Target Quotas for Age and Gender of the Research Sample

Age	Percent		Gender	Percent
18-24	12.20%		Male	49.47%
25-34	19.81%		Female	50.53%
35-44	22.59%			
45-54	18.91%			
55-64	15.31%			
65+	11.17%			

A decision was taken to use self-selection as a sampling technique as the number of respondents required to achieve adequate power was high and other sampling methods were deemed not feasible in the context of this research project. There were significant advantages in this approach to sampling including the ability to obtain geographically heterogeneous samples that may not be feasible when using traditional data collection strategies. Furthermore, the internet-based nature of the research, where users are exposed to advertisements in an online environment, made the sampling method logical. Thus, the sample in fact is a generalized sample of Irish internet users, as participation required the user to be an internet user. This fact explains why there was under-representation of older age segments and over-representation of younger age segments in the final quota sample, as one would expect the sample of internet users to follow this distribution as opposed to the general population.

3.2.2. Sample Size and Power

The total number of participants in the final research sample was nine hundred and six (n=906), with sixty of these excluded as they were identified as outliers using the Mahalanobis method for screening. The final research sample for the field experiment was eight hundred and forty-six participants (n=846). Based on the final structural model obtained from structural equation modelling, 407 degrees of freedom were identified. Using the GPower software application the power in the context of chi-square goodness of fit test criteria for the sample was calculated to be 0.891, which is within acceptable thresholds.

Figure 2. Plot of Range of Power Values Given Sample Size

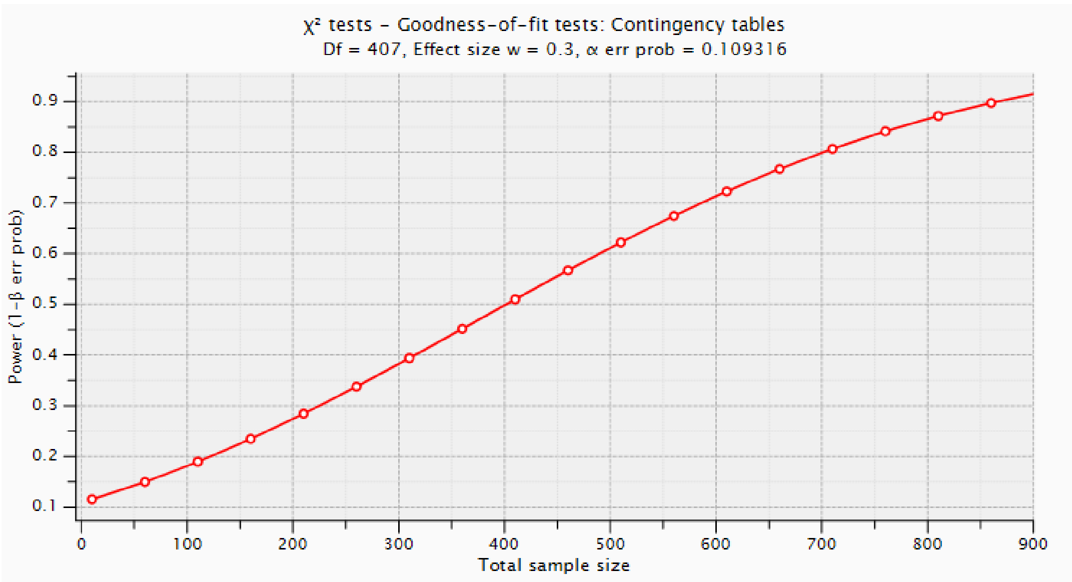


Table 3. Sample Size Power Calculation

Description	Value
Effect size w	0.3
α err prob	0.109
Total sample size	846
Df	407
Noncentrality parameter λ	76.14
Critical χ^2	442.4137
Power (1-β err prob)	0.891

The level of power, expressed as a probability, indicates how likely a Type II error is avoided. A Type II error occurs when one fails to reject the null hypothesis, even though it is false. Failing to reject a false null hypothesis means that an effect existed but was not detected by the study.

3.2.3. Sample Characteristics

The achieved age quotas for the sample are presented in table 4. These are broadly in line with the characteristics of the general population of Ireland, with the largest deviation from the general population seen in the 55-64 and 65+ categories. This is deemed acceptable as these segments differ significantly from other segments in terms of internet use, with approximately 68% of these segments having used the internet within the last 3 months (Central Statistics Office, 2019).

Table 4. Age Distribution for the Research Sample

Age	Frequency	Percent	General Population
18-24	150	17.70%	12.20%
25-34	212	25.10%	19.81%
35-44	212	25.10%	22.59%
45-54	178	21.00%	18.91%
55-64	74	8.70%	15.31%
65+	20	2.40%	11.17%

Based on this we expect the older age segments to be under-represented in the overall sampling frame of internet users. Thus, we can conclude that the sample is broadly representative of the population of Irish internet users. The achieved gender quotas for the research sample are presented in table 5. These closely match the age characteristics of the general population of Ireland, with 49.4% male and 50.6% female, compared with 49.5% male and 50.5% female for the general population.

Table 5. Gender Distribution for the Research Sample

Gender	Frequency	Percent	General Population
Male	418	49.41%	49.47%
Female	428	50.59%	50.53%

The sample was drawn from a research panel in the Republic of Ireland and users were geographically restricted to this territory.

3.2.4. Rationale for Inclusion of All Users in Hypothesis Testing

It is important to clarify and justify the rationale for including all users (notably, desktop users) in hypothesis testing of users' assessment of their attachment to their mobile device. Firstly, within the sampling frame of the republic of Ireland, it is reported by research from ComReg (2021) that 99% of the population own a mobile phone, so the prevalence of mobile phone ownership is practically ubiquitous within the sample. Secondly, the question posited to the respondents is to describe their relationship with their mobile phone and their habits, not their current experience or attitudes towards the device they are currently using right now. Thus, one can assume that the number of users taking the test that don’t own and experience the use of a mobile phone is negligible. Furthermore, as the mobile phone attachment scale (Bock, 2016) looks at behaviors in general and over-time, it is appropriate to use this instrument with all users, as opposed to those only undertaking the online test with their mobile device. The rationale of the experimental test was to look at differences between reactions to ad exposure on different devices, while the mobile attachment scales looks at more global indices of attitudes and behaviours of the user and their relationship with their device.

3.2.5. Ethical Considerations

The research was deemed to have a low to moderate risk to participants so ethical approval was sought from and granted by the Trinity College Dublin School of Business Research Ethics Committee, a level-one research ethics committee. The ethical guidelines followed were as per the TCD Ethics Policy. It was expected that there would be minimal risks and discomforts for participants during the data collection phase. As data was anonymized, no perceived privacy risks were identified.

Data was collected using a questionnaire hosted on the Qualtrics platform and via an experimental website which integrated and passed data back and forth via the platform. Any information or data which was obtained about the participant during this research which was identified as being from the participant was treated confidentially. The only personally identifiable information that was gathered was the user's email address, purely as a method to validate the participant, and this was stored in encrypted and obfuscated form on the Qualtrics platform and only visible to authorised Qualtrics employees, in line with their privacy policy.

All other anonymous data collected was securely retained for the purpose of analysis by securing the data in an encrypted file on a cloud storage platform (Google Sheets, Google Drive, password protected, encrypted with 2-factor authentication). The data will be kept on a secure encrypted cloud storage platform and on a password protected drive on a laptop, accessible only by the named researcher. The data storage and the grounds for continued storage will be reviewed within 24 months of completion of data. Any data that is no longer required will be destroyed or erased in a safe and secure way. Any data that is still required will be further reviewed every 12 months and may be kept for up to 10 years.

Participants invited to take part in the research were presented with a participant information statement and a consent form prior to proceeding with the experimental procedure (see Appendix IV). Prospective participants who did not consent to taking part in the research by ticking the checkbox indicating their consent were shown a page informing them that their participation in the experiment had ended and the session was terminated. Ethical approval was granted by the Trinity Business School Research Ethics Committee on the 23rd November 2017.

3.3. RESEARCH TOOLS

3.3.1. Experimental Website

Pilot Study Website

The pilot study website was developed as a prototype website where users are exposed to different advertising conditions (controllable, obscuring, repeated exposure) in different cognitive intensity environments (high vs low) and on different devices (mobile vs desktop). When the user landed on the website they were presented with a call-to-action to 'begin experiment' and once they clicked to start, they were randomly assigned to one of the different experimental conditions. The cognitive intensity conditions were executed as two separate and independent sections of the website whereby the high intensity condition was a psychometric test section and the low intensity section was a browsing task. The data was collected in the back end of the system, recording variables as per exposure conditions - device type (mobile/desktop), cognitive intensity (low/high), ad format (non-obscuring banner / obscuring popup, non-controllable/controllable popup and repeated exposure / not repeated). Other variables including whether the user clicked on the ad were recorded for exclusion in the data analysis.

The pilot study website was an important first step in developing a scalable solution for the collection of data in the later field experiment. It allowed for the user journey and experience to be tested meticulously on different browsers and devices and in different scenarios. Following comprehensive internal testing, the test was administered to a sample of 99 third-level students in an Irish university to undertake a live test of data collection and to validate the consistency of data collection. The key difference between the experimental design for the pilot study versus the field experiment was that demographic questions and scales were administered on the test website for the pilot study, while these elements were administered on the Qualtrics website (integrated with the test procedure) for the field experiment to enable scalable participant recruitment.

Field Experiment Website

Data was collected using the Qualtrics platform integrated with a proprietary website test system that was developed by the researcher as part of the pilot study. A multipart survey questionnaire was designed so that participants selected from the sampling frame were directed to the first part of the survey which included the participant information leaflet and a consent form. At this point the system collected some anonymous information on the user's operating system, device and browser as well as assigning a user id. Following consent by the user, the system randomly assigned the users to one of the experiment conditions and they were redirected from the Qualtrics system to the experimental website, built on the Wordpress platform. The system then displayed a page with instructions to the participant about the specific task they were assigned to and they proceeded to complete the task, which involved being exposed to one of the two different ad types. Once the participant completed the task, they were redirected back to the Qualtrics platform where they completed the three instruments - perceived intrusiveness scale, attitude to the ad and mobile phone attachment scale.

Using the ‘custom field’ php function in Wordpress, it was possible to pass back and forth the relevant variables from the test website to the qualtrics platform where the unique identifier was used to collate all the data into one contiguous dataset. The mean time to complete the test from start to finish was 160 seconds, so a filter was applied where users who completed the test in 100 seconds or less were excluded (termed ‘speeders’). These unengaged users most likely completed the scales without reading the questions and thus were deemed invalid and excluded.

3.3.2. Advertising Creatives

The advertising creatives used for the field experiment were the same set of ads that were used for the pilot study. The ads were designed according to industry standard principles and were congruent with the user experience. Congruence with the content on the website was deemed necessary as it was important to minimise ad content as a potential confounding factor in the research as per the findings of McCoy and Everard (2008), where congruency of the ad content with the web content was shown to minimise effects of ad content on perceived intrusiveness. The ads represented a fictional brand and fictional service. For all experimental conditions the same set of advertisements were used to prevent a causal identification issue. The ad content promoted an IQ type psychometric test delivered by a fictional brand. The ad content in the high intensity scenario is congruent with the user experience, limiting ad content as a source of experimental bias (McCoy and Everard, 2008).

Figure 3. Advertisement Content Creative Design

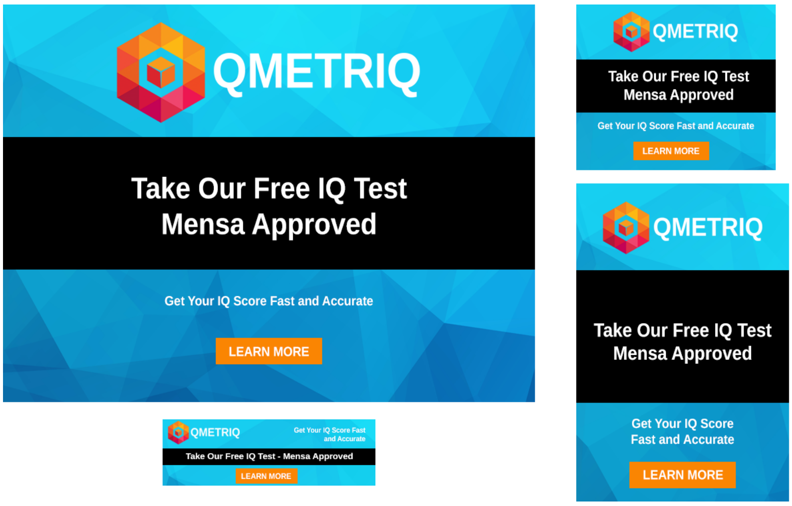


Fig. 3 shows the design of the advertisement creative for the experiment. Top Left: Desktop Modal Ad; Top Right: Desktop Static Banner; Bottom Left: Mobile Static Banner; Bottom Right: Mobile Modal Ad.

The creatives were designed in line with industry standards as per the Internet Advertising Bureau guidelines for display advertising (IAB, 2019). For desktop devices, the static banner treatment was a medium rectangle display ad unit with dimensions of 300 x 250 pixels. For mobile, the static banner treatment as the large mobile banner ad unit was chosen with dimensions of 320 x 100 pixels. For the modal ads, which represented the forced exposure obscuring condition, a modal ad with dimensions of 800x600 pixels was chosen for desktop screens and a modal ad with dimensions of 320x480 pixels for mobile screens, which obscured approximately 60% of the screen.

3.3.3. Instruments

Perceived Intrusiveness

The first instrument used in this research study to measure the latent construct of perceived intrusiveness was the seven-point Likert scale instrument developed by Li et al. (2002) for ad intrusiveness. The scale is widely used in peer reviewed research with over six hundred citations in the Google Scholar search engine as of spring 2020 (Google, 2020). The scale asked participants to rate their opinion of the question, “When the ad was shown, I thought it was…”, labelled from ‘strongly disagree’ to ‘strongly agree’ with scales items of distracting, disturbing, forced, interfering, intrusive, invasive and obtrusive. During the development of the instrument, a reliability analysis was carried out on a sample of the cohort and Cronbach’s Alpha was reported as 0.917, above the acceptable reliability of 0.70 for social science research. Furthermore, eigenvalues and inter-item variance was above acceptable threshold, so the scale was deemed reliable and unidimensional (Li *et al.*, 2002). The scale has been used in multiple high impact research studies (Baek and Morimoto, 2012; Cho and Cheon, 2004; Ha and McCann, 2008; McCoy *et al.*, 2007a, 2007b; Van Doorn and Hoekstra, 2013).

The scale had the following items:

When I saw the ad I thought it was...

- Distracting
- Disturbing
- Forced
- Interfering
- Intrusive
- Invasive
- Obtrusive

Attitude Towards the Ad (Meaningfulness)

The second key instrument used in this research project was the attitude towards the ad (meaningfulness) scale, extracted from Volume 9 of the Marketing Scales Handbook (Bruner, 2017). The scale measures the degree to which a particular advertisement is believed by a person to be appropriate and useful to them and consists of four, seven-point likert-type items.

The scale was taken from work by Smith et al. (2007) as a sub-scale of the overall ad relevance scale and was termed the ad-to-consumer relevance scale and Cronbach's Alpha was determined to be 0.92, indicating good reliability (Smith *et al.*, 2007). The extracted scale was subsequently used by Lehnert et al (2014) in multiple independent studies with reported Cronbach's Alpha ranging from 0.80 to 0.97 and evidence in support of discriminant and convergent validity was provided in each study (Lehnert *et al.*, 2014).

The scale is constructed as follows:

Attitude Towards the Ad (Meaningfulness) Scale

When I saw the ad I thought...

- The ad was meaningful to me.
- The ad was appropriate for me
- The ad was useful to me
- The ad was valuable to me

Mobile Phone Attachment

The Mobile Phone Attachment Scale (MPAS) developed by Bock et al. (2016) rightly pointed out that many of the existing instruments used to measure the user's relationship with technology had a tendency to focus on the negative constructs and were based on the assumption that technology use correlated with pathology. The authors highlighted that technology use can be beneficial in some instances, such as enhancing productivity and connectivity. The authors argued that a more balanced instrument should be developed and this led to the Mobile Phone Attachment Scale (MPAS). The scale consists of 26 statements about mobile phone use across four distinct components - Usefulness, Anxious Attachment, Addiction and 24/7 (Continuous Use). All four subscales demonstrated good internal consistency reliability with Cronbach's alpha for Usefulness (0.90), Anxious Attachment (0.87), Addiction (0.84) and "24/7" (0.77).

Participants were asked to report how true each statement was to them using a 5-point Likert scale from "1=not at all true" to "5=extremely true" (Bock, Thind, *et al.*, 2016).

Usefulness

- My phone helps me keep track of my healthy habits.
- My phone helps me make positive health decisions.
- My phone helps me to be more organized.
- My phone is my personal assistant.
- I can get more work done when I have my phone with me.
- I am never bored if I have my phone with me.
- My phone makes me feel connected to people.
- My phone is the main source of getting any information I need.

Anxious Attachment

- I feel anxious if I don't have my phone with me.
- I feel anxious if I have not received a call or message for some time.
- I feel isolated without my phone.
- I feel dependent on my phone.
- I feel annoyed/angry when people do not respond to my texts immediately.

- I would rather lose my wallet or purse than my phone.
- I check my phone (for text, email, voicemail, etc.) even when it hasn't rung or sounded an alert.

Addiction

- I find myself occupied on my phone even when I'm with other people.
- I find myself occupied with my phone when I should be doing other things.
- I find myself engaged on the mobile phone for longer periods of time than I intended.
- My phone wakes me up at night (dings or notifications from texts, calls or other messages).
- I wake up to check my phone for messages at night.
- I would get more work done if I spent less time on my phone.

"24/7"

- I keep my phone on 24 hours a day.
- I don't leave home without my phone.
- I set my phone on vibrate or silent mode rather than turning it off.
- I read or send text messages when I am at work or in class.
- I use my phone all day.

Strong Interest Inventory

The Strong Interest Inventory questionnaire was utilised as the user task in the high-cognitive intensity task in the experiment. The rationale behind using this instrument was based on the fact that it was readily available, provided a task which required user focus and concentration, provided a value exchange to the participants to complete the task and receive results as well as a supplemental source of data for future analysis. The Strong Interest Inventory is based on Holland's theory of vocational personality (Holland, 1959). The theory gives and outline of approaches for helping people to make career choices based on six vocational personality types - realistic (R), investigative (I), artistic (A), social (S), enterprising (E) and conventional (C). Holland proposed that people tend not to be confined to one specific personality type, but have a combination of strengths across the different personality types. This gave rise to the Holland Code system (R-I-A-S-E-C), where people are categorized based on combinations of letters, from one to three letter combinations, based on the strength of their affinities for each personality type. The Strong Interest Inventory makes up the high cognitive load task in this research study as it required concentration and high cognitive load to carefully answer the questions. The value-exchange of attention for the results of the test and the individual receiving their Holland code and predicted career preferences is expected to assist in compliance and focus attention on the task. The Strong Interest Inventory Questionnaire is shown in Appendix I.

3.4. PILOT STUDY

The pilot study was an important instrument to test and validate research tools, to assess the overall setup of the experimental platform and to test data collection procedures and methodologies. The pilot study also allowed for user experience on the test website to be assessed and to ensure that there were no errors or obstacles for users completing the test. A more extensive range of independent variables were included in the pilot test study, and although the sample size was limited, and any results limited to interaction effects, the overall objective to test the quality and consistency of data collection methodologies on the website was met.

A detailed description of the sampling, research questions, experimental design, data collection and results from the pilot study are discussed in Appendix V and only a summary of the pilot study and learnings will be presented in this section.

3.4.1. Overview

The pilot study was conducted using the same experimental website that was to be used later in the main field experiment. The research sample for the pilot study was recruited from students attending a third-level university in Ireland and a total number of ninety-nine (n=99) participants made up the sample. The key independent variables included in the pilot study were as follows: (a) ad format (made up of controllable ads, obscuring ads and static banner ads), (b) task cognitive intensity, (c) repeat exposure and (d) device type. The relationship between each of these independent variables and perceived intrusiveness were tested. A number of exploratory research questions and hypotheses were developed based on previous empirical research and an experiment designed to test the hypotheses.

The experiment was conducted on a website that was built to test the different experimental conditions. The website was styled as a digital research platform which had two distinct content streams to test varying levels of cognitive load during exposure. The first content stream on the website was the high cognitive load stream which had a number of pages of psychometric test questions, while the second independent low cognitive load content stream had a number of pages of blog articles. At the start of the experiment, the participant was randomly assigned to one of the experimental conditions. Ad exposure occurred on the third step for each participant and the ad selected in the condition was delivered to the participant. At the end of the test following six pages the participant was presented with the perceived intrusiveness scale and asked to respond to their experience of the ad they saw on the third step. There was also a repeat exposure condition where the participant was exposed to the ad on two occasions, step three and step five. Data from the pilot study was collected through the website and logged in a central database on the website. Data from the pilot study was analysed in SPSS and AMOS and a linear regression analysis performed to test for direct effects of the independent variables on the dependent variable, perceived intrusiveness.

The results observed were as follows:

- PI<---OBS, Beta= 0.599, 95% CI [0.422, 0.771], *** ($p<0.001$), Supported
- PI<---CTRL, Beta= 0.269, 95% CI [0.139, 0.399], ** ($p=0.001$), Supported
- PI<---DT, Beta= 0.194, 95% CI [-0.009, 0.408], ($p>0.05$), Not Supported
- PI<---CI, Beta= -0.134, 95% CI [-0.333, 0.065], ($p>0.05$), Not Supported
- PI<---RPT, Beta= 0.245, 95% CI [0.087, 0.403], ** ($p<0.01$), Supported

(PI, perceived intrusiveness; OBS, obscuring ad; CTRL, ad controllability; DT. device type; CI, cognitive intensity; RP

Interaction effects were also tested on the independent variables' device type and cognitive intensity on the effects of observability and controlling on perceived intrusiveness and no significant interaction effects were found. A full breakdown of the methodology and results are presented in Appendix V.

3.4.2. Learnings from Pilot Study

The pilot study was an important learning tool for the researcher to understand the challenges of experimental research in practice and to find solutions to the challenges presented prior to scale up for the field experiment. Furthermore, the pilot study allowed for the refinement of the experimental design, sampling methodology, data collection as well as data methodology for the field experiment.

Key Variables

Based on the preliminary results of the pilot study the independent variables of controllability and obscuring were found to have significant preliminary effects and were deemed suitable to carry forward into the main field experiment. A decision was made to combine these variables into a single ad treatment - forced exposure, where the treatment consisted of an ad that obscured the screen and was not immediately dismissible by the participant. The 95% confidence intervals for device type and cognitive intensity were borderline, so these variables were selected for further study. Repeat exposure was not selected to be carried forward as there was already a significant amount of previous empirical research on the subject and the contribution of including this variable was not deemed to be sufficient.

Number of Factors

The high number of factors in the field experiment was identified as a challenge in terms of the high sample size required to draw any valid conclusions from the observed effects. The issue of confounding variables became apparent, which could introduce measurement error and bias. A decision was taken to reduce the overall number of factors for the field experiment. Firstly, the variable repeat exposure was removed for the field experiment as this had been studied previously by a number of authors (Elsen *et al.*, 2011; McCoy *et al.*, 2017; Rethans *et al.*, 1986) and it was felt that including the variable would not add significant value to the overall research.

Secondly, the ad format factors obscuring and controllability were merged into a single treatment of the variable - forced exposure. This embodied both aspects of obscuring and controllability, whereby the user was exposed to an obscuring advertisement for a period of 5 seconds after which they could exit.

By adopting these changes and reducing the total number of independent variables to three (forced exposure, cognitive intensity and device type) it is believed that the issue of confounding variables was mitigated (as per the high sample size in field experiment).

User Experience

The pilot study allowed for refinement of the user experience on the test website. Following data collection, it was noted that there was a significant difference in the number of users completing the two different tests (high vs low cognitive intensity), even though random assignment had been coded. Following review and feedback it was noted that some users were confused when they redirected to the browsing task as they had skipped past instructions without reading fully. To remedy this for the field experiment, clear instructions were presented on the first page of the browsing task as well as a ticker in the bottom right showing the user the number of pages they had left to complete before the task ended. These adjustments had the desired effects in that when scaled to the field experiment, the issue of lower compliance in the browsing task was not observed.

Sampling & Data Collection

The pilot study highlighted the need for scalable participant recruitment to meet the required sample size to derive sufficient power from the field experiment. A decision was made to make use of a panel of respondents from the company Qualtrics. To use the panel from Qualtrics, modifications were required to the test website, where quotas were applied to the panel to ensure the sample represented the general population of Ireland as closely as possible. The pre-test questionnaire and the survey instruments were moved from the test website to the Qualtrics platform, while the actual test task remained on the experimental website. The website needed to be redeveloped to pass data to and from the Qualtrics platform. This allowed the panel from Qualtrics to have quota applied, yet still keeping the overall flow of the experiment the same, albeit on different backend platforms.

3.5. FIELD EXPERIMENT

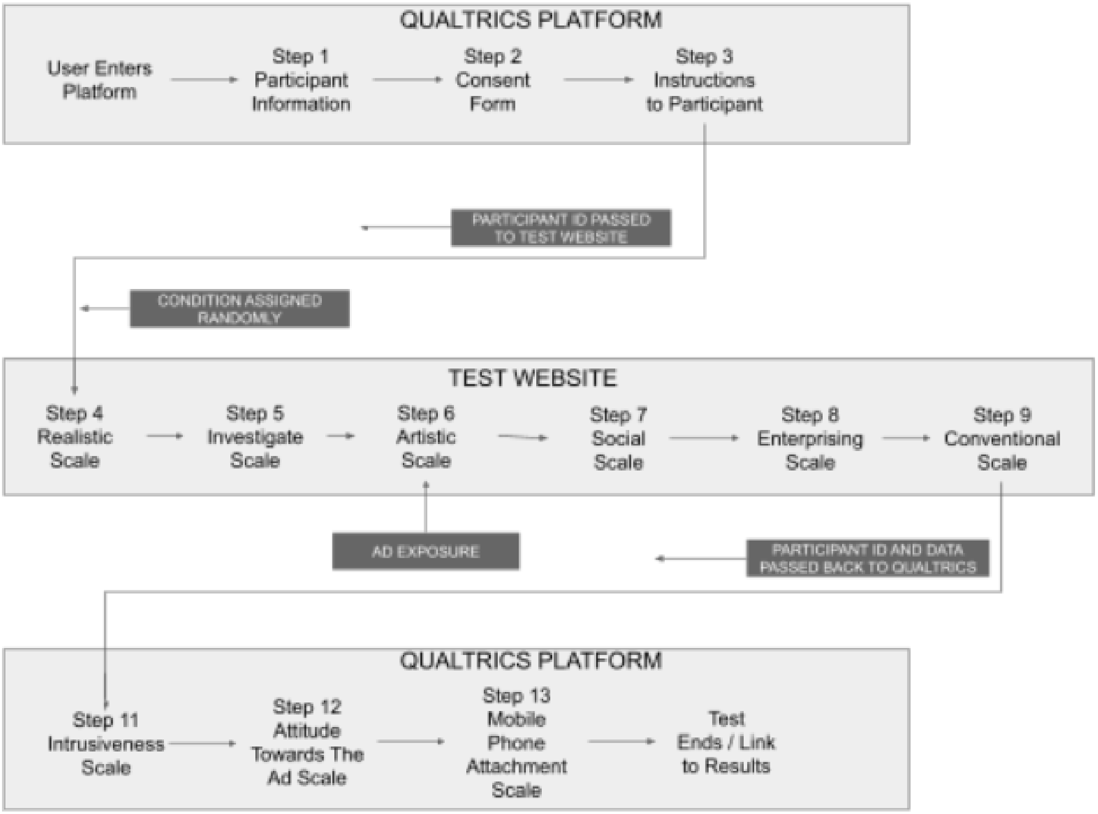
Following the pilot test study, learnings were applied and the second phase of the research programme commenced. Learnings identified from the pilot study included low sample size (n=99) and the large factorial design (3x2x2x2), which risked the issue of confounding factors and insufficient power due to the number of subjects in each group in this small sample size. However, there was potential to see interaction effects. To apply these learnings in the online field experiment, the sample size was increased, with a target of 100 subjects per independent group (n=800) and the overall factorial design was reduced to 3x2x2x2, removing variables that were not relevant to the research questions in the second experiment, namely repeat exposure and ad controllability. Furthermore, the latent constructs were expanded to include perceived intrusiveness, attitude towards the ad and mobile phone attachment. The key independent variables in the online field experiment were (a) two ad formats - forced exposure (obscuring non-controllable modal ad) and static banner ad, (b) two levels of task cognitive intensity (low / high) and (c) two device types (mobile / desktop), which aimed to address the key research questions around whether device type had an effect on perceived intrusiveness to advertising and attitude towards the ad and whether mobile phone attachment demonstrated effects on the latent constructs.

3.5.1. Experimental Design

The field experiment adopted a 2x2x2 factorial design - the three independent variables (forced exposure, cognitive intensity and device type) with two conditions each (banner / modal; psychometric test / browsing task; mobile device / desktop device). The number of overall factors was reduced in the field experiment based on the variables of interest from the pilot study. Similar to the pilot study, and to provide consistent conditions, the high intensity psychometric task and the low intensity browsing tasks we matched so that the subject was exposed to ad after the same number of clicks in each task, in the same format and both tasks ended after the same number of clicks.

To execute the field experiment, the website developed for the pilot study was expanded and an integration with the Qualtrics platform was performed to improve data collection and participant recruitment. The Qualtrics platform was limited in the fact that it could not be programmed to expose participants to the different advertising conditions. Upon recruitment through the Qualtrics platform, participants were asked to fill out a pre-test questionnaire which included demographics and a consent form as well as a participant information page. Once consent was given by the participant, a page showing instructions to the participant was shown and they were randomly assigned to one of the experimental conditions. At this point the Qualtrics system redirected participants to the specific journey on the experimental website. Integration was achieved by passing a unique token with the participant ID from the Qualtrics pre-questionnaire to the test website. Figure 4 illustrates the high-cognitive intensity experimental condition with the data flow between the Qualtrics platform and the test website and back again to the Qualtrics platform. The same data flow process was applied to both the high cognitive and low cognitive tasks.

Figure 4. Field Study Experimental Design



Once on the test website, the participant undertook the task they were assigned to and once completed they were redirected back to the Qualtrics platform to complete the relevant scales.

Upon redirection from the experimental website back to the Qualtrics platform, the saved Participant ID as well as details of the respective condition the participant underwent were passed back by the test website as a query string to the Qualtrics platform and the data appended to the dataset for that participant.

Once the participant completed the relevant latent construct scales the dataset was finalised. Only participants fully completing the process were included in the data analysis. Incomplete entries were excluded from the analysis.

3.5.2. Experimental Conditions

Based on the 2x2x2 factorial design of the field experiment there are eight conditions in total making up eight independent groups, summarised below in Table 6.

Table 6. Experimental Conditions

Condition	Ad Format	Cognitive Intensity	Device Type	Target Sample Size
1	Banner	Low	Mobile	100
2	Banner	Low	Desktop	100
3	Banner	High	Mobile	100
4	Banner	High	Desktop	100
5	Modal	Low	Mobile	100
6	Modal	Low	Desktop	100
7	Modal	High	Mobile	100
8	Modal	High	Desktop	100

Ad Format

The number of factors for the ad format variable was reduced from three (banner, obscuring non-controllable modal and controllable modal to two (banner, obscuring non-controllable modal) for the online field experiment. The rationale behind this change was to focus on the ad format condition that showed the strongest factor loadings for perceived intrusiveness from the pilot study and this was most likely to precipitate feelings of intrusiveness following exposure in the field experiment. Furthermore, it was necessary to reduce the overall number of factors in the experimental design so this progression was deemed justified. Factor reduction requirements also led to the decision to remove the repeat exposure condition from the field experiment. These modifications made it possible to recruit the optimum sample size for each independent group and to avoid possible confounding variables.

The ad formats used in the field experiment were taken from the pilot study and were (a) the non-obscuring banner ad condition, which consisted of a medium rectangle display ad unit on desktop with dimensions of 300 x 250 pixels and a large mobile banner ad unit on mobile devices with dimensions of 320 x 100 pixels and (b) the non-controllable ad condition will consist of a modal ad unit on desktop devices with dimensions of 800 x 600 pixels and a modal ad unit on mobile devices with dimensions of 320x480 pixels.

Mirroring the procedure in the pilot study the ads were shown to users after the same number of clicks irrespective of the experiment condition, ensuring consistency in exposure. Figures 5 and 6 below shows the positioning and format of the respective ads on the test website. The non-obscuring static banner ad was shown in the top right quadrant of the webpage on desktop devices and on the bottom of the screen on mobile devices. The non-controllable modal ad was shown obscuring the screen and forcing the user to wait five seconds before they could close the ad and continue with their task.

Figure 5. Non-Obscuring Banner Ad Format

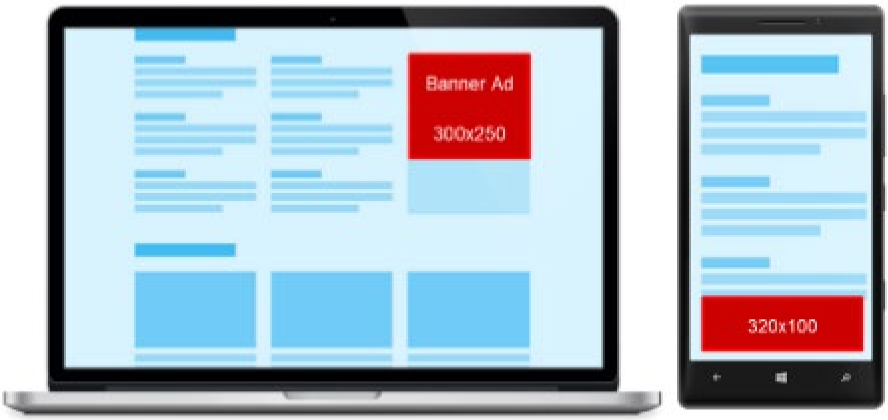
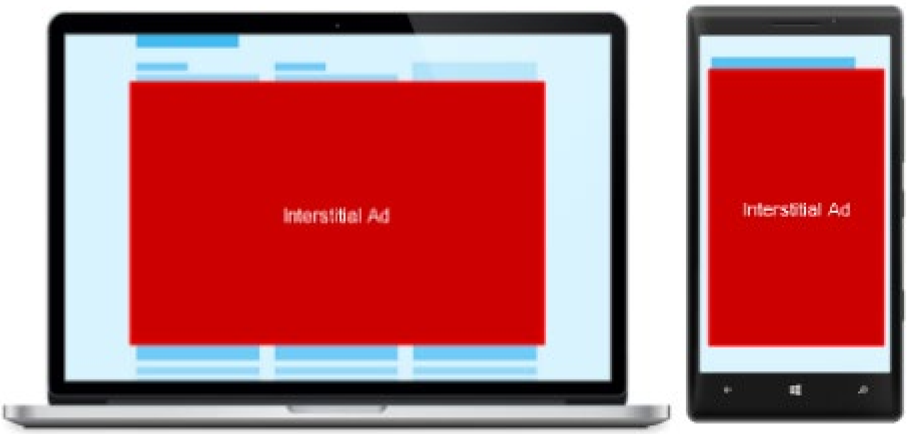


Figure 6. Forced Exposure Popup Ad Format



Cognitive Intensity

The cognitive intensity experimental condition for the field experiment did not differ from the pilot test study (discussed in Appendix V, section 9.5.5). In summary, the first condition was the high cognitive load psychometric test condition and the second condition was the low cognitive load browsing task condition.

Device Type

The device type experimental condition for the field experiment did not differ from the pilot test study discussed in Appendix V, section 9.5.5. The system automatically detected the device type the participant was using and adapted the responsiveness and conditions based on the device type.

3.5.3. Latent Constructs

A key difference between the pilot study and the field experiment was the addition of two additional latent constructs. Scales measuring the constructs of attitude towards the ad (meaningfulness) and mobile phone attachment were included. These scales were placed after the perceived intrusiveness scale in the experimental procedure on the Qualtrics platform.

Each of the scales used in the field experiment are discussed in detail in section 9.5.6, Appendix V..

3.5.4. Data Collection

Data was collected using the Qualtrics platform integrated with a proprietary website test system that was developed by the researcher as part of this research study. A multipart survey questionnaire was designed so that users from the sampling frame were directed to the first part of the survey which included the participant information leaflet and a consent form. At this point the system collected some anonymous information on the user’s operating system, device and browser as well as assigning a user id. Following consent by the user, the system randomly assigned the users to one of the experiment conditions and they were redirected from the Qualtrics system to the experimental website, built on the

Wordpress platform. The system then displayed a page with instructions to the participant about the specific task they were assigned to and they proceeded to complete the task, which involved being exposed to the two different ad types. Once the participant completed the task, they were redirected back to the Qualtrics platform where they completed the three instruments - perceived intrusiveness scale, attitude to the ad and mobile phone attachment scale.

Using the ‘custom field’ php function in Wordpress, it was possible to pass back and forth the relevant variables from the test website to the Qualtrics platform where the unique identifier was used to collate all the data into one contiguous dataset.

The mean time to complete the test from start to finish was 160 seconds, so a filter was applied where users who completed the test in 100 seconds or less were excluded (termed ‘speeders’. These users most likely completed the scales without reading the questions and thus were deemed invalid and excluded.

Chapter 4

DATA ANALYSIS

4.1. INTRODUCTION

Data analysis was performed using the SPSS v.21 statistical software package and the IBM AMOS v.21 software package for structural equation modelling. Following collection, data was exported from the Qualtrics platform as a SPSS data file. The first phase of data analysis involved re-coding the variables in the data file into the formats required for statistical analysis, followed by data screening where the data was checked for accuracy and screened for outliers. A power analysis was then performed to ascertain if the required sample size for each group was met. Descriptive statistics and frequencies were presented followed by an exploratory factor analysis to assess sampling adequacy, discriminant and convergent validity and scale reliability. Following this a confirmatory factor analysis was performed including testing for configural, metric and scalar invariance followed by an assessment of common method bias. Finally, the structural model was developed and tested.

4.2. RATIONALE

4.2.1. Rationale for Using SEM

Structural equation modelling was chosen as the most appropriate technique to analyse the data gathered in the field experiment. Structural equation modelling is popular and widely used in social science (Kline, 2005), based in part on the accessibility of user-friendly software packages (e.g. AMOS, Lavaan, Mplus) (Shaheen *et al.*, 2017). The hypothetico-deductive nature of the current research, whereby hypotheses are developed from theory and then tested using experiment, lends itself well to the use of structural equation modelling. As discussed by Kline (2005), it is easy to fit a model to a specific set of data by overspecification and an exploratory inductive approach, so structural equation modelling as a technique in these instances may lead to unreliable claims due to specification and measurement errors. In this research, where defined hypotheses are developed from theory and tested using experimental techniques, structural equation modelling is deemed appropriate as a model is developed to test the theorised relationships between variables. Another key advantage of structural equation modelling is the ability to define latent constructs from observed factors in a measurement model and impute these unobserved constructs into a structural causal model where the relationship between observed and unobserved variables can be tested (Kline, 2005). One drawback of structural equation modelling discussed by Kline (2005) is the need for large sample sizes due to the risk of technical problems in the analysis as well as errors in certain types of estimates including standard errors for latent variables when a small sample size is employed. The approach used in this study is covariance-based SEM (CB-SEM) using the IBM AMOS program as opposed to the other leading SEM technique, variance-based SEM (VB-SEM).

4.2.2. Rationale for Using SEM over ANOVA

One of the primary reasons for selecting SEM over other analysis techniques such as ANOVA was that hypothesis 3 looked at the mediating effect of perceived intrusiveness on the relationship between forced exposure and attitude towards the ad. ANOVA is not suitable for this type of mediation analysis (Breitsohl, 2019).

A second reason for the selection of SEM over ANOVA was the fact that a model was being tested which is not possible within ANOVA. Model fit indices are not available in ANOVA, while the chi-square test and numerous model fit indices are available within SEM analyses. Furthermore, the large sample size obtained in this current research allowed for the opportunity to use SEM, which large sample sizes are recommended. Furthermore, ANOVA requires a very high number of assumptions to be made, while this is significantly lower in SEM where many assumptions can be tested and validated including invariance. Finally, the current research depends on a number of latent variables and the exploration of causal relationships, which is challenging using ANOVA. Thus, in light of these factors, SEM was deemed the most appropriate analysis technique for this study.

4.2.3. Rationale for Using CB-SEM over VB-SEM

The decision to use covariance-based SEM over the other popular technique for data analysis, namely variance-based SEM, was taken in the light of a number of factors. Firstly, the nature of this research study was to explore relationships between variables based on theory and confirm these relationships as opposed to exploratory research, where the relationship may not be expressly based on theory or if the theoretical foundations are not clear (Hair *et al.*, 2014). Secondly, the choice of CB-SEM was also based on the fact that the data met parametric assumptions required for CB-SEM; (a) that the data had a multivariate normal distribution and that the sample size was sufficiently large for convergence (Mohamad *et al.*, 2019). It was found that the data did meet these assumptions, so CB-SEM was deemed to be the appropriate choice. A third consideration in the choice of CB-SEM over VB-SEM is the discussion and disagreement in the literature regarding potential inherent bias in estimating model parameters in VB-SEM. Some authors have alluded to the possibility that VB-SEM is not suitable as an analysis technique, is difficult to justify and that researchers should abandon it in favour of CB-SEM (Antonakis *et al.*, 2010; Rönkkö and Evermann, 2013).

Given this inherent controversy in VB-SEM, the fact that the current research had a sufficiently large sample size, the data was normally distributed and that the current research aimed to test relationships based on defined theoretical foundations, the rationale for the choice to use CB-SEM over VB-SEM is validated.

4.3. DATA PREPARATION AND OPTIMISATION

One of the first key steps in the structural equation modelling process is the preparation of the data for the analysis. The data is first coded in an appropriate way to ensure the data is consistent with the requirements of the analysis - all data should be numeric and any string data must be transformed into numeric values. Variables should be renamed according to their representative (see appendix VI).

A cursory screen of the data is first performed to check for missing data. Following this the data is probed to identify unengaged responses. In marketing research using survey methodology, unengaged responses consist of responses by users where there is a consistent pattern of responses such as toggle buttons filled out in a straight line or in a zig-zag fashion. These responses tend to represent a scenario where the participant is not engaged with the question and is just arbitrarily checking boxes to get through the survey. Generally, the effect of these responses on the overall consistency of the data is to reduce variability. To remedy this situation, responses that are identified as unengaged (repeated patterns across a number of consecutive multi-factor scales) are excluded from the analysis. A useful adjunct to identifying unengaged responses is to add a timing dimension in the filtering process. Generally, unengaged respondents complete the scales in a much quicker timeframe, so respondents who complete the scales in an unrealistic time frame are also excluded from the analysis. To identify the lower threshold for completing the scale, the overall procedure was timed on five different occasions and the average of this noted. This was correlated with the overall average timing across all respondents. The fastest possible time to complete the procedure by reading each question and answering was noted and this was taken as the lower threshold. Responses which fell outside of this lower threshold were excluded from the analysis.

Following initial data screening and filtering, the data was analysed to identify and exclude multivariate outliers using the Mahalanobis distance method, developed by P.C. Mahalonobis in a study on racial likeness (Mahalanobis, 1930). The statistic measures the distance between a point and a distribution in multiple dimensions and is widely used in the identification of outliers in multivariate regression analyses, and is seen as a more sensitive measure of potential outliers than univariate outlier analysis. As suggested by Tabachnick & Fidell (2007), a threshold of 0.001 is generally accepted as appropriate to identify multivariate outliers when using the cumulative distribution function (CDF) for the chi-square distribution. Once the initial stages of data screening and filtering is completed, the first stage in the technique of covariance based structural equation modelling (CB-SEM), namely an exploratory factor analysis, is performed.

4.3.1. Data Coding Procedure

The raw data was downloaded as a SPSS data file (.sav) from the Qualtrics platform. Variables were checked and a number were identified that required re-coding to enable statistical analysis. Certain internal Qualtrics variables that were collected were unnecessary for the data analysis, so these columns were excluded from the working dataset. The first procedure involved renaming variables to logical names representing the scale items or variables, this included all items on the perceived intrusiveness, attitude towards the ad and mobile phone attachment scales. Other independent variables such as banner type, test type and device type were also renamed to more appropriate variable names for the analysis. The SPSS platform prefers variable name lengths less than or equal to eight characters so this was employed as a naming strategy. The full list of variables that were renamed are outlined in Appendix VI.

A second re-coding procedure was performed on certain variables to standardise numeric variables to the values of ‘1’ and ‘2’ and to also convert string variables to numeric formats. Using the variable transform function in SPSS a number of transformations were applied as follows:

- The raw variable named ‘device’ was converted from a string variable to a numeric variable by re-coding ‘laptop’ as ‘1’ and ‘mobile’ as ‘2’. The measure attribute was changed from nominal to scale. The label “Desktop Device” was applied to ‘1’ and the label “Mobile Device” was applied to ‘2’. The new variable was named “DevType”.

- The raw variable named ‘banner_type’ was converted from a string variable to a numeric variable by re-coding ‘desktop_banner’ and ‘mobile_banner’ to ‘1’ and ‘desktop_popup’ and ‘mobile_popup’ to ‘2’. The measure attribute was changed from nominal to scale. The label “Banner Ad” was applied to ‘1’ and the label “Popup Ad” was applied to ‘2’. The new variable was named “BanType”.
- The raw variable ‘testtype’ was already in numeric format, however the coding was inverted with high intensity coded as ‘1’ and low intensity coded as ‘2’. For consistency, the variable was transformed and re-coded so that high intensity was coded as ‘2’ and low intensity coded as ‘1’. The label ‘Low Intensity’ was applied to ‘1’ and the label ‘High-Intensity’ was applied to ‘2’. The new variable was named “CogInten”.
- The raw variable “Q8” was re-coded as “Gender” and the raw variable “Q9” was re-coded as “Age_Exact”. No further processing of these variables was required.
- Each of the variables from the scales (perceived intrusiveness, attitude towards the ad (meaningfulness) and mobile phone attachment scale) were renamed to shorter names to facilitate statistical analysis in the IBM AMOS programme. The programme recommends variable name lengths less than or equal to eight characters.

4.3.2. Case Screening

Following review of the data no missing data was found. The data was screened for unengaged responses where the respondents showed unusual or fixed patterns when answering the questionnaires. As discussed in section 4.3.4, respondents selecting answers to the questionnaires in straight line or in a zig-zag fashion may be regarded as unengaged responses. A threshold was set where if the respondents selected the same value for all items in a scale for three of the six scales, they were excluded from the analysis.

4.3.3. Outliers and Influentials

A Mahalanobis distance analysis was performed on each of the scale items to identify multivariate outliers in the dataset. Using the cumulative distribution function (CDF) for the chi-square distribution, values below the threshold of 0.001 were regarded as outliers, as suggested by Tabachnick & Fidell (2007), as a very conservative estimate for outlier identification (Tabachnick and Fidell, 2007). On the perceived intrusiveness scale, fourteen cases were identified as outliers and were excluded from the analysis. On the attitude towards the ad (meaningfulness) scale, a total of eleven cases were excluded, while five cases in total were omitted from the mobile phone attachment scale; two from the usefulness sub-scale, two from the addiction subscale and one from the anxious subscale. Furthermore, a total of forty- four cases were identified as users who clicked on one of the experimental ads during the test and these were excluded.

4.3.4. Rationale for Exclusion of Cases

In line with common practice in the screening of cases from online surveys (Jones *et al.*, 2015), respondents who completed the test and survey within the threshold of 100 seconds were excluded. This group of participants are generally termed ‘speeders’ as they tend to rapidly move through the task and survey questions to complete as soon as possible. The threshold of 100 seconds was determined during the experimental platform stage where five users were asked to run through the test and survey, as quickly as they could while still reading each question and completing each task accurately. The mean time to complete the task was 180 seconds and the minimum within the sample was 120 seconds. It is implausible that any participant who completed the task in 100 seconds or under completed the task accurately, so the rationale for exclusion of these cases was justified.

A second category of participants who were excluded from the analysis were respondents who clicked to follow the journey from the test advertisements within the experiment. As these advertisements were fictional and would not lead to the expected outcome when the user clicked on the ad, it was decided to exclude these cases as other confounding factors could come into play when responding to the scales. It is possible that irritation and confusion could arise due to the fact that the click on the ad did not lead to their expected outcome and this could influence both perceived intrusiveness and attitudes towards the ad. Thus, the rationale for exclusion of these cases was justified.

4.4. MULTIVARIATE ASSUMPTIONS

Multivariate analysis requires certain assumptions to be met for the analysis to be valid. Hair et. al. (2014) discusses how violations of these assumptions can lead to biased predictions of the relationships under study and inaccurate results. The key assumptions in multivariate analysis are normality, linearity, homoscedasticity are discussed in this section and multicollinearity in section 4.7.3.

4.4.1. Normality

A normal distribution is used to describe a curve that is symmetrical and bell shaped. To assess normality, the skewness and kurtosis measures of the indicators are assessed. Skewness refers to the distortion or asymmetry from a normally distributed bell curve while kurtosis refers to the measure of the combined weight of a distribution's tails relative to the centre of the distribution. We observed normal distributions for the indicators of latent factors for skewness with an observed range of 0.894 (mpasA2) to -0.879 (mpasU8). For kurtosis, we observed normal distributions for the indicators of latent factors with an observed range of -1.177 (mpasA3) to -0.083 (mpasU8). Both skewness and kurtosis were deemed within the acceptable threshold range of -2 to +2 (George and Mallery, 2010; Gravetter and Wallnau, 2012; Trochim *et al.*, 2015).

4.4.2. Linearity

Linearity was assessed for key relationships in the model using the curve estimate feature in SPSS. The key relationships in the model demonstrated linearity as evidenced by a significant result when estimating a linear plot. Scatterplots of the variables were also assessed and all variables showed satisfactory results.

4.4.3. Homoscedasticity

Homoscedasticity was assessed for the key relationships in the model using the linear regression plot function in SPSS. The plot of the dependent variable and the residuals of the independent variable show uniform distribution of the residuals along the trendline and no significant cone-shaping or major deviations were observed.

4.5. EXPLORATORY FACTOR ANALYSIS

Exploratory factor analysis (EFA) is a statistical technique used to identify the underlying structure amongst a large set of variables and to reduce this large set of observed variables into a small number of clusters of related components. In CB-SEM, the model is interpreted in two phases. In the first phase, the relationships between the observed factors and constructs are examined and construct reliability and validity is confirmed in a method termed confirmatory factor analysis (CFA) and in the second phase, the structural model is assessed. An important prerequisite to performing a CFA is to ensure that variables are consistent and moving together and this takes the form of an exploratory factor analysis (Hadi *et al.*, 2016). In essence, the output of the EFA is the input to the CFA. EFA allows for a number of critical tests to be performed prior to the data being deemed suitable for progression to CFA.

The first critical test is the Kaiser Meyer Olkin (KMO) test for adequacy (Kaiser, 1974), which tests if the sampling is adequate or sufficient, with threshold levels above 0.5 as the minimum acceptable and increasing to greater than 0.9 as superb.

The second critical test is the Bartlett Test of Sphericity (Bartlett, 1954), which is a measure of the multivariate normality of a distribution and checks the null hypothesis that the original correlation matrix is an identity matrix. A significance value of less than 0.05 indicates that the data does not produce an identity matrix and that is thus approximately multivariate normal and deemed acceptable for further analysis.

The next critical test of the data is for discriminant and convergent validity. To pass a discriminant validity test, factor loadings for latent reflective factors that are theoretically not related to each other, should in fact not be related, while the opposite is true for convergent validity, where factors that are theoretically expected to be related to each other are in fact related. In essence, in a pattern correlation matrix, convergent validity is observed when the items cleanly load onto their respective latent reflective factor and discriminant validity is observed when the latent reflective factors are not correlated with each other.

The final important test in the EFA is reliability, measured by Cronbach's Alpha (Cronbach, 1951). Reliability reflects the internal consistency of a scale and measures how well the scale measures what it should measure. The generally acceptable threshold for Cronbach's alpha is above 0.8. with above 0.9 deemed excellent (George and Mallery, 2010).

Following satisfactory scores on tests for adequacy, multivariate normality, validity and reliability the factor loadings and structure matrix can be exported and forms the input for the next stage in data analysis, the confirmatory factor analysis.

4.5.1. Dimension Reduction

The exploratory factor analysis was performed by using the analyse > dimension reduction > factor analysis function in the IBM SPSS program. Only the latent reflective factors in the analysis were assessed and other independent variables including BanType, DevType, CogInten, Age and Gender were excluded. The descriptive settings for the analysis included KMO and Bartlett's test of sphericity as well as reproduced and anti-image correlation matrices. The extraction method was set to maximum likelihood, rotation was set to promax and coefficients with an absolute value below 0.3 were suppressed. The initial pattern matrix identified eight potential groups of variables, with discrepancies observed in the mpasU, mpasA and mpasD scales. Reliability analyses assessing coefficients and Cronbach's Alpha for each of the scales were performed and factors excluded which had a low coefficient and/or didn't correlate with the rest of the scale within the group. Following dimension reduction, the following latent reflective factors were excluded from the analysis:

- mpasU1, mpasU2, mpasU3, mpasU4, mpasU5
- mpasA5, mpasA6, mpasA7, mpasA8
- mpasD1, mpasD4, mpas D5

Figure 7 below presents the final pattern matrix following processing and five distinct groups of factors are shown, which corresponds to the number of scales and subscales used.

Figure 7. Pattern Matrix following Dimension Reduction

Pattern Matrix[a]

	Component				
	1	2	3	4	5
piDistr	.837				
piDistb	.744				
piForcd	.885				
piIntef	.910				
piIntru	.931				
piInvas	.925				
piObtru	.920				
aadMean		.918			
aadApp		.904			
aadUse		.949			
aadVal		.934			
mpasU6					.827
mpasU7					.879
mpasU8					.740
mpasA1			.837		
mpasA2			.866		
mpasA3			.908		
mpasA4			.738		
mpasD2				.801	
mpasD3				.780	
mpasD6				.954	

Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Figure 7 shows the pattern matrix following dimension reduction in exploratory factor analysis. Extraction Method: Principal Component Analysis. Rotation Method: Promax with Kaiser Normalization.

4.5.2. Adequacy

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was reported to be 0.886 as shown in figure 8 below. The test measures sampling adequacy for each variable in the model and for the complete model. The sampling adequacy and suitability for factor analysis was classified as good (above 0.8) according to commonly accepted thresholds (Cerny and Kaiser, 1977).

Figure 8. KMO and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.886
Bartlett's Test of Sphericity	Approx. Chi-Square	15187.994
	df	276
	Sig.	.000

4.5.3. Convergent validity

Convergent validity requires that loadings of latent reflective factors that theoretically should be related to each other are, in fact, observed to be related to each other. In the current analysis, following exploratory factor analysis, factors were observed to be clearly defined into groupings according to the latent construct they were measuring, indicating convergent validity was met.

4.5.4. Discriminant validity

Discriminant validity requires that loadings of latent reflective factors that theoretically should not be related to each other are, in fact, observed to not be related to each other. In the current analysis, following exploratory factor analysis, no major cross loadings or correlations were observed. Table 7 presents the factor correlation matrix and no correlations above 0.70 were observed outside of the diagonals, indicating discriminant validity was met.

Table 7. Factor Correlation Matrix

Component	PI	AAD	MPAS(U)	MPAS(A)	MPAS(D)
PI	1	-0.329	0.005	-0.074	0.054
AAD	-0.329	1	0.094	0.109	-0.024
MPAS(U)	0.005	0.094	1	0.418	0.533
MPAS(A)	-0.074	0.109	0.418	1	0.387
MPAS(D)	0.054	-0.024	0.533	0.387	1

Table 7 shows the correlation matrix following dimension reduction in exploratory factor analysis. Extraction Method: Principal Component Analysis. Rotation Method: Promax with Kaiser Normalization.

4.5.5. Reliability

As reported in table 8 below, the Cronbach's alpha for each scale was greater than the acceptable threshold of 0.7 indicating good reliability (Chen *et al.*, 2017; George and Mallery, 2010). The perceived intrusiveness and attitude to the ad scales both showed Cronbach's alpha greater than 0.90 indicating excellent reliability, while the three mobile phone attachment subscales showed Cronbach's alpha between 0.7 and 0.9 indicating reliability within acceptable thresholds.

Table 8. Scale Reliability Measures

Scale	PI	AAD	MPAS(U)	MPAS(A)	MPAS(D)
Cronbach's Alpha	0.951	0.947	0.761	0.868	0.847

Table 8 shows Cronbach's Alpha for each of the scales.

