Nudging in the workplace: increasing participation in employee EDI wellness events

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Abstract

Organisations are investing significant resources in promoting the physical, emotional, and psychological well-being of their employees. In hybrid working environments, virtual worker wellness events are increasingly being used to combat social isolation and boost employee morale. Yet attendance at such events is often low. Using a randomised control trial, this study tests whether four behaviourally informed nudges (i) simplification, (ii) changing the messenger, (iii) using social proof and (iv) setting a default, can increase the registration and attendance rates of 6,998 public sector employees at three EDI (Equality Diversity Inclusion) wellness events. We find evidence that defaults matter. Pre-registering employees more than trebles the attendance rate, from 2.8% to 9.5%. While providing social proof and changing the messenger increase registration rates, they have no impact on attendance. We find little evidence of treatment heterogeneity, suggesting that defaults may have wide applicability. Our results have important implications for organisations seeking to enhance the impact and return on investment of their worker wellness initiatives.

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Keywords: behavioural economics; nudge; RCT; worker well-being; defaults

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1. Introduction

The economic cost of poor mental health in the workplace in terms of absenteeism, presenteeism, sub-optimal performance, accidents and staff turnover is substantial.\(^1\) Growing numbers of organisations are devoting substantial resources to the design and implementation of worker wellness programmes (WWPs) aimed at safeguarding and enhancing the physical, emotional, and psychological well-being of their employees. The COVID-19 pandemic has accelerated this trend, with organisations seeking to address the negative effects of remote working, such as increased feelings of loneliness and isolation and the blurring of work-life boundaries. These initiatives can take the form of comprehensive, structured WWPs or more ad-hoc, one-off events, which are focused on particular ‘themes’, for example, stress control.

Many employees now have access to some form of worker wellness initiative. Over half of small firms (<200 employees) and 81% of large firms in the US report offering at least one health promotion/wellness programme (Kaiser Family Foundation, 2020). In the UK, the proportion is lower (20-40%), yet many firms report providing some form of employee wellness support (CIPD, 2021). The success of any wellness initiative rests on its ability to attract sufficiently high numbers of employees to attend in order to maximise intervention impact and to increase return on investment (Baicker, Cutler and Song, 2010; Linnan et al., 2001). While access to WWPs is increasing, participation rates remain low (Mattke et al., 2015; Ryde et al., 2013; Srivastava, 2012). Using data from the nationally representative RAND Employer survey, Mattke et al. (2013) found median employee participation rates of 20-40% in large organisations. Robroek, Lindeboom and Burdorf’s (2009) review of worksite exercise and nutrition interventions revealed participation rates of 10-64%, with a median of 33%. In the UK, Ryde et al.’s (2013) meta-analysis of participation rates in workplace physical activity programmes, found a median registration rate of 50-61%. Other studies have reported participation rates of 20-40%, depending on the intervention (Niessen et al., 2013; Wilhilde et al., 2008).

Traditionally, low participation has been addressed through the provision of monetary incentives, particularly in relation to health screening.\(^2\) There is however, increasing evidence that incentives may be, at best, only moderately

\(^1\) PWC (2008) estimated that 13.8 million working days were lost in the UK in 2006/207 due to work-related stress, depression and anxiety.

\(^2\) 44% of large firms who offer WWPs offer incentives to participate (Kaiser Family Foundation, 2020).
effective at increasing employee engagement with WWPs. There is growing recognition that addressing this issue requires a more nuanced understanding of the determinants of participation. The decision to take part in a worker wellness event is generally a function of individual and organisation-level factors (see Lier, Breuer and Dallmeyer, 2019; Linnan et al., 2001; Ott-Holland, Shepherd and Ryan, 2019; Robroek et al., 2009). Individual factors include gender, age, personality, preferences, beliefs in relation to the benefits of wellness initiatives, ability to attend (workload etc.), availability of substitutes, opportunity costs and intrinsic and extrinsic motivation to participate. Organisation-level factors include the perceived organisational support for WWB, organisation size, incentives, event accessibility, the social environment (culture and social norms), communication of the event and contextual factors (timing, location etc.).

Many of the determinants of participation are psychological in nature. As a result, behaviourally informed interventions, in particular ‘nudges’, or behavioural ‘prods’, which change behaviour without changing incentives or precluding options (Thaler and Sunstein, 2008), are increasingly used. There is growing evidence that ‘choice architecture’ or changing the way in which information is messaged or framed (Thaler and Sunstein, 2008; 2022), for example by modifying the text, format, sender, delivery format etc., may influence behaviour. Nudge interventions are particularly suited to the workplace as they are light-touch, low-cost and relatively quick and easy to implement. Crucially, they have also been shown to work in multiple contexts as documented in meta-analyses (see Arno and Thomas, 2016; Beshears and Kosowsky, 2020; DellaVigna and Linos, 2022; Jachimowicz et al., 2019; Mertens et al., 2022). While nudges are often used by organisations to change external stakeholder behaviour (e.g., consumers), they are less frequently used within organisations to change employee behaviour.