4.6. CONFIRMATORY FACTOR ANALYSIS

The confirmatory factor analysis (CFA) is a statistical factor analysis which specifically tests if the measures of a construct are consistent with the expected nature of the construct. In structural equation modelling, the CFA is also referred to as the measurement model. Based on hypotheses grounded in theory and empirical research, the objective of a CFA is to test whether the data in the set fits the hypothesised measurement model and that the hypothesised relationships exist between observed variables and their underlying latent constructs. In the analysis, hypotheses are developed based on theory and empirical evidence, the relationships are postulated a priori and then hypotheses are tested statistically.

An initial procedure in the CFA is to undertake a cursory model fit assessment. Traditional statistical methods generally used one test to determine the significance of the analysis, however in structural equation modelling, a number of tests are used to determine how closely the data fits the model, termed model fit indices. The core model fit indices reported generally are the chi-square statistic ($\chi 2$), the comparative fit index (CFI), the normed fit index (NFI), the incremental fit index (IFI), the relative fit index (RFI), the goodness of fit index (GFI), the root square mean error of approximation (RMSEA) and the standardised root square mean residual ((S)RMR).

The chi-square statistic ($\chi 2$) reports the level of difference between expected and observed covariance matrices and indicates the significance of the results of the test of the null hypothesis that the predicted model and observed data are equal. Thus, a non-significant result ($p>0.05$) indicated that model fit is good. One limitation of the chi-square statistic is that it is sensitive to sample size and larger sample sizes have shown a significant chi-square statistic, while all other fit indices indicate good model fit (Barrett, 2007; Bentler and Bonett, 1980). An extension of the chi-square statistic which is less sensitive to sample size is the chi-square statistic divided by the number of degrees of freedom ($\chi2/df$), which can be more useful. Values below 5 are generally accepted as good model fit (Hu and Bentler, 1999).

The comparative fit index (CFI), a relative fit index, reports the discrepancy between the data and the hypothesized model, adjusting for sample size. CFI ranges from 0 to 1 with a larger value indicating better model fit. The generally accepted threshold for CFI is 0.90, however some authors have indicated that 0.95 is a more appropriate threshold level, circumventing the issue of mis-specified models being deemed acceptable (Hu and Bentler, 1999). A second relative fit index is the normed fit index (NFI) which analyses the discrepancy between the chi-squared value of the hypothesized model and the chi-squared value of the null model. Values for the NFI should range between 0 and 1, with a cut-off of 0.95 or greater indicating a good model fit.

The goodness of fit index (GFI), an absolute fix index, is a measure of fit between the hypothesized model and the observed covariance matrix while the adjusted goodness of fit index (AGFI) corrects the GFI, which can be affected by the number of indicators of each latent variable. The GFI and AGFI range between 0 and 1, with a value of over 0.9 indicating good model fit.

Another common absolute fit index is the root mean square error of approximation (RMSEA) analyses the discrepancy between the hypothesized model, with optimally chosen parameter estimates, and the population covariance matrix. The RMSEA avoids issues of sample size and ranges from 0 to 1, with smaller values indicating better model fit. A generally accepted threshold value of 0.06 or less is indicative of good model fit (MacCallum *et al.*, 1996).

The standardized root mean square residual (SRMR) is the square root of the discrepancy between the sample covariance matrix and the model covariance matrix and is another commonly used absolute fit index. The SRMR overcomes the difficulty of interpreting data based on multiple scales where the ranges are not uniform, which occurs with the root mean square residual (RMR). The SRMR ranges from 0 to 1, with a value of 0.08 or less being indicative of acceptable model fit (Hu and Bentler, 1999).

Using the above model fit indices on the cursory unmodified model in the CFA gives an initial indication of how well the model fits the data. If the model shows good fit indices, the next important step in the confirmatory factor analysis is to perform model validity assessments including discriminant and convergent construct validity, invariance testing and common method bias analysis.

For convergent validity, the most common method is the Fornell-Larcker criterion (Fornell and Larcker, 1981), which compares the average variance extracted (AVE) value with corresponding correlation values with other variables, with values above 0.5 indicating convergent validity is established. For discriminant validity in variance based structural equation modelling, the recommended approach is to use the square-root value of AVE to compare with corresponding correlation values with other variables (Hair *et al.*, 2014). The square root of the AVE is preferred because of its sensitivity to possible overestimation of item loadings (Lohmoller, 1981). If the square root of the AVE is greater than the correlations, discriminant validity is established. Reliability is established if composite reliability (CR) values above 0.700 are observed (Hu and Bentler, 1999).

Measurement invariance is a statistical property of measurement that indicates that the same construct is being measured across some specified groups. Validation of measurement invariance is an important prerequisite to performing structural modelling as violations of measurement invariance may preclude meaningful interpretation of measurement data in subsequent model testing. Invariance falls into three hierarchical levels of measurement invariance (Steenkamp and Baumgartner, 1998). The first level is configural invariance, which is found to be met if the factor structure is the same across groups in a multi-group confirmatory factor analysis. The second level is metric invariance, which is found to be met if factor loadings are similar across groups and finally the third level is scalar invariance, which is deemed to be met if the means are also equivalent across groups.

A final stage in the testing procedure for model validity is to assess if common method bias (CMB) is present. CMB occurs when the instrument introduces bias as opposed to the natural variance in the respondents that the instrument is designed to measure. CMB functions by undermining the capabilities of the respondent, making the task of responding accurately more difficult, decreasing the motivation to respond accurately and making it easier for respondents to achieve the goal of completing the survey (Podsakoff *et al.*, 2003). The consequences of uncontrolled CMB include incorrect conclusions regarding the scales reliability and validity, biased estimates of the effects of other correlated variables on the criterion variable and also it can bias the relationship between two constructs within a model, leading to biased hypothesis testing and type I and II errors. To control for method bias if present in this study, the common method factor technique will be used, whereby the common latent factor is retained and the factor scores imputed effectively parcelling out the shared bias amongst the constructs (Bagozzi, 1984; Podsakoff *et al.*, 2003). Once a final valid and reliable model is arrived at following necessary modifications, model fit indices are assessed once more and if acceptable it is feasible to progress to build the structural model.

4.6.1. Procedure

Data from the pattern matrix from the exploratory factor analysis was transposed into a covariance model in the IBM AMOS programme and the initial model ran to assess cursory model fit. The cursory model is shown section 9.6.1, with each of the latent constructs contrived and their respective indicators with only one path constrained. Modification indices were assessed at this stage to identify covariances within error terms that may improve the model fit. The initial model showed a satisfactory Comparative Fit index (CFI >0.90) and Root Square Mean Error of Approximation (RSMEA <0.08), however improvements in model fit were evident in the modification indices table.

Covariances were applied to the following error terms due to model fit discrepancies (inflating Chi-square): e1>e4, e2>e3, e3>e4, e2>e5, e5>e6, e6>e7, e8>e9. These were deemed acceptable to improve model fit as the covariances were applied within discriminant scales and not across different scales.

4.6.2. Cursory Model Fit

Following application of modification indices, the model was executed in the AMOS program and the output analysed against commonly agreed goodness of fit indices (Kline, 2005). It is noted that the chi-square statistic in the analysis shows a significant result, suggesting unsatisfactory model fit, however there is consensus that for large sample sizes (>400) chi-square-based statistics almost always report a statistically significant difference between the observed data and model expectations (Barrett, 2007; Bentler and Bonett, 1980). In this instance, it is suggested that alternative model fit indices are taken into account including the comparative fit index (CFI), the root square mean error of approximation (RMSEA) and the standardised root square mean residual ((S)RMR). The goodness of fit indices for the confirmatory factor analysis were found to be satisfactory (see table in section 9.6.1, appendix VI)

One index of model fit in confirmatory factor analysis is a non-significant Chi-square test, however, for large sample sizes it is not uncommon for the Chi-square test to be significant. AMOS provides the capability of bootstrapping to test in situations where the assumptions regarding maximum likelihood chi-squares may be violated. Another common test to query a non-significant chi-square statistic result is the Satorra-Bentler scaled Chi-square test (Satorra and Bentler, 1999). However, for large sample sizes, both bootstrapping in AMOS and the Satorra-Bentler scaled Chi-square have the same p-value, and in fact some simulation studies have shown that AMOS bootstrapping performed better (Fouladi, 2000; Hancock and Nevitt, 1999) .

4.6.3. Model Validity

The model did not pass convergent and discriminant validity tests on the first iteration. Following analysis, the MPT scale was removed as the square root of the

AVE for MPT is less than its correlation with MPD, failing discriminant validity checks. Following modifications, the model was found to be valid.

Convergent and discriminant validity was observed for the model as evidenced by data presented in table 9 below. The Average Variance Extracted (AVE) was found to be above 0.5 indicating convergent validity and the square root of AVE was found to be greater than correlations indicating discriminant validity. Reliability was established as evidenced by Composite Reliability (CR) values above 0.700 (Hu and Bentler, 1999).

Table 9. Model Validity Assessment

	CR	AVE	MSV	MaxR(H)	PI	AAD	MPA	MPU	MPD
PI	0.952	0.743	0.122	0.970	**0.862**				
AAD	0.942	0.803	0.122	0.968	-0.349***	**0.896**			
MPA	0.887	0.666	0.465	0.909	0.008	0.108**	**0.816**		
MPD	0.854	0.663	0.465	0.878	0.057	0.010	0.682***	**0.814**	
MPU	0.761	0.515	0.433	0.764	-0.070†	0.166***	0.588***	0.658***	**0.718**

*Significance of Correlations: † $p < 0.100$, * $p < 0.050$, ** $p < 0.010$, *** $p < 0.001$. AVE: Average Variance Extracted, CR: Composite Reliability, MSV: Maximum Shared Variance, MaxR(H); Maximum Reliability*

4.6.4. Configural Invariance

Two groups were created from the gender variable, male and female and the model ran again in the AMOS program. Configural invariance was deemed to be good as evidenced by good model fit measures when estimating two groups without constraints.

4.6.5. Metric Invariance

Metric invariance was found to be met on the default model, as shown in table 10, as there was a non-significant result observed in the chi-square difference test between the constrained and unconstrained models (p>0.05) where the regression weights were constrained. To constrain the model in AMOS, the variance of the latent constructs is set to 1 and the variance removed from the paths to the factors. All regression weight parameters were named to fully constrain the model.

Table 10. Metric Invariance Test

	Chi-square	df	p-val	Invariant
Default Model			0.741	YES
Unconstrained	649.73	340		
Fully constrained	666.233	361		
Number of groups		2		
Difference	17.805	20		

4.6.6. Scalar Invariance

Scalar Invariance was found to be met indicating valid claims could be made in multigroup analyses. To test for scalar invariance in AMOS, a multigroup analysis is performed. In analysis properties, it is important to ensure that the 'estimate means and intercepts' toggle is checked and modification indices are unticked. Using the multigroup analysis function, the intercepts are estimated. It is useful to remove some of the models, including residuals, covariances and weights. Scalar Invariance was found to be met indicating valid claims could be made in multigroup analyses. Using the model comparison output, there was found to be no significant difference (p>0.05) between the unconstrained model and the measurement intercepts mode as shown in table 11.

Table 11. Multigroup Model Comparison Test for Scalar Invariance

Model	DF	CMIN	P	NFI	IFI	RFI	TLI
				Delta-1	Delta-2	rho-1	rho2
Measurement intercepts	42	31.858	**.872**	.002	.002	-.004	-.004

4.6.7. Common Method Bias Analysis

A common method bias analysis was undertaken using multiple progressive techniques to test for common method bias. As a first step, Harman single factor test was performed and the percentage of shared variance was found to be 24.511%, below the acceptable threshold of 50%. Following this, a common latent factor test was performed and the standardised regression weights of the model with the common latent factor and the model without the common latent factor were compared. No factors showed a difference above 0.2 indicating no significant common method bias was present.

4.6.8. Final Measurement Model

The final model was assessed for model fit indices as shown in table 12.

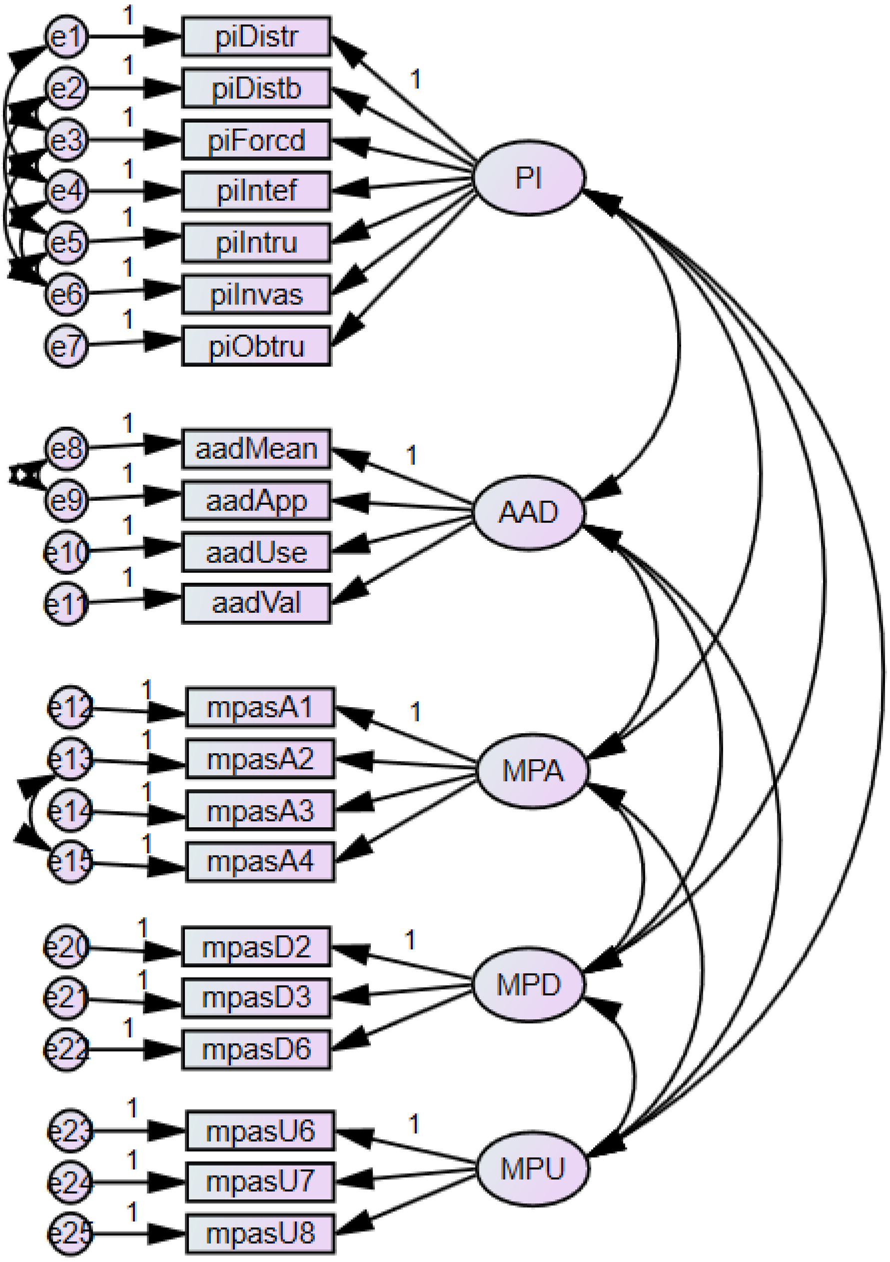
Table 12. Goodness of Fit Indices of Final Measurement Model

Fit Index Type	Observed Value	Acceptable Value	Fit Level
χ2	444.195; $p<0.05$ (df=170)	$p> 0.05$	-
χ2/df	2.613	≤ 5	Good Fit
RMSEA	0.046	≤ 0.08	Good Fit
NFI	0.967	≥ 0.95	Good Fit
CFI	0.980	≥ 0.95	Good Fit
IFI	0.980	≥ 0.95	Good Fit
RFI	0.960	≥ 0.95	Good Fit
(S)RMR	0.0336	≤ 0.05	Good Fit
GFI	0.946	≥ 0.90	Good Fit
PCLOSE	0.898	$p> 0.05$	Good Fit

df: degrees of freedom; χ2: Chi-square; RMSEA: Root Mean Square Error of Approximation; NFI: Normed Fit Index; NNFI: Non-Normed Fit Index; CFI: Comparative Fit Index; IFI: Incremental Fit Index; RFI: Relative Fit Index; (S)RMR: (Standardized) Root Mean Square Residual; GFI: Goodness of Fit Index.

The chi-square test showed a significant result, however as discussed previously, in datasets with large sample sizes this finding in itself does not indicate poor model fit. The χ2/df was reported as 2.613, below the acceptable threshold of 5, which is a good indicator of good model fit. The CFI was found to be 0.980, the NFI was 0.967, the IFI was 0.980, the GFI was 0.946 and the RFI was 0.960, all indicating good model fit. Furthermore, the RMSEA was 0.046 and the (S)RMR was 0.0336 both indicating good model fit. Overall, based on the model fit indices, the measurement model was deemed appropriate for structural modelling.

Figure 9. Final Valid Confirmatory Factor Analysis Model



4.7. STRUCTURAL MODEL

The structural model is the second main component of structural equation modelling. The structural model looks at potential dependencies between exogenous and endogenous variables within a set of data, in contrast to the previous measurement model which looks at relationships between latent variables and their indicators. The key requirement of model specification is that the relationships should be based on theory and grounded hypotheses and the relationships specified in this manner and the model tested.

An initial step in model specification is to retest the data for multivariate outliers and influentials in the specified model using the Cook's distance method. Cook's distance is the scaled change in fitted values which is used as an estimate of influence in observations for predictor variables (Cook, 1977). Another important prerequisite step in the structural model specification is to assess the data for multicollinearity. Multicollinearity refers to the situation where two or more variables are highly correlated and can adversely affect the interpretation of the findings in a model by confounding the contribution of independent variables and may lead to false path coefficient estimates (Niemelä-Nyrhinen and Leskinen, 2014). Multicollinearity is tested by measuring the variable inflation factor (VIF), with a generally accepted threshold of less than 5 indicating that no multicollinearity is present (Kutner *et al.*, 2003; Sheather, 2009).

Once the structural model is specified, model fit indices are reviewed once again and the core indices reported, namely; the chi-square statistic ($\chi 2$), the comparative fit index (CFI), the normed fit index (NFI), the incremental fit index (IFI), the relative fit index (RFI), the goodness of fit index (GFI), the root square mean error of approximation (RMSEA) and the standardised root square mean residual ((S)RMR). If all indices fall within acceptable thresholds, conclusions can be drawn from the model.

4.7.1. Procedure

The final stage in the structural equation modelling process is to specify the structural model. Prior to modelling, it is recommended to run a further outlier and influentials analysis to check for any data points that could be deemed to be multivariate influencers. Furthermore, it is recommended that multicollinearity is assessed using the variable inflation factor (VIF) method to check for significant correlations between the variables in the model, which could subsequently confound the results.

4.7.2. Outliers and Influentials

A cook's distance analysis was performed on each of the dependent variables to determine if any multivariate influential outliers existed. In no case did we observe a cook's distance greater than 1 with most cases far less than 0.100, indicating the no multivariate outliers existed.

4.7.3. Multicollinearity

Variable inflation factors (VIF) were examined for all predictors on the dependent variables. All VIF coefficients greater than 3.5 were observed as shown in figures 10 and 11. This falls within the generally accepted cut-off of below 5, indicating that no multicollinearity was present (Kutner *et al.*, 2003; Sheather, 2009).

Figure 10. Multicollinearity Analysis for the Dependent Variable AAD

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.301	.332		9.943	.000		
	MPU	.483	.087	.293	5.569	.000	.385	2.599
	MPD	-.366	.076	-.288	-4.822	.000	.299	3.348
	MPA	.156	.061	.130	2.563	.011	.413	2.420
	PI	-.254	.033	-.287	-7.661	.000	.762	1.313
	BanType	-.214	.094	-.084	-2.280	.023	.789	1.267
	DevType	.130	.085	.051	1.527	.127	.962	1.040
	CogInten	.048	.083	.019	.572	.567	.994	1.006
	Gender	-.170	.086	-.067	-1.976	.049	.936	1.068
	Age_Exact	-.002	.003	-.020	-.566	.571	.884	1.131

Dependent Variable: AAD; Predictors: (Constant), PI, MPA, CogInten, DevType, BanType, MPU, MPD

Figure 11. Multicollinearity Analysis for the Dependent Variable PI

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.959	.357		5.490	.000		
	MPU	-.486	.093	-.262	-5.206	.000	.398	2.510
	MPD	.329	.082	.230	4.002	.000	.305	3.279
	MPA	.046	.067	.034	.686	.493	.413	2.418
	BanType	1.280	.092	.444	13.927	.000	.991	1.009
	DevType	.001	.093	.000	.011	.991	.962	1.040
	CogInten	.091	.091	.032	.995	.320	.996	1.004
	Gender	-.147	.094	-.051	-1.565	.118	.939	1.065
	Age_Exact	-.001	.004	-.011	-.337	.736	.884	1.131

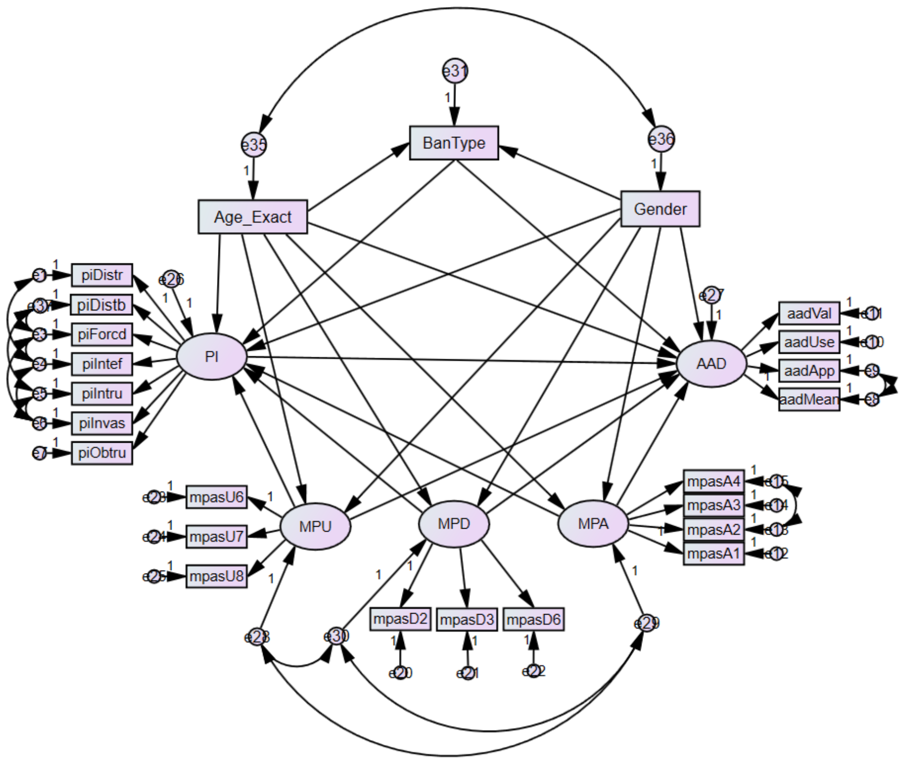
Dependent Variable: PI; Predictors: (Constant), AAD, MPA, CogInten, DevType, BanType, MPU, MPD

4.7.4. Structural Model

The final structural model is shown in figure 12 below. The key relationships between forced exposure, perceived intrusiveness, attitude towards the ad and each sub-dimension of mobile phone attachment are shown. The exogenous variables Age and Gender are shown also and these act as control variables in the model.

It is noted in the model that some measurement errors within the same constructs are correlated. Some authors argue that the correlation of measurement errors should be avoided in structural equation modelling, however there is some consensus, justification and rationale if careful consideration is given to the specific items being correlated (Gerbing and Anderson, 1984). It is difficult to give justification for the correlation of measurement errors between different constructs, however there is rationale for measurement errors within constructs. In the current model, certain measurement errors within-constructs are correlated as the measurement errors observed as likely to be the result of redundancy within the factors, where the scale items have similar or redundant meanings. According to Harrington (2009), correlation of measurement errors within constructs where the scale items may be construed as redundant or similar is acceptable

Figure 12. Final Structural Model in the IBM AMOS program



PI: Perceived Intrusiveness, AAD: Attitude Toward the Ad, MPU: Mobile Phone Attachment Usefulness Subscale, MPA: Mobile Phone Attachment Anxious Subscale, MPD: Mobile Phone Attachment Addiction Subscale, BanType: Type of Banner. Age and Gender Control Variables are Covaried.

Table 13 below presents the model fit indices for the final structural model including the control variables of age and gender. All model fit indices showed good fit. The chi-square test showed a non-significant result, $p>0.05$ with $\chi 2 = 7.029$. The $\chi 2/df$ was reported as 2.343, below the acceptable threshold of 5, which is a good indicator of model fit. The CFI was found to be 0.997, the NFI was 0.995, the IFI was 0.997, the GFI was 0.997 and the RFI was 0.949, all indicating good model fit. Furthermore, the RMSEA was 0.042 and the (S)RMR was 0.143 both indicating good model fit. Overall, based on the model fit indices, the structural model was deemed appropriate for making claims regarding the relationships observed.

Table 13. Goodness of Fit Indices of Final Structural Model including Control Variables

Fit Index Type	Observed Value	Acceptable Value	Fit Level
$\chi 2$	566.254; $p<0.05$, (df=221)	$p> 0.05$	-
$\chi 2$/df	2.562	≤ 5	Good Fit
RMSEA	0.045	≤ 0.08	Good Fit
NFI	0.960	≥ 0.95	Good Fit
CFI	0.975	≥ 0.95	Good Fit
IFI	0.975	≥ 0.95	Good Fit
RFI	0.950	≥ 0.95	Good Fit
(S)RMR	0.0338	≤ 0.05	Good Fit
GFI	0.940	≥ 0.90	Good Fit
PCLOSE	0.957	$p> 0.05$	Good Fit

df: degrees of freedom; χ2: Chi-square; RMSEA: Root Mean Square Error of Approximation; NFI: Normed Fit Index; NNFI: Non-Normed Fit Index; CFI: Comparative Fit Index; IFI: Incremental Fit Index; RFI: Relative Fit Index; (S)RMR: (Standardized) Root Mean Square Residual; GFI: Goodness of Fit Index.

4.8. TESTING PROCEDURE

Following specification of the final structural model, direct and mediation effects were tested. In AMOS analysis properties, under estimation the discrepancy was set to ‘maximum likelihood’ and ‘estimate means and intercepts’ was unchecked, so that bootstrapping could be performed. In the analysis properties output tab, minimization history and standardized estimates were selected. In the bootstrap tab, ‘perform bootstrap’ was checked and the number of samples set to 2,000. Furthermore, ‘Bias-corrected confidence intervals’ as selected with a confidence level set to 95. Following this, estimates were calculated for direct effects.

Mediation was assessed in the model by using an estimand developed by Gaskin (2020) for testing specific indirect effects. The estimand was loaded into AMOS and the relevant paths (AxB) specified relating to the mediating path under assessment. The output of the estimand gave 95% confidence interval standardised regression weights for the mediation.

Interaction effects were tested following the method of Gaskin (2020). Once the structural model containing latent variables and factors was specified, factor scores were imputed to allow for standardisation and the calculation of interaction variables, which could not be calculated on the primary structural model containing latent reflective factors. Once the imputed variables were standardised to their relevant z-scores, interaction variables were calculated using the variable multiplication function in SPSS. An adapted model was constructed with the imputed variables and this was used to probe for interaction effects using the imputed data set. Age and gender variables served as controls in the analysis and all exogenous variables were covaried and paths established between the interaction variables and the dependent variables. Global model fit indices were unfavourable when using all exogenous variables in the adapted model, so interaction effects were tested with relevant and related exogenous variables included only as well as control variables. (Gaskin, 2020).

Multigroup analyses were performed in the AMOS program under the tab analyse - multigroup analysis. For each test, the two groups were specified in the grouping variables. For device type, two groups were created, mobile and desktop and for cognitive intensity, two groups were created, low intensity and high intensity. Using the model comparison in the output table, the results were noted and a significant result indicated that there was a significant difference between the groups. Each of the key paths within the model were tested separately in the multigroup analysis only constraining the specific path under scrutiny. The AMOS multigroup method / Chi-square difference test following Gaskin (2020) was adopted to test for difference between groups at the model level as well as at the specific path level. In the analysis, the multigroup analysis function in AMOS is employed by grouping the cases in the data set according to the specific test variable. A number of models are outputted from the analysis including the unconstrained, structural weights, structural residuals and structural covariances models. For the purpose of the analysis structural residuals and structural covariances models can be removed. Once the model is run, the model comparison output shows the result of the chi-square difference test, identifying if there are specific differences between groups at a model level. To test specific effects at a path level, all other constraints except the path under analysis were removed from the structural weights model in the multigroup analysis. Each of the key paths within the model were tested at a path level as well as the model as a whole for each of the two variables (device type and cognitive intensity). The key paths tested were aligned with research questions one and two including the effects of perceived intrusiveness and forced exposure on attitude towards the ad and the dimensions of mobile phone attachment on perceived intrusiveness and attitude towards the ad.

Chapter 5

RESULTS

5.1. FINAL RESEARCH SAMPLE

5.1.1. Case Screening and Outliers

The research sample for the online field study was acquired from Qualtrics Inc., a specialist research company, and was drawn from a broad quota matched sampling frame of the Irish adult population. The total number of participants in the research sample was one thousand nine hundred and ten (n=1,910). Of this, one thousand and four (n=1,004) were excluded due to either (a) an incomplete response, (b) a complete response not meeting the minimum acceptable time to complete the test (t=100 seconds, colloquially referred to as speeders) and (c) responses where the participant was deemed unengaged, selecting similar values for all scale items (colloquially referred to as flatliners). A total number of nine hundred and six valid participants were obtained (n=906).

Further processing and tests for multivariate outliers were performed. A Mahalanobis distance analysis was performed on each of the scale items to identify multivariate outliers in the dataset. Using the cumulative distribution function (CDF) for the chi-square distribution, values below the threshold of 0.001 were regarded as outliers, as suggested by Tabachnick & Fidell (2007), as a very conservative estimate for outlier identification (Tabachnick and Fidell, 2007). On the perceived intrusiveness scale, seventy-four cases were identified as outliers and were excluded from the analysis. On the attitude towards the ad (meaningfulness) scale, a total of seventeen cases were excluded, while five cases in total were omitted from the mobile phone attachment scale; two from the usefulness sub-scale, two from the addiction subscale and one from the anxious subscale. Furthermore, a total of forty-four cases were identified as users who clicked on one of the experimental ads during the test and these were excluded. The total valid sample following processing was seven hundred and sixty-six cases (n=766).

5.1.2. Final Sample Characteristics

The achieved age quotas for the sample are presented in table 14. The 18-24 year old segment made up 17.9% (n=137), The 25-34 year old segment made up 25.3% (n=194), The 35-44 year old segment made up 25.6% (n=196), The 45-54 year old segment made up 20.5% (n=157), The 55-64 year old segment made up 9% (n=69), while the 65+ year old segment made up 1.7% (n=13). These are broadly in line with the characteristics of the general population of Ireland, with the largest deviation from the general population seen in the 55-64 and 65+ categories. This is deemed acceptable as these segments differ significantly from other segments in terms of internet use, with approximately 68% of these segments having used the internet within the last 3 months (Central Statistics Office, 2019). Based on this we expect the older age segments to be under-represented in the overall sampling frame of internet users. Thus, we can conclude that the sample is broadly representative of the population of Irish internet users.

Table 14. Age Distribution for the Research Sample

Age	Frequency	Percent	General Population
18-24	137	17.9%	12.20%
25-34	194	25.3%	19.81%
35-44	196	25.6%	22.59%
45-54	157	20.5%	18.91%
55-64	69	9%	15.31%
65+	13	1.7%	11.17%

The achieved gender quotas for the research sample are presented in table 15. These closely match the age characteristics of the general population of Ireland, with 49.2% male and 50.8% female, compared with 49.5% male and 50.5% female for the general population.

Table 15. Gender Distribution for the Research Sample

Age	Frequency	Percent	General Population
Male	377	49.2%	49.47%
Female	389	50.8%	50.53%

The sample was drawn from a research panel in the Republic of Ireland and users were geographically restricted to this territory.

5.2. DESCRIPTIVE DATA ANALYSIS

The descriptive data for variables used in the data analysis are presented in Table 16 for the 766 cases used in the final sample. BanType refers to the forced exposure condition, and had a mean of 1.456, a standard error of 0.018, a range between 1 (static banner ad) and 2 (modal ad / forced exposure) and the standard deviation was 0.498. The variable DevType refers to device type condition, and had a mean of 1.490, a standard error of 0.018, a range between 1 (desktop) and 2 (mobile) and the standard deviation was 0.5. The variable CogInten refers to the task cognitive intensity condition, and had a mean of 1.512, a standard error of 0.018, a range between 1 (low) and 2 (high) and the standard deviation was 0.5. The variable Gender had a mean of 1.510, a standard error of 0.018, a range between 1 (male) and 2 (female) and the standard deviation was 0.5. The variable Age_Exact had a mean of 37.734, a standard error of 0.461, a range between 18 and 99 and the standard deviation was 12.751.

There were seven indicators for the variable perceived intrusiveness which had a range of 1 (strongly disagree) to 7 (strongly agree) and included piDistr (scale item distracting: mean 4.250, SE: 0.066, SD: 1.818); piDistb (scale item disturbing: mean 3.170, SE: 0.060, SD: 1.649); piForcd (scale item forced: mean 3.980, SE: 0.066, SD: 1.822); piIntef (scale item interfering: mean 4.220, SE: 0.068, SD: 1.870); piIntru (scale item intrusive: mean 4.080, SE: 0.066, SD: 1.824); piInvas (scale item invasive: mean 3.900, SE: 0.064, SD: 1.779) and finally piObtru (scale item obtrusive: mean 3.840, SE: 0.062, SD: 1.716).

There were four indicators for the variable attitude towards the ad (meaningfulness) which had a range of 1 (strongly disagree) to 7 (strongly agree) and included aadMean (scale item meaningful: mean 3.400, SE: 0.056, SD: 1.549); aadApp (scale item appropriate: mean 3.670, SE: 0.056, SD: 1.538); aadUse (scale item useful: mean 3.440, SE: 0.058, SD: 1.608) and finally aadVal (scale item valuable: mean 3.290, SE: 0.058, SD: 1.592).

Table 16. Descriptive Statistics of the Research Sample

Variable	N	Minimum	Maximum	Mean	Std. Error	Std. Deviation
BanType	766	1	2	1.456	0.018	0.498
DevType	766	1	2	1.490	0.018	0.500
CogInten	766	1	2	1.512	0.018	0.500
Gender	766	1	2	1.510	0.018	0.500
Age_Exact	766	18	99	37.734	0.461	12.751
piDistr	766	1	7	4.250	0.066	1.818
piDistb	766	1	7	3.170	0.060	1.649
piForcd	766	1	7	3.980	0.066	1.822
piIntef	766	1	7	4.220	0.068	1.870
piIntru	766	1	7	4.080	0.066	1.824
piInvas	766	1	7	3.900	0.064	1.779
piObtru	766	1	7	3.840	0.062	1.716
aadMean	766	1	7	3.400	0.056	1.549
aadApp	766	1	7	3.670	0.056	1.538
aadUse	766	1	7	3.440	0.058	1.608
aadVal	766	1	7	3.290	0.058	1.592
mpasU6	766	1	5	3.500	0.045	1.247
mpasU7	766	1	5	3.700	0.041	1.124
mpasU8	766	1	5	3.830	0.043	1.181
mpasA1	766	1	5	2.900	0.048	1.335
mpasA2	766	1	5	2.030	0.041	1.131
mpasA3	766	1	5	2.710	0.048	1.335
mpasA4	766	1	5	2.990	0.048	1.321
mpasD2	766	1	5	3.240	0.044	1.218
mpasD3	766	1	5	3.460	0.044	1.227
mpasD6	766	1	5	3.160	0.048	1.335

There were three indicators for the variable mobile phone attachment (usefulness) which had a range of 1 (not at all true) to 5 (extremely true) and included mpasU6 (scale item ‘never bored’: mean 3.500, SE: 0.045, SD: 1.247); mpasU7 (scale item ‘feel connected’: mean 3.700, SE: 0.041, SD: 1.124) and finally mapsU8 (scale item ‘main source of information’: mean 3.830, SE: 0.043, SD: 1.181).

There were four indicators for the variable mobile phone attachment (anxious) which had a range of 1 (not at all true) to 5 (extremely true) and included mpasA1 (scale item ‘don’t have my phone’: mean 2.900, SE: 0.048, SD: 1.335); mpasA2 (scale item ‘not received a call or message’: mean 2.030, SE: 0.041, SD: 1.131); mpasA3 (scale item ‘isolated’: mean 2.710, SE: 0.048, SD: 1.335) and finally mapsA4 (scale item ‘dependent’: mean 2.990, SE: 0.048, SD: 1.321).

There were three indicators for the variable mobile phone attachment (addiction) which had a range of 1 (not at all true) to 5 (extremely true) and included mpasD2 (scale item ‘occupied when should be doing other things’: mean 3.240, SE: 0.044, SD: 1.218); mpasD3 (scale item ‘engaged longer than intended’: mean 3.460, SE: 0.044, SD: 1.227) and finally mapsD6 (scale item ‘more work done less time on phone’: mean 3.160, SE: 0.048, SD: 1.335).

5.3. RELIABILITY AND VALIDITY TESTS

All factors showed satisfactory loadings for their respective scales and measures of reliability and validity were met for all latent constructs as shown in table 17.

The factor loading for each latent reflective factor, the Cronbach’s alpha for each respective scale, the composite reliability and the average variance extracted are presented in table 17 below.

For the items in the perceived intrusiveness scale, the factor loadings were: distracting (0.798), disturbing (0.654), forced (0.850), interfering (0.905), intrusive (0.949), invasive (0.930) and obtrusive (0.913). The Cronbach's alpha was 0.951, the composite reliability was 0.952 and the average variance extracted was 0.743.

For the items in the attitude towards the ad (meaningfulness) scale, the factor loadings were: meaningful (0.853), appropriate (0.839), useful (0.969) and valuable (0.940). The Cronbach's alpha was 0.947, the composite reliability was 0.942 and the average variance extracted was 0.803.

For the items in the mobile phone attachment (usefulness) scale, the factor loadings were: 'never bored' (0.695), 'feel connected' (0.778) and 'main source of information' (0.659). The Cronbach's alpha was 0.761, the composite reliability was 0.761 and the average variance extracted was 0.515.

Table 17. Factor Loadings, Reliability & Validity

Variable	Factor Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
piDistr	0.798	0.951	0.952	0.743
piDistb	0.654			
piForcd	0.850			
piIntef	0.905			
piIntru	0.949			
piInvas	0.930			
piObtru	0.913			
aadMean	0.853	0.947	0.942	0.803
aadApp	0.839			
aadUse	0.969			
aadVal	0.940			
mpasU6	0.695	0.761	0.761	0.515
mpasU7	0.778			
mpasU8	0.659			
mpasA1	0.768	0.868	0.887	0.666
mpasA2	0.669			
mpasA3	0.976			
mpasA4	0.722			
mpasD2	0.801	0.847	0.854	0.663
mpasD3	0.799			
mpasD6	0.742			

For the items in the mobile phone attachment (usefulness) scale, the factor loadings were: 'never bored' (0.695), 'feel connected' (0.778) and 'main source of information' (0.659). The Cronbach's alpha was 0.761, the composite reliability was 0.761 and the average variance extracted was 0.515. For the items in the mobile phone attachment (anxious) scale, the factor loadings were: 'don't have my phone' (0.768), 'not received a call or message' (0.669); 'isolated' (0.976) and 'dependent' (0.722). The Cronbach's alpha was 0.868, the composite reliability was 0.887 and the average variance extracted was 0.666.

For the items in the mobile phone attachment (addiction) scale, the factor loadings were: 'occupied when should be doing other things' (0.801), 'engaged longer than intended' (0.799) and 'more work done less time on phone' (0.742). The Cronbach's alpha was 0.847, the composite reliability was 0.854 and the average variance extracted was 0.663.

Table 18 below shows the correlation matrix for the latent factors. The correlations for the latent factor perceived intrusiveness are -0.35 with the latent factor attitude towards the ad (meaningfulness), 0 with the latent factor mobile phone attachment (usefulness), 0.049 with the latent factor mobile phone attachment (anxious) and -0.048 with the latent factor mobile phone attachment (addiction). The correlations for the latent factor attitude towards the ad (meaningfulness) are 0.105 with the latent factor mobile phone attachment (usefulness), -0.005 with the latent factor mobile phone attachment (anxious) and 0.105 with the latent factor mobile phone attachment (addiction). The correlations for the latent factor mobile phone attachment (usefulness) are 0.626 with the latent factor mobile phone attachment (anxious) and 0.567 with the latent factor mobile phone attachment (addiction). The correlation for the latent factor mobile phone attachment (anxious) is 0.611 with the latent factor mobile phone attachment (addiction). All correlations are within the acceptable threshold of less than 0.7.

Table 18. Correlation Matrix for Latent Factors

Component	PI	AAD	MPAS(U)	MPAS(A)	MPAS(D)
PI	**1.000**	-0.35	0	0.049	-0.048
AAD	-0.35	**1.000**	0.105	-0.005	0.105
MPAS(U)	0	0.105	**1.000**	0.626	0.567
MPAS(A)	0.049	-0.005	0.626	**1.000**	0.611
MPAS(D)	-0.048	0.105	0.567	0.611	**1.000**

Collinearity diagnostics for the dependent variables are presented in table 19 below for each independent variable. All variable inflation factors were deemed to be satisfactorily within the acceptable limit of less than 5.

For the independent variable attitude towards the ad (meaningfulness), the variable inflation factors for the independent variables are 2.599 for mobile phone attachment (usefulness), 3.348 for mobile phone attachment (addiction), 2.420 for mobile phone attachment (anxious), 1.313 for perceived intrusiveness, 1.267 for banner type, 1.040 for device type, 1.006 for cognitive intensity, 1.068 for gender and 1.131 for age exact.

For the independent variable perceived intrusiveness, the variable inflation factors for the independent variables are 2.510 for mobile phone attachment (usefulness), 3.279 for mobile phone attachment (addiction), 2.418 for mobile phone attachment (anxious), 1.009 for banner type, 1.040 for device type, 1.004 for cognitive intensity, 1.065 for gender and 1.131 for age exact.

Table 19. Collinearity Diagnostics

Dependent: AAD		
Component	**Tolerance**	**VIF**
MPU	0.385	2.599
MPD	0.299	3.348
MPA	0.413	2.42
PI	0.762	1.313
BanType	0.789	1.267
DevType	0.962	1.04
CogInten	0.994	1.006
Gender	0.936	1.068
Age_Exact	0.884	1.131

Dependent: PI		
Component	**Tolerance**	**VIF**
MPU	0.398	2.51
MPD	0.305	3.279
MPA	0.413	2.418
BanType	0.991	1.009
DevType	0.962	1.04
CogInten	0.996	1.004
Gender	0.939	1.065
Age_Exact	0.884	1.131

5.4. MODEL FIT INDICES

The model fit indices for the final structural model are presented in table 20. The observed chi-square was 566.254 with 221 degrees of freedom. The p-value was greater than 0.05, however as discussed previously for large sample sizes the p-value is not a reliable fit index. The adjusted chi square value was 2.562, below the threshold of 5. The root mean square error of approximation was 0.045, below the threshold of 0.08 and the comparative fit index was 0.975, above the threshold of 0.95 for good model fit. The normative fit index was found to be 0.960, the relative fit index was 0.950 and the incremental fit index was 0.975, all observed above the threshold of 0.95 for good model fit. The goodness of fit index was 0.940 above the threshold value of 0.90 and the pclose was 0.957 above the threshold value of 0.05.

The standardised root square mean residual was 0.0338, below the threshold value of 0.05. All fit indices were within acceptable thresholds indicating good fit of the data to the model.

Table 20. Goodness of Fit Indices of Structural Model

Fit Index Type	Observed Value	Acceptable Value	Fit Level
$\chi2$	566.254; $p<0.05$, (df=221)	$p > 0.05$	-
$\chi2$/df	2.562	≤ 5	Good Fit
RMSEA	0.045	≤ 0.08	Good Fit
NFI	0.960	≥ 0.95	Good Fit
CFI	0.975	≥ 0.95	Good Fit
IFI	0.975	≥ 0.95	Good Fit
RFI	0.950	≥ 0.95	Good Fit
(S)RMR	0.0338	≤ 0.05	Good Fit
GFI	0.940	≥ 0.90	Good Fit
PCLOSE	0.957	$p > 0.05$	Good Fit

df: degrees of freedom; χ2: Chi-square; RMSEA: Root Mean Square Error of Approximation; NFI: Normed Fit Index; NNFI: Non-Normed Fit Index; CFI: Comparative Fit Index; IFI: Incremental Fit Index; RFI: Relative Fit Index; (S)RMR: (Standardized) Root Mean Square Residual; GFI: Goodness of Fit Index.

5.5. HYPOTHESIS TESTING

5.5.1. Direct Effects

This section outlines the results of direct effects of independent variables on the dependent variables. Hypothesis 1 looks at the direct effects of forced exposure on perceived intrusiveness (h1a), the direct effect of perceived intrusiveness on attitude towards the ad (h1b) and the direct effect of perceived intrusiveness on attitude towards the ad (h1c). Hypothesis 2a looks at the direct effects of mobile phone attachment, and its subdimensions on perceived intrusiveness, while hypothesis 2b looks at the direct effect of mobile phone attachment on attitude towards the ad. Table 21 below summarizes the direct effects observed in the field experiment and figure 13 shows the path diagram with coefficients overlaid.

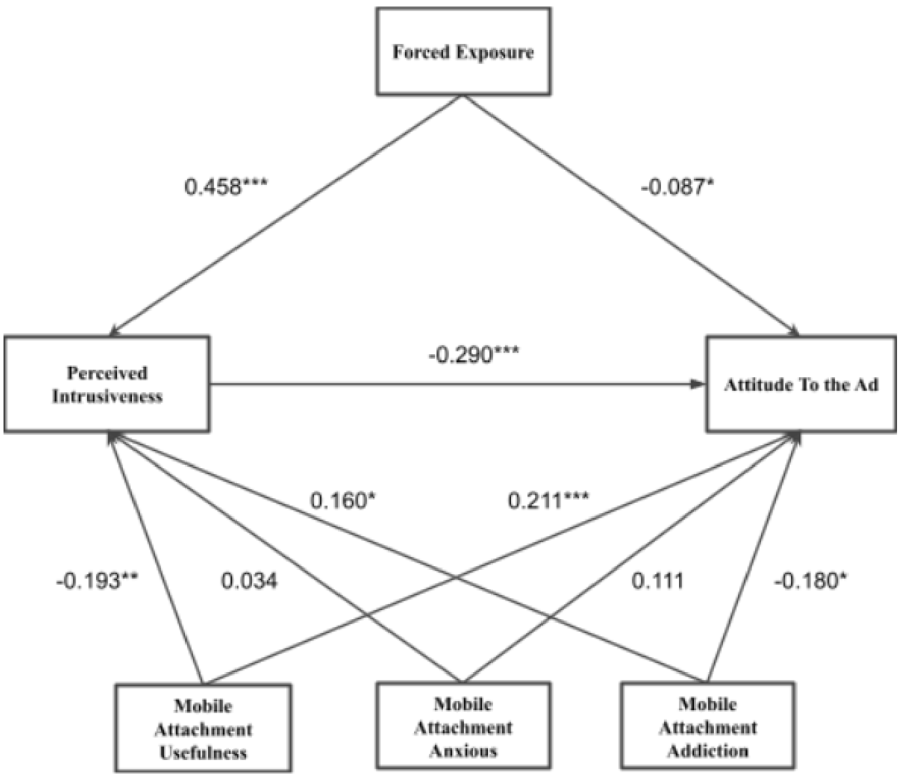
Table 21. Standardised Regression Weights with Confidence Intervals

Hyp	Parameter			Estimate	Lower	Upper	p	
H1a	PI	<---	BanType	0.458	0.399	0.513	0.001	***
H1b	AAD	<---	PI	-0.290	-0.383	-0.202	0.001	***
H1c	AAD	<---	BanType	-0.087	-0.162	-0.005	0.036	*
H2a1	PI	<---	MPU	-0.193	-0.316	-0.073	0.002	**
H2a2	PI	<---	MPA	0.034	-0.077	0.156	0.509	
H2a3	PI	<---	MPD	0.160	0.027	0.306	0.025	*
H2b1	AAD	<---	MPU	0.211	0.083	0.346	0.001	***
H2b2	AAD	<---	MPA	0.111	-0.001	0.239	0.056	
H2b3	AAD	<---	MPD	-0.180	-0.335	-0.035	0.013	*

Referring back to section 2.7.2, the first research question asked if forced exposure to modal ads elicited higher feelings of perceived intrusiveness than passive exposure to banner ads. It was hypothesised that forced exposure to modal ads had a positive direct effect of the levels of perceived intrusiveness experience by users. For research question 1a, the null hypothesis is rejected as evidenced by a beta coefficient of 0.458 with 95% confidence intervals of lower 0.399 and upper 0.513 and a significance level of less than 0.001. It can be concluded that the hypothesis is supported and forced exposure to modal ads has a direct positive significant effect on the level of perceived intrusiveness experienced by users.

The second sub-hypothesis examined the effects of perceived intrusiveness on consumer attitudes to the meaningfulness of an ad. It was hypothesised that perceived intrusiveness had a negative effect on the user’s attitude towards meaningfulness of the ad. For research question 1b, the null hypothesis is rejected as evidenced by a beta coefficient of -0.290 with 95% confidence intervals of lower -0.383 and upper -0.202 and a significance level of less than 0.001. It can be concluded that the hypothesis is supported and perceived intrusiveness has a direct negative significant effect on the user’s attitude towards the meaningfulness of the ad.

Figure 13. Path Diagram of Direct Effects



Age and Gender Control Variables are not shown

The third sub-hypothesis examined the effects of forced exposure to modal ads on consumer attitudes towards the meaningfulness of an ad. It was hypothesised that forced exposure to modal advertisements had a negative effect on the user's attitude towards meaningfulness of the ad. For research question 1c, the null hypothesis is rejected as evidenced by a beta coefficient of -0.087 with 95% confidence intervals of lower -0.162 and upper -0.005 and a significance level of less than 0.05. It can be concluded that the hypothesis is supported and forced exposure to modal advertisements had a direct negative significant effect on the user's attitude towards the meaningfulness of the ad.

The second research question asked if mobile phone attachment affects perceptions of intrusiveness and attitudes towards the ad. The first sub question examined the effects of mobile phone attachment and its sub-dimensions on perceived intrusiveness.

For the first sub-hypothesis it was hypothesised that the level of useful (productive) attachment a user has towards their mobile device had a negative effect on perceived intrusiveness. For hypothesis 2a1, the null hypothesis is rejected as evidenced by a beta coefficient of -0.193 with 95% confidence intervals of lower -0.316 and upper -0.073 and a significance level of 0.002. It can be concluded that the hypothesis is supported and useful (productive) mobile phone attachment direct negative significant effect on perceived intrusiveness.

For the second sub-hypothesis it was hypothesised that the level of anxious (unproductive) attachment a user has towards their mobile device had a negative effect on perceived intrusiveness. For hypothesis 2a2, we fail to reject the null hypothesis as evidenced by a beta coefficient of 0.034 with 95% confidence intervals of lower -0.077 and upper 0.156 and a significance level of 0.509. It can be concluded that the hypothesis is not supported and anxious (unproductive) mobile phone attachment does not have a significant effect on perceived intrusiveness.

For the third sub-hypothesis it was hypothesised that the level of addictive (unproductive) attachment a user has towards their mobile device had a positive effect on perceived intrusiveness. For hypothesis 2a3, the null hypothesis is rejected as evidenced by a beta coefficient of 0.160 with 95% confidence intervals of lower 0.027 and upper 0.306 and a significance level of 0.025. It can be concluded that the hypothesis is supported and addictive (unproductive) mobile phone attachment has a direct positive significant effect on perceived intrusiveness.

The second sub-question examined the effects of mobile phone attachment and its sub-dimensions on attitudes towards the ad (meaningfulness). For the first sub-hypothesis, it was hypothesised that the level of useful (productive) attachment a user has towards their mobile device has a positive effect on attitude towards the ad. For hypothesis 2b1, the null hypothesis is rejected as evidenced by a beta coefficient of 0.211 with 95% confidence intervals of lower 0.083 and upper 0.346 and a significance level of 0.001. It can be concluded that the hypothesis is supported and useful (productive) mobile phone attachment direct positive significant effect on attitudes towards the ad (meaningfulness).

For the second sub-hypothesis, it was hypothesised that the level of anxious (unproductive) attachment a user has towards their mobile device has a negative effect on attitude towards the ad. For hypothesis 2b2, we fail to reject the null hypothesis as evidenced by a beta coefficient of 0.111 with 95% confidence intervals of lower -0.001 and upper 0.239 and a significance level of 0.056. It can be concluded that the hypothesis is not supported and anxious (unproductive) mobile phone attachment does not have a significant effect on attitudes towards the ad (meaningfulness).

For the third sub-hypothesis it was hypothesised that the level of addictive (unproductive) attachment a user has towards their mobile device had a positive effect on attitude towards the ad. For hypothesis 2b3, the null hypothesis is rejected as evidenced by a beta coefficient of -0.180 with 95% confidence intervals of lower -0.335 and upper -0.035 and a significance level of 0.013. It can be concluded that the hypothesis is supported and addictive (unproductive) mobile phone attachment has a direct negative significant effect on attitude towards the ad.

5.5.2. Mediated Effects

The third research question asked if perceived intrusiveness mediated the effect of banner type on consumer attitudes to the meaningfulness of an ad. It was hypothesised that perceived intrusiveness mediates the effect of banner type on consumer attitudes to the meaningfulness of an ad. For hypothesis 3, the null hypothesis is rejected as evidenced by a beta coefficient of -0.345 with 95% confidence intervals of lower -0.474 and upper -0.235 and a significance of $p<0.001$. It can be concluded that the hypothesis is supported and that perceived intrusiveness has a significant mediating effect of forced exposure on consumer attitudes to the meaningfulness of an ad.

5.5.3. Moderation Effects

The fourth research question examined the moderating effects of mobile phone attachment, and its sub-dimensions on the relationships between forced exposure, perceived intrusiveness and attitude towards the ad. The results are summarised in table 22 below.

Table 22. Summary of Moderation Findings

H	Dependent Variable	Independent Variable	Mediator / Moderator	Effect Type	Beta	p-value	Outcome
4a1	Attitude towards the Ad	Perceived Intrusiveness	Mobile Phone Attachment (Useful)	Moderation	0.031	p>0.05	Not Supported
4a2	Attitude towards the Ad	Perceived Intrusiveness	Mobile Phone Attachment (Anxious)	Moderation	-0.058	p>0.05	Not Supported
4a3	Attitude towards the Ad	Perceived Intrusiveness	Mobile Phone Attachment (Addictive)	Moderation	0.067	p>0.05	Not Supported
4b1	Attitude towards the Ad	Forced Exposure	Mobile Phone Attachment (Useful)	Moderation	0.075	p<0.05	Supported
4b2	Attitude towards the Ad	Forced Exposure	Mobile Phone Attachment (Anxious)	Moderation	0.001	p>0.05	Not Supported
4b3	Attitude towards the Ad	Forced Exposure	Mobile Phone Attachment (Addictive)	Moderation	-0.016	p>0.05	Not Supported
4c1	Perceived Intrusiveness	Forced Exposure	Mobile Phone Attachment (Useful)	Moderation	-0.046	p>0.05	Not Supported
4c2	Perceived Intrusiveness	Forced Exposure	Mobile Phone Attachment (Anxious)	Moderation	0.014	p>0.05	Not Supported
4c3	Perceived Intrusiveness	Forced Exposure	Mobile Phone Attachment (Addictive)	Moderation	0.014	p>0.05	Not Supported

The first sub-question asked if mobile phone attachment moderated the effect of perceived intrusiveness on consumer attitudes to the meaningfulness of an ad. For the first sub-hypothesis, it was hypothesised that the level of useful (productive) attachment a user has towards their mobile device dampens the negative relationship between perceived intrusiveness and consumer attitudes to the meaningfulness of an ad. For hypothesis 4a1, we fail to reject the null hypothesis as evidenced by a beta coefficient of 0.031 and a significance of $p>0.05$. It can be concluded that the hypothesis is not supported. For hypothesis 4a2, it was hypothesised that the level of anxious (unproductive) attachment a user has towards their mobile device strengthens the negative relationship between perceived intrusiveness and consumer attitudes to the meaningfulness of an ad. We fail to reject the null hypothesis as evidenced by a beta coefficient of -0.058 and a significance of $p>0.05$. It can be concluded that the hypothesis is not supported. For hypothesis 4a3, it was hypothesised that the level of addictive (unproductive) attachment a user has towards their mobile device strengthens the negative relationship between perceived intrusiveness and consumer attitudes to the meaningfulness of an ad. We fail to reject the null hypothesis as evidenced by a beta coefficient of 0.067 and a significance of $p>0.05$.

The second sub-question asked if mobile phone attachment moderates the relationship between forced exposure and attitude towards the ad. For the first sub-hypothesis, it was hypothesised that the level of useful (productive) attachment a user has towards their mobile device dampens the negative relationship between forced exposure and consumer attitudes to the meaningfulness of an ad. For hypothesis 4b1, we reject the null hypothesis as evidenced by a beta coefficient of

0.075 and a significance of $p<0.05$. It can be concluded that the hypothesis is weakly supported. For hypothesis 4b2, it was hypothesised that the level of anxious (unproductive) attachment a user has towards their mobile device strengthens the negative relationship between forced exposure and consumer attitudes to the meaningfulness of an ad. We fail to reject the null hypothesis as evidenced by a beta coefficient of 0.001 and a significance of $p>0.05$. It can be concluded that the hypothesis is not supported. For hypothesis 4b3, it was hypothesised that the level of addictive (unproductive) attachment a user has towards their mobile device strengthens the negative relationship between forced exposure and consumer attitudes to the meaningfulness of an ad. We fail to reject the null hypothesis as evidenced by a beta coefficient of -0.016 and a significance of $p>0.05$.

The third sub-question asked if mobile phone attachment moderate the relationship between forced exposure and perceived intrusiveness. For the first sub-hypothesis, it was hypothesised that the level of useful (productive) attachment a user has towards their mobile device dampens the positive relationship between forced exposure and perceived intrusiveness. For hypothesis 4c1, we fail to reject the null hypothesis as evidenced by a beta coefficient of -0.046 and a significance of $p>0.05$. It can be concluded that the hypothesis is not supported. For hypothesis 4c2, it was hypothesised that the level of anxious (unproductive) attachment a user has towards their mobile device strengthens the positive relationship between forced exposure and perceived intrusiveness. We fail to reject the null hypothesis as evidenced by a beta coefficient of 0.014 and a significance of $p>0.05$. It can be concluded that the hypothesis is not supported. For hypothesis 4c3, it was hypothesised that the level of addictive (unproductive) attachment a user has towards their mobile device strengthens the positive relationship between forced exposure and perceived intrusiveness. We fail to reject the null hypothesis as evidenced by a beta coefficient of -0.066 and a significance of $p>0.05$.

5.5.4. Multigroup Effects

Multigroup analysis was performed in IBM AMOS using the multigroup analysis function to assess whether the model as a whole or specific paths within the model are invariant between groups. Two groups were tested in the analysis; (a) device type, consisting of mobile users and desktop users and (b) cognitive task load, consisting of high and low cognitive load tasks.

The fifth research question explored if differences existed in the model between mobile and desktop device types. For hypothesis 5a, it was hypothesised that there will be a difference observed at the model level between mobile and desktop groups.

Table 23. Summary of Multigroup Findings

H	Mediator / Moderator	Effect Type	p-value	Outcome
5a	Device Type	Multigroup	p>0.05	Not Supported
5b	Cognitive Intensity	Multigroup	p>0.05	Not Supported

5.6. DISCUSSION OF DATA AND CONSTRUCT VALIDITY

The following section considers the overall robustness of the data collected and describes and discusses the characteristics of the data, the reliability of the scale measures, sampling adequacy and descriptives, factor analysis as well as discriminant and convergent validity of the factor loadings. Prior to discussing the findings from this research, the author feels it important to discuss the key steps taken to arrive at these findings and to give validity to their interpretation.

Data analysis was based on three multidimensional constructs; (a) perceived intrusiveness, (b) attitude towards the ad (meaningfulness) and (c) mobile phone attachment, the latter comprising four subscales. An important step in the validation of these scales for use in this study was to identify the valid and reliable factors within each scale using statistical tests and dimensional structure using a confirmatory factor analysis.

Following data collection, the dataset was reviewed for consistency, errors and outliers. Upon inspection, no missing data was observed. To screen for outliers, a Mahalanobis distance analysis was performed on each of the scale items and cases with a Chi-Square cumulative distribution function below the threshold of 0.001 recommended by Tabachnick & Fidell (2007) were excluded from the working dataset. Based on this criterion, a total of 30 cases were excluded from the dataset as discussed in section 4.3.

It was also important to exclude cases that performed actions within the field experiment which invalidated the individual response. During the experiment, users were exposed to advertisements which were generally appealing and were congruent with the task for the psychometric test. The ads promoted an IQ test website and it was expected that a percentage of participants would find the ad appealing and click the ad during the experiment, and these responses were tagged for exclusion. A total of 44 participants clicked on the ad during the experiment and these cases were excluded from the final dataset used in the analysis.

The total valid sample employed for data analysis in this study was 766 cases, with 80 cases from the original sample of 846 excluded (made up of 30 outliers, 44 cases where an ad click occurred and 6 unengaged responses).

The achieved age quotas for the valid sample were 17.9% (n=137) for the 18-24 segment, 25.3% (n=194) for the 25-34 segment, 25.6% (n=196) for the 35-44 segment, 20.5% (n=157) for the 45-54 segment, 9.0% (n=69) for the 55-64 segment and 1.7% (n=13) for the 65+ segment. The age distribution was generally aligned to the characteristics of the general population of internet users in Ireland, with noted under-representation in the older age segments (55-64 and 65+).

The achieved gender quotas for the valid sample closely matched the age characteristics of the general population of Ireland, with 49.2% (n=377) male and 50.8% (n=389) female. The sample was drawn from a research panel in the Republic of Ireland and participants were geographically restricted to this territory.

The total valid sample was broken down into eight groups based on the independent variables (device type, task intensity and ad exposure) and the 2x2x2 factorial design of the experiment. By using an independent measures design, also known as between-groups design, the risk of confounding variables was reduced. The characteristics and achieved sample size for each group are detailed in figure 14. All groups achieved a minimum of 80 valid participants.

Figure 14. Experimental Groups

Ad Exposure	Device Type	Task Intensity	N
Not Forced	Desktop	Low	110
Not Forced	Desktop	High	112
Not Forced	Mobile	Low	95
Not Forced	Mobile	High	100
Forced	Desktop	Low	82
Forced	Desktop	High	87
Forced	Mobile	Low	87
Forced	Mobile	High	93

In statistical analysis, the term skewness refers to the level of asymmetry in a normal distribution curve in a set of data and can give an indication as to the extent to which a given distribution deviates from a normal distribution. Following statistical tests for skewness, normal distributions for the indicators of latent factors were observed with a range of -1.131 (mpasT2) to +1.152 (mpasD5). A similar test for normality is kurtosis, which is a measure of how significant the tails of the bell-curve for the data set deviate from the tails of a normal distribution. Following statistical tests for kurtosis, normal distributions for the indicators of latent factors were observed with a range of -1.177 (mpasA3) to +0.431 (mpasT2). Both skewness and kurtosis were deemed within the acceptable threshold range of -2 to +2, indicating the dataset followed a normal distribution (George and Mallery, 2010; Gravetter and Wallnau, 2012; Trochim et al., 2015). The Kaiser-Meyer-Olkin measure of sampling adequacy was tested and was reported to be 0.886. The test measures sampling adequacy for each variable in the model and for the complete model. The sampling adequacy and suitability for factor analysis was classified as good (above 0.8) according to commonly accepted thresholds (Cerny and Kaiser, 1977).

The next progressive step in validating the data was to perform an exploratory factor analysis (EFA), a statistical method to elucidate the fundamental structure of a large set of variables within a dataset. The key goal in EFA is to identify the common factors and underlying relationships amongst a number of measures of latent constructs. A key assumption of EFA is that any indicator can be correlated with any factor within the group of measures and the desired outcome is to arrive at a set of constructs with unique factor loadings for each with no overlap between latent constructs. EFA generally has two recommended fitting procedures - maximum likelihood and principal axis factoring. As the data followed a normal distribution, the decision was taken to use the maximum likelihood method as discussed by Fabrigar et al. (1999) as the best fitting procedure when data is normal as well as providing significance testing of factor loading and a wide range of goodness of fit indices. Another important process in EFA is factor rotation, which allows the researcher to condense the infinite possibilities of solutions to the best simple structure. Rotation can be either of two processes - orthogonal and oblique rotation and the key difference between these processes is that orthogonal rotations constrain correlations between factors, while oblique does not. Allowing factors to correlate was seen as the most appropriate option in this analysis, so oblique (promax) rotation was chosen as the preferred method (Fabrigar *et al.*, 1999).

The output of the first run of the EFA identified eight potential groups of measures in the pattern matrix amongst the six scales, with cross-correlations above the threshold coefficient of 0.3 observed in the mpasU, mpasA and mpasD scales. A dimension reduction procedure was initiated to create a clean pattern matrix where the goal was to obtain a set of measures that loaded cleanly onto their respective scales. To achieve this, reliability analyses assessing coefficients and Cronbach's Alpha for each of the scales were performed and factors were excluded that had a low coefficient (<0.5) and/or didn't correlate with the rest of the scale within the group. This procedure was actioned in a stepwise fashion, removing one factor at a time and reiterating the process. Three of the scales did not require dimension reduction, namely the Perceived Intrusiveness Scale, Attitude Towards the Ad (Meaningfulness) scale and the Mobile Phone Attachment (24/7) sub-scale as factors cleanly converged with high factor loading coefficients for each. Conversely, three of the subscales of Mobile Phone Attachment (Usefulness, Anxious and Addiction) did show discrepancies in factor loadings and were treated. The Mobile Phone Attachment (Usefulness) scale had eight latent reflective factors in total and five factors were removed (mpasU1, mpasU2, mpasU3, mpasU4 and mpasU5) due to divergence and low loadings. This was justified as following removal of the non-compliant factors there were still three latent reflective factors loading convergently and with high loadings on the latent construct. Similarly, four latent reflective factors (mpasA5, mpasA6, mpasA7 and mpasA8) were excluded from the Mobile Phone Attachment (Anxious) scale which had eight items in total and three latent reflective factors (mpasD1, mpasD4 and mpasD5) were excluded from the Mobile Phone Attachment (Addiction) scale which had six factors in total. Following optimisation, the EFA was reiterated and a clean pattern matrix was obtained.

The key measure construct validity has two sub elements - convergent validity and discriminant validity. Convergent validity requires that loadings of latent reflective factors that theoretically should be related to each other are, in fact, observed to be related to each other. Based on the obtained pattern matrix from the exploratory factor analysis, factors were observed to be clearly defined into groupings according to the latent construct they were measuring, confirming convergent validity was met. SImilarly, discriminant validity requires that loadings of latent reflective factors that theoretically should not be related to each other are, in fact, observed to not be related to each other. Based on the obtained pattern matrix from the exploratory factor analysis, no cross loadings or correlations were observed confirming discriminant validity was achieved.

The next step in the validation process was to assess measures of scale reliability using the Cronbach’s alpha score. Cronbach's alpha is a measure of internal consistency within a scale and indicates how closely related a set of items are within a group. (George and Mallery, 2010) proposed that scores above 0.70 are deemed to be of an acceptable level of reliability and this threshold is widely accepted (Xie and DeVellis, 1992). The Cronbach’s alpha scores of each scale were as follows: Perceived Intrusiveness (PI), 0.951; Attitude Towards the Ad (Meaningfulness)(AAD), 0.947; Mobile Phone Attachment (Usefulness)(MPAS-U), 0.761; Mobile Phone Attachment (Anxious)(MPAS-A), 0.868; Mobile Phone Attachment (Addictive)(MPAS-D), 0.847; Mobile Phone Attachment (24/7)(MPAS-T), 0.806. As all scales were above the minimum acceptable threshold of 0.70, the reliability of the scales is confirmed.

Based on the statistical tests outlined in this section it has been demonstrated that the data is robust with no errors or missing points, outliers were identified and excluded, sampling adequacy was confirmed, skewness and kurtosis were within acceptable thresholds, convergent and discriminant construct validity were met and scale reliability was classified as good. Given these findings, it can be concluded that both the data and the constructs are valid and suitable for further analysis in a confirmatory factor analysis and structural model development.

5.7. MODEL DEVELOPMENT DISCUSSION AND VALIDITY

Following exploratory factor analysis and validation, a confirmatory factor analysis was performed to verify the factor structure of the observed set of variables and to test whether the factors were consistent with the latent constructs they loaded to. The validated factor structure was loaded into the IBM AMOS statistical software program for analysis. An initial cursory model fit analysis was performed with modification indices selected to identify the baseline fit statistics as well as areas for model fit improvement. The initial model without post-hoc modifications showed satisfactory model fit measures, with a comparative fit index (CFI) greater than 0.90 and the Root Square Mean Error of Approximation (RSMEA) less than 0.08. A review of modification indices revealed potential to improve model fit if certain error residuals were constrained within factors loading to their respective latent constructs. A modification index is a measure of the amount by which the chi-square would be reduced if a single parameter restriction were to be removed from the model; large chi-square values indicate poor model fit, hence reducing the chi-square inevitably improves model fit. An important point to note is that it is not acceptable to apply modification covariances between factors across latent constructs - the valid procedure is to apply covariances between factors *within* discriminant latent constructs (MacCallum *et al.*, 1992).

Following application of post-hoc modification indices to the model, the fit statistics were determined and were found to be acceptable. Of note in the results is the chi-square statistic, which 'assesses the magnitude of discrepancy between the sample and fitted covariances matrices' (Hu and Bentler, 1999) which was found to have a significant results (p>0.05), indicating a *prima facie* poor model fit due to the significant result (Barrett, 2007). However, many authors have pointed out that significant limitations exist in the use of the chi-square statistic as a measure of model fit. The chi-square statistic is sensitive to sample size and nearly always shows poor model fit when large sample sizes are used (Bentler and Bonett, 1980; Hooper *et al.*, 2007; Jöreskog and Sörbom, 1993). Given that a relatively large sample size was used in this study, it was logical to assume that the significant chi-square observed in the model was sensitive to sample size and a more appropriate measure of model fit would be the normative chi-square statistic ($\chi 2/df$), now widely accepted as best practice in this scenario (Wheaton *et al.*, 1977). Based on the observed $\chi 2/df$ in the model, we can conclude that even though the chi-square is significant, the model still can be deemed to be a good fit as the observed $\chi 2/df$ falls below the accepted threshold of 5 put forward by Wheaton et al. (1977).

Another notable fit statistic is the root mean square error of approximation (RMSEA), which was measured at 0.045, falling within the acceptable threshold of ≤ 0.08, indicating good model fit as discussed by Browne and Cudeck (1993). The RMSEA is regarded as an important indicator of model fit due to its sensitivity and by the fact it favours parsimony in choosing the model with the least number of parameters (Diamantopoulos and Siguaw, 2000), as well as the fact that a confidence interval can be determined (MacCallum *et al.*, 1996). Commonly used in conjunction with the RMSEA is the (Standardized) Root Mean Square Residual ((S)RMR). The (S)RMR is a measure of the difference between the residuals of the sample covariance matrix and the hypothesized covariance model. The standardised RMR is preferred as if heterogenous scales are used in the study (e.g., Likert scales 1-5 or 1-7), the RMR becomes difficult to interpret, so the (S)RMR is preferred (Kline, 2005). Thresholds for (S)RMR range from <0.05 indicating good fit, up to <0.08 indicating acceptable fit (Diamantopoulos and Siguaw, 2000; Kline, 2005). The (S)RMR was observed to be 0.0455 in the current model, indicating good fit.

The next important model fit index to be reported is the comparative fit index (CFI), developed by Bentler (1990), which is a revised form of the normed-fit index (NFI), a statistic assesses the model by comparing the $\chi2$ value of the model to the $\chi2$ of the null model. The CFI is not as sensitive to sample size as the earlier NFI (Tabachnick and Fidell, 2007). It is generally accepted as a more appropriate fit index with a recommended threshold of >0.95 seen as representing good model fit (Hu and Bentler, 1999; Tabachnick and Fidell, 2007). The CFI was observed to be 0.97 in the current model, indicating good fit, while the NFI was reported to be 0.95.

Historically, the goodness of fit index (GFI) was seen as an important measure of model fit and it calculates the proportion of variance that is accounted for by the estimated population covariance. In recent years, the GFI has fallen out of favour amongst researchers given the sensitivity of the index to sample size and the number of degrees of freedom (MacCallum and Hong, 1997; Sharma *et al.*, 2005). Larger sample sizes tend to have a bias towards increasing the GFI, while a large number of degrees of freedom tend to have a downward bias on the GFI. Traditionally, the accepted threshold for GFI was >0.90, however some authors have recommended >0.95 as a more appropriate measure of good model fit (Shevlin and Miles, 1998). The GFI in the current model was observed to be 0.93, however given the high number of degrees of freedom (293), a downward bias is suspected in the index. Thus, it is more appropriate to use the CFI as a more reliable measure of model fit as opposed to the GFI in this model.

Following determination of appropriate model fit indices, the next procedure in assessing construct validity is to determine both convergent and discriminant validity. Convergent validity is a measure of confidence that the construct is measured by its respective factors, while discriminant validity is a measure of the degree to which different constructs are unrelated (Campbell and Fiske, 1959). In confirmatory factor analysis, the criterion of Fornell-Larcker (1981) is commonly used to assess the degree of shared variance between the latent variables of the model. According to this criterion, the convergent validity of the measurement model can be assessed by the average variance extracted (AVE) and composite reliability (CR) (Fornell and Larcker, 1981). The AVE measures the level of variance captured by a construct versus the level due to measurement error and values above 0.7 are generally considered very good, whereas levels above 0.5 are deemed acceptable. Composite reliability can be viewed as a less biased estimate of reliability than Cronbach's Alpha with an acceptable threshold value of 0.7 and above (Hair, 2011).

As discussed in section 4.6.3, convergent and discriminant validity was not met for the cursory model. Issues were identified in the Mobile Phone Attachment (24/7) (MPT) construct and following reduction to the minimum number of allowable factors (i.e. 2) loading to the construct, even partial convergent validity could not be achieved. A decision was made to remove the MPT construct from the model - this was justified by the fact that the MPT construct could be viewed as redundant as it was one of four subscales of the mobile phone attachment scale. The rationale was that there were still sufficient sub-scale constructs remaining not to impact the overall robustness of the results. Furthermore, minor reductions in the number of factors loading to the Mobile Phone Attachment (Usefulness) and Mobile Phone Attachment (Anxious) scale were made to improve composite reliability measures as discussed in section 4.6.3. Following modifications, the model was found to meet both convergent and discriminant validity.

Model fit indices for the valid model were $\chi 2 = 426.356$; $p<0.05$ (df=152), RMSEA = 0.049, CFI = 0.979 and (S)RMR = 0.038 indicating good fit.

An important next step undertaken in strengthening the validity of the claims made in this study was testing for measurement invariance. Measurement invariance is a statistical term used to indicate whether the same construct or group of constructs are being measured equivalently across different groups, such as gender or culture, i.e., the constructs are *invariant*. Invariance is categorised into three levels of equivalence; (a) configural invariance; where the factor structure is the same when estimating model fit in a multigroup confirmatory factor analysis, (b) metric invariance; where factor loadings are equivalent across groups and (c) scalar invariance; where intercepts and means are equivalent across groups. Based on invariance testing of the final model, configural, metric and scalar invariance were found to be met as evidenced by non-statistically significant results in chi-square difference tests between the different groups in each test as outlined in section 4.6.4.

A subsequent test for measurement validity was to identify if common method bias (CMB) was present. CMB occurs when variations in responses are caused by the instrument rather than the actual characteristics of the respondents that the instrument attempts to measure. When CMB is present, an inherent bias exists in the results, stemming from the variability associated with the instrument as opposed to the participants characteristics. Using the common latent factor (CLF) method in the confirmatory factor analysis as reported by Gaskin (2020), common method bias was tested in the measurement model and was not found to be present (Gaskin, 2020). Model fit indices for the final measurement model were $\chi2$ = 444.195; $p<0.05$ (df=170), $\chi2/df$ = 2.613, RMSEA = 0.046, CFI = 0.980, NFI = 0.967 and (S)RMR = 0.0336 indicating the model could be classified as good fit as all indices were within thresholds for good model fit.

The final stage in model development was the specification of the structural model. For the structural model, the manifest variable banner type (forced exposure) was included as well as control variables age and gender. A cook's distance analysis was performed to check for outliers and influentials and none were observed above the threshold level of 1. Furthermore, multicollinearity was assessed (see section 4.7.3) and variable inflation factors (VIF) were examined for all predictors and no coefficients above the threshold of 5 were observed, as discussed by Kutner et al. (2003). Multicollinearity occurs when independent variables in a regression model are correlated, thus giving rise to issues in the interpretation of findings as independent variables are expected to be independent and not correlated.

Model fit indices for the final structural model were $\chi2$ = 566.254; $p>0.05$ (df=221), $\chi2/df$ = 2.562, RMSEA = 0.045, CFI = 0.975, NFI = 0.960 and (S)RMR = 0.0338 indicating the model could be classified as good fit as all indices were within thresholds for good model fit.

Based on the tests performed in this section and section 5.6, it is reasonable to assume that claims can be made confidently on the findings from this model given the confirmation of construct validity and reliability, sampling adequacy, measurement invariance, common method bias control, no outliers or influentials was present and no multicollinearity was observed. Furthermore, favourable model fit indices confirm this assumption of the quality of the data and analysis.

Chapter 6

DISCUSSION

6.1. INTRODUCTION

This chapter discusses the results from this research study and puts forward a critical analysis of the findings in light of the current literature in the area. The first section discusses the results of hypothesis testing of the research questions asked in this study and synthesises the current findings with theoretical and empirical knowledge and discusses theoretical implications. The next section of this chapter presents the managerial implications derived from this current body of research and discusses recommendations for practitioners in the field of online advertising and digital marketing. The next section of this chapter considers limitations identified in this thesis, reviewing key areas where potential limitations were observed and what actions were taken to address these limitations. The chapter concludes with a discussion on future areas of research stemming from this study which are deemed to be of significant potential interest to developing the overall body of knowledge in the area of online advertising with a special interest in mobile advertising.

This thesis aimed to examine the effects of advertising exposure in different online conditions on the consumer's perceived intrusiveness of advertising, consumer attitudes towards the meaningfulness of ads and whether mobile phone attachment impacted consumer attitudes and emotional responses. Research interest in the field of online advertising and intrusiveness has been steadily growing since the early 2000's, arguably with Edwards, Li & Lee's (2002) seminal paper on the antecedents and consequences of the perceived intrusiveness of pop-up ads being one of the first studies to explore intrusiveness and pop-up ads in detail and included the development of the perceived intrusiveness scale.

The research strategy adopted in this thesis attempted to mirror, as close as possible, a real-world scenario of advertising exposure in a field experiment. Users were exposed to carefully selected advertisements during an online task that closely matched the expected customer journey in a real-world scenario of a test website with a psychometric test and content publisher website.

The research questions were formulated in the context of previous research in the field (Edwards *et al.*, 2002; Kusse, 2013; Li and Meeds, 2007; McCoy *et al.*, 2007a; Truong and Simmons, 2010), however much of this earlier research was dated and lacked specificity in the mobile context which is critical in today's mobile first society. The research questions were informed by relevant theories hypothesised to provide explanatory mechanisms for the observations including reactance theory (Brehm, 1966), classical conditioning (Pavlov, 1927), the technology acceptance model (Davis *et al.*, 1989) and attachment theory (Bowlby, 1969). The overall conclusion, construed at a high level, is that reactance theory provides a mechanism to understand why forced exposure leads to users finding advertising intrusive as well as those with addictive tendencies (where attachment theory acts synergistically with reactance), while the technology acceptance model and classical conditioning may provide mechanisms to understand why users who characterise their relationship and/or attachment with their mobile phone as useful or utilitarian may be protected from experiencing higher levels of intrusiveness through conditioning or acceptance of the necessity for advertising for the overall sustainability and health of the internet ecosystem. These findings are expected to contribute to empirical knowledge in the field of mobile advertising and to provide practical outcomes for advertising practitioners.

6.2. MAIN FINDINGS & THEORETICAL IMPLICATIONS

The following section outlines the main findings in this research study and then discusses these findings in the context of previous empirical research as well as theoretical and practical implications.

6.2.1. Forced Exposure, Perceived Intrusiveness and Attitude

The first overarching research question in this study, presented as three sub-questions, explored the direct effects of forced exposure on the latent constructs of perceived intrusiveness and attitude towards the ad as well as the direct effect of perceived intrusiveness on attitude towards the ad. Although previously examined by Edwards et al. (2002), the novel aspect of this research is the focus on examining these variables and constructs in a model where there is an emphasis on mobile and introducing the new construct of mobile attachment and its subdimensions.

Research Question 1a - Forced Exposure and Perceived Intrusiveness

The first sub-question asked whether forced exposure to modal ads elicited higher feelings of perceived intrusiveness than passive exposure to banner ads. It was hypothesised that forced exposure had a direct positive effect of the levels of perceived intrusiveness experienced by participants and the null hypothesis was rejected as evidenced by a significant ($p<0.001$) positive effect of magnitude 0.458 with 95% confidence intervals ranging from 0.399 to 0.513. This finding demonstrates that forced exposure to modal ads does elicit feelings of intrusiveness in users exposed to these types of ads. This finding corroborates findings from previous authors who found that popup ads were intrusive (Edwards *et al.*, 2002; Jung Ok Jeon *et al.*, 2009; McCoy *et al.*, 2004), however, the previous research is somewhat dated now and different methodologies and data analytics techniques were used as well as different sampling frames.

In the context of this current research, Brehm's (1966) reactance theory provides an important theoretical framework for understanding why individuals may find forced exposure ad formats intrusive and also form negative attitudes towards them. The threats to freedom of choice that forced exposure to advertising precipitates, not only by the disruptive nature of their execution, the obscuring nature of their delivery and the requirement for the individual to switch attention to the advertisement all embody the fundamental tenets of psychological reactance in individuals. Reactance as an underlying mechanism not only explains the induction of perceived intrusiveness, but may also explain any mediating effects of perceived intrusiveness on attitudes towards the ad.

As Brehm (1966) put forward, threats to freedom of choice can result in individuals moving in the opposite direction of the threat, termed the 'boomerang effect'. In the context of modal ads, the perceived threat to the freedom of choice (or limitation of choice) evident from a forced exposure condition can be viewed as an interpersonal threat where an attempt to influence the individual has been made. As Brehm (1966) discussed, when reactance is triggered through an interpersonal threat to the freedom of choice, the result is for the individual to reassert their freedom. In the context of forced exposure modal ads, the potential avenues for the reassertion of the individual's freedom of choice can include navigating away from the website, not clicking or purchasing the product the ad is promoting as a matter of principle or installing an ad blocker. All of these consequences of the triggering of reactance in forced exposure conditions can be construed as an exceptionally negative outcome for the advertiser, but also potentially highly negative for the brand and the host website (discussed in the findings from research question 1b).

This finding is also important in the context of the current internet environment; a myriad of novel forced exposure and modal formats are served to internet users multiple times during each session and it is evident that many of these elicit feelings of intrusiveness in users. A recent development is the introduction of privacy regulations in the EU which requires companies to seek explicit permission from the user to track their behaviour and to set cookies. Many webmasters have resorted to utilising a forced exposure modal to seek this permission, and although it is not an advertisement *per se*, it is still a marketing communication tool. One must question whether this highly disruptive and intrusive format is having a negative impact on these websites and their visitors. This observation gives rise to a potential area for future research - whether the modal itself as an element drives intrusiveness or is it the advertisement, and this can be tested by assessing the level of intrusiveness experienced by users following exposure to a privacy message modal (which benefits the user through providing freedom of choice) versus an advertisement (which limits their freedom).

A study by Gutierrez et al. (2019), using privacy calculus theory as a framework, found that the perceived intrusiveness of advertising is a critical risk factor in determining mobile users' intentions to accept location based mobile advertising and therefore establishing effective means of minimising intrusiveness is expected to have the greatest impact on achieving effective communications with mobile phone users (Gutierrez *et al.*, 2019). The key question to understand is whether the delivery of a beneficial privacy choice though an intrusive modal format defeats the purpose in the first place.

Research Question 1b - Perceived Intrusiveness and Attitude Towards the Ad

The second sub-question asked what are the effects of perceived intrusiveness on consumer attitudes to the meaningfulness of an ad and posited that the level of perceived intrusiveness a user experiences from advertising exposure has a negative effect on the user's attitude towards the meaningfulness of the ad. The hypothesis was supported, rejecting the null hypothesis as evidenced by a significant ($p<0.001$) negative effect of magnitude -0.290 with 95% confidence intervals ranging from -0.383 to -0.202.

Thus, it is demonstrated that perceived intrusiveness has a direct negative impact on user's attitudes towards the advertisement. Scenarios where advertisers believe that the gains in attention garnered from the more intrusive ad formats are acceptable and welcome may not, in fact, deliver a positive outcome, given that the intrusiveness elicited has a negative impact on the consumer's attitude, leading to an overall negative counter effect.

As MacKenzie et al. (1986) demonstrated, attitude towards the ad influences brand attitude both directly and indirectly through its effect on brand cognitions. Furthermore, Mitchell and Olson (1981) and Shimp (1981) demonstrated that attitude towards the ad influenced both brand attitude and purchase intentions, while Lee (1995) demonstrated that attitude towards the ad also influenced brand extensions. Tan et al. (2019) found that ads that are perceived as intrusive negatively impact attitudes towards the publisher's site. Taken together, it is evident that the negative attitudes towards the ad developed in response to intrusive advertising have far reaching consequences beyond the immediate direct effects of just irritation with the offending advertisement in question. The effects of intrusiveness can cascade downstream and damage attitudes towards the brand, the website as well as hinder intention to purchase.

Possible avenues for future research in this area will include specifying in more detail the dimensions of ad attitude driving this effect and whether it is just the meaningfulness dimension or is it a global effect involving more dimensions. This finding also has some important managerial implications in so far as the formulation of overall digital advertising strategy and the execution of the specific advertising formats to avoid triggering perceived intrusiveness in consumers to ensure the ads, and potentially the brand, are not viewed in a negative light.

From a theoretical standpoint, reactance theory also provides a mechanism for the negative impact of perceived intrusiveness on attitudes towards the ad and also how perceived intrusiveness mediates the negative effects of forced exposure on attitudes towards the ad. As Edwards et al. (2002) described, irritation is a mediator in the development of perceived intrusiveness to advertising, and the triggering of negative emotional responses to intrusive ads and forced exposure to advertising may have a subsequent downstream effect on an individual's attitudes towards the ad, the website where the ad is executed and to the brand the ad is promoting. When a perceived freedom is threatened (for example, when a user's goal directed activity on a website is obstructed and disrupted forcefully and their freedom to continue their session unhindered is eliminated), reactance theory posits that the individual will seek to re-establish that freedom, with ad avoidance being one common remedy. Ad avoidance can manifest as either cognitive avoidance (where the user develops a mental block to awareness of the advertisement) or behavioural (where the users takes action including the use of ad blockers or the actual avoidance of the website where the offending ads are executed). It is possible that the avoidance the individual develops to the ad may indirectly lead, by associative learning, to the user developing avoidance towards the brand promoted in the ad and to the website where the ad is hosted and will seek to avoid in the future.

The potential for ad avoidance, mediated through psychological reactance and intrusiveness, to have a cascade effect leading to more persistent avoidant behaviour is a major potential negative consequence of forced exposure to advertising, affecting not only the effectiveness of advertisements on a website, but potentially leading to a individual rejecting the website where the ad is hosted permanently as well as developing a negative attitude towards the brand, both online and offline. This risk is all the more real due to recent developments in the way content is served on popular platforms such as the Facebook stream and 'Google now' stream, where content is served to users based on their preferences and behaviour. The caveat is, however, that users can decide to exclude certain content themes and websites from their stream, helping the algorithm learn their preferences and serve more relevant content.

Websites which persistently serve intrusive advertising run the risk of being excluded permanently from the user's attention sphere if a threshold of irritation, intrusiveness and reactance is reached. This rejection of the website may also teach the algorithm to limit the reach of the offending website in other user's streams through interest and behavioural associations.

Classical conditioning theory may also play a role in understanding the development of negative attitudes towards the ad and through a cascade effect, negative attitudes towards the website and towards the brand. The irritation and annoyance precipitated by forced exposure to obscuring advertisements and subsequent invocation of feelings of intrusiveness may initiate a direct conditioned response to avoid or dismiss the ad. However, the conditioned response may be much more pervasive and indirectly lead to a negative conditioned response towards the website where the ad is hosted and to the brand the offending ad is promoting. It is plausible that the interplay of classical conditioning and psychological reactance act synergistically to heighten the negative effects of intrusive advertising on attitudes towards the ad, the website and the brand in line with previous research findings (Goodrich *et al.*, 2015; McCoy *et al.*, 2017).

Research Question 1c - Forced Exposure and Attitude Towards the Ad

The third sub-question asked whether forced exposure to modal ads had an effect on consumer attitudes towards the meaningfulness of an ad. It was hypothesised that forced exposure to modal advertisements would have a negative effect on the user's attitude towards meaningfulness of the ad. The hypothesis was supported, rejecting the null hypothesis as evidenced by a significant ($p<0.05$) negative effect of magnitude -0.087 with 95% confidence intervals ranging from -0.-162 to -0.005. The observation of a weak significant direct negative effect of forced exposure to modal ads on the attitude towards the meaningfulness of an ad is interesting, insofar as forced exposure, acting directly, does not appear to influence attitude towards the ad as strongly as it does indirectly, pointing to a significant mediating effect of perceived intrusiveness on the relationship between forced exposure and attitude towards the ad.

Research Question 3 - Mediating Effect of Perceived Intrusiveness

The mediating effect of perceived intrusiveness was explored in the third research question and asked whether perceived intrusiveness mediated the effect of forced exposure on consumer attitudes to the meaningfulness of an ad. It was hypothesised that there was a significant mediating effect and the null hypothesis was rejected as evidenced by a significant ($p<0.001$) negative mediating effect of magnitude -0.345 with 95% confidence intervals ranging from -0.474 to -0.235. It is interesting that the direct effect of forced exposure on attitude towards the ad is weak (beta = -0.087), however a much stronger indirect negative effect is reported (beta = -0.345).

Thus, it is evident that perceived intrusiveness is a key factor in determining how users form attitudes towards advertising and important managerial implications of this will be subsequently discussed in section 6.3, pertaining to how advertisers can prevent negative attitudes from consumer's when executing advertising campaigns by using formats which are designed to be less intrusive. There is an important balance to be drawn between the need to capture the consumer's attention and the risk of that attention being dominated by negative feelings.

Reviewing the findings from the first overarching research question, it is evident that significant direct effects of forced exposure on perceived intrusiveness and attitude towards the ad, as well as a significant effect of perceived intrusiveness on attitude towards the ad. Reactance theory is theorised as the primary driver to explain these effects, with classical conditioning theory playing a role in understanding the effects, in concert with reactance, on attitudes towards the ad. The overall interplay between reactance and conditioning gives rise to a complex system of cascading negative emotional responses and consequences which ultimately highlight the negative consequences of forced exposure and intrusive advertising on attitudes towards the ad, and indirectly on the brand and website. Practical implications will be discussed in section 6.3.

6.2.2. Mobile Attachment, Perceived Intrusiveness and Attitude

The second overarching research question in this study explored whether the phenomenon of mobile phone attachment affects consumer perceptions of intrusiveness and attitude towards the ad. Mobile phone attachment is a relatively novel phenomenon; an inevitable by-product of the juxtaposition of accelerating smartphone penetration in society and a more connected, yet less traditionally interpersonal world. Smartphones provide an always-on connection to the global hive mind, allowing users to forge connections that transcend the human limitations of effort, distance, time and place. They transpose the individual into a world where their own psychological constraints become insignificant when compared to the feelings of confidence, connectedness, companionship and self-actualization that the smartphone device facilitates through social networking, knowledge accessibility and other extensions of human capability.

As discussed previously in section 2.5.2, mobile phone attachment is a complex multidimensional phenomenon. It is inaccurate, and somewhat naive, to regard the effects of this attachment as psychopathological only; many consumers also may consider the relationship they have with their smartphone in a positive light.

Although a significant majority of the current research in the area focuses on the problematic effects of mobile phone attachment including behavioural addiction (Meschtscherjakov et al., 2014), possessional attachment and anxiety (Bodford et al. 2017), risk factors for smartphone addiction (Choi et al., 2015), neuroticism and smartphone addiction (Pearson and Hussain 2017), loneliness and smartphone addictive attachment (Bian and Leung 2015) and the link between negative psychological traits and smartphone addiction (Lee et al., 2014), limited research has included some of the more positive dimensions of mobile phone attachment, including psychological comfort (Melumad and Pham 2020), usefulness (Bock et al., 2016) and productivity (Rodriguez-Torrico et al., 2019), and their impact on the consumer's daily life. Liu et al. (2018) found that high levels of smartphone use would not necessarily mean that the user will experience problematic consequences and thus restricting the view of the relationship of the mobile device and the user to just problematic might be limiting our understanding of this complex relationship. The mobile phone attachment scale developed by Bock et al. (2016) attempted to address this bias in the literature by constructing a scale which aimed to address both the negative and positive dimensions of mobile phone attachment. Some limitations were found in the validity of the complete scale specifically in this study and they will be discussed in section 6.4, however this gives rise to an important area of future research, insofar as expanding and updating the scale to give a more balanced view of the multiple and emerging dimensions of mobile phone attachment.

Research Question 2a - Mobile Attachment and Perceived Intrusiveness

In response to the research question put forward in this research study as to whether the phenomenon of mobile phone attachment directly affects consumer perceptions of intrusiveness, three sub-hypotheses were put forward in the context of each of the sub-dimensions of useful attachment, anxious attachment and addictive attachment.

It was posited that the level of useful (i.e. positive or productive) attachment a user has towards their mobile device has a negative effect on perceived intrusiveness and the hypothesis was supported, rejecting the null hypothesis as evidenced by a significant ($p<0.002$) negative effect of magnitude -0.193 with 95% confidence intervals ranging from -0.316 to -0.073.

The second sub hypothesis explored whether the level of anxious (unproductive) attachment a user has towards their mobile device has a positive effect on perceived intrusiveness and this was not supported showing a non-significant negligible effect ($p>0.05$).

The third sub-hypothesis posited that the level of addictive (i.e., unproductive or negative) attachment a user has towards their mobile device had a positive direct effect on perceived intrusiveness and this hypothesis was supported as evidenced by a significant ($p<0.05$) direct positive effect of magnitude 0.160 with 95% confidence intervals ranging from 0.027 to 0.306.

Thus, it is evident that participants who had a level of useful (positive) attachment to their smartphone experienced lower levels of perceived intrusiveness when exposed to ads, while conversely, participants who had a higher levels of addictive (negative) attachment to their smartphone experienced higher levels of perceived intrusiveness when exposed to advertisements in the study. However, no significant effects of anxious attachment were observed, leading us to the conclusion that negative attachment when taken as a whole does not universally lead to negative emotional responses to advertising and that specific underlying mechanisms are at play in addictive attachment.

Based on the evidence observed in this study, it is reasonable to assume that users that have a positive utilitarian relationship with their mobile phone are less likely to experience intrusiveness or experience it to a lesser degree. This finding aligns with the logical assumption that users who find their smartphone useful and use it productively may be more likely to regard advertising as less intrusive and accept it as an intrinsic value exchange and necessary function of the internet, in essence an implied social contract (Milne and Gordon, 1993). Conversely, logic also supports the finding that those who experience addictive attachment to their smartphone may find advertising inherently more intrusive as their addictive behaviour may make them more prone to reacting negatively to disruptions during their interactions with the device.

In exploring the theoretical mechanisms to explain the observations discussed in the previous paragraph, three key frameworks are proposed: (a) the Technology Acceptance Model (Davis et al., 1989) to explain the mechanisms by which users who exhibit useful attachment with their mobile phone find advertising less intrusive, (b) reactance theory (Brehm, 1966), which can be used to explain why users with addictive attachment to their mobile phone find forced exposure to advertising more intrusive and (c) attachment theory (Bowlby, 1969), which can be used to explain, in conjunction with reactance theory, why addictive attachment results in higher levels of perceived intrusiveness and more negative attitudes towards the ad.

The Technology Acceptance Model's key concept is focused on two key factors that influence the users decision regarding their willingness to adopt a technology, namely, the perceived usefulness of the technology and the perceived ease of use of the technology (Davis *et al.*, 1989). Based on the theory, users are more likely to adopt a technology when the technology and the services the technology provides are perceived as useful and are easy to use. Thus, one can infer that individuals who express the relationship they have with their mobile phone as useful, it can be concluded that, based on the model, they regard the technology as easy to use and deem it useful and thus accept the technology and the services it provides. The Technology Acceptance Model extends beyond the actual technology to include the services provided by that technology so it can be assumed that these individuals accept the advertising served via their device as a necessary element of the overall system. Classical conditioning (Pavlov, 1927) may also have a role to play in understanding why users who have useful attachment to their device tend to accept and are receptive to advertising. As the user develops an underlying acceptance of advertising in their environment, through the mechanism of the technology acceptance model, they develop a conditioned response to the advertising, in essence a type of immunity to the negative effects of intrusiveness. Thus, the Technology Acceptance Model in combination with classical conditioning provides a framework for understanding why individuals who exhibit a more positive useful attachment to their mobile phone find advertising less intrusiveness as they have come to accept and adopt the technology as well as the services it provides, which must include advertising as it is a critical part of the overall system.

In contrast, to understand the theoretical mechanisms as to why individuals who have a more negative addictive attachment with their mobile phone perceive advertising as more intrusive, one looks to reactance theory and attachment theory. As discussed previously, reactance theory can be seen as the negative reaction an individual has in response to a threat to freedom of choice and explains why forced exposure leads to higher levels of perceived intrusiveness and more negative attitudes towards the ad. In exploring the mechanism in addictive attachment, it is necessary to understand the psychopathology of addiction and to identify what freedom is being eliminated for reactance to be plausible as an underlying explanatory mechanism. Addiction can be viewed as a physical and mental dependence on a particular substance or activity. The underlying mechanisms of addiction arise from the reward centres of the brain where neurochemical signals (dopamine release) are triggered when the activity is performed which stimulate pathways which result in feelings of reward (Goodman, 1990). When the activity is stopped, intense feelings of desire to resume the activity and to seek reward may ensue. Thus, in the context of addictive attachment to mobile devices, the individual has a strong relationship with their device and the activities they perform on it and when this connection is threatened or limited, the individual will exhibit an intense desire to resume their activity and avoid scenarios where their freedom to use the device is threatened. Furthermore, the addictively attached user has strong goal orientation to continue the rewarding behaviour that use of the device delivers, thus the disruptive nature of forced exposure advertising gives rise to higher feelings of intrusiveness in these individuals.

Using attachment theory to also explain, in part, it is logical to theorise that mobile phone attachment may have an effect on an individual's emotional reactions to advertising, especially when the dimension of attachment is negative, such as in the addictive spectrum. As attachment theory explains, individuals form strong bonds with their object of attachment and in the context of mobile phone attachment, threats to their freedom to enjoy that attachment and derive the psychological benefits it proffers could result in negative reactions. Thus, intrusive advertising, which reactance theory (discussed in section 2.6.1) explains may be viewed as a threat to freedom, may trigger increased levels of perceived intrusiveness and less favourable attitudes towards advertising when the individual exhibits higher levels of problematic object attachment to their mobile phone. The interplay of reactance and attachment may also explain why addictive attachment increases perceptions of intrusiveness in forced exposure conditions, while anxious attachment does not. It is possible that the causal effects of attachment in isolation is not sufficient to trigger significant intrusiveness and only when attachment and reactance act synergistically does it lead to an enhanced effect and perceived intrusiveness is observed. This explains why anxious attachment does not significantly increase intrusiveness, while addictive attachment does due to the reactance triggered in addictively attached users due to the extra threat to their freedom of choice by the ad impeding the realisation of their addictive behaviour (where this threat is not evident in anxious behaviour).

Research Question 2b - Mobile Attachment and Attitude Towards the Ad

The next key research question explored in this study was whether mobile phone attachment affects a user's attitude towards the meaningfulness of an ad. Similarly, to the previous question, the direct effects of the three sub-dimensions of usefulness, addictive and anxious attachment on attitude towards the meaningfulness of the ad were explored. The first sub-question focussed on useful attachment and posited that the level of useful (productive) attachment a user has towards their mobile device has a positive effect on attitude towards the ad. This hypothesis was supported and the null hypothesis was rejected as evidenced by a significant ($p<0.001$) positive effect of magnitude 0.211 with 95% confidence intervals ranging from 0.083 to 0.346. From a logical standpoint, it is reasonable to propose that users who have a positive relationship with their smartphone are more likely to have a positive attitude towards advertising as the utility mindset means that they find using their smartphone a productive activity and that they may be more accepting of the requirement of advertising in a healthy internet ecosystem, and thus, have more positive attitudes. The second sub-question focussed on anxious attachment and posited that the level of anxious attachment a user has towards their mobile device has a negative effect on attitude towards the ad. This hypothesis was not supported and we failed to reject the null hypothesis as evidenced by a non-significant ($p>0.05$) effect. The third sub-question focussed on addictive attachment and posited that the level of addictive attachment a user has towards their mobile device has a negative effect on attitude towards the ad. The hypothesis was supported as evidenced by a significant ($p<0.05$) negative effect of magnitude -0.180 with 95% confidence intervals ranging from -0.335 to -0.035.

Again, logic dictates that it is reasonable to expect that users that have a more negative relationship with their smartphone in the context of addictive attachment may have more negative attitudes towards advertising.

Drawing on the theories discussed above for explaining the observations with regard to understanding the impact of mobile attachment on perceived intrusiveness, the same frameworks can be applied to the observed relationships between mobile phone attachment and attitude towards the ad. Individuals who exhibit useful attachment to their device show more positive attitudes towards the ad, while conversely, users who exhibit addictive attachment to their device show more negative attitudes towards the ad. The Technology Acceptance Model (Davis *et al.*, 1989), can be used to explain the mechanism by which those individuals who have a useful attachment and utilitarian relationship with their phone, and by proxy are more accepting of a technology, have more positive attitudes towards the ad. The same is true of those with addictive attachment, who have a highly goal orientated behaviour to seek reward by engaging in the use of the device, where reactance theory provides an underlying mechanism as to why these individuals will seek to reassert their freedom of choice when it is threatened and form more negative attitudes towards the ad which is threatening their freedom.

It is interesting to note, and is consistent with the mechanistic explanation of reactance theory, that anxious attachment did not show a significant effect on either perceived intrusiveness and attitude towards the ad. As anxious attachment, and the anxious state in general, does not involve an implicit goal-directed behaviour (as is the case with addiction), it is logical to assume that reactance theory would not be a significant underlying mechanism and thus, perceived intrusiveness nor attitude towards the ad would not be affected in the same way as those with addictive attachment. The observation that anxious attachment did not see a significant effect on both perceived intrusiveness nor attitude towards the ad, while addictive attachment did see an effect is consistent with the theoretical standpoint that reactance forms a key underlying mechanism driving those who exhibit addictive attachment, but not for problematic attachment as a whole.

Taken together, the findings from the overarching research question exploring the effect of mobile phone attachment on perceived intrusiveness and attitude towards the ad raise some interesting points. Firstly, it is interesting to observe that there are different and counteractive effects of mobile phone attachment on perceived intrusiveness and attitude towards the ad depending on whether the dimension of attachment is either positive (useful) or addictive (negative, goal-directed). Useful attachment, where the users view the attachment to their phone in a more positive light tends to dampen their experience of intrusiveness and enhance their attitude towards the ad. Conversely, addictive attachment, where users show signs of a more negative relationship with their device tends to have the opposite effect, enhancing the experience of intrusiveness of advertising and diminishing their attitudes toward the ad. This finding has important implications for practitioners (which will be discussed in section 6.3) in the formulation of advertising strategy and the execution of forced exposure advertising scenarios, especially in age segments where mobile phone attachment is more prevalent. In a similar fashion, the findings from the exploration of the effects of mobile phone attachment on attitudes towards the meaningfulness of the ad is also noteworthy in the fact that useful (productive) attachment tends to have a positive impact on attitude while addictive (unproductive) attachment tends to have a more negative impact on attitude towards the ad.

These findings demonstrate that there are distinct dimensions of mobile phone attachment and that these dimensions can have independent and differing behavioural effects on and attitudes towards advertising. Mobile phone attachment cannot be classified as a unidimensional construct in itself due to the counteractive effects of productive and unproductive dimensions. An important area of future research will be to develop and validate a new updated instrument, taking learnings from this research and that of Bock et. al. (2016) to refine the concept of mobile phone attachment. Important managerial implications will become evident when the different dimensions of mobile phone attachment are identified and their impact on attitudes towards and emotional responses to advertising. This will be especially relevant as the newer always-on generations of smartphone users become dominant in the years to come and who are notably susceptible to mobile phone attachment.

Research Question 4

Interaction effects were also explored in this study. Support was not found for the majority of moderation effects tested and where support was found the effect was very weak. The moderating effects of each of the dimensions of mobile phone attachment on the relationship between perceived intrusiveness and attitude towards the ad was tested and no significant effects were reported. The moderating effects of each of the dimensions of mobile phone attachment on the relationship between forced exposure and attitude towards the ad was also tested and a very weak moderating effect (beta=0.075, $p<0.05$) for useful attachment was reported, however no significant effects were reported for the other sub-dimensions. Finally, the moderating effects of each of the dimensions of mobile phone attachment on the relationship between forced exposure and perceived intrusiveness was tested and no significant effects were reported. The lack of strong evidence for indirect effects gives rise to the conclusion that the independent variable mobile phone attachment acts primarily via a direct mechanism. Interaction effects for the independent variables device type and cognitive intensity were also tested for the key relationships in the model and no hypotheses were supported.

Research Question 5

Multigroup effects for the device type and cognitive intensity groups were also tested in the analysis; (a) device type, consisting of mobile users and desktop users and (b) cognitive task load, consisting of high and low cognitive load tasks. Comparing the Chi-square different test for the two groups, no significant differences were observed between the different groups, indicating that neither device type nor cognitive intensity had a significant impact on the relationships explored in the model.

It is interesting to note that neither device type nor task intensity appeared to play a role in consumer's perceptions of intrusiveness or attitudes towards the ad in this study. One of the research questions in this study related to the effects, if any, device type had on perceived intrusiveness and attitudes towards the ad. It was postulated that exposure to ads on smaller screen sizes, such as mobile devices, resulted in higher levels of perceived intrusiveness. Theoretically, it was possible that a combination of the smaller screen size and the user's higher level of personal connection to their smartphone could drive this effect and some previous research had shown anecdotal evidence that screen size impacted intrusiveness (Truong and Simmons, 2010). The finding that device type does not affect the level of perceived intrusiveness or attitude towards the ad points to a more global effect of perceived intrusiveness, not rooted in device specific or technological factors, but in psychological and emotional factors. The Technology Acceptance Model, proposed by Davis et al. (1989), may explain this finding that the elicitation of feelings of perceived intrusiveness and an effect on attitudes towards the ad is absent when looking at multigroup or interaction effects from device type. According to the model, individuals who perceive technology as useful and easy to use will accept and adopt a technology freely without resistance. As smartphone devices are now ubiquitous in society, much more so than only a decade ago, it is logical to assume the Technology Acceptance Model is applied and that the technology is widely accepted, including the services the technology provides. In this instance, the chasm between desktop devices and smartphone devices in terms of acceptance that may have been more evident a decade ago, where smartphones were in early adoption phase, is less so now and individuals view mobile advertising in the same light as traditional desktop internet advertising. It is possible that, during the early phases of smartphone penetration, the execution of mobile advertising as well as some hesitancy in adoption could have given rise to the anecdotal finding by Truong and Simmons (2010) that there may be a difference in user reactions to advertising on mobile devices versus desktop. However, the finding from this study that no apparent difference in perceived intrusiveness between mobile and desktop devices is observed, which is not consistent with the findings of Truong and SImmons (2010) can be explained in the context of the passage of time and individuals now adopting the technology more freely in line with the Technology Acceptance Model, as opposed to a decade ago when the technology was in early adoption.

This finding is important to practitioners in the fact that mobile advertising as a technology does not necessarily need to differ significantly from desktop advertising, insofar as the execution of advertisements, as device type does not impact the intrusiveness of advertisements. However, of note is the independent effect of mobile phone attachment, which is unique to mobile devices, which is shown to impact consumers' experience of intrusiveness. The multifactorial nature of intrusiveness in advertising makes the area complex and requires further study to differentiate the effects at a more granular level and to further probe mobile specific factors which extend beyond mobile device attachment.

6.3. MANAGERIAL IMPLICATIONS

This research study has highlighted some important implications for advertising practitioners and managers. Firstly, it demonstrates the negative impact forced exposure to obtrusive advertising has on the consumer, eliciting perceptions of intrusiveness which mediates a negative attitude toward the ad. Secondly, it demonstrates that mobile phone attachment is an important factor in influencing how users form attitudes towards advertising as well as impacting the level of perceived intrusiveness they experience following advertising exposure. These findings have implications in how practitioners and managers formulate and execute digital advertising strategies.

In discussing the practical implications of forced exposure conditions where advertising leads to perceptions of intrusiveness, it is important for practitioners to understand that there is a fine line between the goal of capturing the user's attention and the unwanted effect of that attention having a negative result due the intrusiveness caused by the method that attention was garnered. In other words, the benefit that is gained from the attention to the forced exposure ad is lost because the act of forced exposure to obscuring ads triggers feelings of intrusiveness in the user and they form a negative opinion of the ad, which in turn can have a negative impact on the attitude towards the brand and purchase intentions (Goodrich *et al.*, 2011; Tan *et al.*, 2019). Forced exposure advertising as an execution choice should be limited where possible and permissive advertising favoured in light of the often unforeseen negative consequences of forced exposure conditions on consumer attitudes. The key factors identified in triggering reactance and intrusiveness include controllability and obscuration and these factors must be considered if there is a requirement for modal advertising.

Firstly, users must be given the choice to dismiss the ad freely should they choose to do so; having to wait a specified amount of time before closing the advertisement is not recommended as the threat to the freedom of choice of the user has been demonstrated to not only be ineffective, but also detrimental to consumer attitudes. Furthermore, from an execution standpoint, the close button should be easily visible where the user should expect to see it (the conditioned response is to look for the close button in the top right of the modal) and it could be beneficial to also include two calls to action in the ad including the primary call to action to click or a secondary call to action which dismisses the ad with language including 'No

Thanks' or 'Not Interested'. These treatments of overtly interruptive ads may somewhat attenuate the potential for reactance and intrusiveness through a semi permissive hybrid of the traditional interruptive modal ad, in essence adding an element of politeness.

A second consideration with regards to the execution of modal ads is the level to which the modal obscures the website. Preliminary findings from the pilot study identified that obscuring ads were viewed as more disruptive and intrusive, so if there is a necessity to use modal advertising formats, care should be taken in the design so that the ad does not obscure the majority of the user's screen. The ads used in this study obscured 60% of the user's screen, so it can be inferred that ads should obscure considerably less than this to minimise the risk of triggering negative reactions, while still retaining enough of a presence to capture the users attention.

If a modal or popup advertising execution is required, the practitioner should also give consideration to the timing of the interruption in the user's journey. As discussed previously, impediment of the users goal directed activity is a primary factor in the elicitation of perceptions of intrusiveness (McCoy *et al.*, 2008, 2012), so it is logical to assume that interruptions after the user has fulfilled their goal directed activity may be perceived as less intrusive. For example, a user searching for information on a particular topic may undertake a search in a search engine, navigate to a page which fulfils their information need and consume the content on that page. If the modal ad is presented immediately or shortly after the user has landed on the page it is highly likely that it will be dismissed or the user will experience reactance as the advertisement is a threat to their freedom of choice and is an obstacle to their goal directed activity. Conversely, if the modal ad is presented after the user has scrolled to the bottom of the page and fulfilled their need for information, it is less likely to be seen as intrusive as it is not an impediment to their short-term goal directed activity and is hence less likely to trigger reactance.