The purpose of this study is to test the effectiveness of four behaviourally informed nudges in increasing employee attendance at three EDI wellness events held in one of the largest public sector organisations in Ireland. The events were run by the organisation’s well-being committee with the aim of increasing employees’ morale, sense of connectedness and general well-being, as well as

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3 While incentives of over $50 have been shown to increase participation rates, the effects are relatively modest (Gingerich, Anderson and Koland, 2012; Mattke et al., 2013; Wilhilde and Hayes, 2008). Only 30% of firms surveyed by Kaiser Family Foundation (2020) believed that incentives were ‘very effective’ at increasing participation, with 47% deeming them to be ‘somewhat effective’. Jones, Molitor and Reif (2019) report modest effects, with participation increasing from just under 50% (no incentive) to 59% ($100 reward) and 63% ($200) with incentives.

4 For example, women consistently report higher participation in WWPs (Anenson et al., 2013; Beck et al., 2016; Hall et al., 2017), although the strength of association varies by initiative (Kryger et al., 2007). The links between age and participation are less clear, with mixed findings reported (see for example Aldana et al., 2005; Middlestadt et al., 2011; Robroek et al., 2012) but, on balance, participation appears to decrease with age.
increasing EDI awareness in the organisation. Prior to the experiment, we conducted a needs analysis using a baseline survey with multiple well-being outcomes and focus groups on improving working life and reasons for low participation in wellness events. The analysis revealed feelings of social isolation, loneliness and burnout amongst employees. It also identified multiple barriers to wellness event participation e.g., a cumbersome registration process, competing work demands etc.

While the EDI events differ from more traditional worker wellness initiatives (e.g., mindfulness, yoga, step challenges etc.) which are typically studied in the field, a culture of organisational justice and workplace EDI has been shown to be associated with improved WWB (e.g., higher job satisfaction) (Huong, Zheng and Fujimoto, 2016; Saunders, 2015) and positive economic outcomes such as increased organisational commitment and reduced job quits (Fulford, 2005). On the one hand, employees may regard the EDI events as more meaningful and thus they may be more likely to engage with them due to the emphasis on both self-development and improving workplace culture. On the other hand, employees may be less likely to attend if they perceive such events as being less enjoyable than more traditional wellness initiatives.

Using a randomised control trial (RCT) design and a sample of 6,998 employees we test whether nudges can increase attendance at virtual well-being events. We also examine which nudges are the most and least effective, and whether certain sub-groups of employees more susceptible to nudges.

The paper contributes to several strands of literature. Firstly, we address a large gap in the worker well-being literature by rigorously evaluating behaviourally informed interventions which specifically target participation in employee-focused initiatives. Despite the well-documented under-utilisation of costly WWP, researchers have only recently started to examine whether, and how, participation rates can be increased. Most of these studies focus on incentives (e.g., Huang et al., 2016; Mattke et al., 2013), rely on pre-post / survey designs (e.g., Batorsky, Van Stolk and Liu, 2016; Ghesmaty-Sangachin and Cavuoto, 2018; Szrek et al., 2019) and/or involve US organisations where WPPs are usually linked to the provision of employer health insurance plans (e.g., Jones, Molitor and Reif, 2019). We are not aware of any other studies that test whether nudges increase participation in WWP.

We also contribute to a burgeoning behavioural economics literature by evaluating the impact of a range of nudges (including defaults) and nudge combinations (simplification + changing the messenger; simplification + social proof) on participation. Nudges are, by definition, context dependent. There is no
guarantee that a nudge which is effective in one context will translate to a different environment. Repeated testing of nudges in different contexts is thus essential for the construction of a solid evidence base for practitioners to draw on (Soman and Hossain, 2021; Tummers, 2019). By testing nudges within a novel organisational setting, we contribute to this effort. Furthermore, by evaluating the impact of nudges on men, women, senior and junior employees, we address the acknowledged, but rarely met, need to consider treatment heterogeneity when using nudges to change behaviour (Soman and Hossain, 2021). Finally, our findings have important implications for organisations seeking to identify effective low-cost and ‘light-touch’ ways to extend the impact of their wellness initiatives, in order to reduce inefficiencies and improve the return on investment.

The results show that defaults have the largest impact on both registration and attendance rates. By design, automatically opting employees into an event has the largest impact on registration rates, with only 4.9% of defaulted employees electing to opt-out completely. In addition, changing the messenger (the sender of the invitation) and providing social proof (in the form of the number of employees already registered), combined with simplification (providing an embedded registration link), significantly increases registration rates compared to the control, by 2.7 and 2.2 percentage points respectively. However, none of the nudges are effective in closing a substantial intention-behaviour gap, with 58% of employees failing to attend the event for which they self-registered. Defaulting employees into registering for an event is the only nudge that has a positive effect on attendance. Pre-registering employees more than trebles the participation rate relative to the control (9.5% v 2.8%), an increase of 6.3 percentage points. We find little evidence of treatment heterogeneity in relation to gender or seniority, with the default nudge significantly increasing the attendance of all sub-groups. This suggests that defaults may have wide-ranging applicability for organisations seeking to boost employee participation at EDI wellness events.