A further implication stems from this research in the fact the phenomenon of mobile attachment influences users' reactions to advertising. Users who show problematic mobile phone attachment in the form of addictive behaviours tend to experience higher levels of intrusiveness when exposed to advertising, as well as tending to have more negative attitudes towards advertising when forced to view ads. In contrast, users who exhibit positive attachment in the form of useful attachment, tend to experience lower levels of intrusiveness and more positive attitudes towards advertising. In light of these findings, it is logical to assume that the advertising to specific user segments where it can be deduced through user and segmentation analyses that users have a positive attachment to their mobile device might perform better that general advertising and that formats that may be generally regarded as more intrusive might be considered in this target audience. Conversely, it is also logical to assume that targeting of intrusive advertising to users who may exhibit addictive behaviours might be ineffective and potentially damaging to the brand (Goodrich *et al.*, 2011; McCoy *et al.*, 2017). In attempting to develop a model to segment users exhibiting behaviours, it is possible to infer that these users may be very active on social media and also on gaming applications and thus one can conclude that interruptive advertising may be ineffective in these channels. It is interesting to note that, anecdotally, that this is observed in practice, with mobile app advertising generally seen as ineffective and only reserved for special use cases as well as the lack of overt interruptive advertising treatments of social media platforms. Practitioners can drive value and improve effectiveness by defining consumer segments for the productive consumer and the addictive consumer in terms of mobile phone usage and drive more effective advertising campaigns though careful thought in campaign planning and execution. It is also important to note that age may play an important role in how users react to advertising. Both mobile attachment and anxiety tend to be more prevalent and problematic in the younger age groups (Konok *et al.*, 2016), so from a practical point of view care must be taken in the development of advertising strategy targeting these groups as they may be more susceptible to the effects of mobile attachment on both perceived intrusiveness and attitude towards the ad. The execution of ads for this younger audience must consider the negative effects of forced exposure popups have on triggering perceived intrusiveness and the negative sequelae that stem from the phenomenon. Conversely, older demographics tend to exhibit lower levels of anxiety and mobile attachment (Kleinknecht, 1991), hence these age groups may be less susceptible to the negative effects of forced exposure to popup advertising. Another interesting implication for practitioners is the fact that mobile phone attachment, taken in the literal sense, is confined to the use of mobile devices. It does not have an effect on users when they are using desktop devices. Therefore, from a practical standpoint forced exposure to popup ads on desktop or laptop devices may have less of a negative effect than on mobile devices. The implications and consequences of intrusive advertising can be extended to a social media context. As discussed previously in <u>section 2.4.2</u>, advertising intrusiveness leading to reactance can have many prerequisites including perceived manipulation and overt persuasion, privacy concerns as well as forced exposure. It is reasonable to assume that a considerable number of social media users could be regarded as problematically attached to their device and to the social media platform and it is important to consider this fact when planning and executing advertising campaigns on social media platforms. As discussed by Youn and Kim (2019) Facebook news feed native ads presented strong negative responses, which were often accompanied by reactance and ad avoidance with reported triggers including ad intrusiveness, ad clutter, goal impediment and covertness (Youn and Kim, 2019). Considering the accentuated perceptions of intrusiveness experienced by users with addictive attachment to their devices, it is important to understand how ineffective advertising in this context could be, especially in the mobile context. An important implication for the social media platforms and their advertising algorithm development is to adapt the frequency of advertising for users that exhibit behaviours that could be construed as addictive as over exposure to this segment may result in negative attitudes towards the ad and ad avoidance behaviours.

In summary, the findings from this research have implications across multiple stakeholders in the online advertising ecosystem, including marketers who want to effectively promote their brands and products, for publishers and platforms who are interested in the most effective use of their advertising space to sell advertising, for advertising exchanges who are concerned with optimal delivery of advertising across their networks, for policy makers concerned with the ethical considerations of online advertising and finally for the consumer who is ultimately the last link in the chain and who experiences both the negative and positive effects of online advertising

Summary of Managerial Implications and Recommendations

Stakeholder	Advertiser	Publisher / Platforms	Intermediary / Exchanges	Policymaker
Implication	Advertisers should be aware that interruptive and intrusive advertising can lead to negative emotional responses by consumers, especially where problematic mobile attachment is high	Publishers should consider the potential damaging effects of negative responses consumers on the attitudes towards the site and brand which can be amplified by invocation of perceived intrusiveness more pronounced in those consumers which high degree of mobile device attachment	Intermediaries should consider the placement and execution strategy of their advertising portfolio considering the high risk of negative implications of intrusive advertising in segments where mobile attachment is high	Policymakers should consider the rationale for the use of forced exposure and intrusive advertising in the overall advertising ecosystem and the long-term risks of the use of these formats for the advertising industry in general
Recommendation	Care should be taken to ensure that forced exposure and potentially intrusive advertising should be avoided, especially in segments where device attachment may be high. Such scenarios include online gaming, personal services and social media. Marketing Managers should develop ads which are less intrusive and not designed to interrupt user flows. Marketing managers should liaise with advertising partners and executors to ensure they have control of the placement and formats of advertising representing the brand	Publishers should carry out independent research on the effectiveness of these placements within their own inventory to correlate findings and provide recommendations to advertisers In targeting audiences where it can be inferred that there may be a useful dimension of mobile device attachment, such as in business or productivity settings, forced exposure should be considered but only if a viable value exchange is offered to ensure an implied social contract is established.	Intermediaries and exchanges should conduct research on the effectiveness of these formats and placements. With access to placements where high potential for problematic mobile attachment is evident (gaming, social media, personal services), intrusive advertising should be avoided and recommendations made to advertisers and platforms regarding the risks of negative consumer responses beyond immediate ineffectiveness.	Policymakers should undertake advocacy and consultation with advertisers, publishers and exchanges to educate on the negative consequences and risks of using intrusive advertising, especially in problematic device attachment cohorts. Policymakers should develop a framework and guidelines for the effective use of advertising in segment specific cohorts to assist other stakeholder execute effective advertising

As consumers reject aggressive and intrusive ads facilitated by ad avoidance tactics and resistance to advertisers advances, the rationale for employing forced exposure and disruptive advertising techniques becomes questionable. Taken together, the findings from this research study highlight some important implications for practitioners in the field on online advertising. Forced exposure to popup and modal ads elicit perceived intrusiveness and practitioners should limit or wholly exclude these formats from their mobile advertising strategy. Furthermore, attention should be given to having specific mobile and desktop advertising strategies, especially when considering different generations. The optimum execution of ads on mobile devices should focus on non-obscuring ads that have permissive immediate dismissal with care in the younger generations, while ads for desktop devices may be more obscuring, especially when targeting older generations. The overall effect will be increased effectiveness of advertising though reduced perceptions of intrusiveness and enhanced attitudes towards the ad, more pertinent on mobile devices.

6.4. LIMITATIONS

The findings of this study have to be seen in light of some limitations. Firstly, the sampling method chosen for this study was convenience sampling with set quotas for gender and age segments. Due to the inherent nature of convenience sampling, biases may be present and under or over-representation of certain groups within the population may exist and as the sampling frame is unknown and the sample was not randomly selected, thus wider scale generalisations of the results can be challenging. However, based on the quotas achieved, this mitigated this potential bias to some extent. A minor underrepresentation of older age segments and over-representation of the younger age segments was observed. Future research will focus on achieving the quotas more precisely and counteracting any potential bias present.

A second potential limitation of this study is the use of the mobile phone attachment scale by Bock et al. (2016). The number of scale items in each of the four subscales was high, meaning that the overall scale was quite long, which did result in a high non-completion rate (906 of 1910 participants completed the scales), however sufficient power was achieved with the valid sample. Furthermore, validity issues were identified in one of the sub-scales. The sub-scale showing issues was excluded from the data analysis, addressing this limitation in the current study. Moving forward, the development and validation of an updated instrument would be beneficial for the field of research of mobile phone attachment, shortening and refining the subscales to remove redundancies and also included more detail and definition around both product and unproductive dimensions of mobile phone attachment. It is hoped that this will improve compliance in data collection in future studies.

A third limitation evident in the study was the omission of a manipulation check by the researcher in the experiment to determine if the actual task intensity experienced by the participant matched the assumed task intensity. The assumption made was that a psychometric test, where the participants was asked to concentrate and answer questions regarding their career preferences and received the results of the assessment at the end of the task was assumed to be highly intensive, while conversely a second group of participants were asked to browse through a number of pages of generic lifestyle content on a fictional published website with no goal directed task was assumed to be low intensity. The inclusion of a manipulation check following these tasks would have validated the assumptions by the researcher.

6.5. FUTURE RESEARCH

This research has highlighted some interesting findings in terms of how dimensions of mobile phone attachment impact the perceived intrusiveness of advertisements as well as attitudes towards the ad. As discussed previously, the dimension of useful attachment attenuates perceived intrusiveness and enhances attitudes towards the ad, while addictive attachment strengthens feelings of intrusiveness and has a negative impact on consumer attitudes towards the ad. Future research to explore these findings in more detail are warranted as well as expansion and refinement of the current scales used in the field. A potential expansion of this study will be to examine attitudes toward the brand and purchase intentions in the context of addictive and useful mobile phone attachment to see if the effects observed on attitudes towards the ad are transposed to these constructs. This should be examined using an updated mobile attachment scale which includes expanded factors of mobile device attachment.

A recent systematic review has identified some issues in how the construct of mobile phone attachment, primarily problematic, is measured and characterised (Harris *et al.*, 2020). The paper identified 78 existing validated scales that have been developed over the past 13 years and evaluated their theoretical foundations and psychometric properties. The authors reported that many of the published scales lacked internal consistency and test-retest reliability and many lacked evidence supporting the theoretical foundations supporting the instruments. The mobile phone attachment scale developed by Bock et al. (2016) was differentiated by the fact that it had a broader range of factors measuring not only problematic use, but productive use also. Bock et al. (2016) expanded this scale to become the mobile phone affinity scale and moved for a four factor to a six factor model, retaining the problematic factors (anxious, addiction and continuous use), while expanding the usefulness factor to include productivity, connectedness and empowerment (Bock, Lantini, *et al.*, 2016).

Based on the findings from Harris et al. (2020), the field of mobile attachment, and it's associated sequelae, will benefit from the development of a new validated scale addressing some of the points raised in Harris's paper. A future research stream developing this new scale, provisionally termed the Mobile Device Relationship Scale (MDRS), will look to assess the user's relationship with their mobile device (the term phone is somewhat outdated now as device is more appropriate to capture the new wearable technologies). The scale will take a neutral standpoint and will not be biased toward either problematic or productive relationships so as to reflect the changing dynamics of how users interact with their mobile device in current times. It is envisaged that this scale will allow for future research to elaborate on the relationships identified between the dimensions of mobile phone attachment and perceived intrusiveness and attitude towards the ad in a follow up study.

Another important future research stream will be the expansion of the research around the impact of mobile attachment on attitude towards the ad to include more dimensions of this construct, as well as other related constructs. This current research focussed on the meaningfulness dimension of attitude toward the ad, however there are many other factors described in the literature (Bruner, 2017; Muehling and McCann, 1993). An interesting follow-up study should examine the mediating role of attitude towards the ad on the relationships between mobile device attachment and the constructs of attitude towards the brand and purchase intention. Adding these constructs to the overall model in future studies should shed light on whether attitude towards the ad acts as a mediator. Based on the findings of the current research, it is logical to hypothesize that since the addictive dimension of attachment has a negative effect of attitude towards the ad could subsequently a negative mediating effect on the attitude towards the brand, attitude towards the host website and purchase intentions though.

Conversely, it can be hypothesised that dimensions of mobile device attachment that can be deemed of a more positive nature (e.g., usefulness) that have a positive impact on attitude towards the ad and subsequently could have a positive effect on attitudes toward the brand, the host website and purchase intentions. Operationalisation of this future study will be less complex than the experimental model opted for in the current research as there will not be a requirement for the forced exposure condition to be varied and the test is directly related to mobile device relations and attitude towards the ad, brand and purchase intentions. The new Mobile Device Relationship scale will need to be validated and then users exposed to advertising in a single factor online environment (psychometric test) with device type specified to mobile and ad format specified to forced exposure only. This will allow us to more precisely define the differing effects of the dimension of mobile attachment and further elaborate on the effects on brand attitudes and purchase intentions.

Another interesting stream of future research will be to understand if the findings of heightened perceived intrusiveness following forced exposure is a global effect independent of the message delivered in the forced exposure condition or is it specific to advertisements only. This is pertinent in the current internet environment where forced exposure modules are now widespread in delivering messaging to consumers regarding their consent to cookies on websites.

The key question is when the message is regarding a privacy feature, which can be beneficial for the consumer in terms of their privacy preferences, will the forced exposure to an interstitial that is not regarded as advertising still elicit feelings of perceived intrusiveness or will the effect be attenuated when the content is not advertising. The key question to answer is if reactance theory explains this effect if the interruption is for the benefit of the user and instead of a threat to freedom of choice actually delivers more choice through the option to opt into enhanced privacy and no cookie tracking. To operationalise this research in a future study, the intrusiveness scale can be modified to read ‘when I saw the popup…”, removing the reference to ad in the scale and developing a test where users are randomly assigned to either see a cookie consent message or an advertisement. This will shed light on whether it is the modal itself that causes intrusiveness or is it dependent on the content and nature of the interstitial.

Future research is also warranted to examine in detail the factors that influence emotional and behavioural responses in a smartphone only context. As smartphone penetration rapidly accelerates and the device evolves to be the primary mode of internet access for the majority of individuals worldwide, it will be important to examine the interplay between factors including attachment, ad avoidance, intrusiveness, attitudes towards advertising and the individual's usage of certain applications and platforms including social media and online gaming, focusing on the digitally-native generations.

Chapter 7

CONCLUSION

This research study aimed to build on previous empirical evidence and expand the current body of knowledge in the field of online advertising by investigating causal relationships between forced exposure to advertising, mobile phone attachment, perceived intrusiveness and attitude towards the ad in the context of an online field experiment. The internet is constantly evolving at a rapid pace and consumers are increasingly being exposed to novel advertising formats designed to capture their attention. A fact that is often overlooked by advertisers is that this gain in attention is often at the expense of user satisfaction which is being progressively eroded by interruptive and intrusive ads involving forced exposure. It has been demonstrated in this research study that forced exposure to advertising increases perceptions of intrusiveness which in turn has subsequent negative effects on user behaviours and attitudes. Previous research has shown a myriad of negative consequences of eliciting perceived intrusiveness including more negative attitudes towards the brand, ad avoidance, lower levels of purchase intention, lack of trust and more negative attitudes towards the website (Goodrich *et al.*, 2011; McCoy *et al.*, 2017; Tan *et al.*, 2019). Thus, understanding and defining the impact of forced exposure to advertising is an important area of research so as to improve consumer attitudes, reduce negative responses to advertising as well as increase overall advertising effectiveness and revenue for advertisers. The key managerial implication is to limit, or if possible, avoid forced exposure advertising conditions and opt for more permissive advertising formats.

The second and related stream of research in this study focussed on the phenomenon of mobile phone attachment and its impact on perceived intrusiveness and attitudes towards advertising. Mobile phone attachment is a relatively novel phenomenon, a by-product of accelerating smartphone penetration adopted by a younger, dynamic and more connected user base. This research study looked at both productive and problematic dimensions of mobile phone attachment including useful, addictive and anxious attachment. Much of the previous research in the field focused on problematic mobile phone attachment and tended to exclude potential beneficial dimensions of the relationship between the user and their mobile device. There was a gap in the literature in terms of how mobile attachment affects user responses to advertising, an important aspect for practitioners within the advertising industry considering mobile advertising is rapidly growing and now makes up more than half of all internet sessions on websites.

In light of this, the key topics explored in this research fell into two broad categories. Firstly, the study aimed to elucidate the effects of forced exposure to modal ads, device type and task intensity on the constructs of perceived intrusiveness and attitude towards the ad. Secondly, it aimed to understand the effects of mobile phone attachment, and it's sub-dimensions, on the constructs of perceived intrusiveness and attitude towards the ad. Ultimately, the overarching goal was to identify negative consumer reactions to forced exposure to advertising and to discover if mobile attachment played a role in driving these negative reactions. To achieve these aims, research questions and hypotheses were formulated and the research operationalised.

The research questions focussed on 5 key areas: (a) direct effects of forced exposure on perceived intrusiveness and attitude towards the ad, (b) direct effects of mobile phone attachment on perceived intrusiveness and attitude towards the ad, (c) mediation effect of perceived intrusiveness on the effect of forced exposure on attitude towards advertising, (d) moderation effects of mobile phone attachment and finally (e) multigroup effects of device type and task cognitive intensity.

To operationalise the research a field experiment was designed. An initial pilot study was developed to validate the website where the users were exposed to the different experimental conditions. During the pilot study, significant user acceptance testing was undertaken to minimise potential errors in data collection due to factors such as user interface design, survey design, website responsiveness issues and page load time issues. Following the pilot study and feedback from testers, relevant changes were applied to the main field experiment. Firstly, the overall number of factors was reduced as a high factorial design led to potential issues in adequate power and statistical adequacy. This was deemed acceptable as some of the factors were sub-factors of the primary independent variable of forced exposure (controllable and obscuring ads) and repeat exposure was seen as not critical to the core research questions of the research. The field study website was designed with two subsections - one which represented a high cognitive load task (a psychometric test) and one which represented a low cognitive intensity task (a content focussed blog). This allowed for both types of task intensity to be tested. The website was also coded to differentiate between participants who used either mobile and desktop devices to complete the experimental task, which also allowed for analysis of device type on the dependent variables. Finally, the website was coded to randomly expose participants to either a forced exposure condition (where the ad obscured the screen as a popup and could not be dismissed for a period of five seconds) or a permissive advertisement (which was represented by a standard 250x300 banner ad which did not obscure the participants screen). To capture data pertaining to the latent constructs of perceived intrusiveness, attitude towards the ad and mobile phone attachment, the appropriate scales were presented at the end of the experimental task.

The overall experimental platform was coded across two systems; (a) the Qualtrics system, which recruited participants from their research panel and (b) the experimental website, where ad exposure occurred. Initially, participants were invited from the Qualtrics research panel to take part in the experiment and completed consents forms and read the patient information leaflet before proceeding to the experiment platform. Once the participant was redirected to the experimental platform, their data was logged and they were randomly assigned to one of the experimental conditions. Following completion of the task, the participant (and their data) was subsequently redirected back to the Qualtrics platform where they completed the latent construct scales and the data collated and stored for that participant. Participants who clicked on the ad during the task were excluded from the analysis as well as participants who did not complete the scales in their entirety.

The sample from the Qualtrics platform was selected based on quota sampling to match as close as possible the population of Ireland as per the latest census in 2016. Some challenges existed in meeting quotas for the older age groups (55-64 and 65+) as they tended to have lower levels of internet proficiency and adoption. This resulted in some of the younger age groups being overrepresented and the older age groups being underrepresented, however the actual quotas achieved more closely matched the sample of internet users in Ireland.

Data was collected and collated in the SPSS statistical software programme. Coding was required to transform the data into a usable format including the renaming of variables into logical nomenclature and the coding of string data into numeric data. Following coding, the data was checked for accuracy and missing, erroneous on unengaged responses. An initial outlier analysis was performed using the Mahalanobis distance protocol and these entries were excluded. Furthermore, responses where the participant clicked on an ad during the experimental task were excluded at this juncture.

Structural equation modelling was chosen as the preferred analysis technique for the data as there were multidimensional scales and this technique is best suited to this type of data. Furthermore, structural equation modelling allows for the explicit assessment of measurement error and the estimation of latent variables via observed variables. Structural equation modelling also allows for detailed model testing which was in line with the overarching goals of the research.

Data validation was required prior to performing structural analyses. Firstly, an Mahalanobis distance analysis was performed to identify and exclude multivariate outliers followed by checks for skewness and kurtosis to ensure the data was within acceptable thresholds for normality, which was confirmed. Following this an exploratory factor analysis was performed and dimensions were reduced to a selection where both convergent and discriminant validity was met. Furthermore, tests for adequacy and reliability were performed and the data was confirmed to meet acceptable threshold for inclusion.

The next step in the structural equation modelling process was to perform a confirmatory factor analysis, a statistical method which is used to validate the factor structure for a set of observed variables. Initially the factor structure obtained in the exploratory factor analysis was imported from SPSS in the IBM Amos software package to run a cursory model fit analysis. The cursory model fit analysis showed good model fit indices apart from a non-significant Chi-Square test which was deemed acceptable due to the large sample size. Model validity assessments were performed and the latent construct MPT was removed due to discriminant validity issues. Following modifications, convergent and discriminant validity was met. Invariance assessments were also performed and configural, metric and scalar invariance were all found to be met within thresholds. In addition, a common method bias analysis was performed and found not to be present. A final model fit assessment was performed and all model fit indices were found to be within thresholds, indicating the model was valid.

The final stage in the data analysis procedure was to develop and validate the structural model. A further outlier analysis was performed at this stage using the cook's distance method and no influentials or outliers were found. Multicollinearity was also assessed to ensure that significant correlations between independent variables existed and this was confirmed by the relative variable inflation factors all falling below acceptable thresholds. A final model fit assessment was performed on the structural model and all indices, including the chi-square statistics were found to be of good fit, indicating the structural model was valid and claims could be made regarding the relationships in the model.

The structural model was analysed and results of hypothesis testing were obtained. For the first research question, support was found for all sub-hypotheses 1a, 1b and 1b, namely the direct effect of forced exposure on perceived intrusiveness, the direct effect of perceived intrusiveness on attitude towards the ad and the direct effect of forced exposure on attitude towards the ad. For research question 3, which looked at the mediating effect of perceived intrusiveness on the relationship between forced exposure and attitude towards the ad and support was found and a significant mediating effect was observed.

The second research question explored the direct effects of mobile phone attachment on perceived intrusiveness and attitude towards the ad, and significant effects were observed between some of the variables. Firstly, it was observed that useful (productive) attachment had a significant negative effect on perceived intrusiveness, with a significant positive effect on attitude towards the ad, demonstrating that this positive dimension of mobile attachment reduces feelings of intrusiveness and enhances consumer attitudes towards advertising. Furthermore, it was observed that the addictive dimension of mobile phone attachment impacted consumer's emotional reactions to advertising; addictive attachment was shown to have a significant direct positive effect on perceived intrusiveness, while also having a significant direct negative effect on attitude towards the ad. Thus, users who tended to show addictive attributes experienced higher levels of intrusiveness during forced exposure to advertising and had lower attitudes towards the ad. These findings demonstrate mobile phone attachment is an important factor influencing consumer’s emotional reactions to advertising, achieving one of the primary aims of this research study.

The fourth research question examined potential interaction / moderating effects between the independent variables (mobile phone attachment, device type, cognitive intensity) and the relationships between (a) forced exposure and perceived intrusiveness, (b) perceived intrusiveness and attitude towards the ad and (c) forced exposure and attitude towards the ad. No moderating effects were observed for device type, an interesting finding, indicating that the effects of forced exposure on perceived intrusiveness and attitude towards the ad are not influenced by device type. Thus, whether the user is forcefully exposed to advertising on a mobile or desktop device, the level of intrusiveness experienced and the attitude towards the ad shows no significant differences. The same finding was observed for cognitive intensity, where no moderating effects were found, indicating that task intensity at the time of exposure has no significant effect on the strength of the effects of forced exposure on perceived intrusiveness or attitude towards the ad.

The fifth and final research question looked at multi-group effects. With multi-group moderation, the aim is to assess the differences among the groups in the research model, while in moderation analysis the aim is to assess whether the moderating variable can strengthen or weaken the direct effects between independent and dependent variables. Two specific groups were analysed: (a) device type consisting of mobile and desktop and (b) cognitive intensity, consisting of low and high intensity tasks. A non-significant chi-square difference test signalled that no significant differences between groups and both groups showed this finding indicating multi-group differences were not observed. This finding was interesting in and of itself in terms of device type, indicating that the effects observed were independent of the device type the participant was using, inferring that observed effects of perceived intrusiveness and forced exposure were higher level effects not influenced by screen size or task intensity.

Based on the stated aims of this research, the author believes that these have been addressed. The study looked to identify causal relationships between forced exposure, perceived intrusiveness, mobile phone attachment and attitude towards the advertising in an online field experiment. Forced exposure to modal advertisements has been demonstrated to elicit higher levels of perceived intrusiveness in users and perceived intrusiveness has been shown to mediate the effects of forced exposure on attitude towards the ad. Furthermore, mobile phone attachment has been shown to affect both perceived intrusiveness and attitude towards the ad. Productive attachment, defined as usefulness, has been shown to reduce levels of perceived intrusiveness and instil more favourable attitudes towards the ad, while addictive attachment has been shown to increase levels of perceived intrusiveness and decrease attitudes towards the ad. Additionally, neither device type nor task cognitive intensity has been shown to moderate the effects of forced exposure on perceived intrusiveness or attitude towards the ad, as well as the effects of perceived intrusiveness on attitude towards the ad. Similarly, multi group analyses of device type and cognitive intensity showed no differences between groups, indicating that neither device type nor task cognitive intensity influences the effects of forced exposure on perceived intrusiveness and perceived intrusiveness on attitude towards the ad.

The theoretical implications of this study centre on a number of key theoretical frameworks which have been utilised to explain the mechanisms for the main findings observed in this study. Reactance theory, developed by Brehm (1966), can be used to explain why users find advertising in forced exposure conditions intrusive, where users move in the opposite direction to a perceived threat to their freedom of choice - forced exposure advertising can be viewed as such a threat. Reactance theory also explains why those with addictive attachment find advertising more intrusive, where their goal directed activity in fulfilling the need to carry out their addictive activity is impeded by disruptive and obstructive advertising. The Technology Acceptance Model (Davis et al., 1989) provides a mechanism for understanding why users who have a more useful attachment to their mobile phone find forced exposure advertising less intrusive and have more positive attitudes towards the ad. The application of these theories to understand the phenomenon of mobile phone attachment and its relationship to online behaviour augments the overall body of knowledge in the fields of online advertising, human computer interaction and consumer behaviour. Finally, Attachment Theory (Bowlby, 1969), explains why addictive attachment, in concert with reactance theory leads to perceptions of intrusiveness and may explains why other dimensions of problematic attachment do not lead to increased intrusiveness as attachment on its own may not be a strong enough factor to trigger perceived intrusiveness, but acting synergistically with reactance can lead to a stronger negative emotional response.

The managerial and practical implications of these findings are important. Firstly, it is necessary for advertising practitioners and platforms to understand that forced exposure to advertising as a tactic to increase user attention is counterproductive. As discussed previously, many advertisers believe that any level of attention to advertising is beneficial, however the impacts of perceived intrusiveness and its negative sequelae on attitude to the ad should now be considered in the context of online advertising. The long-term effects of consistent intrusion by advertising not only damages attitude towards advertising, one might argue that this also damages attitudes toward the brand, the website where the ad is executed and purchase intentions though the mediating effects of perceived intrusiveness. Furthermore, consistent intrusion has also been shown to increase ad avoidance and the adoption of ad blocking technologies, in essence making intrusive advertising self-defeating in this purpose. Given these negative effects, forced exposure to modal ads gives rise to too high of a price to pay to seek a user's attention toward their advertisement.

The second major implication of this study is the elucidation of the impact of mobile phone attachment on perceived intrusiveness and attitude towards the ad. Mobile phone attachment in the context of online advertising has limited previous research literature and as such this study highlights some important novel information that will inform advertising practitioners in digital advertising practice. Given the fact that addictive mobile phone attachment increases the levels of intrusiveness experienced by users and decrease attitudes towards the ad, one would question the efficacy of the use of forced exposure to modal advertisements on websites and applications where it is probable that higher levels of addiction may be present such as online gaming, online shopping and social media.

The corollary of this is in the cohort of users where the attachment to their mobile phone is regarded as useful and productive. For these users, the effects of forced exposure on perceived intrusiveness are reduced, while attitudes towards the ad are increased, leading one to suggest that forced exposure in this cohort may be less disruptive. It is difficult to classify this audience in an online context. One could argue that it represents a segment of generation Z who have created a positive relationship with their mobile device and as such accept the internet holistically, realising advertising is just a necessary part of the overall internet ecosystem. This segment may have developed immunity to the negative effects of intrusive advertising and as such exhibit lower levels of intrusiveness. Overall, from a practical implication standpoint, care should be taken in the implementation of modal advertisements and managers and practitioners should question the necessity of forced exposure in any scenario.

This study has contributed to the body of knowledge in both the fields of online advertising and mobile phone attachment. The study has made an empirical contribution to our understanding of how mobile phone attachment influences consumer’s reactions to advertising. The study has also made an empirical contribution to our understanding of how forced exposure to obscuring advertisements influences perceived intrusiveness, adding to the previous body of evidence of this phenomenon. The study has also empirically contributed to our understanding of the effects of device type on perceived intrusiveness, which has not been studied before. The study has also a number of significant practical contributions to the advertising practice community, including reiterating the negative impacts of forced exposure to advertising as well as new evidence on the impact of mobile attachment on perceived intrusiveness and attitudes towards advertising, a topical area considering the accelerating penetration and impending domination of mobile advertising.

Some limitations in this study were identified. The sample derived from the research panel did not exactly match the target quotas, with underrepresentation in older age groups and overrepresentation in younger age groups. However, based on the fact the quotas were aimed at a general population of Ireland sample, the quotas achieved were more representative of a sample of internet users in Ireland. Furthermore, there were some validity issues that needed attention in the scale developed by Bock et al. (2016), however these were addressed during data analysis.

Logical avenues for future research are evident. As mobile attachment is expected to be a more common phenomenon in the future, research on the impact of mobile phone attachment on pertinent latent constructs in the online environment including attitude towards the brand, attitude towards the website and purchase intentions will be important to classify from an empirical perspective. Furthermore, a deeper understanding of the dimensions of mobile phone attachment will be beneficial in further developing our understanding of the construct and its implications for advertising and marketing practitioners. As some authors have highlighted (Harris *et al.*, 2020), there may be a lack of test-retest reliability in the current scales available to measure the construct of mobile phone attachment, the development and validation of a new scale termed the mobile device relationship scale will give a deeper level of clarity on the relationship between users and their mobile device. An interesting future steam of research could also focus on the effects of mobile phone attachment on users in a social media context and to understand the impact of the different dimensions of attachment and user's reactions and attitudes to advertising in this environment.

In conclusion, this study has demonstrated important novel findings in the field of online advertising research. It has demonstrated that the evolving phenomenon of mobile phone attachment is relevant in the current online advertising paradigm and significantly impacts how users react to and experience online advertising. This study has also demonstrated the impact of forced exposure to certain types of online advertising can have significant effects on user's experience of perceived intrusiveness, and through mediation, their attitudes towards the ad. As the internet advertising ecosystem continues to dynamically evolve, the empirical contribution this new evidence highlights will add to the growing body of knowledge in the field to help practitioners develop more effective and less intrusive advertising in the future, leading to a more engaging and less irritating online experience for users as well as increased revenue.

REFERENCES

Aaker, D.A. and Bruzzone, D.E. (1985), “Causes of irritation in advertising”, *Journal of Marketing*, pp. 47–57.

Adithya Pattabhiramaiah, S. Sriram and Puneet Manchanda. (2019), *Paywalls: Monetizing Online Content*, [London]: SAGE, 2019.

Aguirre, E., Mahr, D., Grewal, D., de Ruyter, K. and Wetzels, M. (2015), “Unraveling the personalization paradox: The effect of information collection and trust-building strategies on online advertisement effectiveness”, *Journal of Retailing*, Vol. 91 No. 1, pp. 34–49.

Altuna, O.K. and Konuk, F.A. (2009), “UNDERSTANDING CONSUMER ATTITUDES TOWARD MOBILE ADVERTISING AND ITS IMPACT ON CONSUMERS BEHAVIORAL INTENTIONS: A CROSSMARKET COMPARISON OF UNITED STATES AND TURKISH CONSUMERS”, *International Journal of Mobile Marketing*, Vol. 4 No. 2.

Antonakis, J., Bendahan, S., Jacquart, P. and Lalive, R. (2010), “On making causal claims: A review and recommendations”, *The Leadership Quarterly*, Vol. 21 No. 6, pp. 1086–1120.

Aromaki, A.M. (2011), “A comparative study of different media toward attitude and behavior of advertising avoidance and using time in Finland”.

Bachnik, K., Nowacki, R. and Szopiński, T.S. (2018), “Determinants of assessing the quality of advertising services - The perspective of enterprises active and inactive in advertising”, *Journal of Business Research*, Elsevier, Vol. 88, pp. 474–480.

Baek, T.H. and Morimoto, M. (2012), “Stay away from me”, *Journal of Advertising*, Vol. 41 No. 1, pp. 59–76.

Bagozzi, R.P. (1984), “A Prospectus for Theory Construction in Marketing”, *Journal of Marketing*, SAGE Publications Inc, Vol. 48 No. 1, pp. 11–29.

Bang, H. and Wojdynski, B.W. (2016), “Tracking users’ visual attention and responses to personalized advertising based on task cognitive demand”, *Computers in Human*

Behavior, Vol. 55, pp. 867–876.

Barrett, P. (2007), “Structural equation modelling: Adjudging model fit”, *Personality and Individual Differences*.

Bartlett, M.S. (1954), “A Note on the Multiplying Factors for Various χ2 Approximations”, *Journal of the Royal Statistical Society: Series B (Methodological)*.

Bart, Y., Stephen, A.T. and Sarvary, M. (2014), “Which products are best suited to mobile advertising? A field study of mobile display advertising effects on consumer attitudes and intentions”, *JMR, Journal of Marketing Research*, Vol. 51 No. 3, pp. 270–285.

Belanche, D. (2019), “Ethical limits to the intrusiveness of online advertising formats: A critical review of Better Ads Standards”, *Journal of Marketing Communications*, Routledge, Vol. 25 No. 7, pp. 685–701.

Bentler, P.M. and Bonett, D.G. (1980), “Significance tests and goodness of fit in the analysis of covariance structures”, *Psychological Bulletin*.

Berlyne, D.E. (1970), “Novelty, complexity, and hedonic value”, *Perception & Psychophysics*, Springer, Vol. 8 No. 5, pp. 279–286.

Bian, M. and Leung, L. (2015), “Linking Loneliness, Shyness, Smartphone Addiction Symptoms, and Patterns of Smartphone Use to Social Capital”, *Social Science Computer Review*, SAGE Publications Inc, Vol. 33 No. 1, pp. 61–79.

Biehal, G., Stephens, D. and Curio, E. (1992), “Attitude toward the ad and brand choice”, *Journal of Advertising*, Vol. 21 No. 3, pp. 19–36.

Bleier, A. and Eisenbeiss, M. (2015), “The Importance of Trust for Personalized Online Advertising”, *Journal of Retailing*, New York University, Vol. 91 No. 3, pp. 390–409.

Bock, B.C., Lantini, R., Thind, H., Walaska, K., Rosen, R.K., Fava, J.L., Barnett, N.P., *et al.* (2016), “The Mobile Phone Affinity Scale: Enhancement and Refinement”, *JMIR mHealth and uHealth*, mhealth.jmir.org, Vol. 4 No. 4, p. e134.

Bock, B.C., Thind, H., Fava, J.L., Walaska, K., Barnett, N.P., Rosen, R., Traficante, R., *et al.*

(2016), “Development of the Mobile Phone Attachment Scale”, *Proceedings of the ... Annual Hawaii International Conference on System Sciences. Annual Hawaii International Conference on System Sciences*, Vol. 2016, pp. 3401–3407.

Bodford, J.E., Kwan, V.S.Y. and Sobota, D.S. (2017), “Fatal Attractions: Attachment to Smartphones Predicts Anthropomorphic Beliefs and Dangerous Behaviors”, *Cyberpsychology, Behavior and Social Networking*, Vol. 20 No. 5, pp. 320–326.

Bowlby, J. (1969), *Attachment and Loss: Attachment*.

Brehm, J.W. (1966), “A theory of psychological reactance”.

Breitsohl, H. (2019), “Beyond ANOVA: An Introduction to Structural Equation Models for Experimental Designs”, *Organizational Research Methods*, SAGE Publications Inc, Vol. 22 No. 3, pp. 649–677.

Bruner, G.C., II. (2017), “Marketing Scales Handbook: Multi-Item Measures for Consumer Insight Research (Volume 9)”, worldpdf.info, available at: http://worldpdf.info/download/1542547245-marketing-scales-handbook-multi-item-measures-for-consumer-insight-research-volume-9-gordon-c-bruner-ii.pdf.

“Cambridge Handbook of Experimental Political Science”. (2011), , available at:https://doi.org/10.1017/cbo9780511921452.

Campbell, D.T. and Fiske, D.W. (1959), “Convergent and discriminant validation by the multitrait-multimethod matrix”, *Psychological Bulletin*, Vol. 56 No. 2, pp. 81–105.

Central Statistics Office. (2019), “Frequency of Internet Usage”, *CSO*, available at: https://www.cso.ie/en/releasesandpublications/ep/p-isshh/informationsocietystatistics-households2019/frequencyofinternetusage/ (accessed 6 March 2020).

Cerny, B.A. and Kaiser, H.F. (1977), “A Study Of A Measure Of Sampling Adequacy For Factor-Analytic Correlation Matrices”, *Multivariate Behavioral Research*.

Chakrabarty, S., Yelkur, R. and Brown, G. (2004), “GENDER DIFFERENCES IN AD

IRRITATION: IMPLICATIONS FOR MARKET SEGMENTATION", *Marketing Management Journal*, Vol. 14 No. 2.

Chatterjee, P. (2008), "Are unclicked ads wasted? Enduring effects of banner and pop-up ad exposures on brand memory and attitudes", *Journal of Electronic Commerce Research*, Vol. 9 No. 1, p. 51.

Chen, G. and Mei, F. (2017), "Research on the Willingness to Accept Mobile Internet Advertising Based on Customer Perception---A Case of College Students", *Wuhan International Conference on E*, pdfs.semanticscholar.org, available at: https://pdfs.semanticscholar.org/5a31/8eaa86269bef5b5cc7da4a85091ddbbe9506.pdf.

Chen, W., Xie, X.-C., Ping, F. and Wang, M.-Z. (2017), "Personality differences in online and offline self-disclosure preference among adolescents: A person-oriented approach", *Personality and Individual Differences*, Vol. 105, pp. 175–178.

Cho, C.-H. and Cheon, H.J. (2004), "Why do people avoid advertising on the internet?", *Journal of Advertising*, Vol. 33 No. 4, pp. 89–97.

Choi, S.-W., Kim, D.-J., Choi, J.-S., Ahn, H., Choi, E.-J., Song, W.-Y., Kim, S., *et al.* (2015), "Comparison of risk and protective factors associated with smartphone addiction and Internet addiction", *Journal of Behavioral Addictions*, akademiai.com, Vol. 4 No. 4, pp. 308–314.

Clee, M.A. and Wicklund, R.A. (1980), "Consumer Behavior and Psychological Reactance", *The Journal of Consumer Research*, Vol. 6 No. 4, pp. 389–405.

Cole, C., Chase, S., Couch, O. and Clark, M. (2011), "Research methodologies and professional practice: Considerations and practicalities", *Electronic Journal of Business Research Methods*, Academic Conferences International Limited, Vol. 9 No. 2, p. 141.

Constantin, C.D. (2007), *The Psychological Significance of Pop-up Windows in Online*

Information Processing, The Pennsylvania State University.

Cook, R.D. (1977), “Detection of Influential Observation in Linear Regression”, *Technometrics*, Taylor & Francis, Vol. 19 No. 1, pp. 15–18.

Cortland, M. (2017), “2017 Adblock Report”, *PageFair*, 1 February, available at: https://pagefair.com/blog/2017/adblockreport/ (accessed 4 March 2018).

Cronbach, L.J. (1951), “Coefficient alpha and the internal structure of tests”, *Psychometrika*.

Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1989), “User Acceptance of Computer Technology: A Comparison of Two Theoretical Models”, *Management Science*, INFORMS, Vol. 35 No. 8, pp. 982–1003.

van Deursen, A.J.A.M., Bolle, C.L., Hegner, S.M. and Kommers, P.A.M. (2015), “Modeling habitual and addictive smartphone behavior: The role of smartphone usage types, emotional intelligence, social stress, self-regulation, age, and gender”, *Computers in Human Behavior*, Elsevier, Vol. 45, pp. 411–420.

Diamantopoulos, A. and Siguaw, J. (2000), “Introducing LISREL”, available at:https://doi.org/10.4135/9781849209359.

Dillard, J.P. and Shen, L. (2005), “On the Nature of Reactance and its Role in Persuasive Health Communication”, *Communication Monographs*.

Edwards, S.M., Li, H. and Lee, J.-H. (2002), “Forced exposure and psychological reactance: Antecedents and consequences of the perceived intrusiveness of pop-up ads”, *Journal of Advertising*, Vol. 31 No. 3, pp. 83–95.

Elsen, M., Pieters, R. and Wedel, M. (2011), “When creativity meets repetition: Frequency effects depend on exposure duration”, *ACR North American Advances*.

Fabrigar, L.R., Wegener, D.T., MacCallum, R.C. and Strahan, E.J. (1999), “Evaluating the use of exploratory factor analysis in psychological research”, *Psychological Methods*.

Feng, Y., Xie, Q. and Lou, C. (2019), “The Key to 360-Degree Video Advertising: An

Examination of the Degree of Narrative Structure”, *Journal of Advertising*, Routledge, Vol. 48 No. 2, pp. 137–152.

Ferreira, C., Michaelidou, N., Moraes, C. and McGrath, M. (2017), “Social media advertising: Factors influencing consumer ad avoidance”, *Journal of Customer Behaviour*, Vol. 16 No. 2, pp. 183–201.

Ferris, M. (2007), “Insights on mobile advertising, promotion, and research”, *Journal of Advertising Research*, WARC Limited, Vol. 47 No. 1, pp. 28–37.

Flanders, N.A., Fishbein, M. and Ajzen, I. (1975), *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*, Addison-Wesley.

Fornell, C. and Larcker, D.F. (1981), “Evaluating Structural Equation Models with Unobservable Variables and Measurement Error”, *Journal of Marketing Research*.

Fouladi, R.T. (2000), “Performance of Modified Test Statistics in Covariance and Correlation Structure Analysis Under Conditions of Multivariate Nonnormality”, *Structural Equation Modeling: A Multidisciplinary Journal*.

Gallagher, K. (2017), *The Ad Tech Explainer*, BI Intelligence, available at: http://uk.businessinsider.com/social-video-ad-spend-will-double-in-2017-2017-4 (accessed 21 February 2018).

Galletta, D.F., Henry, R., McCoy, S. and Polak, P. (2004), “Web site delays: How tolerant are users?”, *Journal of the Association for Information Systems*, Vol. 5 No. 1, p. 1.

Gardner, K. (2007), “Conducting your PhD via the internet”, *The Psychologist*, Vol. 20 No. 4, pp. 232–233.

Gaskin. (2020), “Confirmatory Factor Analysis - StatWiki”, available at: http://statwiki.kolobkreations.com/index.php?title=Confirmatory_Factor_Analysis (accessed 25 July 2020).

George, D. and Mallery, P. (2010), *SPSS for Windows Step by Step: A Simple Guide and Reference, 17.0 Update*, Prentice Hall.

Gerbing, D.W. and Anderson, J.C. (1984), “On the Meaning of Within-Factor Correlated Measurement Errors”, *The Journal of Consumer Research*, Oxford Academic, Vol. 11 No. 1, pp. 572–580.

“Global Digital Ad Spending”. (2019), *eMarketer*, available at: https://www.emarketer.com/content/global-digital-ad-spending-2019 (accessed 18 April 2020).

Goldstein, D.G., Suri, S., McAfee, R.P., Ekstrand-Abueg, M. and Diaz, F. (2014), “The economic and cognitive costs of annoying display advertisements”, *JMR, Journal of Marketing Research*, Vol. 51 No. 6, pp. 742–752.

Goodman, A. (1990), “Addiction: definition and implications”, *British Journal of Addiction*, Wiley Online Library, Vol. 85 No. 11, pp. 1403–1408.

Goodrich, K., Schiller, S. and Galletta, D. (2011), “Intrusiveness of online video advertising and its effects on marketing outcomes”.

Goodrich, K., Schiller, S.Z. and Galletta, D. (2015), “Consumer Reactions to Intrusiveness Of Online-Video Advertisements”, *Journal of Advertising Research*, Vol. 55 No. 1, pp. 37–50.

Google. (2018), “Google.com”, *Google.com*, available at: https://developers.google.com/web/updates/2017/12/better-ads (accessed 11 March 2018).

Google. (2020), “Google Scholar”, available at: https://scholar.google.com/ (accessed 20 April 2020).

Gravetter, F.J. and Wallnau, L.B. (2012), *Statistics for the Behavioral Sciences*, Cengage Learning.

Gresham, L.G. and Shimp, T.A. (1985), “Attitude toward the Advertisement and Brand Attitudes: A Classical Conditioning Perspective”, *Journal of Advertising*.

Gutierrez, A., O’Leary, S., Rana, N.P., Dwivedi, Y.K. and Calle, T. (2019), “Using privacy calculus theory to explore entrepreneurial directions in mobile location-based advertising: Identifying intrusiveness as the critical risk factor”, *Computers in Human Behavior*, Elsevier, Vol. 95, pp. 295–306.

Hadi, N.U., Abdullah, N. and Sentosaa, I. (2016), “An Easy Approach to Exploratory Factor Analysis: Marketing Perspective Noor Ul Hadi”, unknown, Vol. 6 No. 1, pp. 215–223.

Hair, J.F. (2011), “Multivariate Data Analysis: An Overview”, *International Encyclopedia of Statistical Science*.

Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2014), “Multivariate data analysis: Pearson new international edition”, *Essex: Pearson Education Limited*.

Ha, L. and McCann, K. (2008), “An integrated model of advertising clutter in offline and online media”, *International Journal of Advertising*, Vol. 27 No. 4, pp. 569–592.

Hancock, G.R. and Nevitt, J. (1999), “Bootstrapping and the identification of exogenous latent variables within structural equation models”, *Structural Equation Modeling: A Multidisciplinary Journal*.

Harris, B., Regan, T., Schueler, J. and Fields, S.A. (2020), “Problematic Mobile Phone and Smartphone Use Scales: A Systematic Review”, *Frontiers in Psychology*, ncbi.nlm.nih.gov, Vol. 11, p. 672.

Hart, J., Nailling, E., Bizer, G.Y. and Collins, C.K. (2015), “Attachment theory as a framework for explaining engagement with Facebook”, *Personality and Individual Differences*, Vol. 77, pp. 33–40.

Haug, S., Castro, R.P., Kwon, M., Filler, A., Kowatsch, T. and Schaub, M.P. (2015), “Smartphone use and smartphone addiction among young people in Switzerland”, *Journal of Behavioral Addictions*, akademiai.com, Vol. 4 No. 4, pp. 299–307.

Heinonen, K. and Strandvik, T. (2003), “Consumer responsiveness to mobile marketing”, *Stockholm Mobility Roundtable*, Vol. 22, pp. 23–50.

Hein, W., O’Donohoe, S. and Ryan, A. (2011), “Mobile phones as an extension of the participant observer’s self: Reflections on the emergent role of an emergent technology”, *Qualitative Market Research: An International Journal*, Vol. 14 No. 3, pp. 258–273.

Hershberger, E. and Costea, A.E. (2009), “Task orientation and ad recall: an exploratory study”, *Proceedings of the 3rd International Conference on Management, Marketing and Finances*, Vol. 30, pp. 82–87.

Hervet, G., Guérard, K., Tremblay, S. and Chtourou, M.S. (2011), “Is banner blindness genuine? Eye tracking internet text advertising”, *Applied Cognitive Psychology*.

Holden, M.T. and Lynch, P. (2004), “Choosing the Appropriate Methodology: Understanding Research Philosophy”, *The Marketing Review*, Vol. 4 No. 4, pp. 397–409.

Holland, J.L. (1959), “A theory of vocational choice”, *Journal of Counseling Psychology*.

Hong, F.-Y., Chiu, S.-I. and Huang, D.-H. (2012), “A model of the relationship between psychological characteristics, mobile phone addiction and use of mobile phones by Taiwanese university female students”, *Computers in Human Behavior*, Vol. 28 No. 6, pp. 2152–2159.

Hooper, D., Coughlan, J. and Mullen, M.R. (2007), “Structural Equation Modeling: Guidelines for Determining Model Fit”, *Electronic Journal on Business Research Methods*, Academic Conferences and Publishing International, Vol. 6 No. 1, available at: http://dx.doi.org/ (accessed 19 July 2020).

Huang, S.-L. and Chen, H.-W. (2017), “Understanding Online Intrusive Advertising: A Perspective of Attentional Inertia and Cognitive Engagement”, Vol. 9 No. 4, pp. 297–320.

Hu, L. and Bentler, P.M. (1999), “Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives”, *Structural Equation Modeling: A Multidisciplinary Journal*.

Hu, Y., Guo, J., Jou, M., Zhou, S., Wang, D., Maguire, P., Wei, J., *et al.* (2020), "Investigating the attentional bias and information processing mechanism of mobile phone addicts towards emotional information", *Computers in Human Behavior*, Elsevier Ltd, available at:https://doi.org/10.1016/j.chb.2020.106378.

IAB. (2019), "Display Ad Standards | IAB Ireland", available at: https://iabireland.ie/councils/display-ad-standards/ (accessed 22 April 2020).

Izian Idris, *., Siti Suhana, A.*., Ahmad, A. and Lim, S.K.X. (2020), "Factors that influence the effectiveness of online advertising in enhancing consumer's purchase intention among young adults in Malaysia", *Test Engineering & Management*, The Mattingley Publishing Co., Inc, Vol. 82, pp. 5528–5536.

Jones, M.S., House, L.A. and Gao, Z. (2015), "Respondent Screening and Revealed Preference Axioms: Testing Quarantining Methods for Enhanced Data Quality in Web Panel Surveys", *Public Opinion Quarterly*, Oxford Academic, Vol. 79 No. 3, pp. 687–709.

Jöreskog, K.G. and Sörbom, D. (1993), *LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language*, Scientific Software International.

Jung Ok Jeon, Hyun-Hee Park, Jin-Hwa Lee, Yoon-Ho Kim and Hee-Young Han. (2009), "The Effects of Negative Feelings Caused by Forced Exposure to Banner Ads on Advertising Responses", *Advances in Consumer Research. Association for Consumer Research* , Association for Consumer Research, Vol. 36, pp. 872–872.

Kaiser, H.F. (1974), "An index of factorial simplicity", *Psychometrika*.

Kim, J.K. and Seo, S.H. (2017), "An Exploration of Advertising Avoidance by Audiences across Media", *International Journal of Contents*, Vol. 13 No. 1.

Kim, N.Y. (2017), "The Effect Of Advertising Content Control On Advertising Effectiveness In The Different Forced Exposure Circumstance", *Journal of Promotion Management*, pp. 1–18.

Kleinknecht, R.A. (1991), “The Prevalence, Assessment, and Diagnosis of Anxiety Disorders”, *Mastering Anxiety*.

Kline, R.B. (2005), *Principles and Practice of Structural Equation Modeling, Second Edition*, Guilford Press.

Kolsaker, A. and Drakatos, N. (2009), “Mobile advertising: The influence of emotional attachment to mobile devices on consumer receptiveness”, *Journal of Marketing Communications*, Vol. 15 No. 4, pp. 267–280.

Kong, F., Li, X., Xia, Y., Wang, M. and Sun, X. (2020), “Technology Acceptance Model of Mobile Social Media Among Chinese College Students”, *Journal of Technology in Behavioral Science*, Springer, available at:https://doi.org/10.1007/s41347-020-00169-0.

Konok, V., Gigler, D., Bereczky, B.M. and Miklósi, Á. (2016), “Humans’ attachment to their mobile phones and its relationship with interpersonal attachment style”, *Computers in Human Behavior*.

Koshksaray, A.A., Franklin, D. and Hanzaee, K.H. (2015), “The relationship between e-lifestyle and Internet advertising avoidance”, *Australasian Marketing Journal (AMJ)*, Vol. 23 No. 1, pp. 38–48.

Kuneinen, E. (2013), “Study on banner advertisement type and shape effect on clickthrough-rate and conversion”, *Journal of Management and Marketing Research*, Vol. 13, p. 1.

Kusse, D.C. (2013), *Forced Pre-Roll Video-Advertising-Length, Control, Emotional Appeal and Contextual Overlap of Pre-Roll Video-Ads on Perceived Intrusiveness, Attitudes and Skipping*, University of Twente,.

Kutner, M.H., Nachtsheim, C.J. and Neter, J. (2003), *Applied Linear Regression Models*, McGraw-Hill/Irwin.

Lambrecht, A. and Tucker, C. (2013), “When does retargeting work? Information specificity in online advertising", *JMR, Journal of Marketing Research*, Vol. 50 No. 5, pp. 561–576.

Lee, J. and Ahn, J.-H. (2012), "Attention to banner ads and their effectiveness: An eye-tracking approach", *International Journal of Electronic Commerce*, Vol. 17 No. 1, pp. 119–137.

Lee, J.S. (1995), "Role of attitude toward brand advertising on consumer perception of a brand extension", *ACR North American Advances*, available at: http://acrwebsite.org/volumes/7682/volumes/v22/NA-22.

Lee, Y.-K., Chang, C.-T., Lin, Y. and Cheng, Z.-H. (2014), "The dark side of smartphone usage: Psychological traits, compulsive behavior and technostress", *Computers in Human Behavior*, Vol. 31, pp. 373–383.

Lehnert, K., Till, B.D. and Ospina, J.M. (2014), "Advertising Creativity: The Role of Divergence Versus Meaningfulness", *Journal of Advertising*.

Lewandowska, A. and Jankowski, J. (2017), "The negative impact of visual web advertising content on cognitive process: towards quantitative evaluation", *International Journal of Human-Computer Studies*, Vol. 108, pp. 41–49.

Li, C. and Meeds, R. (2005), "Different Forced-Exposure Levels of Internet Advertising: An Experimental Study on POP-UP ADS and INTERSTITIALS", *American Academy of Advertising. Conference. Proceedings*, American Academy of Advertising, p. 200.

Li, C. and Meeds, R. (2007), "Factors affecting information processing of internet advertisements: a test on exposure condition, psychological reactance, and advertising frequency", *American Academy of Advertising. Conference. Proceedings (Online)*, American Academy of Advertising, p. 93.

Li, H., Edwards, S.M. and Lee, J.-H. (2002), "Measuring the intrusiveness of advertisements: Scale development and validation", *Journal of Advertising*, Vol. 31 No. 2, pp. 37–47.

Li, H. and Stoller, B. (2007), “Parameters of mobile advertising: A field experiment”, *International Journal of Mobile Marketing*, Vol. 2 No. 1, available at: http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=19391161&AN=26111942&h=W9L5dK5I7rntLP0y8SAxfEwwroJERgW8L6nTupU4w6oVIpuDpOchkgV672DAkUmVYsFbPHmSSTUgQgH%2Bfr%2FNgg%3D%3D&crl=c.

Lin, C.A. and Kim, T. (2016), “Predicting user response to sponsored advertising on social media via the technology acceptance model”, *Computers in Human Behavior*, Vol. 64, pp. 710–718.

Liu, Q.-Q., Zhang, D.-J., Yang, X.-J., Zhang, C.-Y., Fan, C.-Y. and Zhou, Z.-K. (2018), “Perceived stress and mobile phone addiction in Chinese adolescents: A moderated mediation model”, *Computers in Human Behavior*, Elsevier, Vol. 87, pp. 247–253.

Li, W. and Huang, Z. (2016), “The research of influence factors of online behavioral advertising avoidance”, *American Journal of Industrial and Business Management*, Vol. 6 No. 09, pp. 947–957.

Lohmoller, J.-B. (1981), “LVPLS 1.6: Latent variables path analysis with partial least squares estimation”, *Munich: University of Federal Armed Forces*.

Lutz, R.J. (1985), “Affective and cognitive antecedents of attitude toward the ad: A conceptual framework”, *Psychological Process and Advertising Effects: Theory, Research, and Application*, Lawrence Erlbaum Associates Publishers, pp. 45–63.

MacCallum, R.C., Browne, M.W. and Sugawara, H.M. (1996), “Power analysis and determination of sample size for covariance structure modeling”, *Psychological Methods*, psycnet.apa.org, Vol. 1 No. 2, pp. 130–149.

MacCallum, R.C. and Hong, S. (1997), “Power Analysis in Covariance Structure Modeling Using GFI and AGFI”, *Multivariate Behavioral Research*, Taylor & Francis, Vol. 32 No. 2, pp. 193–210.

MacCallum, R.C., Roznowski, M. and Necowitz, L.B. (1992), “Model modifications in covariance structure analysis: the problem of capitalization on chance”, *Psychological Bulletin*, Vol. 111 No. 3, pp. 490–504.

MacKenzie, S.B., Lutz, R.J. and Belch, G.E. (1986), “The role of attitude toward the ad as a mediator of advertising effectiveness: A test of competing explanations”, *JMR, Journal of Marketing Research*, pp. 130–143.

Mahalanobis, P.C. (1930), “A Statistical Study of Certain Anthropometric Measurements from Sweden”, *Biometrika*, [Oxford University Press, Biometrika Trust], Vol. 22 No. 1/2, pp. 94–108.

Maneesoonthorn, C. and Fortin, D. (2006), “TEXTING BEHAVIOUR AND ATTITUDES TOWARD PERMISSION MOBILE ADVERTISING: AN EMPIRICAL STUDY OF MOBILE USERS’ ACCEPTANCE OF SMS FOR MARKETING PURPOSES”, *International Journal of Mobile Marketing*, Vol. 1 No. 1, available at: http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=19391161&AN=27678000&h=3s7ZOUYMT2WP5fLZglE43lQNtK8hxLi46wx%2FZIfxcjuMDFuaRQ0YBtCQqB3zthAR1jC%2B7WLFnZsrwSrIVLQNkg%3D%3D&crl=c.

Mattke, J., Muller, L.K. and Maier, C. (2017), “Why do individuals block online ads? An explorative study to explain the use of ad blockers”.

McCoy, S., Everard, A., Galletta, D.F. and Moody, G. (2012), “A Rational Choice Theory Approach towards a Causal Model of Online Advertising Intrusiveness and irritation”, *ECIS*, aisel.aisnet.org, p. 124.

McCoy, S., Everard, A., Galletta, D.F. and Moody, G.D. (2017), “Here we go again! The impact of website ad repetition on recall, intrusiveness, attitudes, and site revisit intentions”, *Information & Management*, Vol. 54 No. 1, pp. 14–24.

McCoy, S., Everard, A., Galletta, D. and Polak, P. (2004), “A study of the effects of online advertising: A focus on pop-up and in-line ads", *SIGHCI 2004 Proceedings*, p. 11.

McCoy, S., Everard, A., Polak, P. and Galletta, D.F. (2007a), "The effects of online advertising", *Communications of the ACM*, Association for Computing Machinery (ACM), Vol. 50 No. 3, pp. 84–88.

McCoy, S., Everard, A., Polak, P. and Galletta, D.F. (2007b), "Online ad intrusiveness", *International Conference on Human-Computer Interaction*, Springer, pp. 86–89.

McCoy, S., Everard, A., Polak, P. and Galletta, D.F. (2008), "An experimental study of antecedents and consequences of online ad intrusiveness", *Intl. Journal of Human Computer Interaction*, Vol. 24 No. 7, pp. 672–699.

McManus, P., Mulhall, S., Ragab, M. and Arisha, A. (2017), "An Investigation in the Methodological Approaches used in Doctoral Business Research in Ireland", *ECRM 2017 16th European Conference on Research Methods in Business and Management*, Academic Conferences and publishing limited, p. 233.

McNair, C. (2017), "Worldwide Ad Spending: eMarketer's Updated Estimates and Forecast for 2016–2021", *Emarketer.com*, available at: https://www.emarketer.com/Report/Worldwide-Ad-Spending-eMarketers-Updated-Estimates-Forecast-20162021/2002145 (accessed 5 September 2018).

Melumad, S. and Pham, M.T. (2020), "The Smartphone as a Pacifying Technology", *The Journal of Consumer Research*, Oxford University Press / USA, Vol. 47 No. 2, pp. 237–255.

Merisavo, M., Kajalo, S., Karjaluoto, H., Virtanen, V., Salmenkivi, S., Raulas, M. and Leppäniemi, M. (2007), "An Empirical Study of the Drivers of Consumer Acceptance of Mobile Advertising", *Journal of Interactive Advertising*, Routledge, Vol. 7 No. 2, pp. 41–50.

Meschtscherjakov, A., Wilfinger, D. and Tscheligi, M. (2014), "Mobile attachment causes and consequences for emotional bonding with mobile phones", *Proceedings of the*

SIGCHI Conference on Human Factors in Computing Systems, ACM, pp. 2317–2326.

Miller, R.B. (1968), "Response time in man-computer conversational transactions", *Proceedings of the December 9-11, 1968, Fall Joint Computer Conference, Part I on - AFIPS '68 (Fall, Part I)*, available at:https://doi.org/10.1145/1476589.1476628.

Milne, G.R. and Gordon, M.E. (1993), "Direct Mail Privacy-Efficiency Trade-offs within an Implied Social Contract Framework", *Journal of Public Policy & Marketing*, SAGE Publications Inc, Vol. 12 No. 2, pp. 206–215.

Mital, M. (2008), "An empirical analysis of factors influencing customer responsiveness to mobile advertising", *Journal of Database Marketing & Customer Strategy Management*, Vol. 15 No. 2, pp. 119–125.

Mitchell, A.A. and Olson, J.C. (1981), "Are Product Attribute Beliefs the Only Mediator of Advertising Effects on Brand Attitude?", *JMR, Journal of Marketing Research*, American Marketing Association, Vol. 18 No. 3, pp. 318–332.

Mohamad, M., Afthanorhan*, A., Awang, Z. and Mohammad, M. (2019), "Comparison Between CB-SEM and PLS-SEM: Testing and Confirming the Maqasid Syariah Quality of Life Measurement Model", *The Journal of Social Sciences Research*, Academic Research Publishing Group, Vol. 5 No. 3, pp. 608–614.

Morimoto, M. (2017), "Personalization, Perceived Intrusiveness, Irritation, and Avoidance in Digital Advertising", *Digital Advertising*.

Morimoto, M. and Chang, S. (2006), "Consumers attitudes toward unsolicited commercial e-mail and postal direct mail marketing methods: intrusiveness, perceived loss of control, and irritation", *Journal of Interactive Advertising*, Vol. 7 No. 1, pp. 1–11.

Muehling, D.D. and McCann, M. (1993), "Attitude toward the Ad: A Review", *Journal of Current Issues & Research in Advertising*, Routledge, Vol. 15 No. 2, pp. 25–58.

Muzellec, L. and O'Raghallaigh, E. (2018), "Mobile technology and its impact on the consumer decision-making journey: how brands can capture the mobile-driven

‘Ubiquitous’ moment of truth”, *Journal of Advertising Research*, Journal of Advertising Research, Vol. 58 No. 1, pp. 12–15.

Myers, E. (1985), “Phenomenological analysis of the importance of special possessions: An exploratory study”, *ACR North American Advances*, available at: https://www.acrwebsite.org/volumes/6447/volumes/v12/NA-12/full.

Neben, T. and Schneider, C. (2015), “Ad intrusiveness, loss of control, and stress: a psychophysiological study”.

Nettelhorst, S., Brannon, L., Rose, A. and Whitaker, W. (2020), “Online viewers’ choices over advertisement number and duration”, *Journal of Research in Interactive Marketing*, Emerald Publishing Limited, available at: https://www.emerald.com/insight/content/doi/10.1108/JRIM-07-2019-0110/full/html.

Nie, J., Wang, P. and Lei, L. (2020), “Why can’t we be separated from our smartphones? The vital roles of smartphone activity in smartphone separation anxiety”, *Computers in Human Behavior*, Elsevier Ltd, Vol. 109, available at:https://doi.org/10.1016/j.chb.2020.106351.

Niemelä-Nyrhinen, J. and Leskinen, E. (2014), “Multicollinearity in marketing models: notes on the application of ridge trace estimation in structural equation modelling”, *Electronic Journal of Business Research Methods*, Academic Conferences International Limited, Vol. 12 No. 1, p. 3.

Nithyanand, R., Khattak, S., Javed, M., Vallina-Rodriguez, N., Falahrastegar, M., Powles, J.E., Cristofaro, E.D., *et al.* (2016), “Adblocking and counter blocking: A slice of the arms race”, *CoRR*, Vol. 16, USENIX.

Noor, M.N.M., Sreenivasan, J. and Ismail, H. (2013), “Malaysian consumers attitude towards mobile advertising, the role of permission and its impact on purchase intention: a structural equation modeling approach”, *Asian Social Science*, Vol. 9 No.

5, p. 135.

Parent, N. and Shapka, J. (2020), “Moving beyond addiction: An attachment theory framework for understanding young adults’ relationships with their smartphones”, *Human Behavior and Emerging Technologies*, Wiley Online Library, Vol. 2 No. 2, pp. 179–185.

Park, E. and Ohm, J. (2014), “The impacts of media type, placement and exposure type on attitudes towards advertisements on mobile devices”, *International Journal of Mobile Communications*, Vol. 12 No. 2, pp. 160–176.

Park, S.S. and Park, B. (2020), “Advertising on Mobile Apps Versus the Mobile Web: Which Delivers Better Advertisement Recognition and Willingness to Buy?”, *Journal of Advertising Research*, Journal of Advertising Research, available at: http://www.journalofadvertisingresearch.com/content/early/2020/01/06/JAR-2019-044.abstract.

Passman, R.H. (1987), “Attachments to inanimate objects: are children who have security blankets insecure?”, *Journal of Consulting and Clinical Psychology*, Vol. 55 No. 6, pp. 825–830.

Patton, W. (1999), “Review: The Self-Directed Search and Related Holland Career Materials: A Practitioner’s Guide”, *Australian Journal of Career Development*.

Pavlov, P.I. (1927), “Conditioned reflexes: An investigation of the physiological activity of the cerebral cortex”, *Annals of Neurosciences*, Vol. 17 No. 3, pp. 136–141.

Pearson, C. and Hussain, Z. (2017), “Smartphone Use, Addiction, Narcissism, and Personality: A Mixed Methods Investigation”, *Gaming and Technology Addiction: Breakthroughs in Research and Practice*, IGI Global, pp. 212–229.

Pochun, T., Brennan, L. and Parker, L. (2018), “Advertising effects? An elemental experiment”, *Australasian Marketing Journal (AMJ)*, Elsevier, Vol. 26 No. 4, pp. 338–349.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y. and Podsakoff, N.P. (2003), “Common method biases in behavioral research: a critical review of the literature and recommended remedies”, *The Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879–903.

“Prime-ing the Digital Ad Market”. (2020), *Gartner*, available at: https://www.gartner.com/en/marketing/insights/daily-insights/prime-ing-the-digital-ad-market (accessed 18 April 2020).

Rau, P.-L.P., Liao, Q. and Chen, C. (2013), “Factors influencing mobile advertising avoidance”, *International Journal of Mobile Communications*, Vol. 11 No. 2, pp. 123–139.

Rejer, I. and Jankowski, J. (2017), “Brain activity patterns induced by interrupting the cognitive processes with online advertising”, *Cognitive Processing*, Vol. 18 No. 4, pp. 419–430.

Remenyi, D., Williams, B., Money, A. and Swartz, E. (1998), *Doing Research in Business and Management: An Introduction to Process and Method*, Sage.

Resnick, M.L. and Albert, W. (2013), “The Impact of Advertising Location and User Task on The Emergence of Banner Ad Blindness”, *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*.

Rethans, A.J., Swasy, J.L. and Marks, L.J. (1986), “Effects of Television Commercial Repetition, Receiver Knowledge, and Commercial Length: A Test of the Two-Factor Model”, *JMR, Journal of Marketing Research*, American Marketing Association, Vol. 23 No. 1, pp. 50–61.

Richards, J.E. and Anderson, D.R. (2004), “Attentional inertia in children’s extended looking at television”, in Kail, R.V. (Ed.), *Advances in Child Development and Behavior*, Vol. 32, JAI, pp. 163–212.

Riedel, A.S., Weeks, C.S. and Beatson, A.T. (2018), “Am I intruding? Developing a conceptualisation of advertising intrusiveness”, *Journal of Marketing Management*, Routledge, Vol. 34 No. 9-10, pp. 750–774.

Rodgers, S., Wang, Y., Rettie, R. and Alpert, F. (2007), “The Web Motivation Inventory”, *International Journal of Advertising*, Vol. 26 No. 4, pp. 447–476.

Rodriguez-Torrico, P., Prodanova, J., San-Martin, S. and Jimenez, N. (2019), “The ideal companion: the role of mobile phone attachment in travel purchase intention”, *CURRENT ISSUES IN TOURISM*, 10 July, available at:https://doi.org/10.1080/13683500.2019.1637828.

Rojas-Méndez, J.I., Davies, G. and Madran, C. (2009), “Universal differences in advertising avoidance behavior: A cross-cultural study”, *Journal of Business Research*, Vol. 62 No. 10, pp. 947–954.

Rönkkö, M. and Evermann, J. (2013), “A Critical Examination of Common Beliefs About Partial Least Squares Path Modeling”, *Organizational Research Methods*, SAGE Publications Inc, Vol. 16 No. 3, pp. 425–448.

Rose, G.M., Lees, J. and Meuter, M.L. (2001), “A refined view of download time impacts on e-consumer attitudes and patronage intentions toward e-retailers”, *International Journal on Media Management*, Routledge, Vol. 3 No. 2, pp. 105–111.

Samaha, M. and Hawi, N.S. (2016), “Relationships among smartphone addiction, stress, academic performance, and satisfaction with life”, *Computers in Human Behavior*, Vol. 57, pp. 321–325.

Satorra, A. and Bentler, P.M. (1999), “A Scaled Difference Chi-Square Test Statistic for Moment Structure Analysis”, *SSRN Electronic Journal*, available at:https://doi.org/10.2139/ssrn.199064.

Saunders, M., Lewis, P. and Thornhill, A. (2009), *Research Methods for Business Students*, Pearson Education.

Seyedghorban, Z., Tahernejad, H. and Matanda, M.J. (2016), “Reinquiry into advertising avoidance on the internet: A conceptual replication and extension”, *Journal of*

Advertising, Vol. 45 No. 1, pp. 120–129.

Shaheen, F., Ahmad, N., Waqas, M., Waheed, A., Farooq, O. and Others. (2017), "Structural Equation Modeling (SEM) in Social Sciences & Medical Research: A Guide for Improved Analysis", *International Journal of Academic Research in Business and Social Sciences*, Human Resource Management Academic Research Society, International Journal …, Vol. 7 No. 5, pp. 2222–6990.

Sharma, S., Mukherjee, S., Kumar, A. and Dillon, W.R. (2005), "A simulation study to investigate the use of cutoff values for assessing model fit in covariance structure models", *Journal of Business Research*, Elsevier, Vol. 58 No. 7, pp. 935–943.

Sheather, S. (2009), "A Modern Approach to Regression with R", *Springer Texts in Statistics*, available at:https://doi.org/10.1007/978-0-387-09608-7.

Shevlin, M. and Miles, J.N.V. (1998), "Effects of sample size, model specification and factor loadings on the GFI in confirmatory factor analysis", *Personality and Individual Differences*, Vol. 25 No. 1, pp. 85–90.

Shimp, T.A. (1981), "Attitude toward the AD as a Mediator of Consumer Brand Choice", *Journal of Advertising*, Routledge, Vol. 10 No. 2, pp. 9–48.

Shin, M. and Rhee, C. (2017), "Floating Banner Blindness on Mobile Device: An Experimental Approach Using Neuroscientific Methods".

Smith, K.T. (2011), "Digital marketing strategies that Millennials find appealing, motivating, or just annoying", *Journal of Strategic Marketing*, Vol. 19 No. 6, pp. 489–499.

Smith, R.E., MacKenzie, S.B., Yang, X., Buchholz, L.M. and Darley, W.K. (2007), "Modeling the Determinants and Effects of Creativity in Advertising", *Marketing Science*.

Soroa-Koury, S. and Yang, K.C.C. (2010), "Factors affecting consumersâ€™ responses to mobile advertising from a social norm theoretical perspective", *Telematics and Informatics*, Vol. 27 No. 1, pp. 103–113.

Souiden, N., Chtourou, S. and Korai, B. (2017), "Consumer attitudes toward online advertising: The moderating role of personality”, *Journal of Promotion Management*, Vol. 23 No. 2, pp. 207–227.

Speck, P.S. and Elliott, M.T. (1997), “Predictors of advertising avoidance in print and broadcast media”, *Journal of Advertising*, Vol. 26 No. 3, pp. 61–76.

StatCounter. (2018), “StatCounter Global Stats”, *StatCounter Global Stats*, available at: http://gs.statcounter.com/browser-market-share (accessed 11 March 2018).

Steenkamp, J.-B.E.M. and Baumgartner, H. (1998), “Assessing Measurement Invariance in Cross-National Consumer Research”, *The Journal of Consumer Research*, Oxford Academic, Vol. 25 No. 1, pp. 78–90.

Strom, R., Vendel, M. and Bredican, J. (2014), “Mobile marketing: A literature review on its value for consumers and retailers”, *Journal of Retailing and Consumer Services*, Vol. 21 No. 6, pp. 1001–1012.

Tabachnick, B.G. and Fidell, L.S. (2007), *Using Multivariate Statistics*.

Tan, B.J., Brown, M. and Pope, N. (2016), “The role of respect in the effects of perceived ad interactivity and intrusiveness on brand and site”, *Journal of Marketing Communications*, pp. 1–19.

Tan, B.J., Brown, M. and Pope, N. (2019), “The role of respect in the effects of perceived ad interactivity and intrusiveness on brand and site”, *Journal of Marketing Communications*, Taylor & Francis, Vol. 25 No. 3, pp. 288–306.

Trochim, Donnelly and Arora, K. (2015), *Research Methods: The Essential Knowledge Base*, Cengage Learning.

Truong, Y. and Simmons, G. (2010), “Perceived intrusiveness in digital advertising: strategic marketing implications”, *Journal of Strategic Marketing*, Routledge, Vol. 18 No. 3, pp. 239–256.

Unal, S., Ercis, A. and Keser, E. (2011), “Attitudes towards mobile advertisingâ€“A research to determine the differences between the attitudes of youth and adults”, *Procedia-*

Social and Behavioral Sciences, Vol. 24, pp. 361–377.

Van Doorn, J. and Hoekstra, J.C. (2013), “Customization of online advertising: The role of intrusiveness”, *Marketing Letters*, Vol. 24 No. 4, pp. 339–351.

Venkatesh, V. and Davis, F.D. (2000), “A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies”, *Management Science*.

Venkatesh, Venkatesh, Morris, Davis and Davis. (2003), “User Acceptance of Information Technology: Toward a Unified View”, *MIS Quarterly*.

Wehmeyer, K. (2007a), “Mobile ad intrusiveness-The effects of message type and situation”, *BLED 2007 Proceedings*, p. 6.

Wehmeyer, K. (2007b), “Assessing users’ attachment to their mobile devices”, *Management of Mobile Business, 2007. ICMB 2007. International Conference on the*, IEEE, pp. 16–16.

Wheaton, B., Muthen, B., Alwin, D.F. and Summers, G.F. (1977), “Assessing Reliability and Stability in Panel Models”, *Sociological Methodology*.

White, T.B., Zahay, D.L., ThorbjÃ¸rnsen, H. and Shavitt, S. (2008), “Getting too personal: Reactance to highly personalized email solicitations”, *Marketing Letters*, Vol. 19 No. 1, pp. 39–50.

Wu, T., Lu, Y., Gong, X. and Gupta, S. (2017), “A study of active usage of mobile instant messaging application: An attachment theory perspective”, *Information Development*, SAGE Publications Ltd, Vol. 33 No. 2, pp. 153–168.

Yap, K., Eppingstall, J., Brennan, C., Le, B. and Grisham, J.R. (2020), “Emotional attachment to objects mediates the relationship between loneliness and hoarding symptoms”, *Journal of Obsessive-Compulsive and Related Disorders*, Elsevier Inc., Vol. 24, available at:https://doi.org/10.1016/j.jocrd.2019.100487.

Yildirim, C. (2014), *Exploring the Dimensions of Nomophobia: Developing and Validating a Questionnaire Using Mixed Methods Research*, Iowa State University,.

Ying, L., Korneliussen, T. and Groenhaug, K. (2009), “The effect of ad value, ad placement and ad execution on the perceived intrusiveness of web advertisements”, *International Journal of Advertising*, Vol. 28 No. 4, pp. 623–638.

Yoon, S., Choi, Y.K. and Song, S. (2011), “When Intrusive Can Be Likable”, *Journal of Advertising*.

Young, J. (2016), *Meet the Blockers: A Quantitative Analysis of Ad Blocker Usage*, Middle Tennessee State University,.

Youn, S. and Kim, S. (2019), “Newsfeed native advertising on Facebook: young millennials’ knowledge, pet peeves, reactance and ad avoidance”, *International Journal of Advertising*, Routledge, Vol. 38 No. 5, pp. 651–683.

Zanjani, S.H.A., Diamond, W.D. and Chan, K. (2011), “Does ad-context congruity help surfers and information seekers remember ads in cluttered e-magazines?”, *Journal of Advertising*, Vol. 40 No. 4, pp. 67–84.

Zanot, E.J. (1984), “Public attitudes towards advertising: The American experience”, *International Journal of Advertising*, Vol. 3 No. 1, pp. 3–15.

Zhao, J. and Wang, J. (2020), “Health Advertising on Short-Video Social Media: A Study on User Attitudes Based on the Extended Technology Acceptance Model”, *International Journal of Environmental Research and Public Health*, Multidisciplinary Digital Publishing Institute, Vol. 17 No. 5, p. 1501.

Zha, W. and Wu, H.D. (2014), “The Impact of Online Disruptive Ads on Users’ Comprehension, Evaluation of Site Credibility, and Sentiment of Intrusiveness”, *American Communication Journal*, Vol. 16 No. 2.

APPENDICES

9.1. Appendix I - Scales & Measures

9.1.1. Ad intrusiveness

Ad intrusiveness was measured by the perceived intrusiveness scale developed by Li et al. (2002). The authors followed a rigorous process of scale development and validated the scale in two studies. In the first study, the original 11 item scale was reduced to 8 items following an exploratory factor analysis and dimension reduction. Three of the items had eigenvalues above threshold and were excluded. In the second study, further construct validity and reliability tests were performed. One itfirther item was found to have high covariance and was excluded, leaving a seven point scale. Conbach's alpha was reported as 0.90, indicating the scale had excellent reliability.

The seven-point scale is labelled with ends "Strongly Disagree–Strongly Agree". Subjects respond to the statement

"When I saw the ad, I thought it was:"

- Distracting
- Disturbing
- Forced
- Interfering
- Intrusive
- Invasive
- Obtrusive

When the ad was shown, I thought it was....

	Strongly Disagree						*Strongly Agree*
Distracting	1	2	3	4	5	6	7
Disturbing	1	2	3	4	5	6	7
Forced	1	2	3	4	5	6	7
Interfering	1	2	3	4	5	6	7
Intrusive	1	2	3	4	5	6	7
Invasive	1	2	3	4	5	6	7
Obtrusive	1	2	3	4	5	6	7

Notes: α= .90 for interstitials, .85 for television commercials, and .88 for magazine ads.

9.1.2. Attitude towards the ad (meaningfulness)

The attitude towards the ad (meaningfulness) scale measures the degree to which a particular advertisement is believed by a person to be appropriate and useful to him or herself. The scale was developed by Lehnert, Till and Ospina (2014) across three studies and the scale was adapted from previous work by Smith et al. (2007), the latter scale called the 'ad to consumer relevance' scaled and reported a Cronbach's alpha of 0.92, indicating excellent reliability.

The scale reliability was reported with Cronbach's alpha of 0.97 in study 1, above 0.90 in study 2 and above is 0.80 in study 3, indicating good reliability across all three studies. Evidence in support of the scales convergent and discriminant validity was provided from tests run in studies 1, 2, and 3 by the authors.

With four seven-point Likert type items, respondents are asked to respond to the following statements with the scale ends labelled from Strongly Disagree to Strongly Agree:

Items

1. The ad was meaningful to me.

2. The ad was appropriate for me.

3. The ad was useful to me.

4. The ad was valuable to me.

9.1.3. Mobile Phone Attachment Scale

The Mobile Phone Attachment Scale was developed by Bock et al. (2016) and is used to assess an individual's relationship with their mobile phone on four subscales: Usefulness, Addictive Attachment, Anxious Attachment and 24/7 use. The scale was validated in a study of 146 adults and the scale consisted of 26 statements about mobile phone use. Participants were asked to report how true each statement was to them using a 5-point Likert scale from “1=not at all true” to “5=extremely true”

All four subscales demonstrated good internal consistency and reliability (Cronbach’s alpha): Usefulness = 0.90; Anxious Attachment = 0.87; Addiction = .0.84; and “24/7” = 0.77.

MPAS Final 26 items

Measured by a four five-point sub-scales, with labelled ends “Not at all true - Extremely true”, subjects respond to the following statements:

Usefulness

- My phone helps me keep track of my healthy habits.
- My phone helps me make positive health decisions.
- My phone helps me to be more organized.
- My phone is my personal assistant.
- I can get more work done when I have my phone with me.
- I am never bored if I have my phone with me.
- My phone makes me feel connected to people.
- My phone is the main source of getting any information I need.

Anxious Attachment

- I feel anxious if I don’t have my phone with me.
- I feel anxious if I have not received a call or message for some time.

- I feel isolated without my phone.
- I feel dependent on my phone.
- I feel annoyed/angry when people do not respond to my texts immediately.
- I would rather lose my wallet or purse than my phone.
- I check my phone (for text, email, voicemail, etc.) even when it hasn't rung or sounded an alert.

Addiction

- I find myself occupied on my phone even when I'm with other people.
- I find myself occupied with my phone when I should be doing other things.
- I find myself engaged on the mobile phone for longer periods of time than I intended.
- My phone wakes me up at night (dings or notifications from texts, calls or other messages).
- I wake up to check my phone for messages at night.
- I would get more work done if I spent less time on my phone.

"24/7"

- I keep my phone on 24 hours a day.
- I don't leave home without my phone.
- I set my phone on vibrate or silent mode rather than turning it off.
- I read or send text messages when I am at work or in class. I use my phone all day.
- I use my phone all day.

9.1.4. Strong Interest Inventory

The Strong Interest Inventory is based on Holland's theory of vocational personality (Holland, 1959). The theory outlines approaches for helping people to make career choices based on six vocational personality types - realistic (R), investigative (I), artistic (A), social (S), enterprising (E) and conventional (C). Holland proposed that people tend not to be confined to one specific personality type, but have a combination of strengths across the different personality types. This gave rise to the Holland Code system (R-I-A-S-E-C), where people are categorized based on combinations of letters, from one to three letter combinations, based on the strength of their affinities for each personality type.

Realistic

- Repair a car
- Build things with wood
- Work outdoors
- Study electronics
- Arrest lawbreakers
- Plant a garden
- Work with animals
- Operate power tools
- Drive a truck

Artistic

- Sing before the public
- Design clothing
- Decorate a home or office
- Act in or direct a play
- Write a poem, story or play
- Design a poster
- Create a sculpture

- Arrange flowers
- Make videos

Enterprising

- Start my own business
- Make a speech
- Supervise the work of others
- Start a club
- Save money
- Sell things
- Lead a meeting
- Take charge of a project
- Work in a political campaign

Investigative

- Study causes of diseases
- Work on a science project
- Study human anatomy
- Work in a science lab
- Research solutions to
- environmental problems
- Collect minerals and rocks
- Study the solar system
- Do math problems
- Study plants and animals

Social

- Work with children
- Care for a sick person
- Help people who are upset
- Interview clients
- Help a person with disabilities
- Work as a volunteer
- Study psychology
- Make people laugh
- Teach teens or adults

Conventional

- Keep detailed reports
- Operate business machines
- Organize a work area
- Take telephone messages
- Attend to details
- Balance a budget
- Use a computer
- Proofread a document
- Create a filing system

9.2. Appendix II - Survey Design

Q1 Participant Information Leaflet

Q2 Consent Form

Q3 Confirmation by Participant of Consent to Participate

I understand what is involved in this research and I agree to participate in the study.

- I agree to participate
- I do not agree to participate (test will end)

Q4 Please Specify Your Gender

○ Male (1)

○ Female (2)

Q5 Please Specify Your Age

____

Skip To: End of Block If Condition: Please Specify Your Age Is Less Than 18. Skip To: End of Block.

If condition: Please Specify Your Age Is Less Than 18. Redirect to Test Website

Return from Test Website, Continue to Q6

Q6 Please Rate Your Response to the Following Statements About The Ad Shown During The Test

When I saw the ad, I thought it was...

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
Distracting (1)	○	○	○	○	○	○	○
Disturbing (2)	○	○	○	○	○	○	○
Forced (3)	○	○	○	○	○	○	○
Interfering (4)	○	○	○	○	○	○	○

Intrusive (5)	○	○	○	○	○	○	○
Invasive (6)	○	○	○	○	○	○	○
Obtrusive (7)	○	○	○	○	○	○	○

Q7 Please Rate Your Response to the Following Statements About The Ad Shown During The Test

When I saw the ad, I thought...

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
The ad was meaningful to me (1)	○	○	○	○	○	○	○
The ad was appropriate for me (2)	○	○	○	○	○	○	○
The ad was useful to me (3)	○	○	○	○	○	○	○
The ad was valuable to me (4)	○	○	○	○	○	○	○

Q8 Please Rate Your Response to the Following Statements About Your Mobile Phone's Usefulnes

	Not at all True				Extremely True
	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)
My phone helps me keep track of my healthy habits. (1)	○	○	○	○	○
My phone helps me make positive health decisions. (2)	○	○	○	○	○
My phone helps me to be more organized. (3)	○	○	○	○	○
My phone is my personal assistant. (4)	○	○	○	○	○
I can get more work done when I have my phone with me. (5)	○	○	○	○	○
I am never bored if I have my phone with me. (6)	○	○	○	○	○
My phone makes me feel connected to people. (7)	○	○	○	○	○
My phone is the main source of getting any information I need. (8)	○	○	○	○	○

Q9 Please Rate Your Response to the Following Statements Regarding Your Relationship With Your Mobile Phone

	Not at all True 1 (1)	2 (2)	3 (3)	4 (4)	Extremely True 5 (5)
I feel anxious if I don't have my phone with me. (1)	○	○	○	○	○
I feel anxious if I have not received a call or message for some time. (2)	○	○	○	○	○
I feel isolated without my phone. (3)	○	○	○	○	○
I feel dependent on my phone. (4)	○	○	○	○	○
I feel annoyed/angry when people do not respond to my texts immediately. (5)	○	○	○	○	○
I am never bored if I have my phone with me. (6)	○	○	○	○	○
I would rather lose my wallet or purse than my phone. (7)	○	○	○	○	○
I check my phone (for text, email, voicemail, etc.) even when it hasn't rung or sounded an alert. (8)	○	○	○	○	○

Q10 Please Rate Your Response to the Following Statements Regarding Your Dependency on Your Mobile Phone.

	Not at all True 1 (1)	2 (2)	3 (3)	4 (4)	Extremely True 5 (5)
I find myself occupied on my phone even when I'm with other people (1)	○	○	○	○	○
I find myself occupied with my phone when I should be doing other things. (2)	○	○	○	○	○
I find myself engaged on the mobile phone for longer periods of time than I intended (3)	○	○	○	○	○
My phone wakes me up at night (dings or notifications from texts, calls or other messages). (4)	○	○	○	○	○
I wake up to check my phone for messages at night. (5)	○	○	○	○	○
I would get more work done if I spent less time on my phone. (6)	○	○	○	○	○

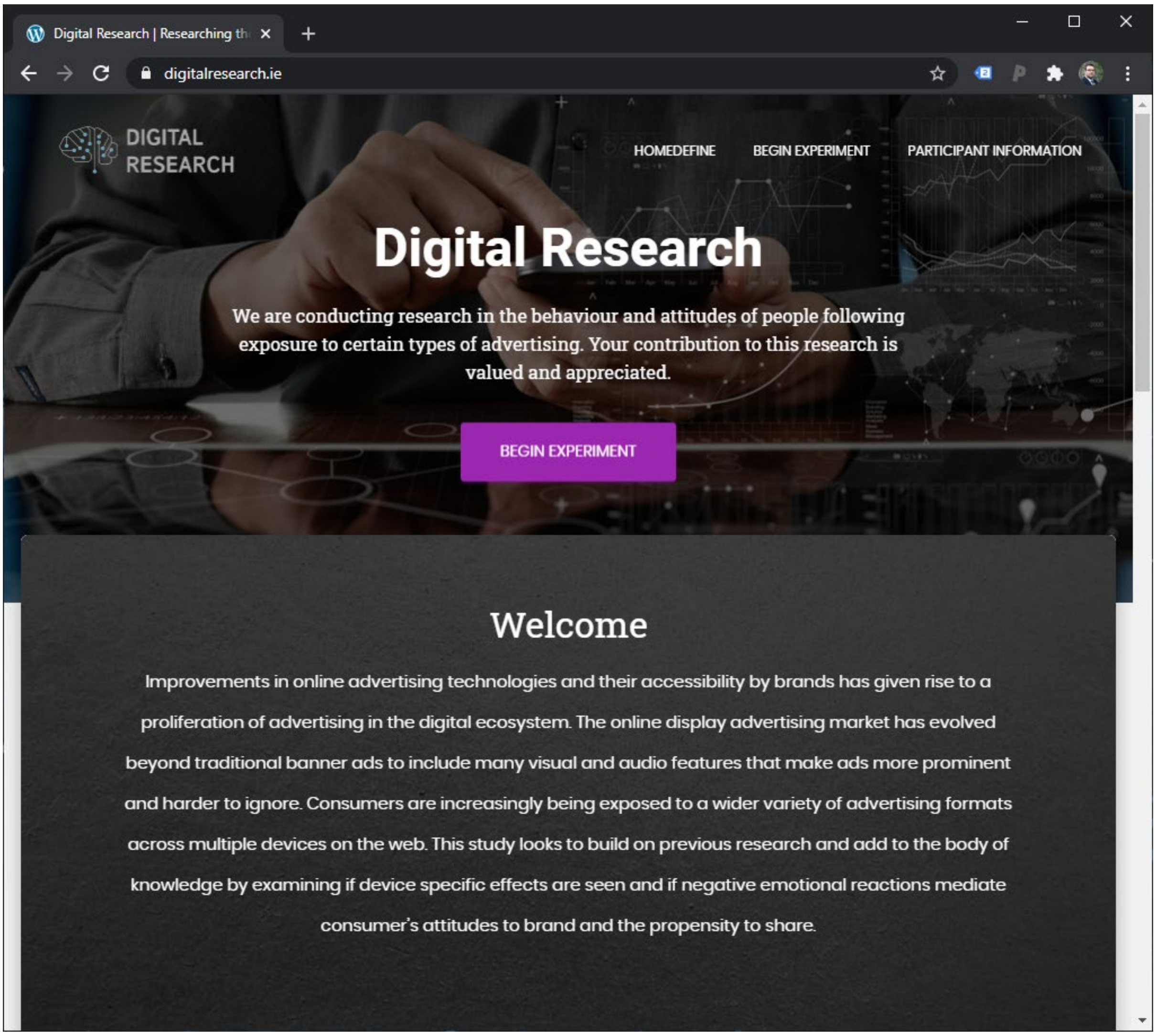
Q11 Please Rate Your Response to the Following Statements Regarding Your Mobile Phone Behaviours

	Not at all True 1 (1)	2 (2)	3 (3)	4 (4)	Extremely True 5 (5)
I keep my phone on 24 hours a day. (1)	○	○	○	○	○
I don't leave home without my phone. (2)	○	○	○	○	○
I set my phone on vibrate or silent mode rather than turning it off. (3)	○	○	○	○	○
I read or send text messages when I am at work or in class. (4)	○	○	○	○	○
I use my phone all day. (5)	○	○	○	○	○

9.3. Appendix III - Test Website Design

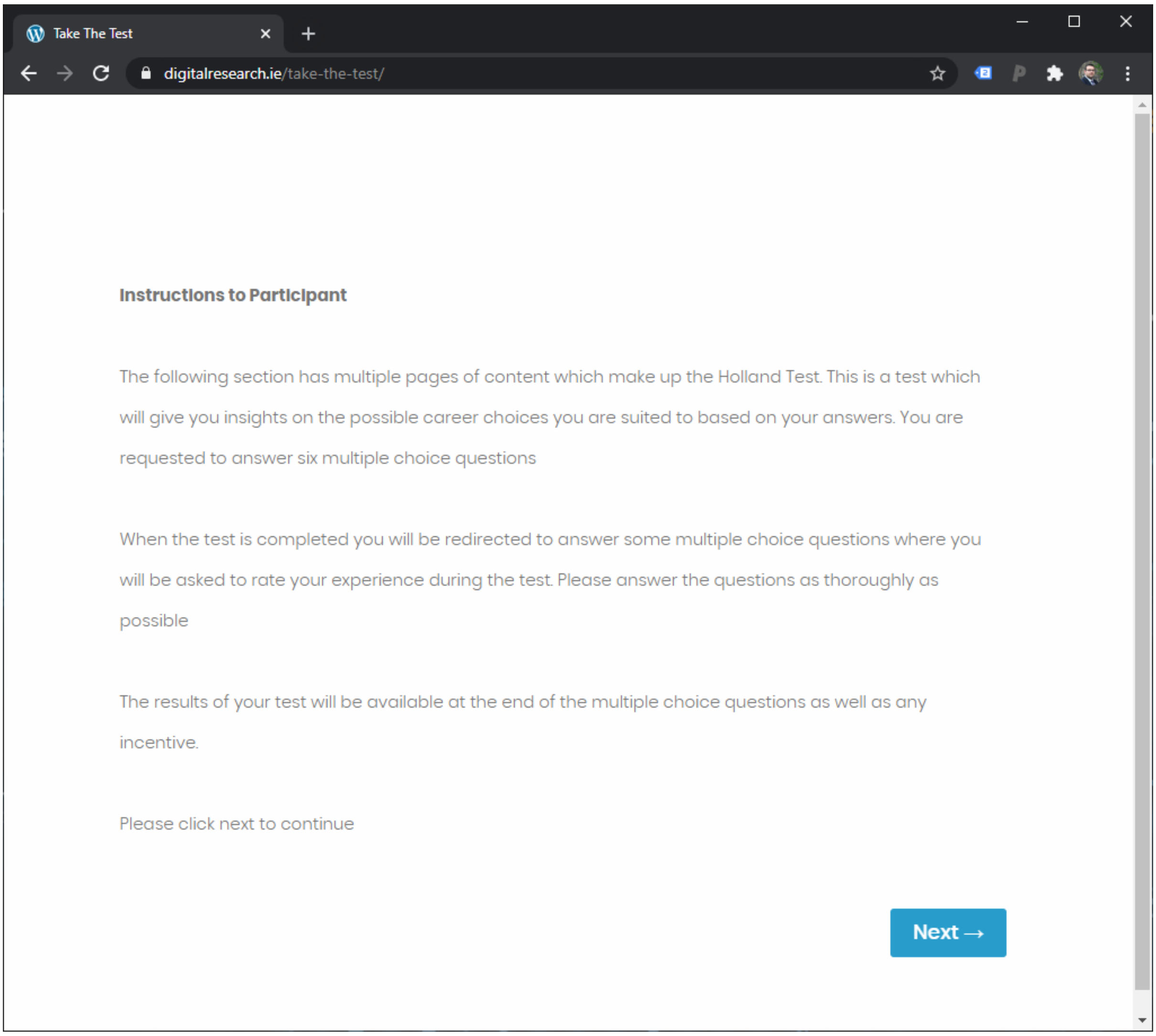
Step 1

Users enter the website and are presented with a call to action button to 'begin experiment.



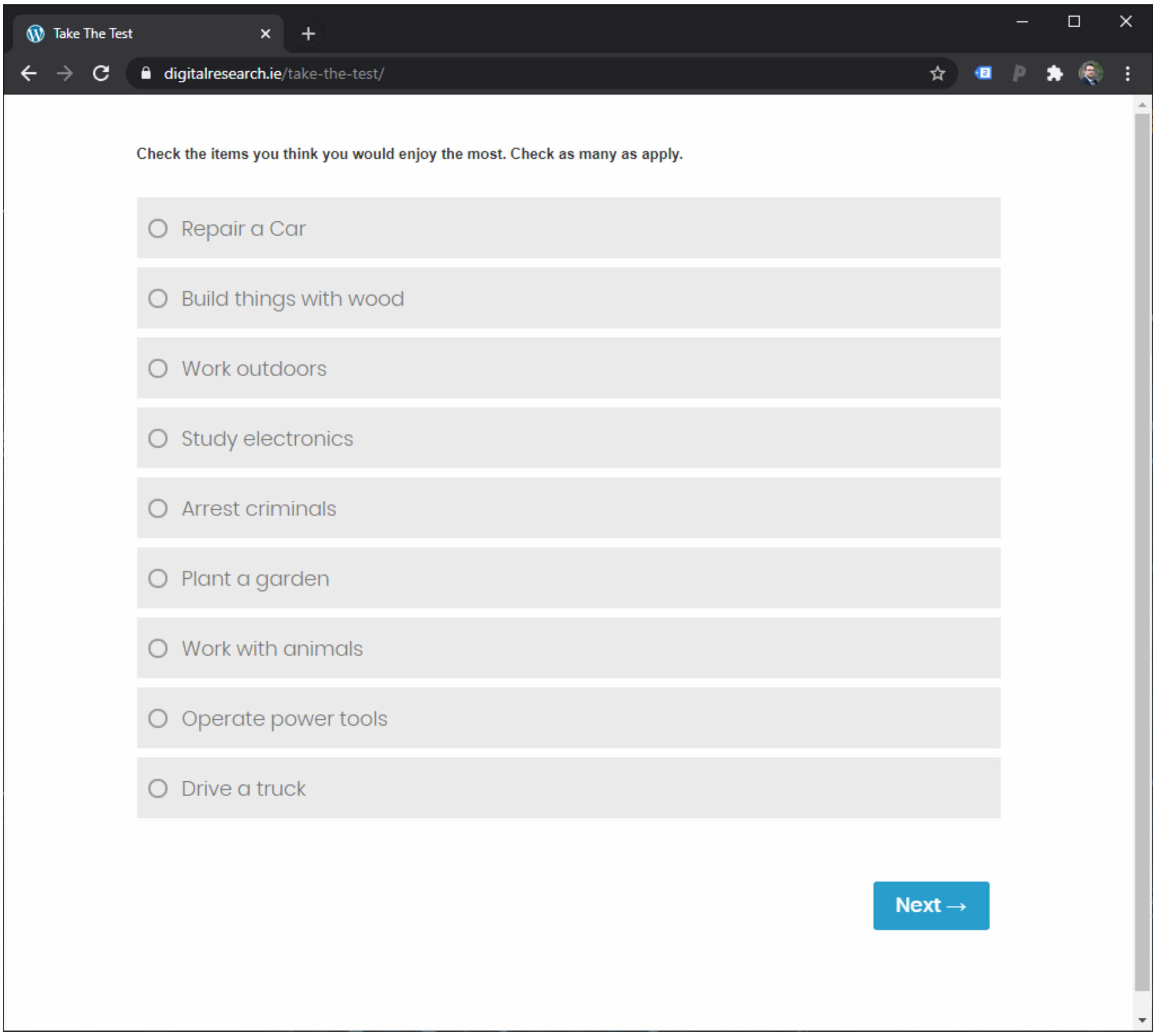
Step 2

Participants are presented with instructions on how to complete the test



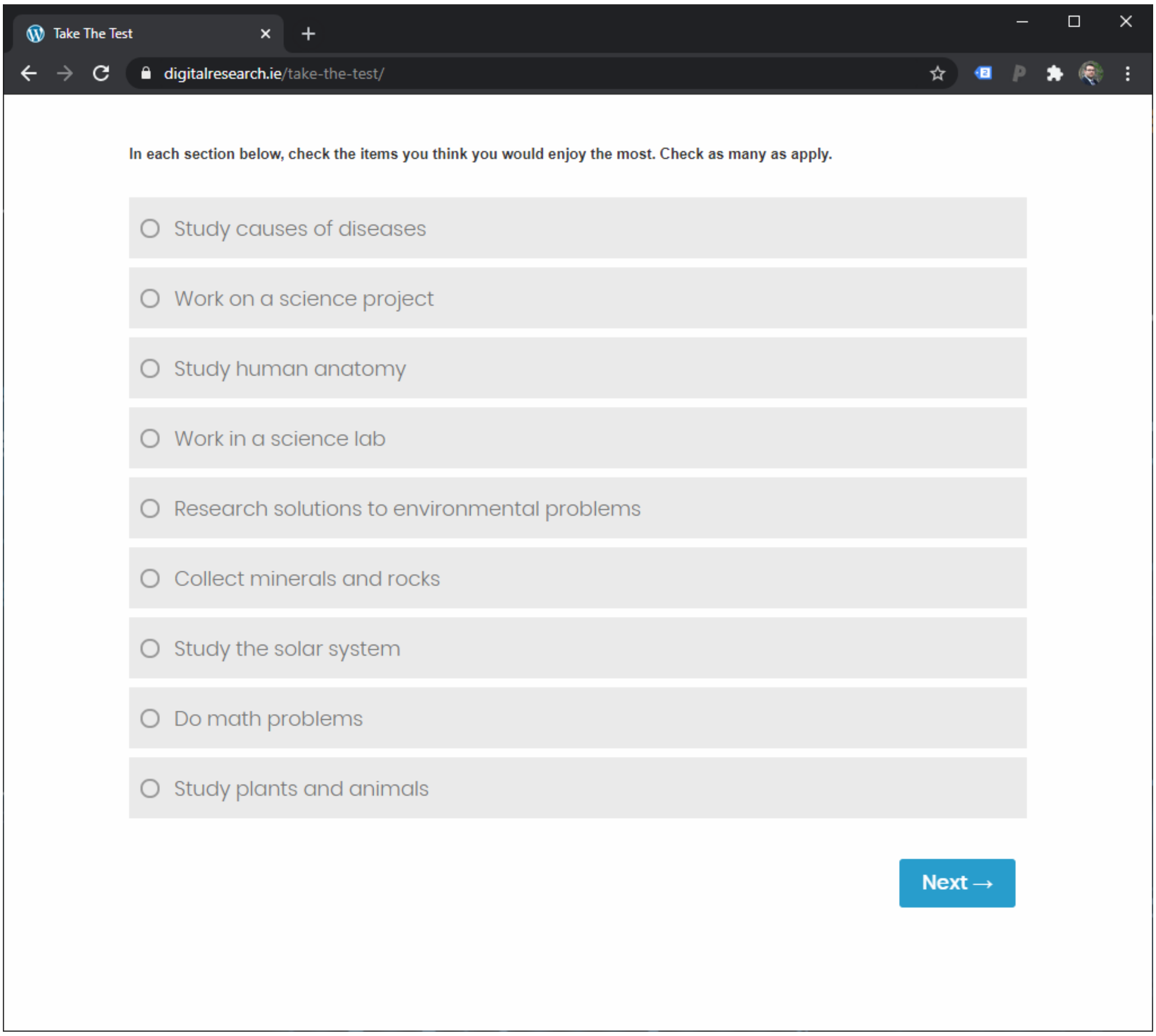
Step 3a

For the high intensity task, users are presented with questions relating to the Holland career test. There are six pages of test questions in total and the ad is always executed on the third step.



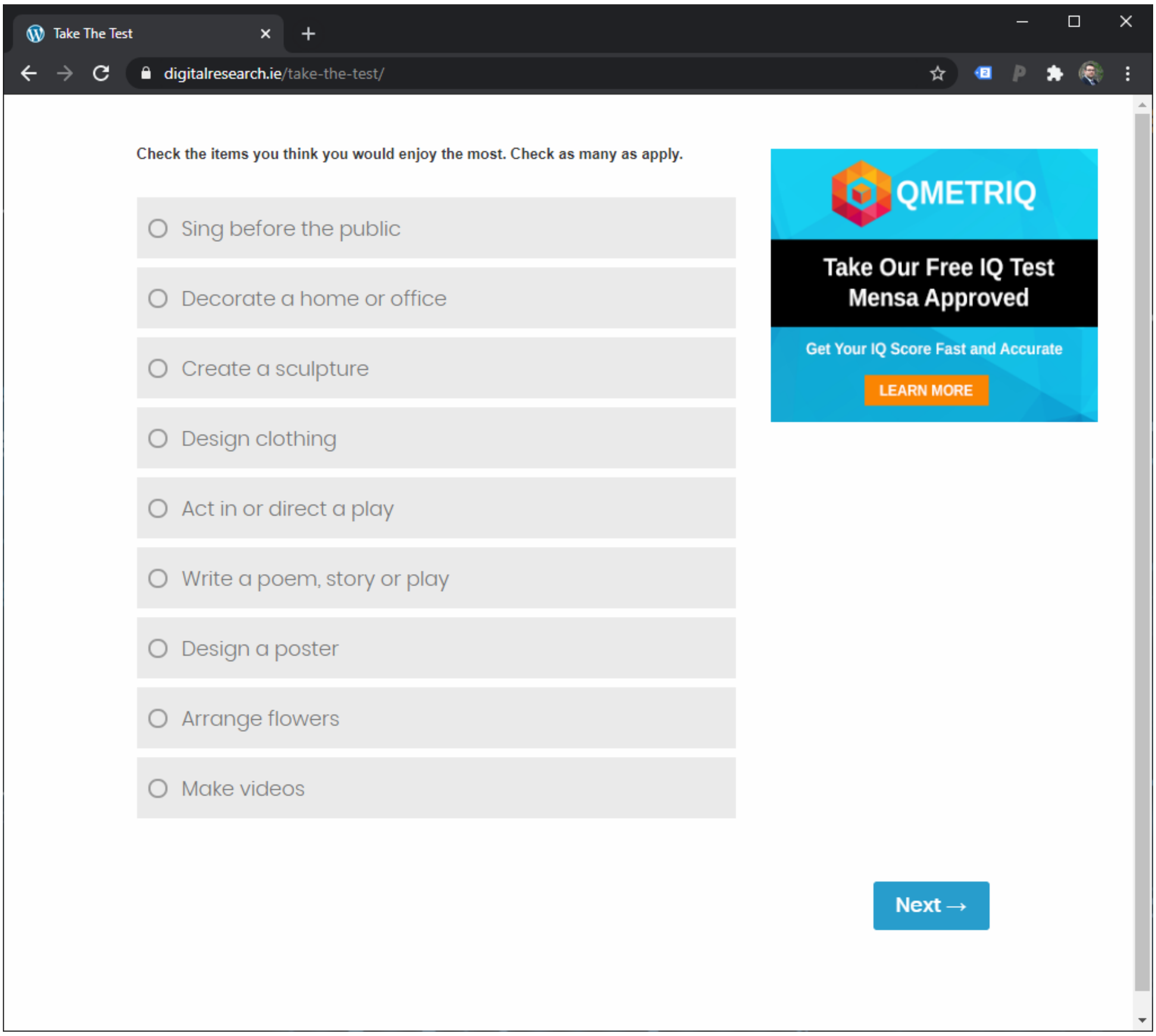
Step 4a

Page two of the questions for the high intensity task



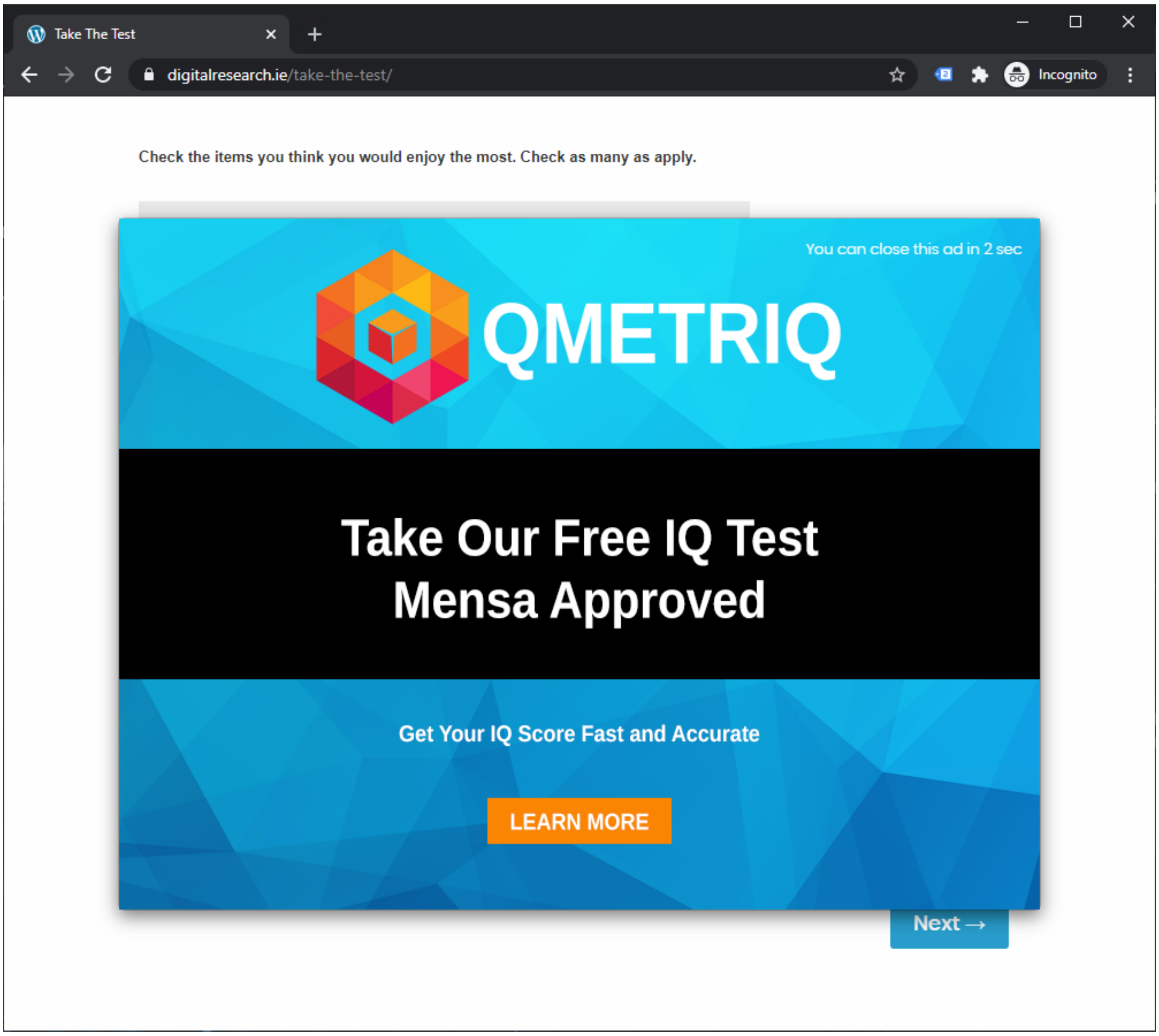
Step 5a

Page three of the test questions, with the static banner ad shown



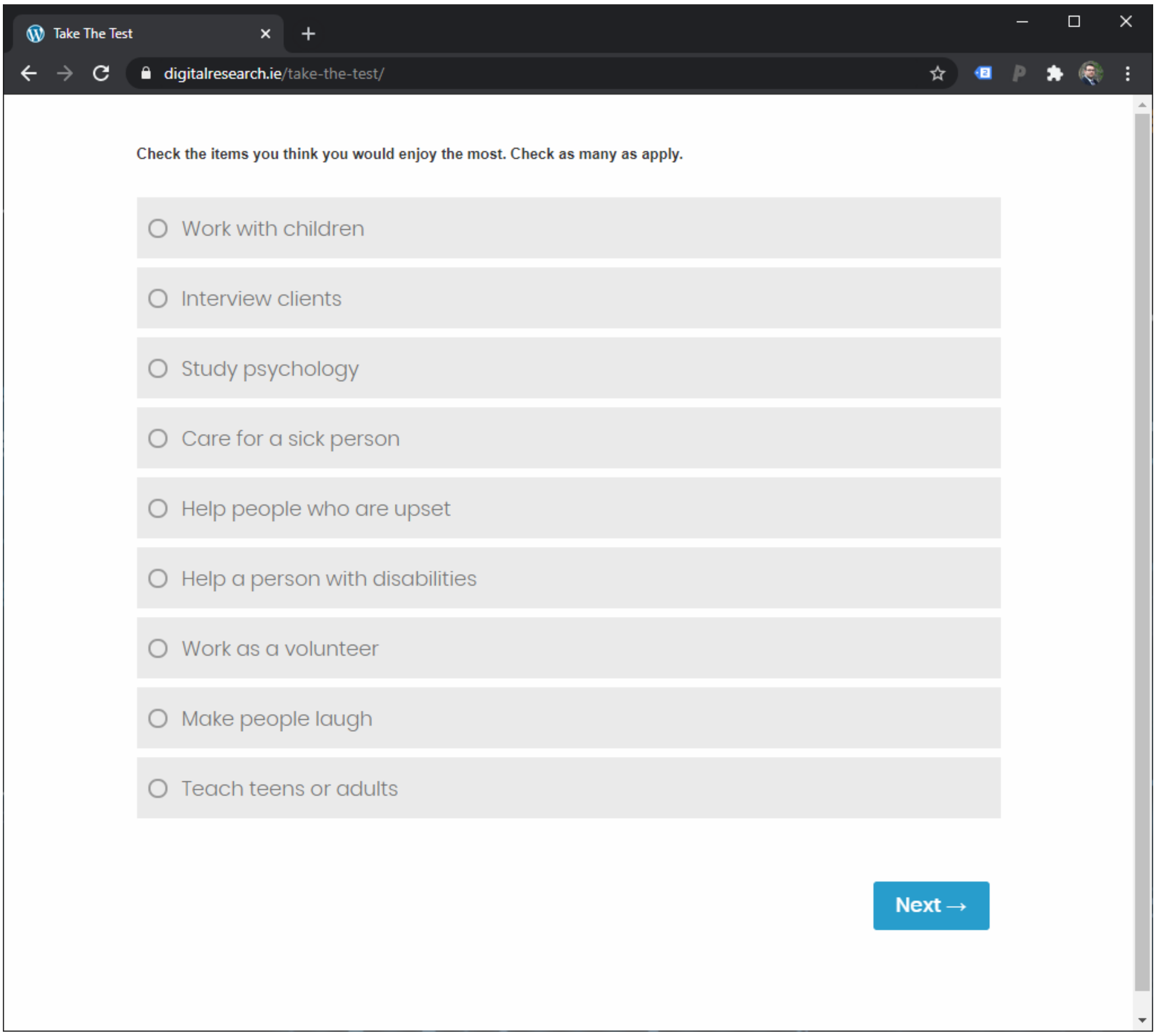
Step 5a (Version 2)

Page three of the test questions, with the modal ad shown



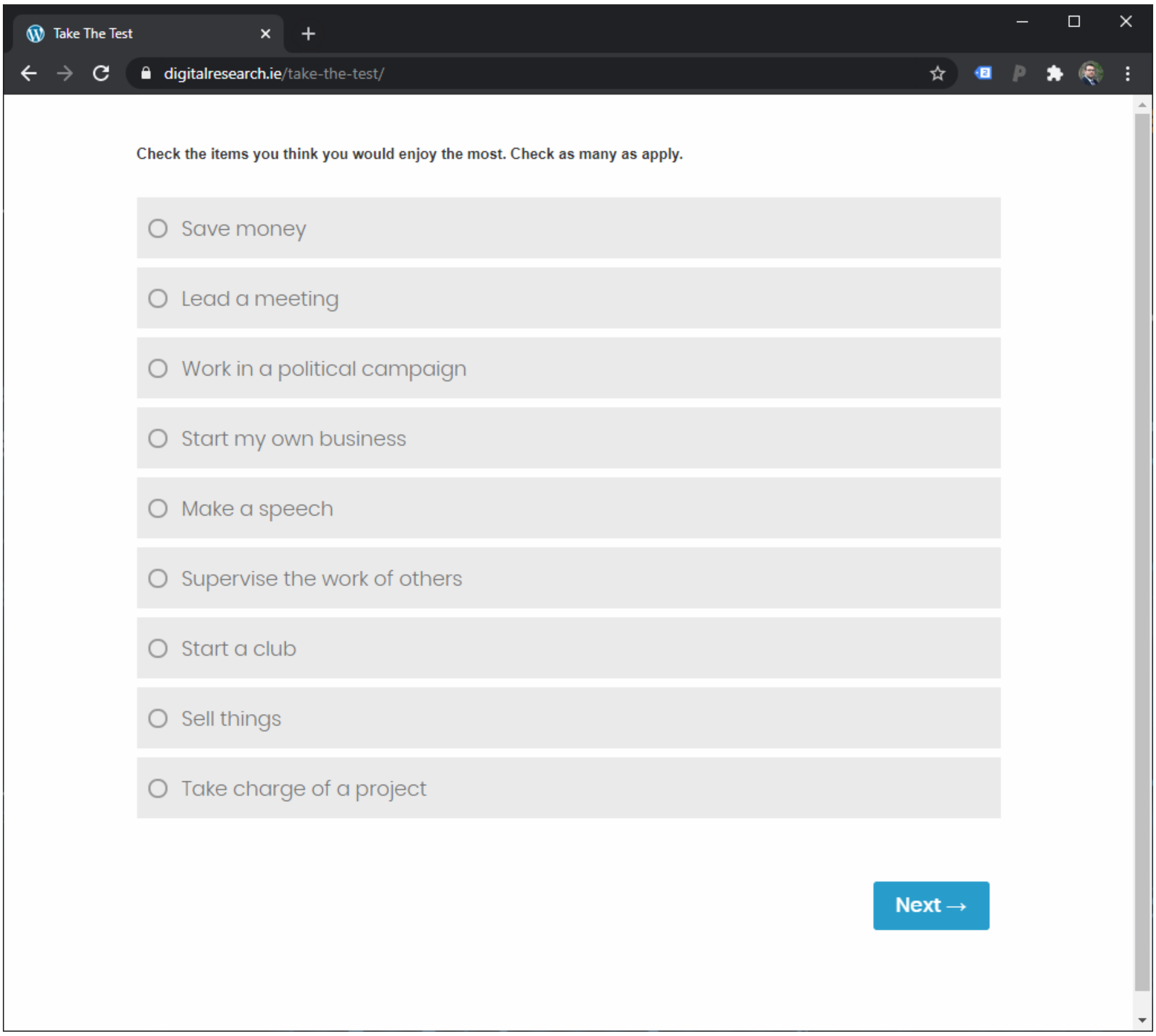
Step 6a

Page four of the Holland career test questions



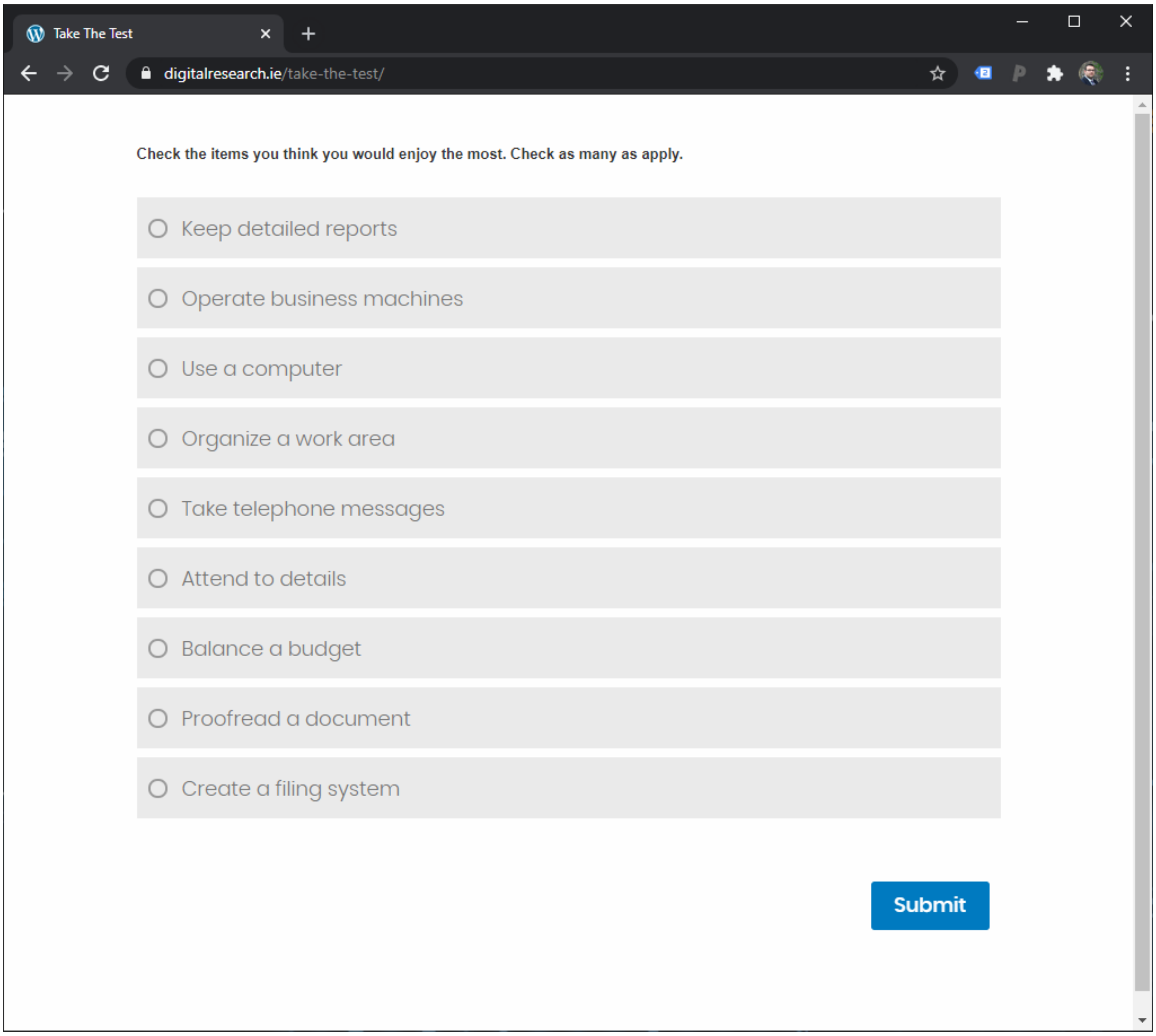
Step 7a

Page five of the Holland career test questions



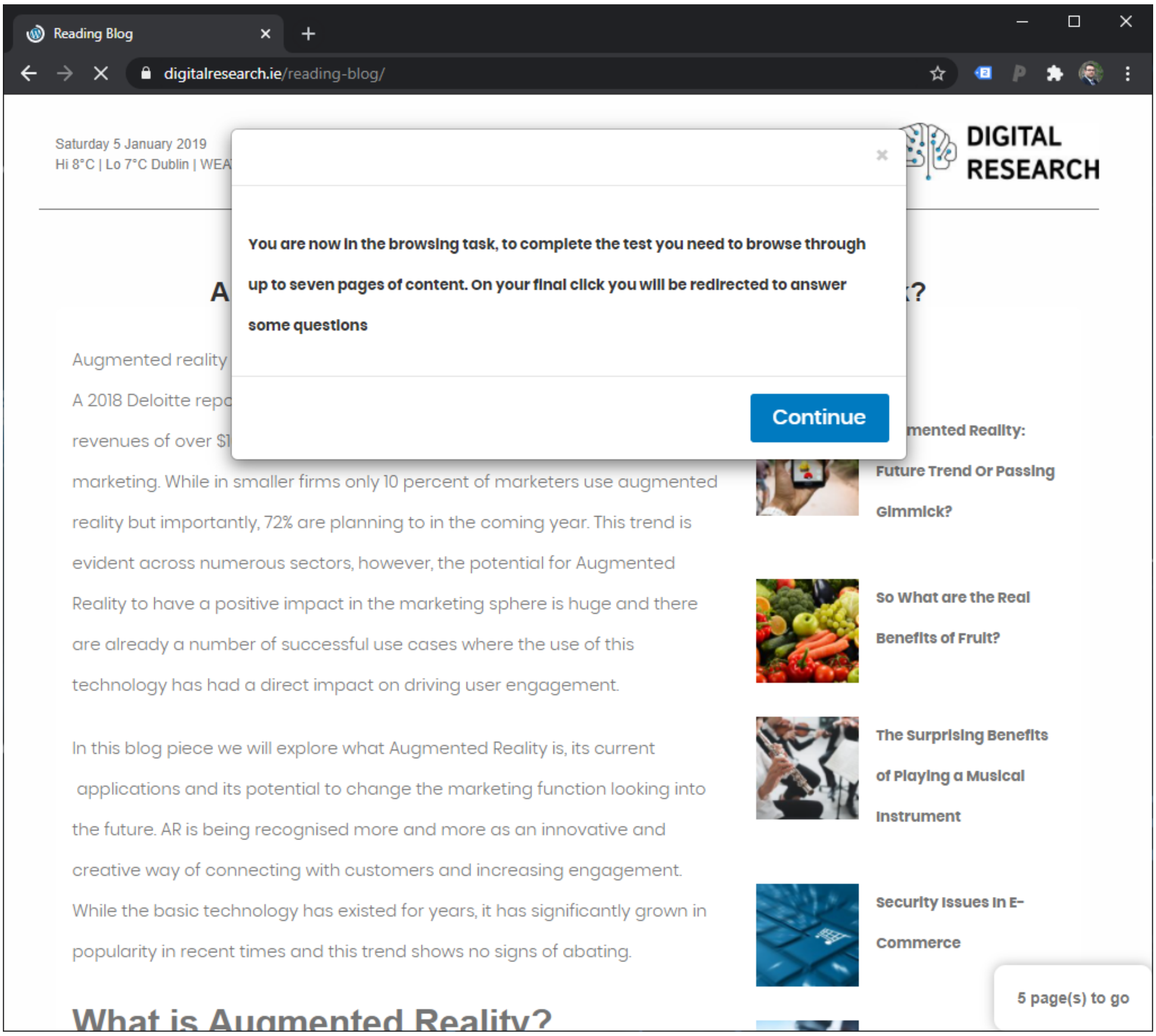
Step 8a

Page six of the Holland career test questions. On clicking next, the test ends and the user is redirected back to complete the instruments. Their results are presented to them following completion of the instruments.



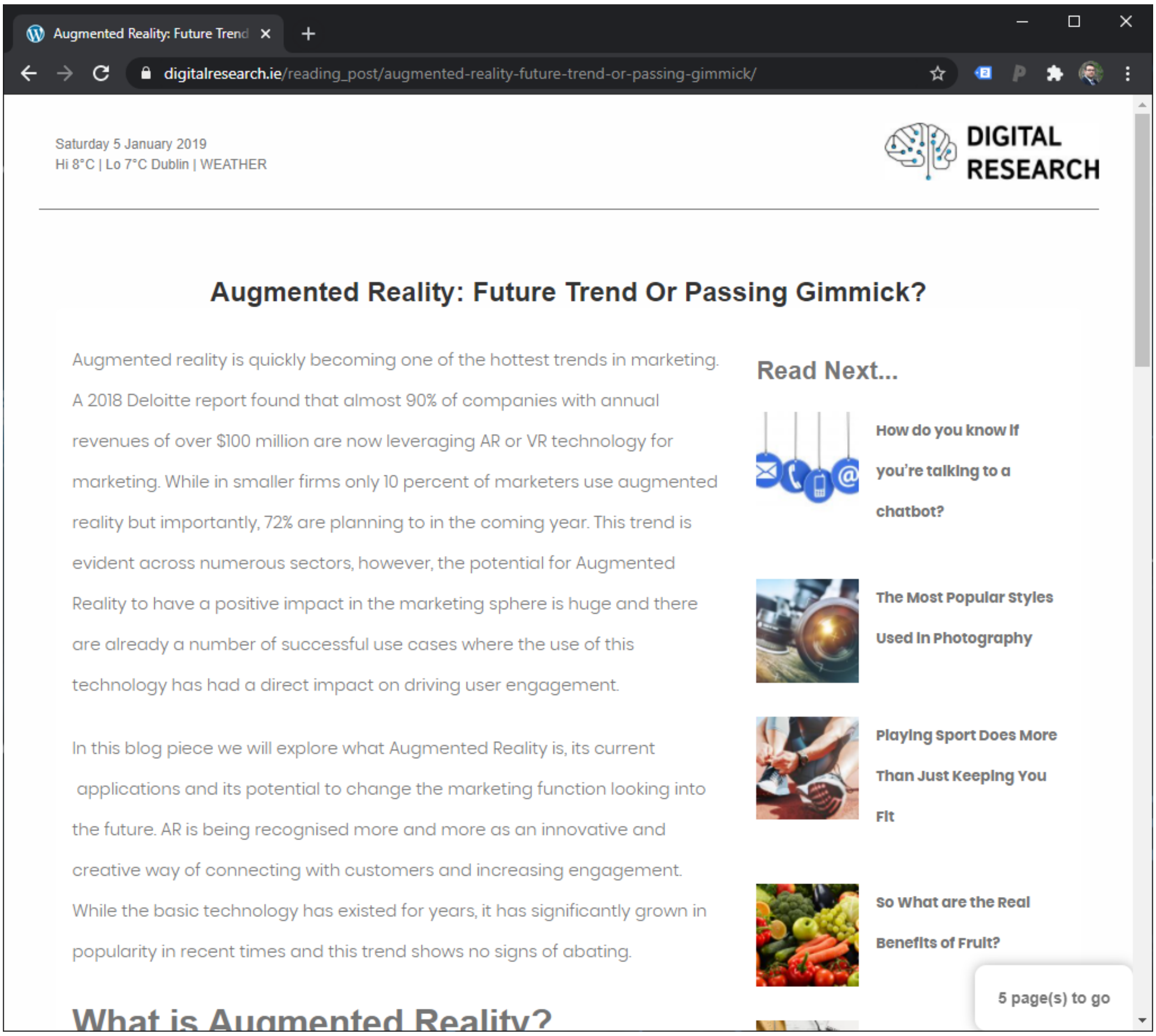
Step 3b

The second cognitive intensity condition is the low intensity condition and following instructions and consent they are presented with a publisher / content website where they are asked to browse through a number of pages.



Step 4b

The second page of the low intensity task


Augmented Reality: Future Trend

digitalresearch.ie/reading_post/augmented-reality-future-trend-or-passing-gimmick/

Saturday 5 January 2019
Hi 8°C | Lo 7°C Dublin | WEATHER

DIGITAL RESEARCH

Augmented Reality: Future Trend Or Passing Gimmick?

Augmented reality is quickly becoming one of the hottest trends in marketing. A 2018 Deloitte report found that almost 90% of companies with annual revenues of over $100 million are now leveraging AR or VR technology for marketing. While in smaller firms only 10 percent of marketers use augmented reality but importantly, 72% are planning to in the coming year. This trend is evident across numerous sectors, however, the potential for Augmented Reality to have a positive impact in the marketing sphere is huge and there are already a number of successful use cases where the use of this technology has had a direct impact on driving user engagement.

In this blog piece we will explore what Augmented Reality is, its current applications and its potential to change the marketing function looking into the future. AR is being recognised more and more as an innovative and creative way of connecting with customers and increasing engagement. While the basic technology has existed for years, it has significantly grown in popularity in recent times and this trend shows no signs of abating.

What is Augmented Reality?

Read Next...

How do you know if you're talking to a chatbot?

The Most Popular Styles Used In Photography

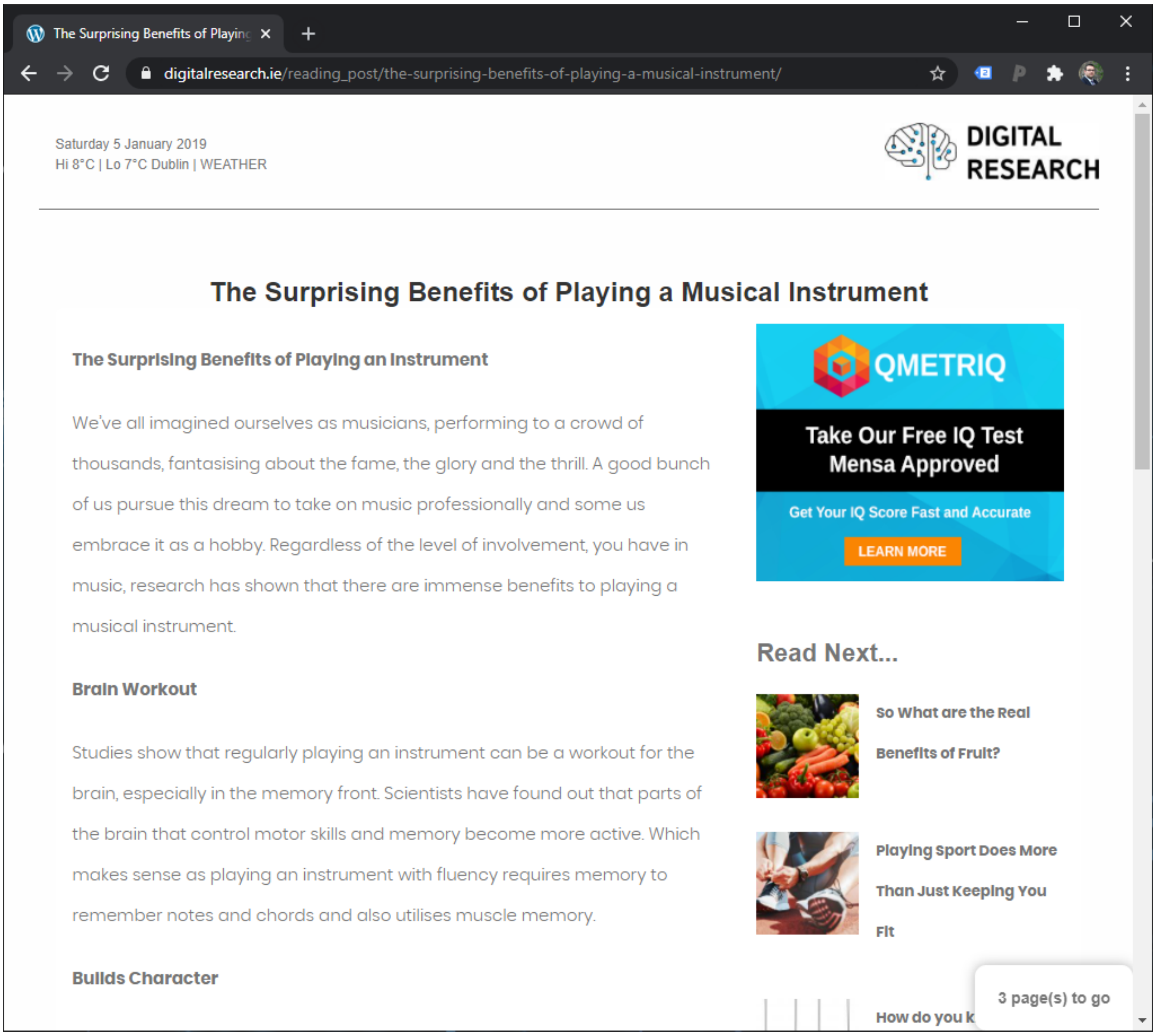
Playing Sport Does More Than Just Keeping You Fit

So What are the Real Benefits of Fruit?

5 page(s) to go

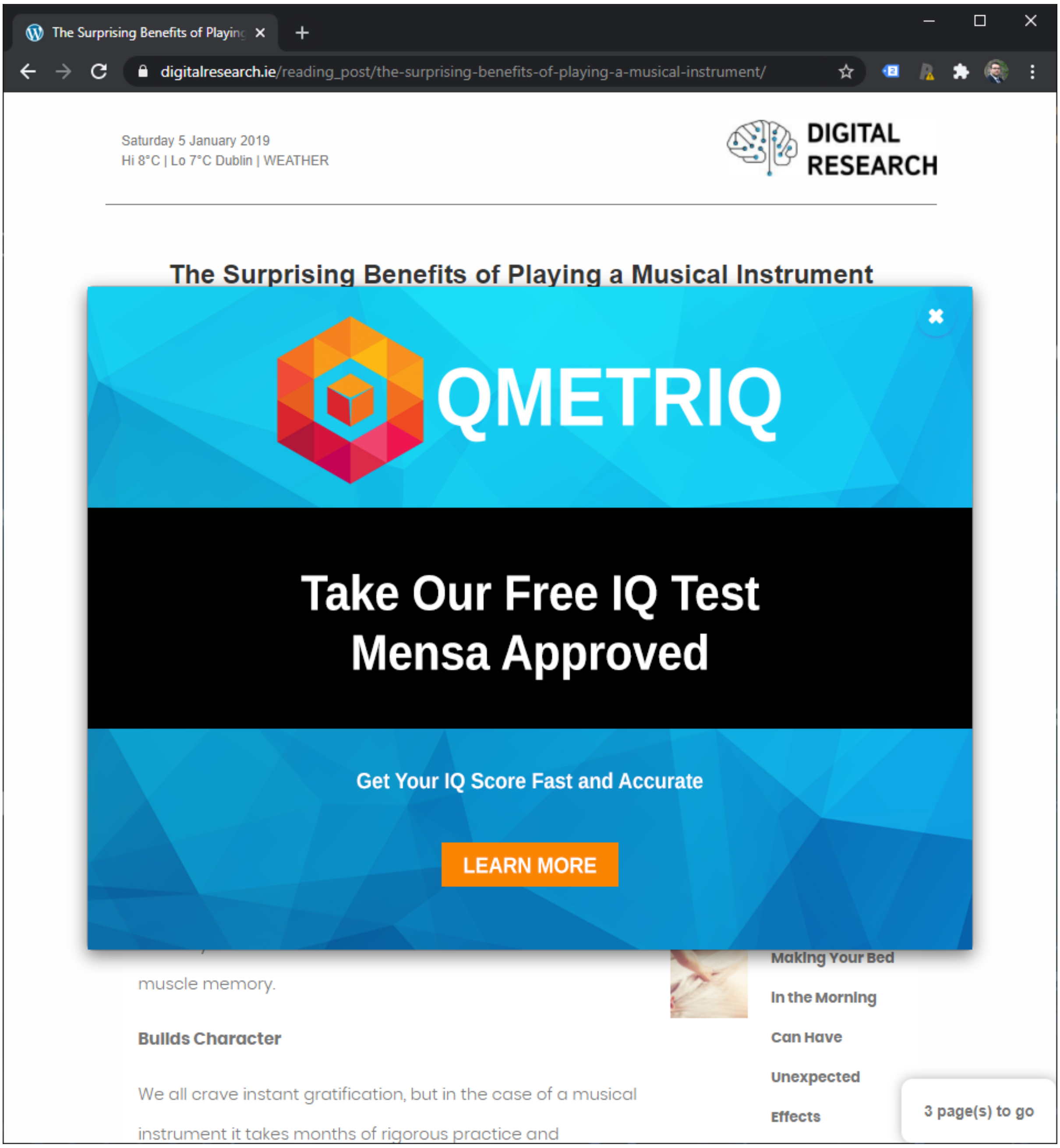
Step 5b

The third page of the low intensity task where ad exposure occurs



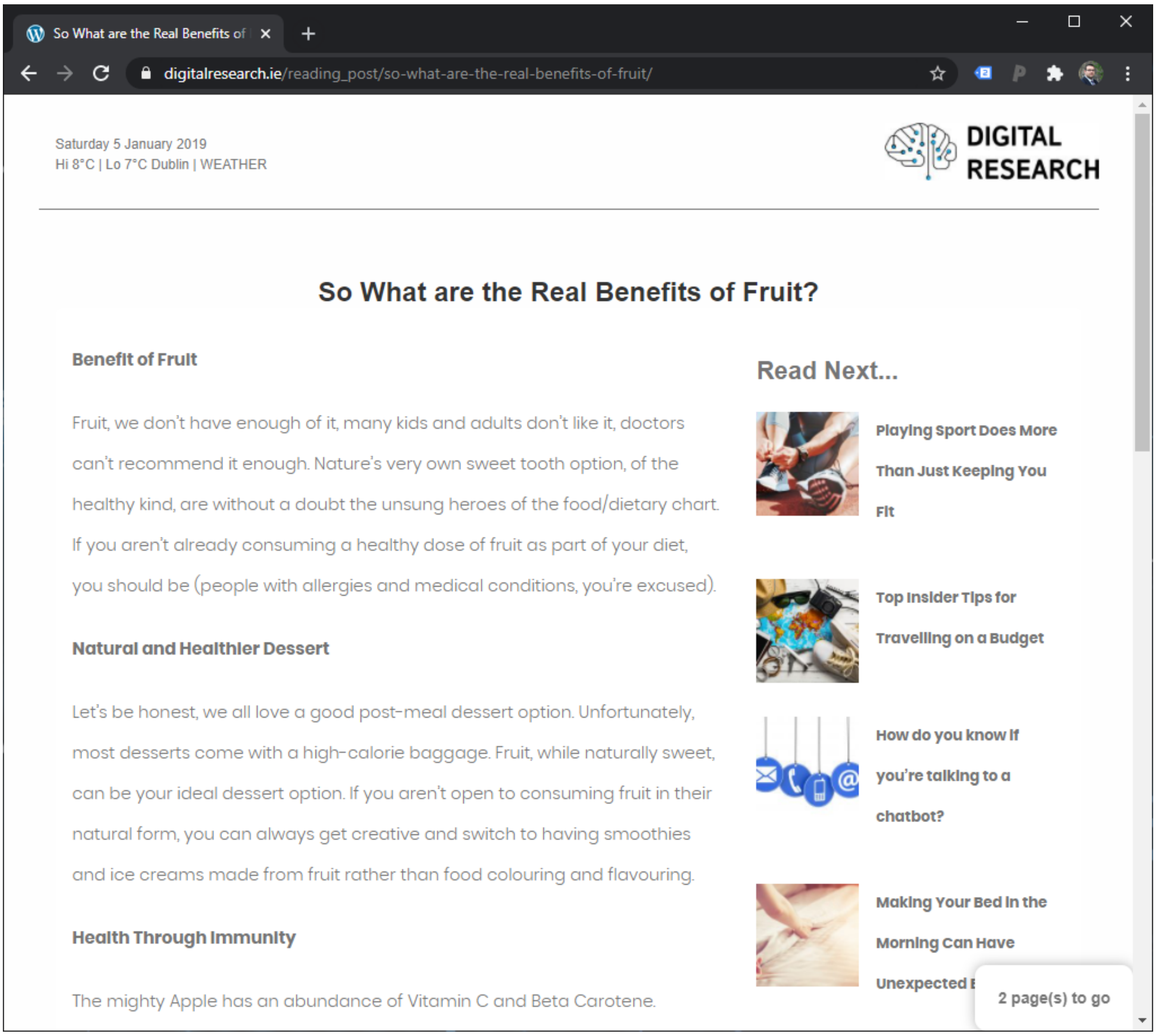
Step 5b (Version 2)

The third page of the low intensity task showing the second variation of the ad exposure - the modal ad.



Step 6b

The fourth page of the low intensity task



So What are the Real Benefits of

digitalresearch.ie/reading_post/so-what-are-the-real-benefits-of-fruit/

Saturday 5 January 2019
Hi 8°C | Lo 7°C Dublin | WEATHER

DIGITAL RESEARCH

So What are the Real Benefits of Fruit?

Benefit of Fruit

Fruit, we don't have enough of it, many kids and adults don't like it, doctors can't recommend it enough. Nature's very own sweet tooth option, of the healthy kind, are without a doubt the unsung heroes of the food/dietary chart. If you aren't already consuming a healthy dose of fruit as part of your diet, you should be (people with allergies and medical conditions, you're excused).

Natural and Healthier Dessert

Let's be honest, we all love a good post-meal dessert option. Unfortunately, most desserts come with a high-calorie baggage. Fruit, while naturally sweet, can be your ideal dessert option. If you aren't open to consuming fruit in their natural form, you can always get creative and switch to having smoothies and ice creams made from fruit rather than food colouring and flavouring.

Health Through Immunity

The mighty Apple has an abundance of Vitamin C and Beta Carotene.

Read Next...

Playing Sport Does More Than Just Keeping You Fit

Top Insider Tips for Travelling on a Budget

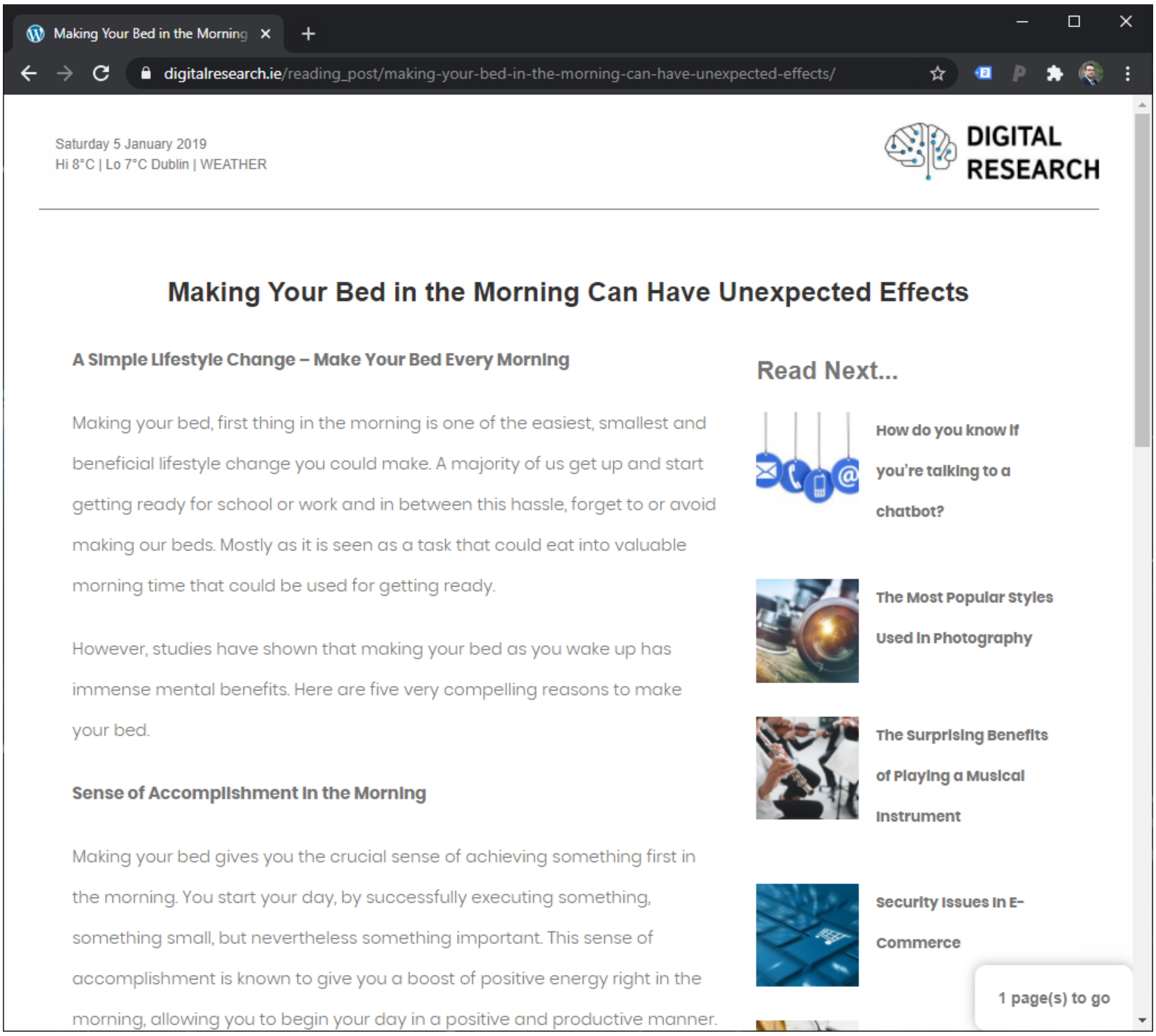
How do you know if you're talking to a chatbot?

Making Your Bed in the Morning Can Have Unexpected

2 page(s) to go

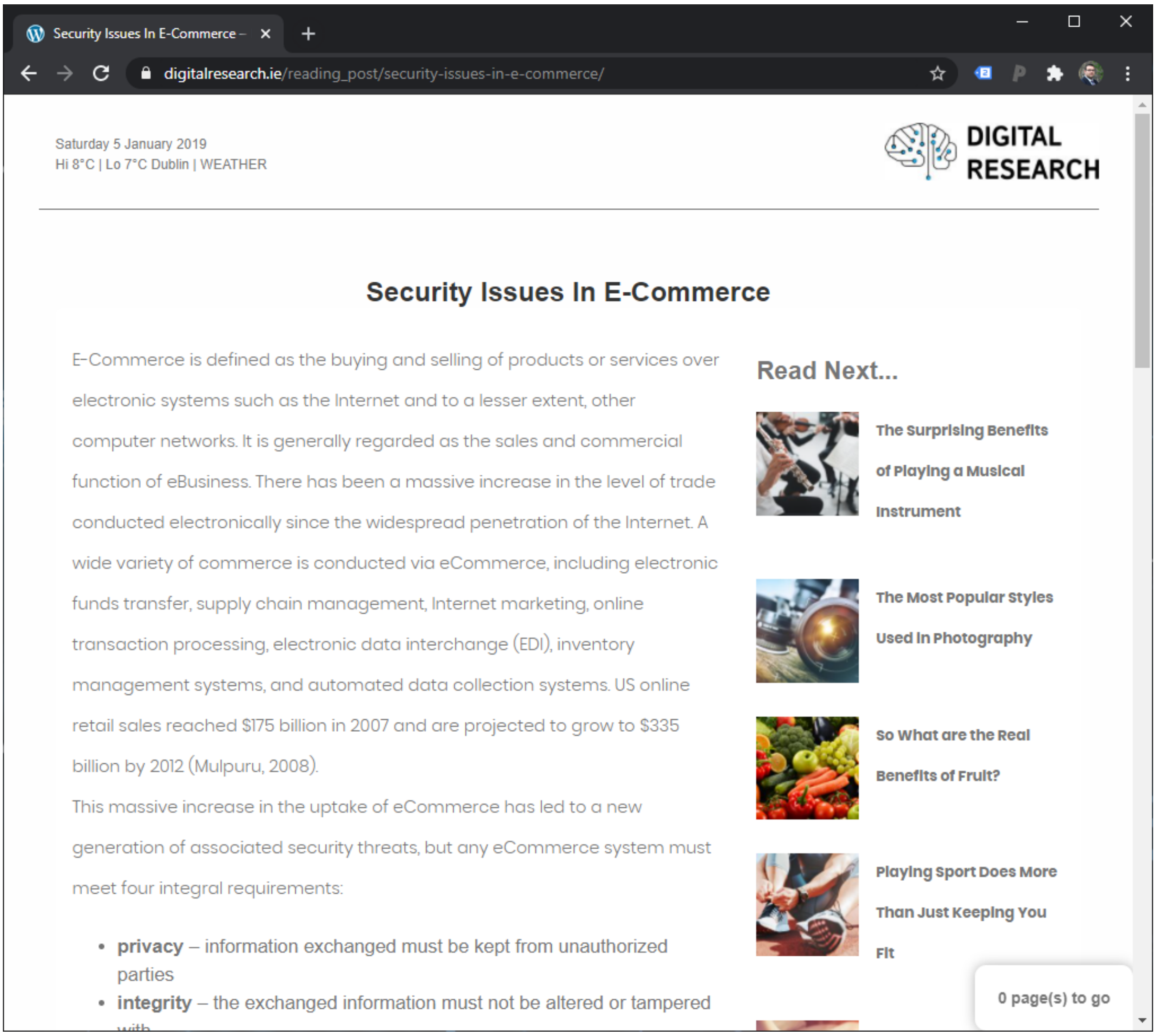
Step 7b

The fifth page of the low intensity task



Step 8b

The last page of the low intensity task. Following the next click on an article, the user is redirected to complete the instruments



9.4. Appendix IV - Ethical approval

TRINITY COLLEGE DUBLIN

SCHOOL OF BUSINESS

Participant Information Leaflet

Investigation of the effects of exposure to online advertisements on consumer attitudes, behaviour and brand perceptions.

Prof. Laurent Muzellec, Ph.D, MBA, B.A

Eamonn O'Raghallaigh, M.Sc, M.Sc, B.Sc(Hons), H.Dip

Trinity Business School

You are invited to participate in this research project which is being carried out by Prof. Laurent Muzellec and Eamonn O'Raghallaigh. Your participation is voluntary. Even if you agree to participate now, you can withdraw at any time during the experimental tests without any consequences of any kind.

The study is designed to investigate the effects of exposure to online advertisements on consumer attitudes, behaviour and brand perceptions.

If you agree to participate, this will involve me either browsing and reading articles on a website or completing a career aptitude test on a website. I will be required to fill out a questionnaire at the end of my browsing session, which will approximately be 5-10 minutes.

It is expected that there will be minimal risks and discomforts during the session on the website, however if you highlight anything which may make you uncomfortable we will do everything possible to minimise this.

You will not benefit directly from participating in this research, however this research may benefit the overall experience of people on websites by giving clearer instructions to advertisers on what types of adverts cause annoyance to web users, enhancing the overall web experience.

Any information or data which is obtained about you during this research which can be identified as being from you will be treated confidentially. This will be done by securing the data in an encrypted file on a cloud storage platform (Google Sheets, Google Drive, password protected, encrypted with 2-factor authentication). The data will be kept on a secure encrypted cloud storage platform and on a password protected drive on a laptop, accessible only by the named researchers above. The data storage and the grounds for continued storage will be reviewed within 24 months of completion of data. Any data that is no longer required will be destroyed or erased in a safe and secure way. Any data that is still required will be further reviewed every 12 months and may be kept for up to 10 years.

Data from this research project may be published in future. The original data will be available only to the present investigators.

If you have any questions about this research you can ask me. You are also free, however, to contact any of the other people involved in the research to seek further clarification and information.

Researcher
Eamonn O'Raghallaigh
Email: eoraghal@tcd.ie
Phone: 086 1701808

Principal Investigator
Prof. Laurent Muzellec
Email: laurent.muzellec@tcd.ie

TRINITY COLLEGE DUBLIN

SCHOOL OF BUSINESS

Consent Form

Researcher name: **Eamonn O'Raghallaigh**

Supervisor name: **Prof. Laurent Muzellec**

I am invited to participate in this research project which is being carried out by *Eamonn O'Raghallaigh and Prof. Laurent Muzellec.* My participation is voluntary. Even if I agree to participate now, I can withdraw at any time during the experimental tests without any consequences of any kind.

PURPOSE OF THE STUDY

The study is designed to investigate the effects of exposure to online advertisements on consumer attitudes, behaviour and brand perceptions.

PROCEDURES

If I agree to participate, this will involve me either browsing and reading articles on a website or completing a career aptitude test on a website. I will be required to fill out a questionnaire at the end of my browsing session, which will approximately be 5-10 minutes.

POTENTIAL RISKS AND DISCOMFORTS

It is expected that there will be minimal risks and discomforts during the session on the website.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

I will not benefit directly from participating in this research.

This research may benefit the overall experience of people on websites by giving clearer instructions to advertisers on what types of adverts cause annoyance to web users.

CONFIDENTIALITY AND DATA PROTECTION

Any information or data which is obtained from me during this research which can be identified with me will be treated confidentially. This will be done securing the data in an encrypted file on a cloud storage platform (Google Sheets, Google Drive, password protected, encrypted with 2-factor authentication). The data will be kept on a secure encrypted cloud storage platform and on a password protected drive on a laptop, accessible only by the named researchers above. The data storage and the grounds for continued storage will be reviewed within 24 months of completion of data. Any data that is no longer required will be destroyed or erased in a safe and secure way. Any data that is still required will be further reviewed every 12 months and may be kept for up to 10 years.

PARTICIPATION AND WITHDRAWAL

I can choose whether or not to be in this study. If I volunteer to be in this study, I may withdraw at any time without consequences of any kind. I may also refuse to answer any questions I do not want to answer. There is no penalty if I withdraw from the study and I will not lose any benefits to which I am otherwise entitled. The researcher may withdraw me from this research if my physician tells us that continued participation may injure my health.

QUESTIONS ABOUT RESEARCH

If I have any questions about this research I can ask Eamonn O'Raghallaigh by calling (086) 1701808. I am also free, however, to contact Prof. Laurent Muzellec.

RIGHTS OF RESEARCH SUBJECTS

The Trinity College Dublin School of Business Research Ethics Committee has reviewed the researcher's request to conduct this project. If I have any concerns about my rights in this study, I can contact [*Director of Research, School of Business*]

Signature of research participant

I understand what is involved in this research and I agree to participate in the study. [*I have been given a copy of this consent form to keep.]*

________________________ _____________

Signature of participant Date

Signature of researcher

I believe the participant is giving informed consent to participate in this study

________________________ _____________

Signature of researcher Date

9.5. Appendix V - Pilot Study

9.5.1. Sampling

The research sample for the pilot study was recruited from students attending a third-level university in Ireland. Participants were invited to join a research panel from which the test was self-administered by clicking on a link in an email sent to the participants inviting them to take part in the experiment. A total number of ninety-nine participants made up the sample.

9.5.2. Research Questions & Hypotheses

Research questions were developed based on the insights gained from the review of the literature, and focussed on the effects of independent variables on the construct of perceived intrusiveness. The key independent variables included in the pilot study were as follows: (a) ad format, (b) task cognitive intensity, (c) repeat exposure and (d) device type. The relationship between each of these independent variables and perceived intrusiveness were tested.

The independent variable of ad format consisted of three different treatments. The first treatment was a static banner ad which was in-line with the content on the webpage. The second treatment was a modal ad which was controllable, i.e. the user had the option to close the ad immediately after its presented by clicking on a close button in the top right corner of the ad. The third treatment was an uncontrollable / forced exposure modal ad where the user was unable to close the ad when it presented until a period of five seconds elapsed, at which point a close button appeared in the top right corner of the ad.

> **Research Question 1:** Does the format and execution of an advertisement affect the level of perceived intrusiveness experienced by a user following exposure?
>
> - **Hypothesis 1a:** The level of controllability of advertisements in the online environment is negatively correlated with the level of perceived intrusiveness
> - **Hypothesis 1b:** The level of obscuration of an ad is positively correlated with the level of perceived intrusiveness

- **Hypothesis 1c:** Repeated exposure to advertisements positively correlates with the level of perceived intrusiveness

The second research question in the pilot study looked to address any differences in the level of perceived intrusiveness experienced by users based on the type of device the user employed during the test, specifically mobile device or desktop (laptop or desktop falls into this category).

Research Question 2: Is there a difference between mobile and desktop devices in the perceived intrusiveness of advertisements?

- **Hypothesis 2:** Intrusive ads rendered on mobile devices elicit higher perceived intrusiveness

The third research question in the pilot study is based around the effects of task intensity on the level of perceived intrusiveness experienced by the user. Using two different test environments - (a) a high cognitive load environment where the user needs to concentrate on answering questions in a psychometric test and (b) a low cognitive load environment where the user needs to browse casually through a blog website, it is proposed to look for differences in user reactions to advertising in these different environments to ascertain if task intensity impacts perceived intrusiveness.

Research Question 3: Do ads served during tasks involving high cognitive intensity elicit higher perceptions of intrusiveness?

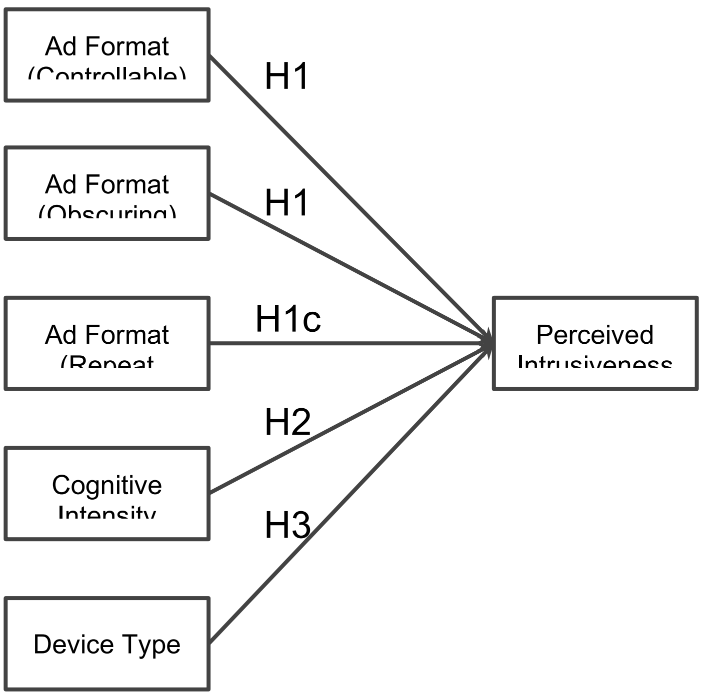
- **Hypothesis 3:** The level of cognitive intensity of the task during advertising exposure is positively correlated with the level of perceived intrusiveness experienced

The research questions for the pilot study focus on all the independent variables available and the dependent variable is reduced to a single scale to facilitate testing and validation of the execution of the experiment and the validation of data collection methods. Although the pilot study was limited in terms of insights regarding the relationships between variables due to a complex factorial design with a high number of variables and low sample size, making confounding variables an issue, this was acceptable as testing hypotheses was not the overall objective when undertaking the pilot study. The main objective was to test the experimental website and look for methodological issues which may affect the further large scale field experiment. It was important prior to recruiting a larger sample that the methodology and data collection procedures were validated.

9.5.3. Conceptual Model

The conceptual model for the pilot study is presented in figure 3. The three components of ad format are tested for direct effect on perceived intrusiveness - controllable (H1a), obscuring (H1b) and repeat exposure (H1c). The second hypothesis relates to cognitive intensity (H2) of the task during exposure while the third hypothesis looks at the direct effect of device type (H3) on perceived intrusiveness.

Figure 15. Conceptual Model for the Pilot Test Study



9.5.4. Pilot Study Experimental Design

The online pilot study was executed on a website which was developed to allow for the exposure of the different experimental conditions to participants. The website was styled as a digital research platform which had two distinct content streams to test varying levels of cognitive load during exposure.

The first content stream on the website was the high cognitive load stream which had a number of pages of psychometric test questions, while the second independent low cognitive load content stream had a number of pages of blog articles. When the user was invited to take the test, they clicked a button on the landing page termed ‘Begin Experiment’, at which point they were randomly assigned to one of the particular experiment conditions. Following assignment, they first read through a participant information page, followed by a content form where they agreed to participate with consent by clicking a checkbox followed by a page where they were presented with instructions on how to complete the experiment.

Once the participant reached this point, they were automatically directed to the specific content stream (psychometric task or browsing task) which they were assigned to and they continued in this stream until they took a specified number of actions at which point they were redirected to a page which presented the perceived intrusiveness scale. On completion of the scale responses, the experiment ended and in the case of the psychometric test they were given the results of their test. Figure 4 below shows the high cognitive intensity experimental condition where users took the Holland career aptitude test to represent a high cognitive load task (Patton, 1999). The test comprised six pages of multiple choice questions which the user was required to answer.

Figure 16. High Cognitive Intensity Experimental Condition

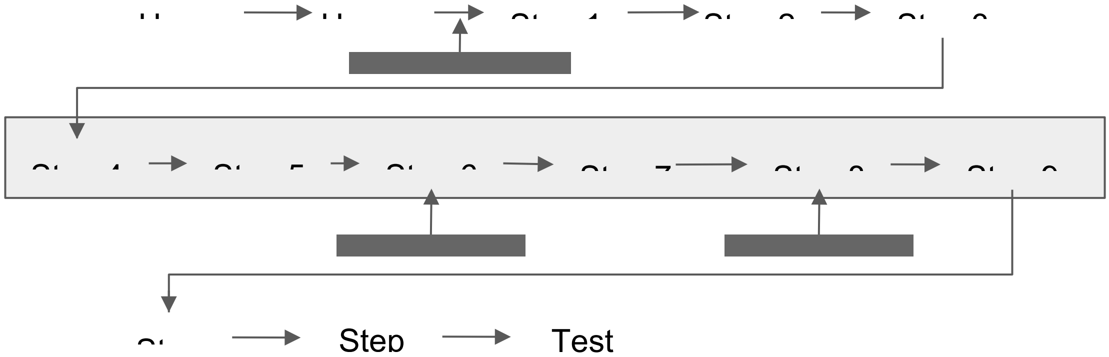
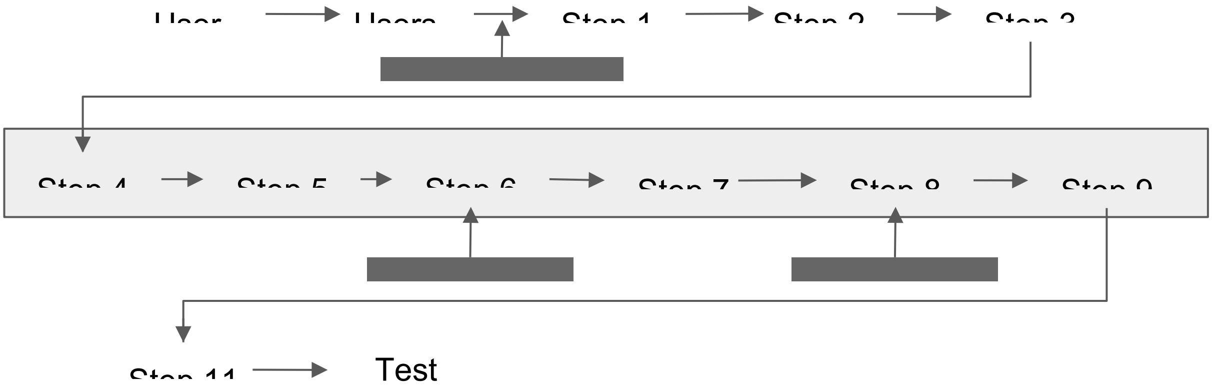


Figure 6 below shows the low cognitive intensity condition where users were asked to browse through six articles on a blog, representing a low cognitive load task. The articles were written to appear to the general audience and represented a range of themes in the lifestyle category. Ten articles in total were created and the users self-selected which article they wanted to consume as they browsed through the blog. The number of articles that the user read was recorded by the system and on the click action to read a seventh article the user was redirected to the perceived intrusiveness scale and the browsing task ended. The process was automatic and the user did not need to be aware of the number of articles they consumed. The browsing task was designed to emulate a typical web browsing session with light-reading of generic lifestyle content at a leisurely pace.

Figure 17. Low Cognitive Intensity Experimental Condition



The system was designed to identify the type of device the participant was using during the test and the content was designed responsively to ensure good user experience. Furthermore, as will be discussed below, the system was able to be programmed to show the different ad formats to users at specific points during the tasks.

9.5.5. Experimental Conditions

Table 24. Overview of Experimental Design

Experiment	Independent Variables	Dependent Variable	Factorial Design
Pilot Study	Ad Format (x3) Repeated Exposure (x2) Cognitive Intensity (x2) Device Type (x2)	Perceived Intrusiveness	4x3x2x2x2

Ad Formats

Ad format consisted of two treatments of modal ads (controllability and obscuring) and one further static banner ad treatment, three conditions in total. Obscuring refers to the property of an advertisement where it covers or obscures the majority of the screen where it is displayed. Banners, or display ads, are small advertisements usually at the top, side or bottom of the screen and are inline with the website content so don't obscure the screen (non-obscuring). Modal ads (sometimes used interchangeably with the terms interstitial or pop-up ads) consume the vast majority of the screen (obscuring) and force users to interact by clicking a close button (controllable ads) or the ad remains on the screen for a specified length of time forcing the user's attention (non-controllable). Controllable modal ads allow the user to close the advertisement at any point by clicking on the 'x' in the top right corner. Non-controllable modal ads do not allow the user to close immediately; they must wait for a specified length of time (generally 5 seconds) before the advertisement can be dismissed. Industry standard treatments of the modal ads have been chosen with dimensions of 800x600 pixels for desktop (laptop) screens and dimensions of 320x480 pixels for mobile screens. The non-obscuring ad will be executed as a static banner in line with industry standards for placement of advertisements on websites; the IAB guidelines for display advertising (IAB, 2019). Users who have an ad-blocker installed will still see the advertisements as the system has been designed to override ad-blocking technology.

Ad Design Criteria

As discussed previously, the advertisement created for exposure to participants will be designed with general appeal. Based on McCoy and Everard's (2008) findings that ads congruent with the user's experience on the website tend to reduce negative reactions to advertisements, the ads will be based around a fictional psychometric test brand, limiting ad content as a source of potential bias. The ads will promote an IQ test by the fictional brand QMetrix. The same messaging and design will be kept consistent across all test conditions.

Timing of Ad Exposure

The specific position of ad exposure was kept constant across all conditions, with the advertisement showing on the third step in the user's respective task. Keeping the ad exposure position constant ensured consistency across all tasks and conditions and so limiting potential sources of bias due to timing of exposure.

Limiting Exposure Errors

A source of exposure error identified in early platform testing was the effect of ad-blocking technology. Ad blockers are extension programs for browsers that prevent advertisements from showing and users with them installed would not see the ad as it was blocked. A modification to the code of the platform was performed to force the ads to show to the user even if they had an ad blocker installed by removing the advertising script that the blocker recognised and directed the ad internally on the website.

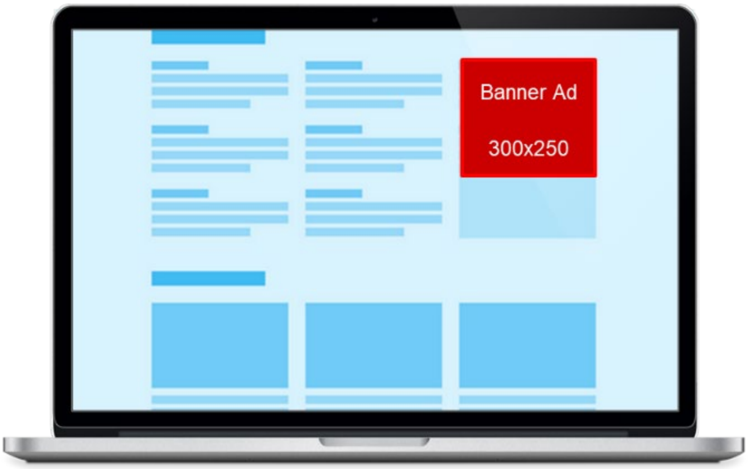
Treatment of Ad Clicks

If a user clicked on the ad the test was ended and they were brought to a landing page where they were thanked for their participation. The exception to this rule was if a user clicked on the close button on a modal ad, where the click was not deemed to be an ad click. Data from users who clicked on an ad was not included in the pilot dataset for analysis.

Non-Obscuring Static Banner Ad - Desktop

The non-obscuring ad condition will consist of a medium rectangle display ad unit on desktop with dimensions of 300 x 250 pixels as shown in figure 7. This format represents the least disruptive of the ad types used in the experiment. This unit will display on desktop devices and has non-controllable, non-obscuring and non-repeated properties. The ad will be displayed in-line with the content on the webpage. The advertisement will be shown on the third step of each respective task, ensuring consistency in timing of exposure.

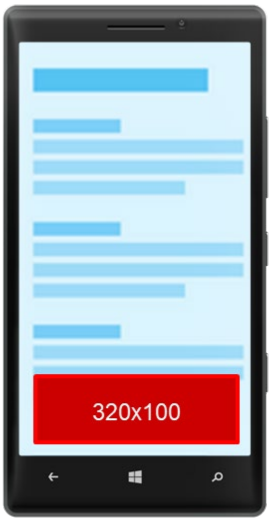
Figure 18. Non-Obscuring Banner Ad Format - Desktop



Non-Obscuring Static Banner Ad - Mobile

The non-obscuring static ad condition will consist of a large mobile banner ad unit on mobile devices with dimensions of 320 x 100 pixels as shown in figure 8. This unit will display on mobile devices only and has non-controllable, non-obscuring and non-repeated properties. The ad will be displayed in-line with the content on the webpage. The advertisement will be shown on the third step of each respective task, ensuring consistency in timing of exposure.

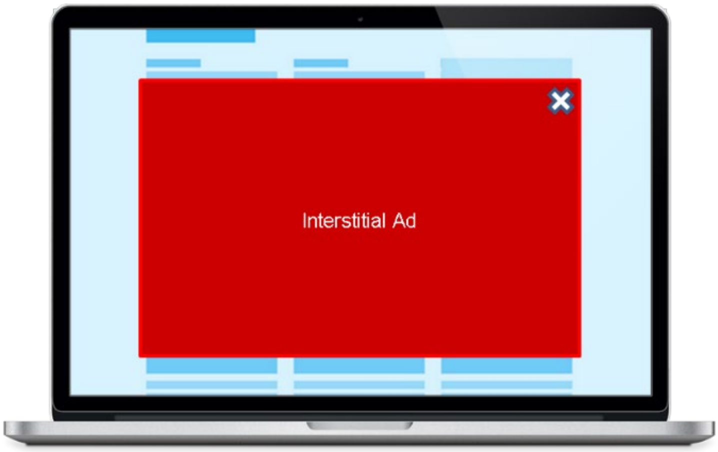
Figure 19. Non-Obscuring Banner Ad Format - Mobile



Obscuring Modal (Popup) Ad - Desktop

The obscuring ad condition will consist of a modal (popup) ad unit on desktop devices with dimensions of 800 x 600 pixels as shown in figure 9. This unit will display on desktop devices only and has controllable, obscuring and non-repeated properties. The user will be able to freely and immediately close the ad by clicking the ‘x’ in the top right of the advert. The ad will be displayed as a modal unit over the content on the webpage. The advertisement will be shown on the third step of each respective task, ensuring consistency in timing of exposure.

Figure 20. Obscuring Modal (Popup) Ad - Desktop



Obscuring Modal (Popup) Ad - Mobile

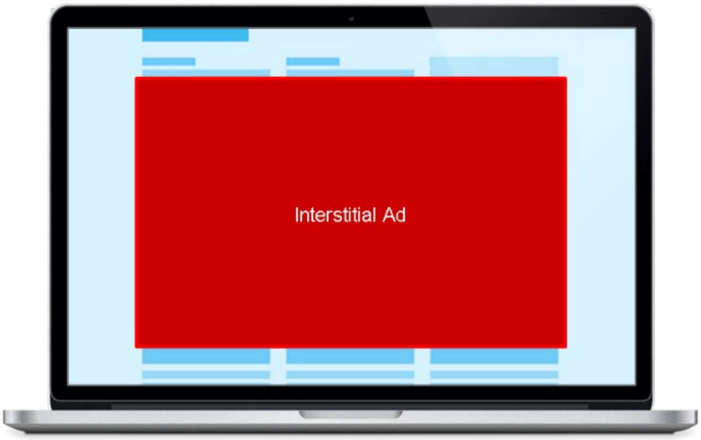
The obscuring ad condition will consist of a modal (popup) ad unit on mobile devices with dimensions of 320 x 480 pixels as shown in figure 10. This unit will display on mobile devices only and has controllable, obscuring and non-repeated properties. The user will be able to freely and immediately close the ad by clicking the ‘x’ in the top right of the advert. The ad will be displayed as an interstitial popup over the content on the webpage. The advertisement will be shown on the third step of each respective task, ensuring consistency in timing of exposure.

Figure 21. Obscuring Modal (Popup) Ad - Mobile

Non-Controllable Modal (Popup) Ad - Desktop

The non-controllable ad condition will consist of a modal (popup) ad unit on desktop devices with dimensions of 800 x 600 pixels as shown in figure 11. This unit will display on desktop devices only and has non-controllable, obscuring and non-repeated properties. The user must wait for a period of five seconds before the close button appears and they can dismiss the ad, meaning they do not have free control over the ad and there is a situation of forced exposure to the ad. The ad will be displayed as a modal element over the content on the webpage. The advertisement will be shown on the third step of each respective task, ensuring consistency in timing of exposure.

Figure 22. Non-Controllable Modal (Popup) Ad - Desktop



Non-Controllable Modal (Popup) Ad - Mobile

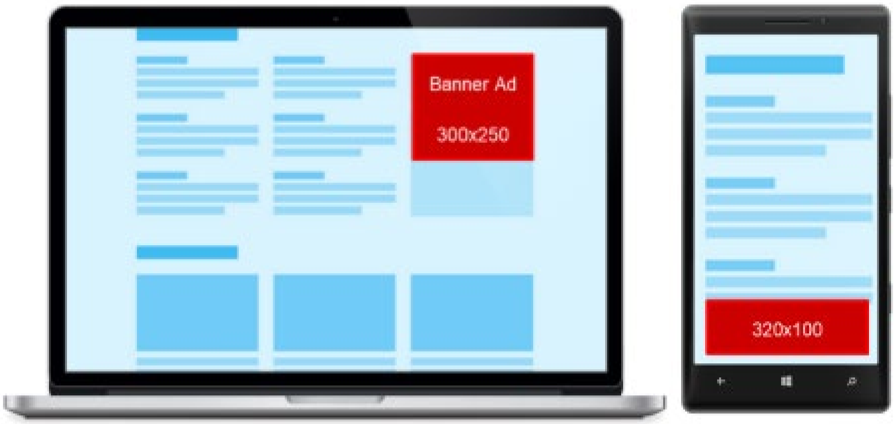
The non-controllable ad condition will consist of a modal (popup) ad unit on mobile devices with dimensions of 320x480 pixels as shown in figure 12. This unit will display on mobile devices only and has non-controllable, obscuring and non-repeated properties. The user must wait for a period of five seconds before the close button appears and they can dismiss the ad, meaning they do not have free control over the ad and there is a situation of forced exposure to the ad. The ad will be displayed as a modal element over the content on the webpage. The advertisement will be shown on the third step of each respective task, ensuring consistency in timing of exposure.

Figure 23. Non-Controllable Modal (Popup) Ad - Mobile

Repeat Exposure

Repeat exposure will be modelled similar to the common marketing technique of remarketing where users are repeatedly exposed to the same advertisement after an initial interaction. In the pilot study, the repeat exposure condition will involve a group of participants being exposed to the same advertisement twice during the experimental procedure. The advertisement that the users will be exposed to is the medium rectangle display ad unit on desktop with dimensions of 300 x 250 pixels and the large mobile banner ad unit on mobile devices with dimensions of 320 x 100 pixels as shown in figure 13. The ad will be displayed in-line with the content on the webpage. The advertisement will be shown on the third and fifth steps of each respective task, ensuring consistency in timing of exposure.

Figure 24. Repeat Exposure Ad Format - Desktop & Mobile



Cognitive Intensity

Cognitive intensity will comprise two conditions - high intensity goal-directed activity and low intensity cognitive activity and will be executed as two separate journeys via different content streams on the experimental website. To model high intensity cognitive activity users will be asked to undertake a psychometric test on the website which offers a free career aptitude test to users, based on the Strong Interest Inventory, a widely used career tool (Katz et al., 1999). As the user proceeds through multiple pages of the test (a goal directed activity), they will be exposed to advertising as per experimental conditions as outlined in table 7 below. To model low intensity cognitive activity, users will be asked to browse through a generic blog type content stream with articles aimed at a general audience with universal appeal. Users will be exposed to all of the experimental conditions (obscuring ads, non-controllable ads, repeated exposure of advertisements) on both low and high cognitive tasks. Figure 14 shows the high intensity content stream which is represented by multiple choice questions which the user must answer to progress. Shown as an example is how the standard in-line banner was presented to the participants during their session.

Figure 25. High Cognitive Intensity Condition

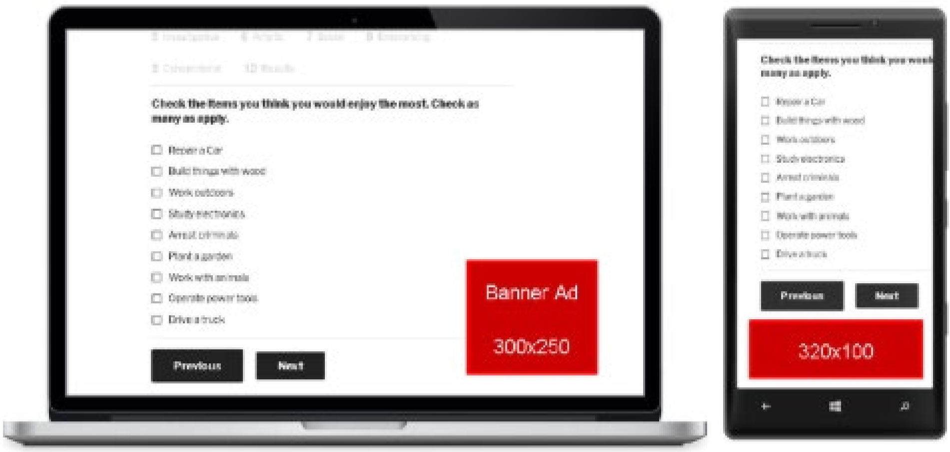
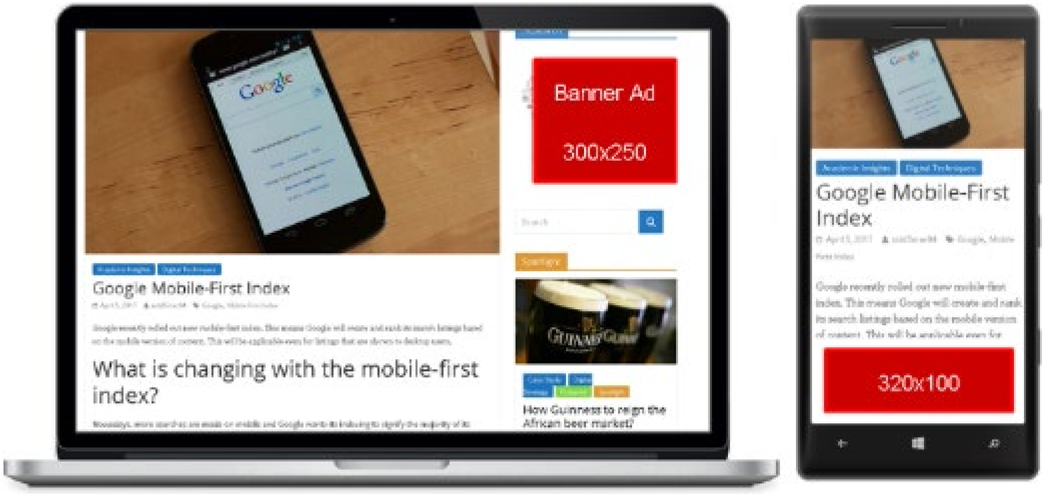


Figure 15 shows the low intensity content stream which is represented by a series of random articles of universal appeal that the user must browse through to progress. Shown as an example is how the standard in-line banner was presented to the participants during their session.

Figure 26. Low Cognitive Intensity Condition



Device Type

Device type will comprise two conditions - exposure to advertisements on desktop devices on a desktop optimized version of the experimental website and exposure to advertisements on a mobile device on a responsive mobile optimised version of the experimental website. The test website was developed using responsive methodology, insofar as the website was programmed to detect the type of the device the participant was using and adapted the layout and style to ensure a good user experience irrespective of device type. At the end of the participants session the data was tagged with the device type used.

Table 25. Summary of Experimental Conditions

		Experimental Condition				
		Obscuring	Controllable	Multiple Exposure	Cognitive Intensity	Device
Ad Format	Static Banner	No	No	No	Low	Mobile
		No	No	No	Low	Desktop
		No	No	No	High	Mobile
		No	No	No	High	Desktop
	Obscuring Non-Controllable Modal	Yes	No	No	Low	Mobile
		Yes	No	No	Low	Desktop
		Yes	No	No	High	Mobile
		Yes	No	No	High	Desktop
	Controllable Modal	Yes	Yes	No	Low	Mobile
		Yes	Yes	No	Low	Desktop
		Yes	Yes	No	High	Mobile
		Yes	Yes	No	High	Desktop
	Repeat Exposure Banner	No	No	Yes	Low	Mobile
		No	No	Yes	Low	Desktop
		No	No	Yes	High	Mobile
		No	No	Yes	High	Desktop

9.5.6. Latent Construct

The latent construct in the pilot study was limited to the dependent variable perceived intrusiveness, measured by a seven-point likert scale instrument developed by Li et al. (2002). The scale was presented to users at the end of their experimental task, with the user being automatically redirected to the page with the scale. The scale consisted of the question, "When the ad was shown, I thought it was…", labelled from 'strongly disagree' to 'strongly agree' with scales items of distracting, disturbing, forced, interfering, intrusive, invasive and obtrusive. In line with the responsive nature of the webpage, the scale was visually adapted for both mobile and desktop versions. Following competition of the scale, the test ended and users were redirected to the results of their test (high intensity task) or a thank you page (low intensity task).

9.5.7. Data Collection

The data for the pilot study was collected through the website. Using the gravity forms plugin for Wordpress, the questionnaire was developed for the psychometric test and the responses of the test were logged in a central database. The Ad Rotate Pro plugin was used to create each of the different advertising exposure conditions and using a custom field php function the exposure condition was matched to the participants responses. The task type and device type were also logged to the data layer and these were combined in the master dataset. The full dataset of participant responses, task type, device type and ad exposure condition as well as demographic data and consent status were available for download as a csv file from the backend of the platform.

9.5.8. Pilot Study Results

The pilot study data was analysed using the SPSS and the AMOS programs. Data was retrieved from the experimental website and re-coded as per recommended statistical standards, see appendix VI for detail. The likert-scale items were combined into a single variable using a confirmatory factor analysis in the AMOS program. Following this, all the variables were standardised using the SPSS program under the descriptics tab.

A linear regression analysis, using bootstrapping, was performed to look at direct effects of the independent variables on the dependent variable, perceived intrusiveness.

The results observed were as follows:

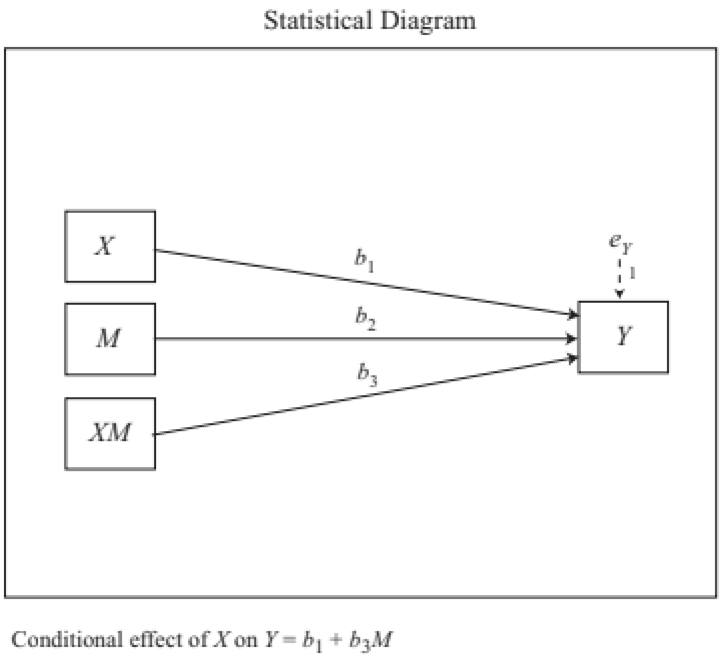
- PI<---OBS, Beta= 0.599, 95% CI [0.422, 0.771], *** (p<0.001), Supported
- PI<---CTRL, Beta= 0.269, 95% CI [0.139, 0.399], ** (p=0.001), Supported
- PI<---DT, Beta= 0.194, 95% CI [-0.009, 0.408], (p>0.05), Not Supported
- PI<---CI, Beta= -0.134, 95% CI [-0.333, 0.065], (p>0.05), Not Supported
- PI<---RPT, Beta= 0.245, 95% CI [0.087, 0.403], ** (p<0.01), Supported

(PI, perceived intrusiveness; OBS, obscuring ad; CTRL, ad controllability; DT. device type; CI, cognitive intensity; RPT, repeated exposure). Standardised regression weights reported.nm.

-It is important to note that given the small sample size and high number of factors, there is the potential of confounding variables, whereby there is a risk of increasing variance or introducing bias. Hence, the outputs from the regression analysis must be caveated with these observations and are not intended to give definitive claims regarding the relationships between the variables. Moreso, the pilot study was intended to be used as a methodological quality assurance procedure to test the platform and to look for potential errors or challenges in larger scale data collection and experimental execution..

Following the regression analysis, interaction effects were probed using model 1 of Hayes Process Macro. The statistical diagram is shown in figure 16.

Figure 27. Hayes Process Macro for SPSS Model 1



The first interaction effect to probe was the moderating effect of device type on the relationship between the independent variable obscuring ad type on the latent construct perceived intrusiveness. As per figure 16 above, the Y variable was perceived intrusiveness, the X variable was obscuring ad format, the M variable was device type and the interaction XM was obscuring ad format x device type. The following results of the test using Hayes Macro model 1 was found, showing a non-significant interaction effect.

- PI<---OBS←DT, Beta= -0.400, 95% CI [-1.228, 0.426], (p>0.05), Not Supported

The second interaction effect to probe was the moderating effect of cognitive intensity on the relationship between the independent variable obscuring ad type on the latent construct perceived intrusiveness. As per figure 16 above, the Y variable was perceived intrusiveness, the X variable was obscuring ad format, the M variable was cognitive intensity and the interaction XM was obscuring ad format x cognitive intensity. The following results of the test using Hayes Macro model 1 was found, showing a non-significant interaction effect.

- PI<---OBS←CI, Beta= 0.098, 95% CI [-0.662, 0.858], (p>0.05), Not Supported

The third interaction effect to probe was the moderating effect of device type on the relationship between the independent variable controllable ad type on the latent construct perceived intrusiveness. As per figure 16 above, the Y variable was perceived intrusiveness, the X variable was controllable ad format, the M variable was device type and the interaction XM was controllable ad format x device type. The following results of the test using Hayes Macro model 1 was found, showing a non-significant interaction effect.

- PI<---CTRL←DT, Beta= -0.138, 95% CI [0.812, -1.289], (p>0.05), Not Supported

The final interaction effect to probe was the moderating effect of cognitive intensity on the relationship between the independent variable controllable ad type on the latent construct perceived intrusiveness. As per figure 16 above, the Y variable was perceived intrusiveness, the X variable was controllable ad format, the M variable was cognitive intensity and the interaction XM was controllable ad format x cognitive intensity. The following results of the test using Hayes Macro model 1 was found, showing a non-significant interaction effect.

- PI<---CTRL←CI, Beta= 0.013, 95% CI [-0.957, 0.985], (p>0.05), Not Supported

9.6. Appendix VI - Supplemental Data Analysis

9.6.1. Confirmatory Factor Analysis

Table 26. Goodness of Fit Indices of Cursory Confirmatory Factor Analysis

Fit Index Type	Observed Value	Acceptable Value	Fit Level
χ2	742.020; p<0.05 (df=293)	p> 0.05	-
χ2/df	2.532	≤ 5	Good Fit
RMSEA	0.045	≤ 0.08	Good Fit
NFI	0.952	≥ 0.95	Good Fit
CFI	0.970	≥ 0.95	Good Fit
IFI	0.970	≥ 0.95	Good Fit
RFI	0.943	≥ 0.95	Good Fit
(S)RMR	0.0455	≤ 0.05	Good Fit
GFI	0.930	≥ 0.90	Good Fit
PCLOSE	0.985	p> 0.05	Good Fit

df: degrees of freedom; χ2: Chi-square; RMSEA: Root Mean Square Error of Approximation; NFI: Normed Fit Index; NNFI: Non-Normed Fit Index; CFI: Comparative Fit Index; IFI: Incremental Fit Index; RFI: Relative Fit Index; (S)RMR: (Standardized) Root Mean Square Residual; GFI: Goodness of Fit Index.

9.6.2. Moderation Effects Testing

Research Question 4a: Does mobile phone attachment moderate the effect of perceived intrusiveness on consumer attitudes to the meaningfulness of an ad

Hypothesis 4a1: The level of useful (productive) attachment a user has towards their mobile device dampens the negative relationship between perceived intrusiveness and consumer attitudes to the meaningfulness of an ad

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction MPUxPI → AAD, Beta = 0.031, (p>0.05)
- Not Supported

Figure 28. Path Diagram: Interaction of MPU on PI and AAD

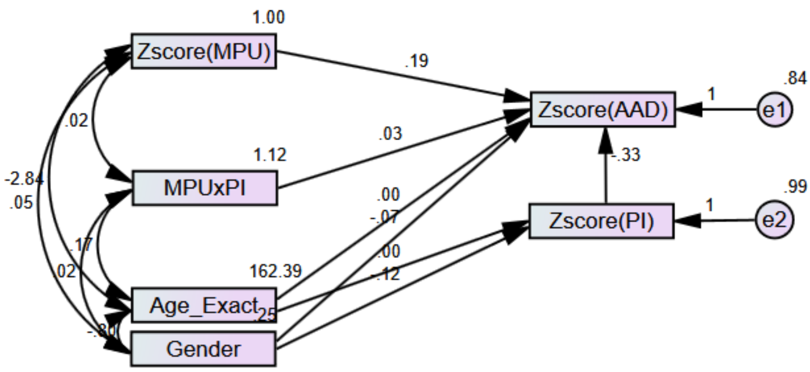


Figure 29. Regression Weights: Interaction of MPU on PI and AAD

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZPI	<---	Age_Exact	-.002	.003	-.840	.401
ZPI	<---	Gender	-.120	.073	-1.653	.098
ZAAD	<---	ZMPU	.189	.034	5.544	***
ZAAD	<---	MPUxPI	.031	.031	1.004	.316
ZAAD	<---	Age_Exact	.000	.003	.006	.995
ZAAD	<---	ZPI	-.334	.033	-10.047	***
ZAAD	<---	Gender	-.070	.067	-1.043	.297

Hypothesis 4a2: The level of anxious (unproductive) attachment a user has towards their mobile device strengthens the negative relationship between perceived intrusiveness and consumer attitudes to the meaningfulness of an ad

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction MPAxPI → AAD, Beta = -0.058, (p>0.05)
- Not Supported

Figure 30. Path Diagram: Interaction of MPA on PI and AAD

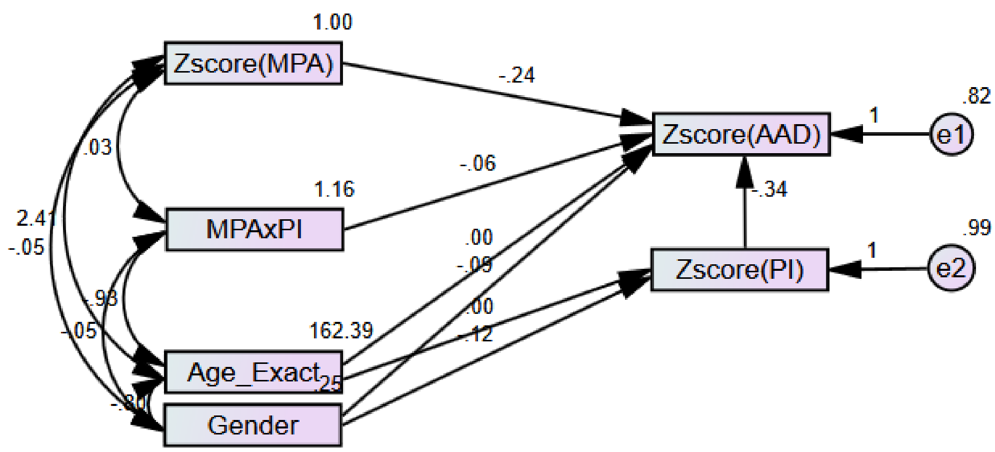


Figure 31. Regression Weights: Interaction of MPA on PI and AAD

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZPI	<---	Age_Exact	-.002	.003	-.840	.401
ZPI	<---	Gender	-.120	.073	-1.653	.098
ZAAD	<---	ZMPA	-.238	.033	-7.119	***
ZAAD	<---	MPAxPI	-.058	.031	-1.889	.059
ZAAD	<---	Age_Exact	.000	.003	-.075	.940
ZAAD	<---	ZPI	-.344	.033	-10.497	***
ZAAD	<---	Gender	-.093	.066	-1.398	.162

Hypothesis 4a3: The level of addictive (unproductive) attachment a user has towards their mobile device strengthens the negative relationship between perceived intrusiveness and consumer attitudes to the meaningfulness of an ad

- **Result:** Reject the null hypothesis. MPD Dampens The Negative Relationship Between PI And AAD.
- **Evidence:** Interaction MPDxPI → AAD, Beta = 0.067, (p>0.05)
- Not Supported

Figure 32. Path Diagram: Interaction of MPD on PI and AAD

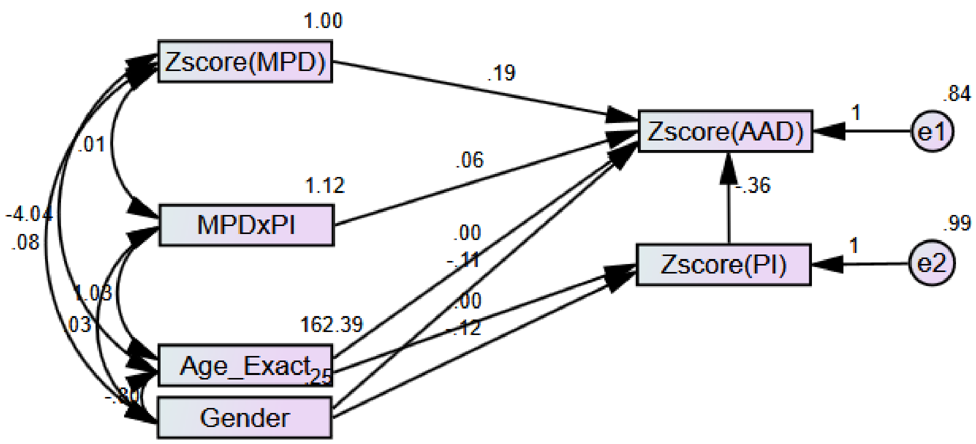


Figure 33. Regression Weights: Interaction of MPD on PI and AAD

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZPI	<---	Age_Exact	-.002	.003	-.840	.401
ZPI	<---	Gender	-.120	.073	-1.653	.098
ZAAD	<---	ZMPD	.194	.035	5.495	***
ZAAD	<---	MPDxPI	.063	.031	2.021	.043
ZAAD	<---	Age_Exact	.001	.003	.336	.737
ZAAD	<---	ZPI	-.359	.033	-10.826	***
ZAAD	<---	Gender	-.107	.068	-1.585	.113

Research Question 4b: Does mobile phone attachment moderate the relationship between forced exposure and attitude towards the ad

Hypothesis 4b1: The level of useful (productive) attachment a user has towards their mobile device dampens the negative relationship between forced exposure and consumer attitudes to the meaningfulness of an ad

- **Result:** Reject the null hypothesis. MPU dampens the negative relationship between Forced Exposure (BT) and AAD.
- **Evidence:** Interaction MPUxBT → AAD, Beta = 0.075, * ($p<0.05$)
- Supported

Figure 34. Path Diagram: Interaction of MPU on BT and AAD

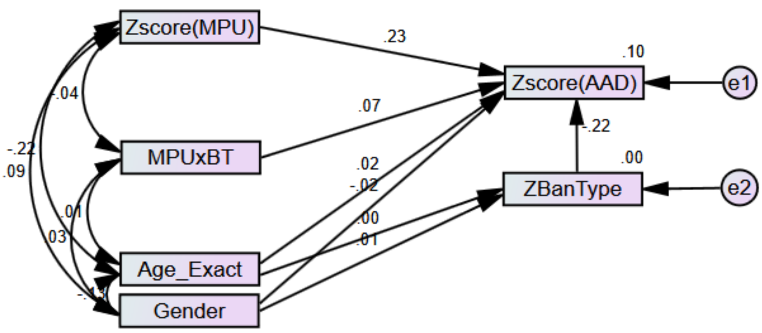


Figure 35. Regression Weights: Interaction of MPU on BT and AAD

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZBanType	<---	Age_Exact	.000	.003	.039	.969
ZBanType	<---	Gender	.029	.073	.403	.687
ZAAD	<---	ZMPU	.234	.035	6.644	***
ZAAD	<---	MPUxBT	.075	.034	2.175	.030
ZAAD	<---	Age_Exact	.002	.003	.565	.572
ZAAD	<---	ZBanType	-.217	.034	-6.341	***
ZAAD	<---	Gender	-.031	.069	-.453	.651

Hypothesis 4b2: The level of anxious (unproductive) attachment a user has towards their mobile device strengthens the negative relationship between forced exposure and consumer attitudes to the meaningfulness of an ad

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction MPAxBT → AAD, Beta = 0.001, (p>0.05)
- Not Supported

Figure 36. Path Diagram: Interaction of MPA on BT and AAD

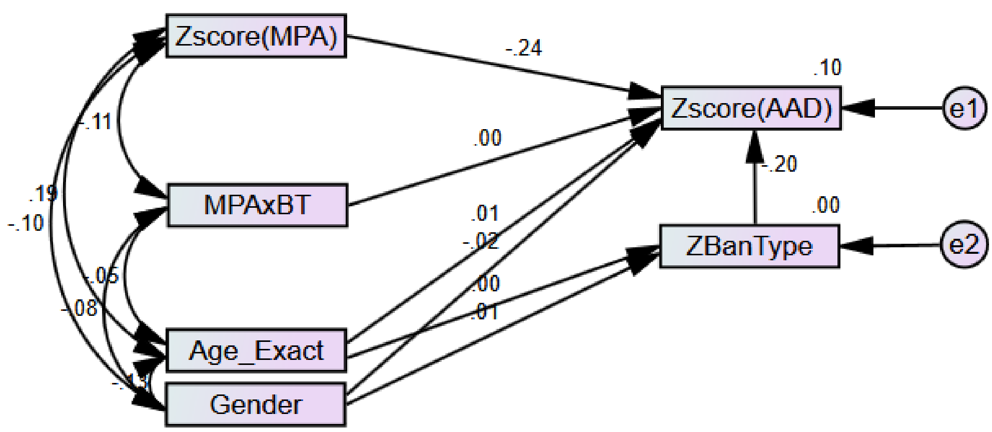


Figure 37. Regression Weights: Interaction of MPA on BT and AAD

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZBanType	<---	Age_Exact	.000	.003	.039	.969
ZBanType	<---	Gender	.029	.073	.403	.687
ZAAD	<---	ZMPA	-.239	.035	-6.784	***
ZAAD	<---	MPAxBT	-.001	.035	-.018	.986
ZAAD	<---	Age_Exact	.001	.003	.381	.703
ZAAD	<---	ZBanType	-.198	.034	-5.763	***
ZAAD	<---	Gender	-.034	.070	-.491	.623

Hypothesis 4b3: The level of addictive (unproductive) attachment a user has towards their mobile device strengthens the negative relationship between forced exposure and consumer attitudes to the meaningfulness of an ad

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction MPDxBT → AAD, Beta = -0.016, (p>0.05)
- Not Supported

Figure 38. Path Diagram: Interaction of MPD on BT and AAD

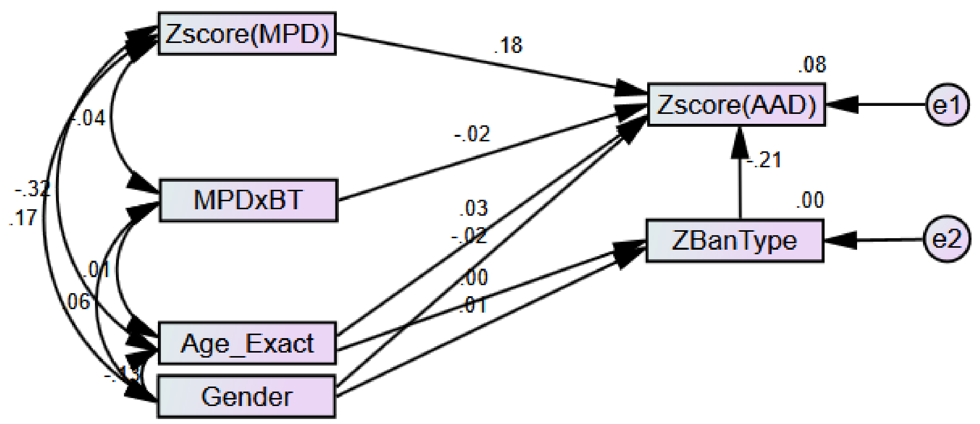


Figure 39. Regression Weights: Interaction of MPD on BT and AAD

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZBanType	<---	Age_Exact	.000	.003	.039	.969
ZBanType	<---	Gender	.029	.073	.403	.687
ZAAD	<---	ZMPD	.183	.037	4.953	***
ZAAD	<---	MPDxBT	-.016	.035	-.470	.638
ZAAD	<---	Age_Exact	.002	.003	.709	.479
ZAAD	<---	ZBanType	-.211	.035	-6.085	***
ZAAD	<---	Gender	-.043	.071	-.607	.544

Research Question 4c: Does mobile phone attachment moderate the relationship between forced exposure and perceived intrusiveness

Hypothesis 4c1: The level of useful (productive) attachment a user has towards their mobile device dampens the positive relationship between forced exposure and perceived intrusiveness

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction PI <— MPUxBT, Beta = -0.046, p>0.05
- Not Supported

Figure 40. Regression Weights: Interaction of MPU on BT and PI

Figure 41. Path Diagram: Interaction of MPU on BT and PI

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZBanType	<---	Age_Exact	.000	.003	.039	.969
ZBanType	<---	Gender	.029	.073	.403	.687
ZPI	<---	ZMPU	-.125	.033	-3.812	***
ZPI	<---	MPUxBT	-.046	.032	-1.442	.149
ZPI	<---	Age_Exact	-.005	.003	-1.748	.080
ZPI	<---	ZBanType	.454	.032	14.256	***
ZPI	<---	Gender	-.115	.064	-1.781	.075

Hypothesis 4c2: The level of anxious (unproductive) attachment a user has towards their mobile device strengthens the positive relationship between forced exposure and perceived intrusiveness

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction PI <— MPAxBT, Beta = 0.014, p>0.05
- Not Supported

Figure 42. Path Diagram: Interaction of MPA on BT and PI

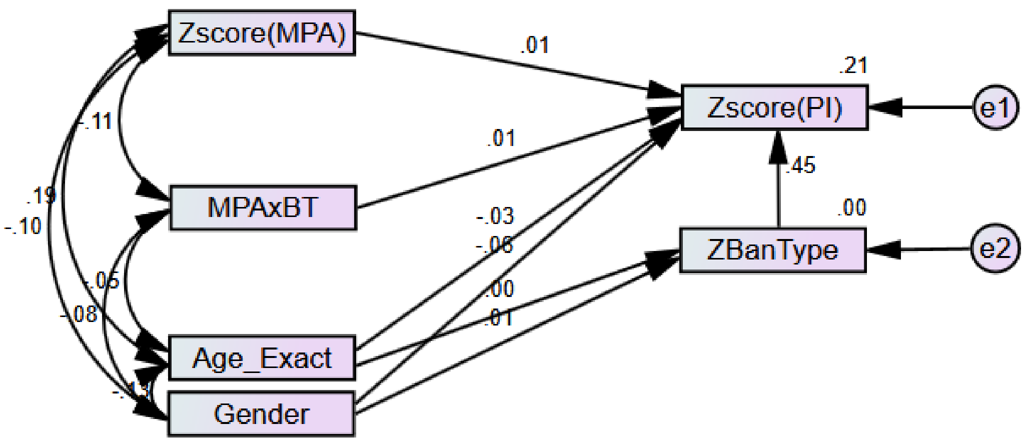


Figure 43. Regression Weights: Interaction of MPA on BT and PI

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZBanType	<---	Age_Exact	.000	.003	.039	.969
ZBanType	<---	Gender	.029	.073	.403	.687
ZPI	<---	ZMPA	.007	.033	.222	.825
ZPI	<---	MPAxBT	.014	.033	.439	.660
ZPI	<---	Age_Exact	-.002	.003	-.959	.337
ZPI	<---	ZBanType	.452	.032	14.049	***
ZPI	<---	Gender	-.130	.065	-1.988	.047

Hypothesis 4c3: The level of addictive (unproductive) attachment a user has towards their mobile device strengthens the positive relationship between forced exposure and perceived intrusiveness

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction PI <--- MPDxBT, Beta = 0.014, p>0.05
- Not Supported

Figure 44. Path Diagram: Interaction of MPD on BT and PI

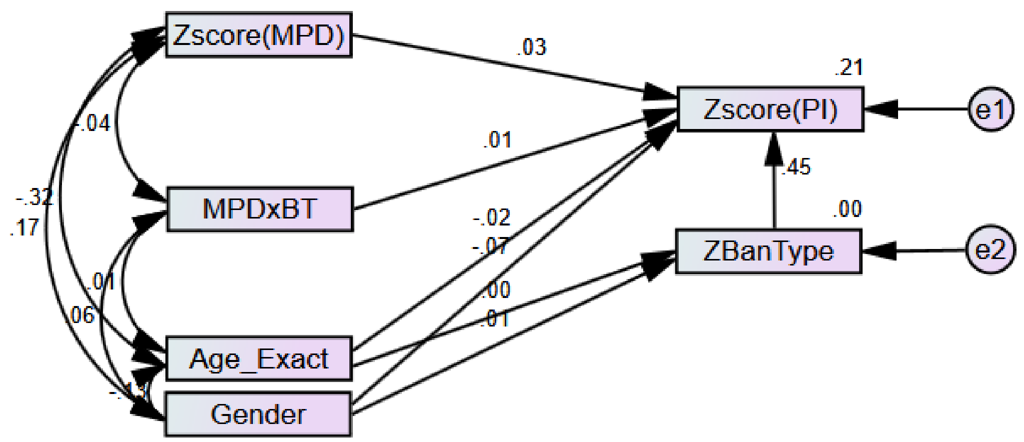


Figure 45. Regression Weights: Interaction of MPD on BT and PI

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZBanType	<---	Age_Exact	.000	.003	.039	.969
ZBanType	<---	Gender	.029	.073	.403	.687
ZPI	<---	ZMPD	.030	.034	.873	.382
ZPI	<---	MPDxBT	.014	.032	.432	.666
ZPI	<---	Age_Exact	-.002	.003	-.660	.509
ZPI	<---	ZBanType	.453	.032	14.098	***
ZPI	<---	Gender	-.143	.066	-2.182	.029

Research Question 4d: Does device type moderate the relationship between perceived intrusiveness and attitude towards the ad?

Hypothesis 4d Device type strengthens the negative relationship between perceived intrusiveness and attitude towards the ad

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction AAD <--- DTxPI, Beta = -0.066, p>0.05
- Not Supported

Figure 46. Path Diagram: Interaction of DT on PI and AAD

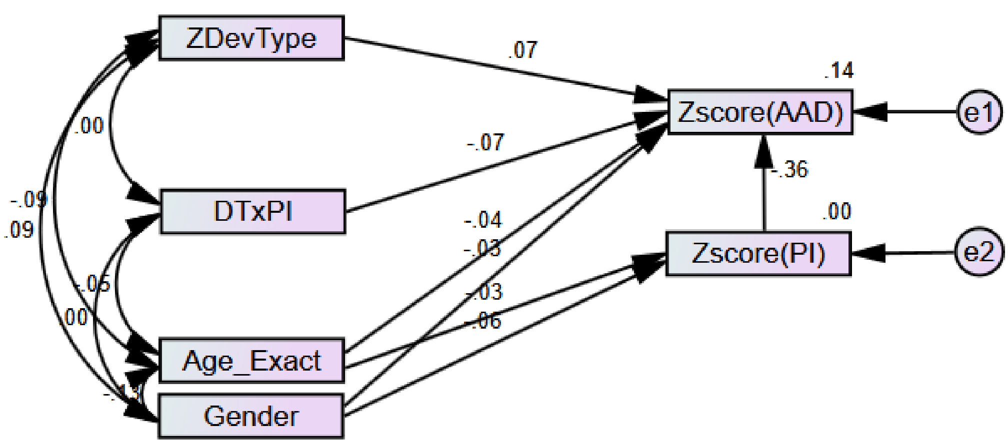


Figure 47. Regression Weights: Interaction of DT on PI and AAD

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZPI	<---	Age_Exact	-.002	.003	-.840	.401
ZPI	<---	Gender	-.120	.073	-1.653	.098
ZAAD	<---	ZDevType	.075	.034	2.211	.027
ZAAD	<---	DTxPI	-.066	.034	-1.949	.051
ZAAD	<---	Age_Exact	-.003	.003	-1.118	.264
ZAAD	<---	ZPI	-.361	.034	-10.724	***
ZAAD	<---	Gender	-.058	.068	-.853	.394

Research Question 4e: Does device type moderate the relationship between forced exposure and perceived intrusiveness?

Hypothesis 4e: Device type strengthens the positive relationship between forced exposure and perceived intrusiveness

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction PI <--- DTxBT, Beta = -0.035, p>0.05
- Not Supported

Figure 48. Path Diagram: Interaction of DT on BT and PI

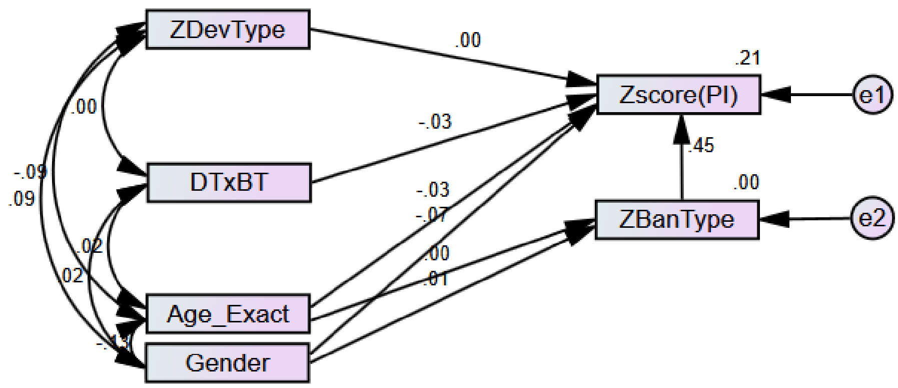


Figure 49. Regression Weight: Interaction of DT on BT and PI

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZBanType	<---	Age_Exact	.000	.003	.039	.969
ZBanType	<---	Gender	.029	.073	.403	.687
ZPI	<---	ZDevType	-.002	.032	-.067	.947
ZPI	<---	DTxBT	-.035	.032	-1.084	.279
ZPI	<---	Age_Exact	-.002	.003	-.940	.347
ZPI	<---	ZBanType	.453	.032	14.093	***
ZPI	<---	Gender	-.132	.065	-2.028	.043

Research Question 4f: Does device type moderate the relationship between forced exposure and attitude towards the ad?

Hypothesis 4f: Device type strengthens the negative relationship between forced exposure and attitude towards the ad

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction AAD <--- DTxBT, Beta = -0.024, p>0.05
- Not Supported

Figure 50. Path Diagram: Interaction of DT on BT and AAD

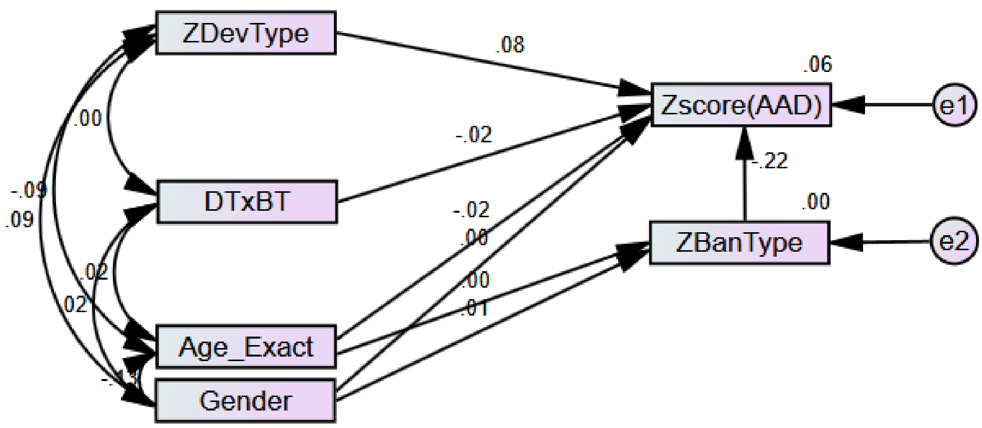


Figure 51. Regression Weights: Interaction of MPD on PI and AAD

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZBanType	<---	Age_Exact	.000	.003	.039	.969
ZBanType	<---	Gender	.029	.073	.403	.687
ZAAD	<---	ZDevType	.079	.035	2.218	.027
ZAAD	<---	DTxBT	-.024	.035	-.670	.503
ZAAD	<---	Age_Exact	-.002	.003	-.640	.522
ZAAD	<---	ZBanType	-.218	.035	-6.209	***
ZAAD	<---	Gender	-.008	.071	-.106	.915

Research Question 4g: Does task intensity moderate the relationship between perceived intrusiveness and attitude towards the ad?

Hypothesis 4g: Task intensity strengthens the negative relationship between perceived intrusiveness and attitude towards the ad

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction AAD <--- CIxPI, Beta = -0.012, p>0.05
- Not Supported

Figure 52. Path Diagram: Interaction of CI on PI and AAD

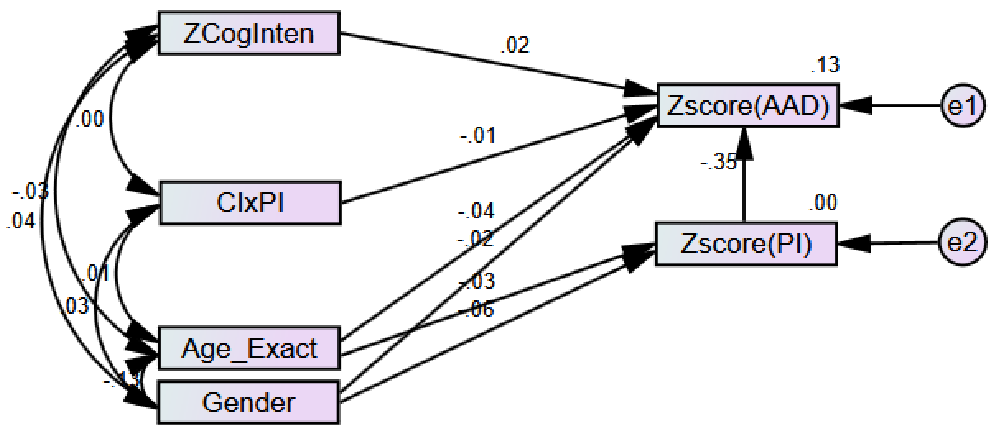


Figure 53. Regression Weights: Interaction of CI on PI and AAD

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZPI	<---	Age_Exact	-.002	.003	-.840	.401
ZPI	<---	Gender	-.120	.073	-1.653	.098
ZAAD	<---	ZCogInten	.017	.034	.496	.620
ZAAD	<---	CIxPI	-.012	.034	-.350	.726
ZAAD	<---	Age_Exact	-.003	.003	-1.170	.242
ZAAD	<---	Gender	-.046	.068	-.669	.503
ZAAD	<---	ZPI	-.353	.034	-10.426	***

Research Question 4h: Does task intensity moderate the relationship between forced exposure and attitude towards the ad?

Hypothesis 4h: Task intensity strengthens the negative relationship between forced exposure and attitude towards the ad

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction AAD <--- ClxBT, Beta = -0.041, p>0.05
- Not Supported

Figure 54. Path Diagram: Interaction of CI on BT and AAD

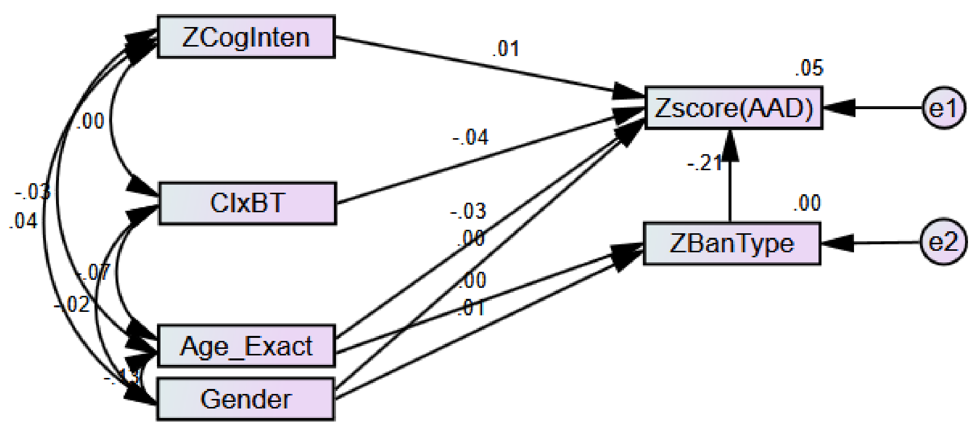


Figure 55. Regression Weights: Interaction of MPD on PI and AAD

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZBanType	<---	Age_Exact	.000	.003	.039	.969
ZBanType	<---	Gender	.029	.073	.403	.687
ZAAD	<---	ZCogInten	.007	.035	.196	.844
ZAAD	<---	ClxBT	-.041	.035	-1.161	.246
ZAAD	<---	Age_Exact	-.003	.003	-.907	.365
ZAAD	<---	Gender	.000	.071	.007	.995
ZAAD	<---	ZBanType	-.215	.035	-6.094	***

Research Question 4i: Does task intensity moderate the relationship between forced exposure and perceived intrusiveness?

Hypothesis 4i: Task intensity strengthens the positive relationship between forced exposure and perceived intrusiveness

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Interaction PI <--- CIxBT, Beta = 0.014, p>0.05
- Not Supported

Figure 56. Path Diagram: Interaction of CI on BT and PI

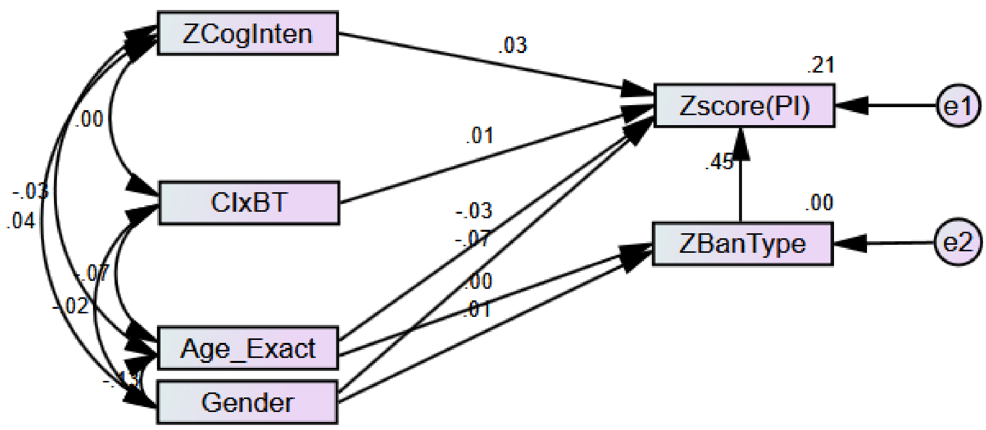


Figure 57. Regression Weights: Interaction of CI on BT and PI

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
ZBanType	<---	Age_Exact	.000	.003	.039	.969
ZBanType	<---	Gender	.029	.073	.403	.687
ZPI	<---	ZCogInten	.029	.032	.899	.369
ZPI	<---	CIxBT	.014	.032	.447	.655
ZPI	<---	Age_Exact	-.002	.003	-.906	.365
ZPI	<---	Gender	-.135	.065	-2.075	.038
ZPI	<---	ZBanType	.452	.032	14.072	***

9.6.3. Multigroup Effects

Multigroup analysis was performed in IBM AMOS using the multigroup analysis function to assess whether the model as a whole or specific paths within the model are invariant between groups. Two groups were tested in the analysis; (a) device type, consisting of mobile users and desktop users and (b) cognitive task load, consisting of high and low cognitive load tasks.

Effect of Device Type on Overall Model

The independent variable device type falls into two groups; users undertaking the field experiment on a mobile device and users undertaking the field experiment on a desktop device.

Research Question 5a: Are differences at the model level observed between mobile and desktop device type

Hypothesis 5a: There will be a difference observed at the model level between mobile and desktop groups.

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Model Comparison Chi-square Difference Test of Device Type Groups, CMIN=30.957, p>0.05
- Not Supported

Figure 58. Model Comparison χ2 Test of Device Type Groups

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	21	30.957	.074	.023	.023	-.007	-.008

Figure 59. Path Diagrams for Desktop and Mobile Groups

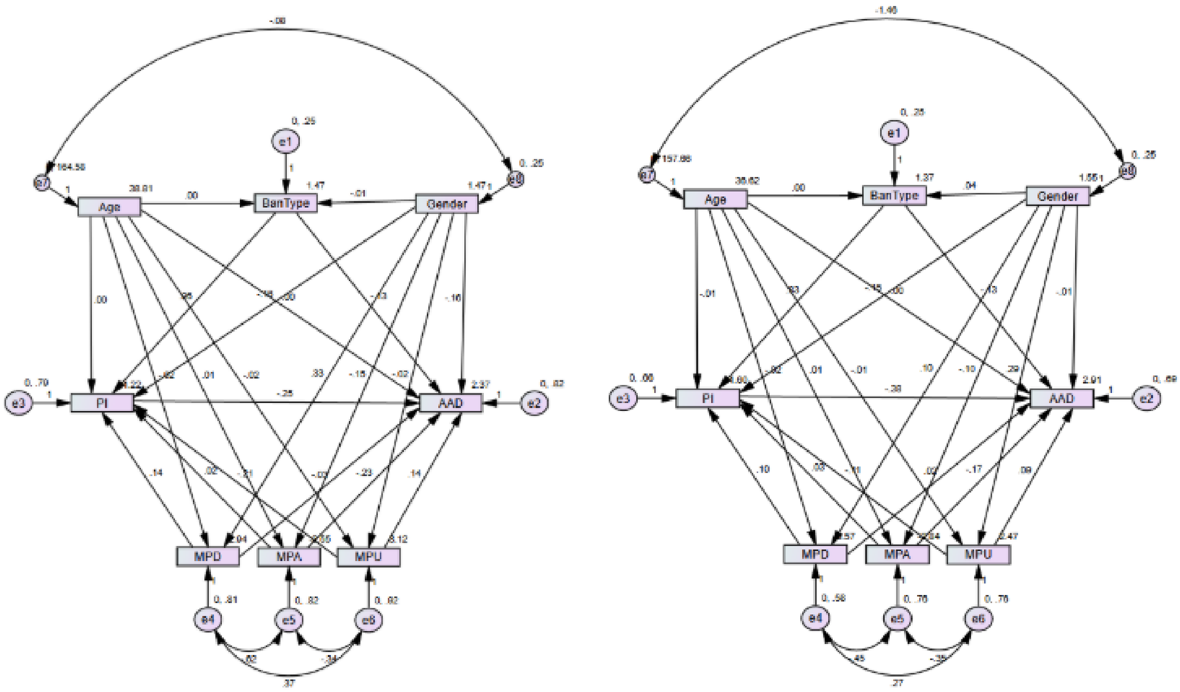


Figure 60. Regression Weights with Bootstrap Confidence Intervals

Regression Weights: (Desktop - Unconstrained)

Parameter			Estimate	Lower	Upper	P
BanType	<---	Age_Exact	-.001	-.005	.003	.757
MPD	<---	Age_Exact	-.020	-.027	-.013	.001
MPA	<---	Age_Exact	.011	.005	.018	.001
MPU	<---	Age_Exact	-.018	-.025	-.011	.001
BanType	<---	Gender	-.007	-.107	.093	.886
MPU	<---	Gender	-.016	-.210	.175	.876
MPA	<---	Gender	-.153	-.350	.014	.077
MPD	<---	Gender	.326	.145	.504	.001
PI	<---	BanType	.962	.772	1.135	.001
PI	<---	MPD	.145	-.020	.317	.098
PI	<---	MPA	.023	-.147	.177	.778
PI	<---	MPU	-.206	-.312	-.100	.001
PI	<---	Age_Exact	.001	-.006	.008	.737
PI	<---	Gender	-.160	-.345	.014	.077
AAD	<---	BanType	-.133	-.344	.085	.230
AAD	<---	PI	-.245	-.355	-.136	.001
AAD	<---	MPD	-.030	-.203	.151	.758
AAD	<---	MPA	-.230	-.398	-.050	.010
AAD	<---	MPU	.145	.041	.254	.006
AAD	<---	Age_Exact	.004	-.003	.012	.232
AAD	<---	Gender	-.162	-.366	.043	.112

Regression Weights: (Mobile - Unconstrained)

Parameter			Estimate	Lower	Upper	P
BanType	<---	Age_Exact	.001	-.003	.006	.534
MPD	<---	Age_Exact	-.022	-.029	-.015	.001
MPA	<---	Age_Exact	.014	.006	.021	.001
MPU	<---	Age_Exact	-.013	-.019	-.005	.001
BanType	<---	Gender	.036	-.070	.135	.541
MPU	<---	Gender	.285	.091	.462	.002
MPA	<---	Gender	-.102	-.304	.077	.276
MPD	<---	Gender	.099	-.061	.275	.246
PI	<---	BanType	.825	.663	1.000	.001
PI	<---	MPD	.101	-.055	.253	.229
PI	<---	MPA	.030	-.126	.177	.710
PI	<---	MPU	-.106	-.228	.015	.089
PI	<---	Age_Exact	-.007	-.015	.000	.049
PI	<---	Gender	-.153	-.327	.027	.091
AAD	<---	BanType	-.132	-.313	.055	.173
AAD	<---	PI	-.377	-.500	-.256	.001
AAD	<---	MPD	.024	-.147	.189	.819
AAD	<---	MPA	-.165	-.310	-.023	.027
AAD	<---	MPU	.093	-.025	.218	.132
AAD	<---	Age_Exact	-.001	-.009	.007	.810
AAD	<---	Gender	-.013	-.187	.172	.905

Effect of Cognitive Intensity on Overall Model

The independent variable cognitive intensity falls into two groups; users undertaking the field experiment in a high cognitive intensity online environment and users undertaking the field experiment in a low cognitive intensity online environment.

Research Question 5b: Are differences at the model level observed between high-cognitive intensity and low cognitive intensity groups.

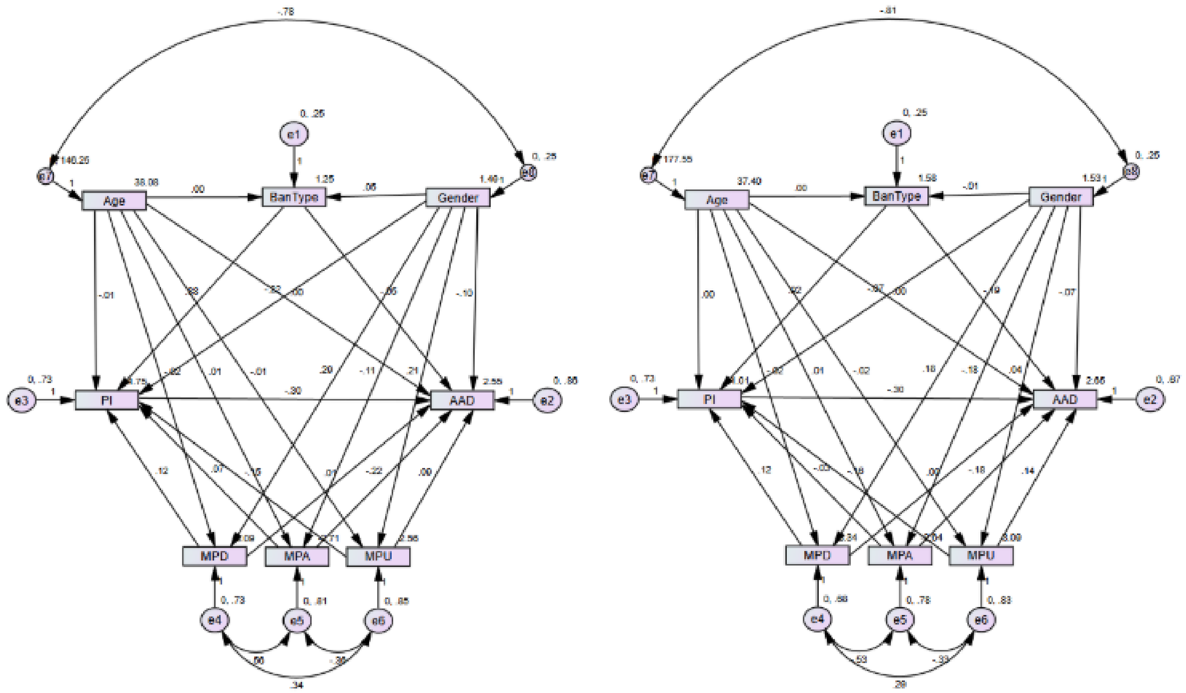
Hypothesis 5b: There will be a difference observed at the model level high-cognitive intensity and low cognitive intensity groups.

- **Result:** Fail to reject the null hypothesis
- **Evidence:** Model Comparison Chi-square Difference Test of Device Type Groups, CMIN=19.734, p>0.05
- Not Supported

Figure 61. Model Comparison χ2 Test of Cognitive Intensity Groups

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	21	19.734	.538	.015	.015	-.021	-.022

Figure 62. Path Diagrams for Low and High Cognitive Intensity Groups



Regression Weights: (Low CI - Unconstrained)

Parameter			Estimate	Lower	Upper	P
BanType	<---	Age_Exact	.003	-.001	.008	.101
MPD	<---	Age_Exact	-.021	-.027	-.014	.001
MPA	<---	Age_Exact	.012	.005	.020	.001
MPU	<---	Age_Exact	-.011	-.019	-.003	.008
BanType	<---	Gender	.046	-.055	.153	.344
MPU	<---	Gender	.210	.014	.391	.035
MPA	<---	Gender	-.106	-.294	.076	.232
MPD	<---	Gender	.289	.118	.462	.001
PI	<---	BanType	.877	.692	1.047	.001
PI	<---	MPD	.116	-.043	.280	.152
PI	<---	MPA	.065	-.096	.218	.437
PI	<---	MPU	-.154	-.274	-.047	.004
PI	<---	Age_Exact	-.007	-.015	.001	.073
PI	<---	Gender	-.215	-.386	-.041	.016
AAD	<---	BanType	-.045	-.259	.167	.716
AAD	<---	PI	-.302	-.434	-.169	.001
AAD	<---	MPD	.012	-.174	.172	.926
AAD	<---	MPA	-.221	-.389	-.060	.008
AAD	<---	MPU	.091	-.037	.206	.148
AAD	<---	Age_Exact	.000	-.008	.008	.955
AAD	<---	Gender	-.098	-.282	.111	.336

Regression Weights: (High CI - Unconstrained)

Parameter			Estimate	Lower	Upper	P
BanType	<---	Age_Exact	-.003	-.006	.001	.184
MPD	<---	Age_Exact	-.021	-.028	-.015	.001
MPA	<---	Age_Exact	.013	.006	.019	.001
MPU	<---	Age_Exact	-.020	-.026	-.013	.001
BanType	<---	Gender	-.015	-.106	.085	.850
MPU	<---	Gender	.041	-.141	.228	.641
MPA	<---	Gender	-.175	-.349	.014	.071
MPD	<---	Gender	.182	.019	.353	.029
PI	<---	BanType	.919	.738	1.080	.001
PI	<---	MPD	.120	-.055	.288	.169
PI	<---	MPA	-.027	-.192	.111	.653
PI	<---	MPU	-.162	-.285	-.053	.004
PI	<---	Age_Exact	.001	-.006	.008	.842
PI	<---	Gender	-.069	-.247	.093	.394
AAD	<---	BanType	-.192	-.392	.003	.054
AAD	<---	PI	-.303	-.419	-.193	.001
AAD	<---	MPD	-.004	-.161	.153	.959
AAD	<---	MPA	-.182	-.311	-.039	.013
AAD	<---	MPU	.140	.041	.243	.006
AAD	<---	Age_Exact	.003	-.004	.010	.457
AAD	<---	Gender	-.065	-.231	.106	.437

9.6.4. Software

IBM SPSS Statistics

Version 21

Release 21.0.0.0

64-Bit edition

IBM SPSS Amos

Version 21

Build 1178

64-Bit edition

Wordpress Content Management System

Version 5.5 “Eckstine”

9.6.5. Field Experiment Data Analysis

Final Data Set Statistics

Statistics							
		Response ID	BanType	DevType	CogInten	Gender	Age_Exact
N	Valid	846	846	846	846	846	846
	Missing	0	0	0	0	0	0

Statistics								
		piDistr	piDistb	piForcd	piIntef	piIntru	piInvas	piObtru
N	Valid	846	846	846	846	846	846	846
	Missing	0	0	0	0	0	0	0

Statistics								
		aadMean	aadApp	aadUse	aadVal	mpasU1	mpasU2	mpasU3
N	Valid	846	846	846	846	846	846	846
	Missing	0	0	0	0	0	0	0

Statistics								
		mpasU4	mpasU5	mpasU6	mpasU7	mpasU8	mpasA1	mpasA2
N	Valid	846	846	846	846	846	846	846
	Missing	0	0	0	0	0	0	0

Statistics								
		mpasA3	mpasA4	mpasA5	mpasA6	mpasA7	mpasA8	mpasD1
N	Valid	846	846	846	846	846	846	846
	Missing	0	0	0	0	0	0	0

Statistics								
		mpasD2	mpasD3	mpasD4	mpasD5	mpasD6	mpasT1	mpasT2
N	Valid	846	846	846	846	846	846	846
	Missing	0	0	0	0	0	0	0

Statistics				
		mpasT3	mpasT4	mpasT5
N	Valid	846	846	846
	Missing	0	0	0

Frequency Tables

BanType					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Banner Ad	435	51.4	51.4	51.4
	Popup Ad	411	48.6	48.6	100.0
	Total	846	100.0	100.0	

DevType					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desktop Device	429	50.7	50.7	50.7
	Mobile Device	417	49.3	49.3	100.0
	Total	846	100.0	100.0	

CogInten					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low Intensity	415	49.1	49.1	49.1
	High Intensity	431	50.9	50.9	100.0
	Total	846	100.0	100.0	

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	418	49.4	49.4	49.4
	Female	428	50.6	50.6	100.0
	Total	846	100.0	100.0	

Age_Exact					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18.00	30	3.5	3.5	3.5
	19.00	22	2.6	2.6	6.1
	20.00	29	3.4	3.4	9.6
	21.00	21	2.5	2.5	12.1
	22.00	19	2.2	2.2	14.3
	23.00	17	2.0	2.0	16.3
	24.00	12	1.4	1.4	17.7
	25.00	23	2.7	2.7	20.4
	26.00	13	1.5	1.5	22.0
	27.00	25	3.0	3.0	24.9
	28.00	29	3.4	3.4	28.4
	29.00	15	1.8	1.8	30.1
	30.00	23	2.7	2.7	32.9
	31.00	19	2.2	2.2	35.1
	32.00	22	2.6	2.6	37.7
	33.00	19	2.2	2.2	40.0
	34.00	24	2.8	2.8	42.8
	35.00	20	2.4	2.4	45.2
	36.00	19	2.2	2.2	47.4
	37.00	19	2.2	2.2	49.6
	38.00	32	3.8	3.8	53.4
	39.00	20	2.4	2.4	55.8
	40.00	26	3.1	3.1	58.9

	41.00	21	2.5	2.5	61.3
	42.00	17	2.0	2.0	63.4
	43.00	22	2.6	2.6	66.0
	44.00	16	1.9	1.9	67.8
	45.00	23	2.7	2.7	70.6
	46.00	30	3.5	3.5	74.1
	47.00	16	1.9	1.9	76.0
	48.00	17	2.0	2.0	78.0
	49.00	16	1.9	1.9	79.9
	50.00	14	1.7	1.7	81.6
	51.00	8	.9	.9	82.5
	52.00	19	2.2	2.2	84.8
	53.00	12	1.4	1.4	86.2
	54.00	23	2.7	2.7	88.9
	55.00	11	1.3	1.3	90.2
	56.00	15	1.8	1.8	92.0
	57.00	6	.7	.7	92.7
	58.00	8	.9	.9	93.6
	59.00	8	.9	.9	94.6
	60.00	3	.4	.4	94.9
	61.00	4	.5	.5	95.4
	62.00	4	.5	.5	95.9
	63.00	8	.9	.9	96.8
	64.00	7	.8	.8	97.6
	65.00	2	.2	.2	97.9
	66.00	10	1.2	1.2	99.1
	67.00	1	.1	.1	99.2
	68.00	3	.4	.4	99.5
	69.00	1	.1	.1	99.6
	70.00	1	.1	.1	99.8
	76.00	1	.1	.1	99.9
	99.00	1	.1	.1	100.0
	Total	846	100.0	100.0	

piDistb

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	156	18.4	18.4	18.4
	Disagree	206	24.3	24.3	42.8
	Somewhat Disagree	86	10.2	10.2	53.0
	Neither Agree nor Disagree	253	29.9	29.9	82.9
	Somewhat Agree	60	7.1	7.1	90.0
	Agree	47	5.6	5.6	95.5
	Strongly Agree	38	4.5	4.5	100.0
	Total	846	100.0	100.0	

piForcd

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	97	11.5	11.5	11.5
	Disagree	129	15.2	15.2	26.7
	Somewhat Disagree	89	10.5	10.5	37.2
	Neither Agree nor Disagree	189	22.3	22.3	59.6
	Somewhat Agree	135	16.0	16.0	75.5
	Agree	126	14.9	14.9	90.4
	Strongly Agree	81	9.6	9.6	100.0
	Total	846	100.0	100.0	

piIntef					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	94	11.1	11.1	11.1
	Disagree	111	13.1	13.1	24.2
	Somewhat Disagree	80	9.5	9.5	33.7
	Neither Agree nor Disagree	176	20.8	20.8	54.5
	Somewhat Agree	146	17.3	17.3	71.7
	Agree	122	14.4	14.4	86.2
	Strongly Agree	117	13.8	13.8	100.0
	Total	846	100.0	100.0	

piIntru					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	86	10.2	10.2	10.2
	Disagree	124	14.7	14.7	24.8
	Somewhat Disagree	98	11.6	11.6	36.4
	Neither Agree nor Disagree	188	22.2	22.2	58.6
	Somewhat Agree	137	16.2	16.2	74.8
	Agree	107	12.6	12.6	87.5
	Strongly Agree	106	12.5	12.5	100.0
	Total	846	100.0	100.0	

piInvas					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	95	11.2	11.2	11.2
	Disagree	135	16.0	16.0	27.2
	Somewhat Disagree	102	12.1	12.1	39.2
	Neither Agree nor Disagree	219	25.9	25.9	65.1
	Somewhat Agree	113	13.4	13.4	78.5
	Agree	94	11.1	11.1	89.6
	Strongly Agree	88	10.4	10.4	100.0
	Total	846	100.0	100.0	

piObtru					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	98	11.6	11.6	11.6
	Disagree	133	15.7	15.7	27.3
	Somewhat Disagree	76	9.0	9.0	36.3
	Neither Agree nor Disagree	267	31.6	31.6	67.8
	Somewhat Agree	111	13.1	13.1	81.0
	Agree	87	10.3	10.3	91.3
	Strongly Agree	74	8.7	8.7	100.0
	Total	846	100.0	100.0	

aadMean					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	130	15.4	15.4	15.4
	Disagree	157	18.6	18.6	33.9
	Somewhat Disagree	102	12.1	12.1	46.0
	Neither Agree nor Disagree	250	29.6	29.6	75.5
	Somewhat Agree	128	15.1	15.1	90.7
	Agree	52	6.1	6.1	96.8
	Strongly Agree	27	3.2	3.2	100.0
	Total	846	100.0	100.0	

aadApp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	99	11.7	11.7	11.7
	Disagree	132	15.6	15.6	27.3
	Somewhat Disagree	88	10.4	10.4	37.7
	Neither Agree nor Disagree	276	32.6	32.6	70.3
	Somewhat Agree	143	16.9	16.9	87.2
	Agree	82	9.7	9.7	96.9
	Strongly Agree	26	3.1	3.1	100.0
	Total	846	100.0	100.0	

aadUse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	130	15.4	15.4	15.4
	Disagree	159	18.8	18.8	34.2
	Somewhat Disagree	93	11.0	11.0	45.2
	Neither Agree nor Disagree	240	28.4	28.4	73.5
	Somewhat Agree	122	14.4	14.4	87.9
	Agree	72	8.5	8.5	96.5
	Strongly Agree	30	3.5	3.5	100.0
	Total	846	100.0	100.0	

aadVal					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	151	17.8	17.8	17.8
	Disagree	167	19.7	19.7	37.6
	Somewhat Disagree	92	10.9	10.9	48.5
	Neither Agree nor Disagree	247	29.2	29.2	77.7
	Somewhat Agree	116	13.7	13.7	91.4
	Agree	46	5.4	5.4	96.8
	Strongly Agree	27	3.2	3.2	100.0
	Total	846	100.0	100.0	

mpasU1					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	168	19.9	19.9	19.9
	2	140	16.5	16.5	36.4
	3	230	27.2	27.2	63.6
	4	192	22.7	22.7	86.3
	Extremely True	116	13.7	13.7	100.0
	Total	846	100.0	100.0	

mpasU2					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	178	21.0	21.0	21.0
	2	181	21.4	21.4	42.4
	3	227	26.8	26.8	69.3
	4	179	21.2	21.2	90.4
	Extremely True	81	9.6	9.6	100.0
	Total	846	100.0	100.0	

mpasU3					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	56	6.6	6.6	6.6
	2	72	8.5	8.5	15.1
	3	180	21.3	21.3	36.4
	4	317	37.5	37.5	73.9
	Extremely True	221	26.1	26.1	100.0
	Total	846	100.0	100.0	

mpasU4					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	78	9.2	9.2	9.2
	2	116	13.7	13.7	22.9
	3	205	24.2	24.2	47.2
	4	250	29.6	29.6	76.7
	Extremely True	197	23.3	23.3	100.0
	Total	846	100.0	100.0	

mpasU5					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	147	17.4	17.4	17.4
	2	140	16.5	16.5	33.9
	3	226	26.7	26.7	60.6
	4	198	23.4	23.4	84.0
	Extremely True	135	16.0	16.0	100.0
	Total	846	100.0	100.0	

mpasU6					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	78	9.2	9.2	9.2
	2	94	11.1	11.1	20.3
	3	202	23.9	23.9	44.2
	4	255	30.1	30.1	74.3
	Extremely True	217	25.7	25.7	100.0
	Total	846	100.0	100.0	

mpasU7					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	41	4.8	4.8	4.8
	2	85	10.0	10.0	14.9
	3	185	21.9	21.9	36.8
	4	300	35.5	35.5	72.2
	Extremely True	235	27.8	27.8	100.0
	Total	846	100.0	100.0	

mpasU8					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	51	6.0	6.0	6.0
	2	72	8.5	8.5	14.5
	3	147	17.4	17.4	31.9
	4	273	32.3	32.3	64.2
	Extremely True	303	35.8	35.8	100.0
	Total	846	100.0	100.0	

mpasA1					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	165	19.5	19.5	19.5
	2	176	20.8	20.8	40.3
	3	198	23.4	23.4	63.7
	4	187	22.1	22.1	85.8
	Extremely True	120	14.2	14.2	100.0
	Total	846	100.0	100.0	

mpasA2					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	356	42.1	42.1	42.1
	2	231	27.3	27.3	69.4
	3	143	16.9	16.9	86.3
	4	82	9.7	9.7	96.0
	Extremely True	34	4.0	4.0	100.0
	Total	846	100.0	100.0	

mpasA3					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	209	24.7	24.7	24.7
	2	187	22.1	22.1	46.8
	3	180	21.3	21.3	68.1
	4	174	20.6	20.6	88.7
	Extremely True	96	11.3	11.3	100.0
	Total	846	100.0	100.0	

mpasA4					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	155	18.3	18.3	18.3
	2	159	18.8	18.8	37.1
	3	210	24.8	24.8	61.9
	4	197	23.3	23.3	85.2
	Extremely True	125	14.8	14.8	100.0
	Total	846	100.0	100.0	

mpasA5					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	250	29.6	29.6	29.6
	2	234	27.7	27.7	57.2
	3	208	24.6	24.6	81.8
	4	103	12.2	12.2	94.0
	Extremely True	51	6.0	6.0	100.0
	Total	846	100.0	100.0	

mpasA6					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	109	12.9	12.9	12.9
	2	119	14.1	14.1	27.0
	3	214	25.3	25.3	52.2
	4	236	27.9	27.9	80.1
	Extremely True	168	19.9	19.9	100.0
	Total	846	100.0	100.0	

mpasA7					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	274	32.4	32.4	32.4
	2	159	18.8	18.8	51.2
	3	211	24.9	24.9	76.1
	4	115	13.6	13.6	89.7
	Extremely True	87	10.3	10.3	100.0
	Total	846	100.0	100.0	

mpasA8					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	142	16.8	16.8	16.8
	2	138	16.3	16.3	33.1
	3	174	20.6	20.6	53.7
	4	236	27.9	27.9	81.6
	Extremely True	156	18.4	18.4	100.0
	Total	846	100.0	100.0	

mpasD1					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	168	19.9	19.9	19.9
	2	210	24.8	24.8	44.7
	3	216	25.5	25.5	70.2
	4	183	21.6	21.6	91.8
	Extremely True	69	8.2	8.2	100.0
	Total	846	100.0	100.0	

mpasD2					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	103	12.2	12.2	12.2
	2	145	17.1	17.1	29.3
	3	190	22.5	22.5	51.8
	4	287	33.9	33.9	85.7
	Extremely True	121	14.3	14.3	100.0
	Total	846	100.0	100.0	

mpasD3					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	86	10.2	10.2	10.2
	2	110	13.0	13.0	23.2
	3	165	19.5	19.5	42.7
	4	309	36.5	36.5	79.2
	Extremely True	176	20.8	20.8	100.0
	Total	846	100.0	100.0	

mpasD4					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	432	51.1	51.1	51.1
	2	154	18.2	18.2	69.3
	3	104	12.3	12.3	81.6
	4	101	11.9	11.9	93.5
	Extremely True	55	6.5	6.5	100.0
	Total	846	100.0	100.0	

mpasD5					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	463	54.7	54.7	54.7
	2	152	18.0	18.0	72.7
	3	108	12.8	12.8	85.5
	4	76	9.0	9.0	94.4
	Extremely True	47	5.6	5.6	100.0
	Total	846	100.0	100.0	

mpasD6					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	142	16.8	16.8	16.8
	2	129	15.2	15.2	32.0
	3	201	23.8	23.8	55.8
	4	214	25.3	25.3	81.1
	Extremely True	160	18.9	18.9	100.0
	Total	846	100.0	100.0	

mpasT1					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	110	13.0	13.0	13.0
	2	84	9.9	9.9	22.9
	3	103	12.2	12.2	35.1
	4	189	22.3	22.3	57.4
	Extremely True	360	42.6	42.6	100.0
	Total	846	100.0	100.0	

mpasT2					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	34	4.0	4.0	4.0
	2	57	6.7	6.7	10.8
	3	124	14.7	14.7	25.4
	4	226	26.7	26.7	52.1
	Extremely True	405	47.9	47.9	100.0
	Total	846	100.0	100.0	

mpasT3					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	80	9.5	9.5	9.5
	2	74	8.7	8.7	18.2
	3	115	13.6	13.6	31.8
	4	196	23.2	23.2	55.0
	Extremely True	381	45.0	45.0	100.0
	Total	846	100.0	100.0	

mpasT4					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	108	12.8	12.8	12.8
	2	122	14.4	14.4	27.2
	3	180	21.3	21.3	48.5
	4	219	25.9	25.9	74.3
	Extremely True	217	25.7	25.7	100.0
	Total	846	100.0	100.0	

mpasT5					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All True	85	10.0	10.0	10.0
	2	106	12.5	12.5	22.6
	3	214	25.3	25.3	47.9
	4	227	26.8	26.8	74.7
	Extremely True	214	25.3	25.3	100.0
	Total	846	100.0	100.0	

Descriptive Statistics

Descriptive Statistics								
	N	Minimum	Maximum	Mean		Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error
BanType	846	1.00	2.00	1.4858	.01719	.50009	.057	.084
DevType	846	1.00	2.00	1.4929	.01720	.50025	.028	.084
CogInten	846	1.00	2.00	1.5095	.01720	.50021	-.038	.084
Gender	846	1	2	1.51	.017	.500	-.024	.084
Age_Exact	846	18.00	99.00	38.0000	.44502	12.94376	.393	.084
piDistr	846	1	7	4.23	.063	1.834	-.197	.084
piDistb	846	1	7	3.17	.057	1.660	.455	.084
piForcd	846	1	7	3.99	.063	1.835	-.063	.084
piIntef	846	1	7	4.19	.065	1.893	-.160	.084
piIntru	846	1	7	4.08	.063	1.847	-.042	.084
piInvas	846	1	7	3.89	.062	1.810	.080	.084
piObtru	846	1	7	3.85	.060	1.753	.046	.084
aadMean	846	1	7	3.42	.055	1.611	.115	.084
aadApp	846	1	7	3.69	.055	1.588	-.088	.084
aadUse	846	1	7	3.47	.057	1.666	.117	.084
aadVal	846	1	7	3.30	.056	1.632	.192	.084
mpasU1	846	1	5	2.94	.045	1.317	-.049	.084
mpasU2	846	1	5	2.77	.043	1.264	.101	.084
mpasU3	846	1	5	3.68	.039	1.144	-.757	.084
mpasU4	846	1	5	3.44	.043	1.242	-.436	.084
mpasU5	846	1	5	3.04	.045	1.317	-.112	.084
mpasU6	846	1	5	3.52	.043	1.241	-.541	.084
mpasU7	846	1	5	3.71	.038	1.120	-.680	.084
mpasU8	846	1	5	3.83	.041	1.178	-.874	.084
mpasA1	846	1	5	2.91	.046	1.330	.036	.084
mpasA2	846	1	5	2.06	.040	1.156	.881	.084
mpasA3	846	1	5	2.72	.046	1.338	.190	.084
mpasA4	846	1	5	2.97	.045	1.321	-.045	.084
mpasA5	846	1	5	2.37	.041	1.197	.522	.084
mpasA6	846	1	5	3.28	.044	1.286	-.331	.084
mpasA7	846	1	5	2.51	.046	1.337	.398	.084
mpasA8	846	1	5	3.15	.047	1.353	-.232	.084
mpasD1	846	1	5	2.73	.042	1.231	.139	.084
mpasD2	846	1	5	3.21	.042	1.236	-.337	.084
mpasD3	846	1	5	3.45	.043	1.239	-.562	.084
mpasD4	846	1	5	2.05	.045	1.302	.949	.084
mpasD5	846	1	5	1.93	.043	1.237	1.132	.084
mpasD6	846	1	5	3.14	.046	1.347	-.209	.084
mpasT1	846	1	5	3.72	.049	1.427	-.774	.084
mpasT2	846	1	5	4.08	.038	1.119	-1.132	.084
mpasT3	846	1	5	3.86	.046	1.330	-.927	.084
mpasT4	846	1	5	3.37	.046	1.343	-.380	.084
mpasT5	846	1	5	3.45	.044	1.268	-.436	.084
Valid N (listwise)	846							

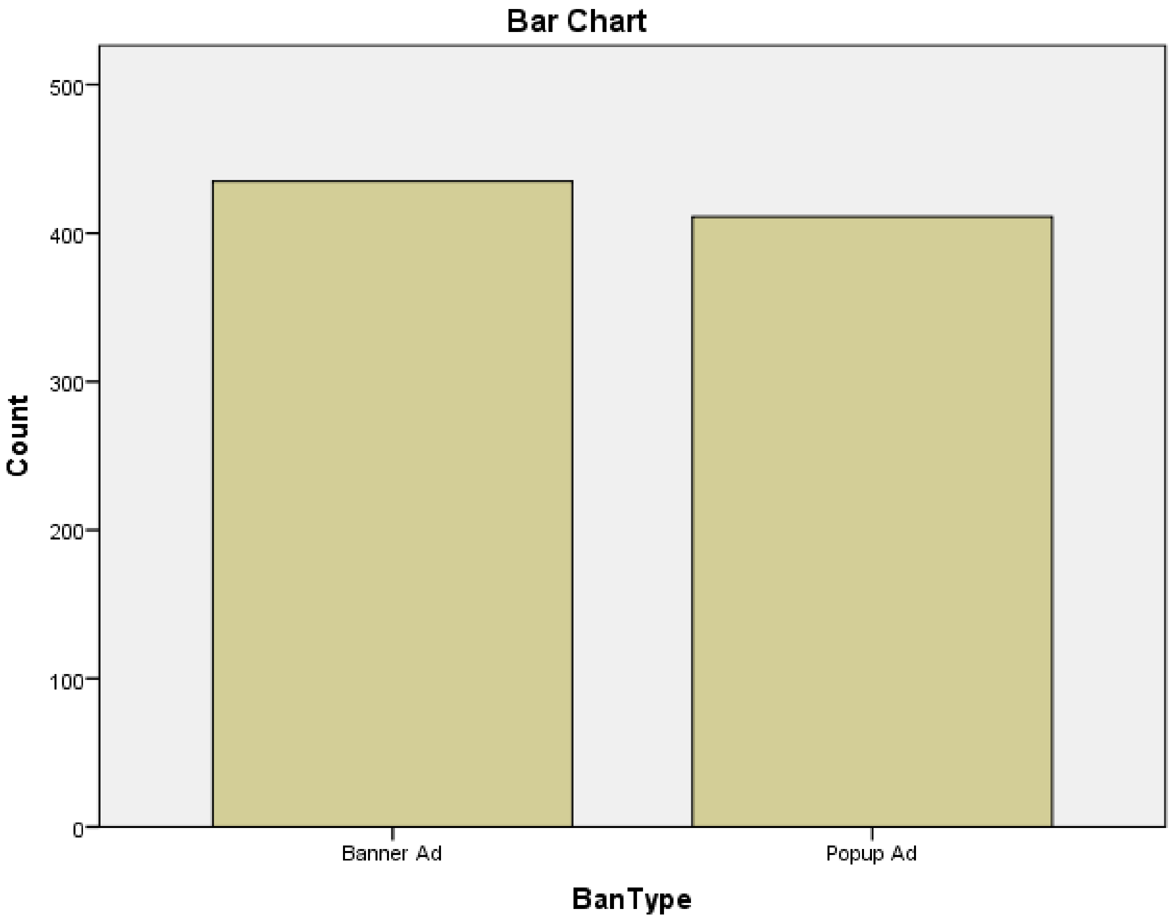
Kurtosis

Descriptive Statistics		
	Kurtosis	
	Statistic	Std. Error
BanType	-2.002	.168
DevType	-2.004	.168
CogInten	-2.003	.168
Gender	-2.004	.168
Age_Exact	-.258	.168
piDistr	-.929	.168
piDistb	-.531	.168
piForcd	-1.045	.168
piIntef	-1.052	.168
piIntru	-1.018	.168
piInvas	-.936	.168
piObtru	-.812	.168
aadMean	-.766	.168
aadApp	-.729	.168
aadUse	-.863	.168
aadVal	-.788	.168
mpasU1	-1.099	.168
mpasU2	-1.039	.168
mpasU3	-.108	.168
mpasU4	-.772	.168
mpasU5	-1.079	.168
mpasU6	-.642	.168
mpasU7	-.244	.168
mpasU8	-.086	.168
mpasA1	-1.157	.168
mpasA2	-.176	.168
mpasA3	-1.173	.168
mpasA4	-1.126	.168
mpasA5	-.645	.168
mpasA6	-.922	.168
mpasA7	-1.010	.168
mpasA8	-1.154	.168
mpasD1	-1.004	.168
mpasD2	-.904	.168
mpasD3	-.670	.168
mpasD4	-.416	.168
mpasD5	.083	.168
mpasD6	-1.117	.168
mpasT1	-.792	.168
mpasT2	.463	.168
mpasT3	-.376	.168
mpasT4	-1.026	.168
mpasT5	-.804	.168
Valid N (listwise)		

Cross Tabulations

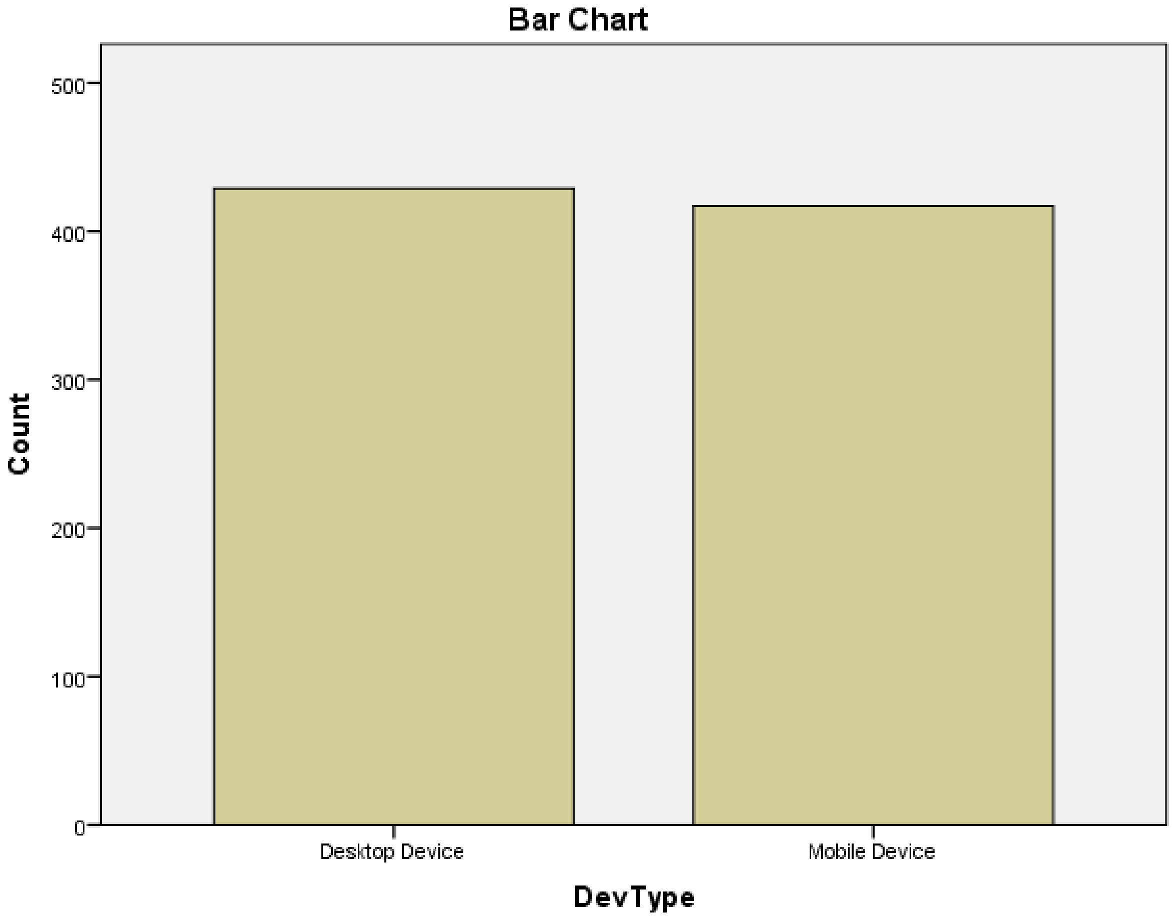
Banner Type

Crosstab			
Count			
		Finished	Total
		True	
BanType	Banner Ad	435	435
	Popup Ad	411	411
Total		846	846



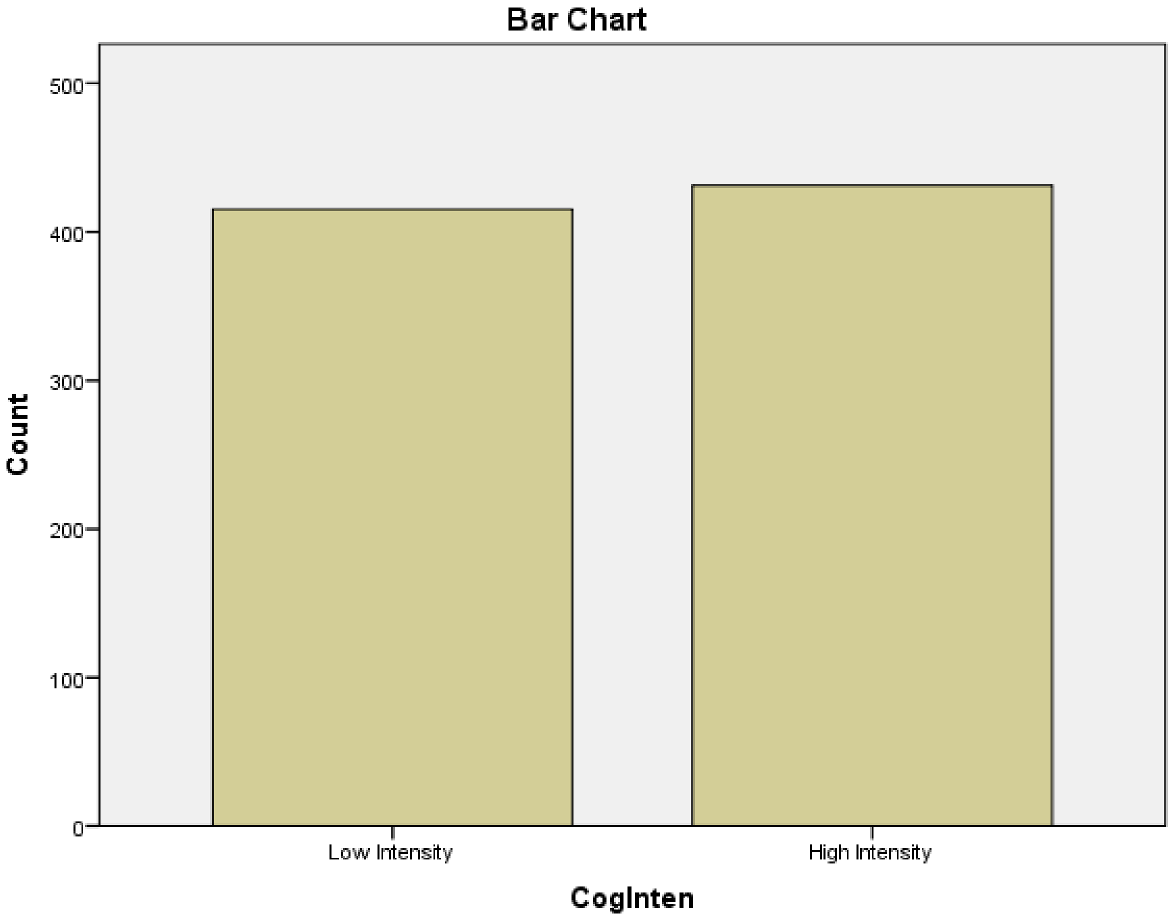
Device Type

Crosstab			
Count			
		Finished	Total
		True	
DevType	Desktop Device	429	429
	Mobile Device	417	417
Total		846	846



Cognitive Intensity

Crosstab			
Count			
		Finished	Total
		True	
CogInten	Low Intensity	415	415
	High Intensity	431	431
Total		846	846



9.6.6. Variable Descriptives

Forced Exposure

BanType				
		Value	Count	Percent
Standard Attributes	Position	2		
	Label	BanType		
	Type	Numeric		
	Format	F8.2		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	1.4858		
	Standard Deviation	.50009		
	Percentile 25	1.0000		
	Percentile 50	1.0000		
	Percentile 75	2.0000		
Labeled Values	1.00	Banner Ad	435	51.4%
	2.00	Popup Ad	411	48.6%

Device Type

DevType				
		Value	Count	Percent
Standard Attributes	Position	3		
	Label	DevType		
	Type	Numeric		
	Format	F8.2		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	1.4929		
	Standard Deviation	.50025		
	Percentile 25	1.0000		
	Percentile 50	1.0000		
	Percentile 75	2.0000		
Labeled Values	1.00	Desktop Device	429	50.7%
	2.00	Mobile Device	417	49.3%

Cognitive Intensity

CogInten				
		Value	Count	Percent
Standard Attributes	Position	4		
	Label	CogInten		
	Type	Numeric		
	Format	F8.2		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	1.5095		
	Standard Deviation	.50021		
	Percentile 25	1.0000		
	Percentile 50	2.0000		
	Percentile 75	2.0000		
Labeled Values	1.00	Low Intensity	415	49.1%
	2.00	High Intensity	431	50.9%

Gender

Gender				
		Value	Count	Percent
Standard Attributes	Position	5		
	Label	Gender		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	1.51		
	Standard Deviation	.500		
	Percentile 25	1.00		
	Percentile 50	2.00		
	Percentile 75	2.00		
Labeled Values	1	Male	418	49.4%
	2	Female	428	50.6%

Age Exact

Age_Exact		
		Value
Standard Attributes	Position	6
	Label	Age_Exact
	Type	Numeric
	Format	F40.2
	Measurement	Scale
	Role	Input
N	Valid	846
	Missing	0
Central Tendency and Dispersion	Mean	38.0000
	Standard Deviation	12.94376
	Percentile 25	28.0000
	Percentile 50	38.0000
	Percentile 75	47.0000

Perceived Intrusiveness - Distracting

piDistr				
		Value	Count	Percent
Standard Attributes	Position	7		
	Label	piDistr		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	4.23		
	Standard Deviation	1.834		
	Percentile 25	3.00		
	Percentile 50	4.00		
	Percentile 75	6.00		
Labeled Values	1	Strongly Disagree	86	10.2%
	2	Disagree	98	11.6%
	3	Somewhat Disagree	84	9.9%
	4	Neither Agree nor Disagree	188	22.2%
	5	Somewhat Agree	161	19.0%
	6	Agree	117	13.8%
	7	Strongly Agree	112	13.2%

Perceived Intrusiveness - Disturbing

piDistb				
		Value	Count	Percent
Standard Attributes	Position	8		
	Label	piDistb		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.17		
	Standard Deviation	1.660		
	Percentile 25	2.00		
	Percentile 50	3.00		
	Percentile 75	4.00		
Labeled Values	1	Strongly Disagree	156	18.4%
	2	Disagree	206	24.3%
	3	Somewhat Disagree	86	10.2%
	4	Neither Agree nor Disagree	253	29.9%
	5	Somewhat Agree	60	7.1%
	6	Agree	47	5.6%
	7	Strongly Agree	38	4.5%

Perceived Intrusiveness - Forced

piForcd				
		Value	Count	Percent
Standard Attributes	Position	9		
	Label	piForcd		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.99		
	Standard Deviation	1.835		
	Percentile 25	2.00		
	Percentile 50	4.00		
	Percentile 75	5.00		
Labeled Values	1	Strongly Disagree	97	11.5%
	2	Disagree	129	15.2%
	3	Somewhat Disagree	89	10.5%
	4	Neither Agree nor Disagree	189	22.3%
	5	Somewhat Agree	135	16.0%
	6	Agree	126	14.9%
	7	Strongly Agree	81	9.6%

Perceived Intrusiveness - Interfering

piIntef				
		Value	Count	Percent
Standard Attributes	Position	10		
	Label	piIntef		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	4.19		
	Standard Deviation	1.893		
	Percentile 25	3.00		
	Percentile 50	4.00		
	Percentile 75	6.00		
Labeled Values	1	Strongly Disagree	94	11.1%
	2	Disagree	111	13.1%
	3	Somewhat Disagree	80	9.5%
	4	Neither Agree nor Disagree	176	20.8%
	5	Somewhat Agree	146	17.3%
	6	Agree	122	14.4%
	7	Strongly Agree	117	13.8%

Perceived Intrusiveness - Intrusive

piIntru				
		Value	Count	Percent
Standard Attributes	Position	11		
	Label	piIntru		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	4.08		
	Standard Deviation	1.847		
	Percentile 25	3.00		
	Percentile 50	4.00		
	Percentile 75	6.00		
Labeled Values	1	Strongly Disagree	86	10.2%
	2	Disagree	124	14.7%
	3	Somewhat Disagree	98	11.6%
	4	Neither Agree nor Disagree	188	22.2%
	5	Somewhat Agree	137	16.2%
	6	Agree	107	12.6%
	7	Strongly Agree	106	12.5%

Perceived Intrusiveness - Invasive

piInvas				
		Value	Count	Percent
Standard Attributes	Position	12		
	Label	piInvas		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.89		
	Standard Deviation	1.810		
	Percentile 25	2.00		
	Percentile 50	4.00		
	Percentile 75	5.00		
Labeled Values	1	Strongly Disagree	95	11.2%
	2	Disagree	135	16.0%
	3	Somewhat Disagree	102	12.1%
	4	Neither Agree nor Disagree	219	25.9%
	5	Somewhat Agree	113	13.4%
	6	Agree	94	11.1%
	7	Strongly Agree	88	10.4%

Perceived Intrusiveness - Obtrusive

piObtru				
		Value	Count	Percent
Standard Attributes	Position	13		
	Label	piObtru		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.85		
	Standard Deviation	1.753		
	Percentile 25	2.00		
	Percentile 50	4.00		
	Percentile 75	5.00		
Labeled Values	1	Strongly Disagree	98	11.6%
	2	Disagree	133	15.7%
	3	Somewhat Disagree	76	9.0%
	4	Neither Agree nor Disagree	267	31.6%
	5	Somewhat Agree	111	13.1%
	6	Agree	87	10.3%
	7	Strongly Agree	74	8.7%

Attitude Towards the Ad - Meaningful

aadMean				
		Value	Count	Percent
Standard Attributes	Position	14		
	Label	aadMean		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.42		
	Standard Deviation	1.611		
	Percentile 25	2.00		
	Percentile 50	4.00		
	Percentile 75	4.00		
Labeled Values	1	Strongly Disagree	130	15.4%
	2	Disagree	157	18.6%
	3	Somewhat Disagree	102	12.1%
	4	Neither Agree nor Disagree	250	29.6%
	5	Somewhat Agree	128	15.1%
	6	Agree	52	6.1%
	7	Strongly Agree	27	3.2%

Attitude Towards the Ad - Appropriate

aadApp				
		Value	Count	Percent
Standard Attributes	Position	15		
	Label	aadApp		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.69		
	Standard Deviation	1.588		
	Percentile 25	2.00		
	Percentile 50	4.00		
	Percentile 75	5.00		
Labeled Values	1	Strongly Disagree	99	11.7%
	2	Disagree	132	15.6%
	3	Somewhat Disagree	88	10.4%
	4	Neither Agree nor Disagree	276	32.6%
	5	Somewhat Agree	143	16.9%
	6	Agree	82	9.7%
	7	Strongly Agree	26	3.1%

Attitude Towards the Ad - Useful

aadUse				
		Value	Count	Percent
Standard Attributes	Position	16		
	Label	aadUse		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.47		
	Standard Deviation	1.666		
	Percentile 25	2.00		
	Percentile 50	4.00		
	Percentile 75	5.00		
Labeled Values	1	Strongly Disagree	130	15.4%
	2	Disagree	159	18.8%
	3	Somewhat Disagree	93	11.0%
	4	Neither Agree nor Disagree	240	28.4%
	5	Somewhat Agree	122	14.4%
	6	Agree	72	8.5%
	7	Strongly Agree	30	3.5%

Attitude Towards the Ad - Valuable

aadVal				
		Value	Count	Percent
Standard Attributes	Position	17		
	Label	aadVal		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.30		
	Standard Deviation	1.632		
	Percentile 25	2.00		
	Percentile 50	4.00		
	Percentile 75	4.00		
Labeled Values	1	Strongly Disagree	151	17.8%
	2	Disagree	167	19.7%
	3	Somewhat Disagree	92	10.9%
	4	Neither Agree nor Disagree	247	29.2%
	5	Somewhat Agree	116	13.7%
	6	Agree	46	5.4%
	7	Strongly Agree	27	3.2%

Mobile Phone Attachment - Usefulness Scale

My phone helps me keep track of my healthy habits.

mpasU1				
		Value	Count	Percent
Standard Attributes	Position	18		
	Label	mpasU1		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	2.94		
	Standard Deviation	1.317		
	Percentile 25	2.00		
	Percentile 50	3.00		
	Percentile 75	4.00		
Labeled Values	1	Not At All True	168	19.9%
	2	2	140	16.5%
	3	3	230	27.2%
	4	4	192	22.7%
	5	Extremely True	116	13.7%

My phone helps me make positive health decisions.

mpasU2				
		Value	Count	Percent
Standard Attributes	Position	19		
	Label	mpasU2		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	2.77		
	Standard Deviation	1.264		
	Percentile 25	2.00		
	Percentile 50	3.00		
	Percentile 75	4.00		
Labeled Values	1	Not At All True	178	21.0%
	2	2	181	21.4%
	3	3	227	26.8%
	4	4	179	21.2%
	5	Extremely True	81	9.6%

My phone helps me to be more organized.

mpasU3				
		Value	Count	Percent
Standard Attributes	Position	20		
	Label	mpasU3		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.68		
	Standard Deviation	1.144		
	Percentile 25	3.00		
	Percentile 50	4.00		
	Percentile 75	5.00		
Labeled Values	1	Not At All True	56	6.6%
	2	2	72	8.5%
	3	3	180	21.3%
	4	4	317	37.5%
	5	Extremely True	221	26.1%

My phone is my personal assistant.

mpasU4				
		Value	Count	Percent
Standard Attributes	Position	21		
	Label	mpasU4		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.44		
	Standard Deviation	1.242		
	Percentile 25	3.00		
	Percentile 50	4.00		
	Percentile 75	4.00		
Labeled Values	1	Not At All True	78	9.2%
	2	2	116	13.7%
	3	3	205	24.2%
	4	4	250	29.6%
	5	Extremely True	197	23.3%

I can get more work done when I have my phone with me.

mpasU5				
		Value	Count	Percent
Standard Attributes	Position	22		
	Label	mpasU5		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.04		
	Standard Deviation	1.317		
	Percentile 25	2.00		
	Percentile 50	3.00		
	Percentile 75	4.00		
Labeled Values	1	Not At All True	147	17.4%
	2	2	140	16.5%
	3	3	226	26.7%
	4	4	198	23.4%
	5	Extremely True	135	16.0%

I am never bored if I have my phone with me.

mpasU6				
		Value	Count	Percent
Standard Attributes	Position	23		
	Label	mpasU6		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.52		
	Standard Deviation	1.241		
	Percentile 25	3.00		
	Percentile 50	4.00		
	Percentile 75	5.00		
Labeled Values	1	Not At All True	78	9.2%
	2	2	94	11.1%
	3	3	202	23.9%
	4	4	255	30.1%
	5	Extremely True	217	25.7%

My phone makes me feel connected to people.

mpasU7				
		Value	Count	Percent
Standard Attributes	Position	24		
	Label	mpasU7		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.71		
	Standard Deviation	1.120		
	Percentile 25	3.00		
	Percentile 50	4.00		
	Percentile 75	5.00		
Labeled Values	1	Not At All True	41	4.8%
	2	2	85	10.0%
	3	3	185	21.9%
	4	4	300	35.5%
	5	Extremely True	235	27.8%

My phone is the main source of getting any information I need.

mpasU8				
		Value	Count	Percent
Standard Attributes	Position	25		
	Label	mpasU8		
	Type	Numeric		
	Format	F40		
	Measurement	Scale		
	Role	Input		
N	Valid	846		
	Missing	0		
Central Tendency and Dispersion	Mean	3.83		
	Standard Deviation	1.178		
	Percentile 25	3.00		
	Percentile 50	4.00		
	Percentile 75	5.00		
Labeled Values	1	Not At All True	51	6.0%
	2	2	72	8.5%
	3	3	147	17.4%
	4	4	273	32.3%
	5	Extremely True	303	35.8%

9.6.7. Pilot Data Analysis

Descriptives

Statistics								
		OBSR	CTRL	DT	CI	RPTR	PI_DIST	PI_DISB
N	Valid	99	99	99	99	99	99	99
	Missing	0	0	0	0	0	0	0

Statistics						
		PI_FRCD	PI_INTF	PI_INTV	PI_INVS	PI_OBTR
N	Valid	99	99	99	99	99
	Missing	0	0	0	0	0

Descriptive Statistics						
	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
OBSR	99	1.00	2.00	1.7677	.04266	.42446
CTRL	99	1.00	2.00	1.1818	.03896	.38766
DT	99	1.00	2.00	1.7879	.04130	.41089
CI	99	1.00	2.00	1.4141	.04976	.49508
RPTR	99	1.00	2.00	1.2323	.04266	.42446
PI_DIST	99	1.00	7.00	5.1414	.15794	1.57149
PI_DISB	99	1.00	7.00	3.8586	.19476	1.93786
PI_FRCD	99	1.00	7.00	4.9596	.17224	1.71380
PI_INTF	99	1.00	7.00	5.1414	.16559	1.64757
PI_INTV	99	1.00	7.00	4.7879	.18063	1.79724
PI_INVS	99	1.00	7.00	4.3737	.18364	1.82715
PI_OBTR	99	1.00	7.00	4.6667	.18387	1.82946
Valid N (listwise)	99					

Descriptive Statistics				
	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
OBSR	-1.287	.243	-.350	.481
CTRL	1.675	.243	.823	.481
DT	-1.430	.243	.046	.481
CI	.354	.243	-1.914	.481
RPTR	1.287	.243	-.350	.481
PI_DIST	-.915	.243	.022	.481
PI_DISB	.041	.243	-1.160	.481
PI_FRCD	-.755	.243	-.184	.481
PI_INTF	-.957	.243	.211	.481
PI_INTV	-.546	.243	-.660	.481
PI_INVS	-.275	.243	-.869	.481
PI_OBTR	-.686	.243	-.466	.481
Valid N (listwise)				

Frequency Tables

OBSR					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	23	23.2	23.2	23.2
	2.00	76	76.8	76.8	100.0
	Total	99	100.0	100.0	

CTRL					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Non-Controllable	81	81.8	81.8	81.8
	Controllable	18	18.2	18.2	100.0
	Total	99	100.0	100.0	

DT					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Mobile	21	21.2	21.2	21.2
	Desktop	78	78.8	78.8	100.0
	Total	99	100.0	100.0	

CI					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	58	58.6	58.6	58.6
	Low	41	41.4	41.4	100.0
	Total	99	100.0	100.0	

RPTR					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	76	76.8	76.8	76.8
	2.00	23	23.2	23.2	100.0
	Total	99	100.0	100.0	

PI_DIST					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2.0	2.0	2.0
	Disagree	8	8.1	8.1	10.1
	Somewhat Disagree	7	7.1	7.1	17.2
	Neutral	9	9.1	9.1	26.3
	Somewhat Agree	21	21.2	21.2	47.5
	Agree	35	35.4	35.4	82.8
	Strongly Agree	17	17.2	17.2	100.0
	Total	99	100.0	100.0	

PI_DISB					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	14	14.1	14.1	14.1
	Disagree	19	19.2	19.2	33.3
	Somewhat Disagree	6	6.1	6.1	39.4
	Neutral	22	22.2	22.2	61.6
	Somewhat Agree	15	15.2	15.2	76.8
	Agree	12	12.1	12.1	88.9
	Strongly Agree	11	11.1	11.1	100.0
	Total	99	100.0	100.0	

PI_FRCD					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	5.1	5.1	5.1
	Disagree	8	8.1	8.1	13.1
	Somewhat Disagree	5	5.1	5.1	18.2
	Neutral	12	12.1	12.1	30.3
	Somewhat Agree	28	28.3	28.3	58.6
	Agree	20	20.2	20.2	78.8
	Strongly Agree	21	21.2	21.2	100.0
	Total	99	100.0	100.0	

PI_INTF					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	4.0	4.0	4.0
	Disagree	7	7.1	7.1	11.1
	Somewhat Disagree	5	5.1	5.1	16.2
	Neutral	9	9.1	9.1	25.3
	Somewhat Agree	25	25.3	25.3	50.5
	Agree	28	28.3	28.3	78.8
	Strongly Agree	21	21.2	21.2	100.0
	Total	99	100.0	100.0	

PI_INTV					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	6.1	6.1	6.1
	Disagree	8	8.1	8.1	14.1
	Somewhat Disagree	9	9.1	9.1	23.2
	Neutral	16	16.2	16.2	39.4
	Somewhat Agree	19	19.2	19.2	58.6
	Agree	21	21.2	21.2	79.8
	Strongly Agree	20	20.2	20.2	100.0
	Total	99	100.0	100.0	

PI_INVS					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	9	9.1	9.1	9.1
	Disagree	9	9.1	9.1	18.2
	Somewhat Disagree	11	11.1	11.1	29.3
	Neutral	23	23.2	23.2	52.5
	Somewhat Agree	15	15.2	15.2	67.7
	Agree	18	18.2	18.2	85.9
	Strongly Agree	14	14.1	14.1	100.0
	Total	99	100.0	100.0	

PI_OBTR					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	10	10.1	10.1	10.1
	Disagree	7	7.1	7.1	17.2
	Somewhat Disagree	4	4.0	4.0	21.2
	Neutral	17	17.2	17.2	38.4
	Somewhat Agree	23	23.2	23.2	61.6
	Agree	23	23.2	23.2	84.8
	Strongly Agree	15	15.2	15.2	100.0
	Total	99	100.0	100.0	

~~~ END ~~~