2. Choice architecture and nudge theory

Multiple experiments have demonstrated that re-framing a message by altering or re-formatting text; changing who delivers the information; changing the order of presentation; making one option the default; or changing the number of

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9 The nudge literature typically focuses on average treatment effects, largely ignoring heterogeneity (Howley and Ocean, 2021). Halpern (2016) speculates this may be because nudges do not appear to be significantly moderated by characteristics that might raise equity concerns but tend instead to have universal applicability, a finding which he attributes to the universal nature of the cognitive biases they exploit. However, researchers have called for more attention to be paid at the design stage to potential heterogeneity as it determines whether nudge delivery should be ‘personalised’ etc. (Mills, 2022).
options, can change behaviour (see Balart, Ezaurerra and Hernandez-Arenaz, 2020; Cookson, 2000; Tversky and Kahneman, 1985).

The effectiveness of such nudges is, however, far from guaranteed (Hummel and Maedche, 2019). They may be more effective in some contexts than others, for example, when motivation to perform the targeted behaviour is very low (Grüne-Yanoff, Marchionni and Feufel, 2018). Their effects may also dissipate over time with repeated use (Sunstein, 2017). In addition, they may have unintended consequences. Osman (2020) detailed 65 nudge studies which produced boomerang effects in the opposite direction (see Beshears and Kosowsky, 2020).

Nudges may backfire due to psychological reactance (Brehm, 1966; Steindl et al., 2015), which is the tendency to resist nudges which are perceived to be a threat to autonomy or an attempt to manipulate behaviour. In addition, poorly designed nudges may inadvertently ‘crowd-out’ intrinsic motivation (Damgaard and Nielsen, 2018) and/or support for other policy instruments (Hagmann, Ho and Loewenstein, 2019). As Dimant, VanKleef and Shalvi (2020) highlight, some habitual behaviours are more resistant to change than others and may require more than a gentle nudge. As voluntary workplace events are relatively low stake events which do not involve significant changes in behaviour, we hypothesise that they may be particularly susceptible to nudges.

3. Intention-behaviour gap

Participation in any voluntary event often involves two distinct, but closely linked, behaviours: registration and attendance. On the assumption that the act of registration indicates an intention to attend the live event, we hypothesise that higher registration rates (intentions) should result in greater attendance (behaviour) based on extensive theoretical (e.g., Theory of Planned Behaviour (TPB), Ajzen, 1991) and empirical (Adriaanse et al., 2011; Belanger-Gravel, Godin and Amireault, 2011; Sheeran and Webb, 2016) evidence in support of behavioural intentions acting as a precursor to actual behaviour.

However, given experimental and simulation evidence that changing intentions alone may not necessarily change behaviour (see Fife-Schaw, Sheeran, and Norman, 2007; Hassan, Shiu and Shaw, 2016; Rhodes and de Bruijn, 2013; Rongen

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6 Hummel and Maedche (2019) found that only 62% of nudges result in significant behavioural change.

7 For example, using a social proof nudge which highlights how many others behave in a socially harmful way, may make the behaviour seem ‘natural’, thus inadvertently encouraging it (Bicchieri and Dimant, 2019).

8 In a meta-analysis of ten previous meta-analyses (422 studies), Sheeran (2002) found a ‘large’ average correlation between intentions measured at one time-point and subsequent measures of behaviour of $r = 0.53$. However, we acknowledge that registering for an event may also indicate a desire to receive the recorded version of the event and the intention to listen to it at a later stage.
et al., 2014), we hypothesise that a substantial proportion of registrations may fail to convert into actual attendances. Good intentions may fail to be enacted due to human failings such as procrastination (Steel, 2007), forgetfulness (O’Carroll et al., 2014) and failing to plan (Sniehotta, Scholz and Schwarzer, 2005). Rongen et al. (2014) found that, while intention to participate predicted WWP participation six months later, only 21% of employees who initially intended to participate had actually participated at follow-up.

4. Nudge literature review

This section provides the theoretical and empirical case for each of the nudges used to increase participation and attendance rates in this study.

4.1 Simplification

The starting point for many nudge interventions is simplification. Simplification aims to reduce the cognitive load associated with information processing by increasing the salience of the target behaviour, strengthening the signal (emphasising key information), and reducing noise (irrelevant information) (Sunstein, 2014). Simplification nudges also seek to reduce transaction costs and administrative burden (Herd and Moynihan, 2019), or ‘sludge’ (Thaler, 2018), associated with engaging in the target behaviour. They typically involve changing the presentation format (streamlining text; changing the colour scheme etc.), and/or the use of ‘digital nudges’ (Meske et al., 2019) such as enhanced user interfaces or embedded electronic links to prompt immediate action. Bhargava and Manoli (2015) showed that reducing the small ‘hassles’ associated with registering for social welfare, can reduce psychological frictions resulting in higher uptake levels.

Simplification nudges have been used across multiple domains to encourage, for example, tax compliance (Leets et al., 2020) and switching to online renewal (John and Blume, 2017) inter alia. Simplification nudges have also been used to boost attendance. For example, nudges have been used to reduce court ‘no shows’ (Fishbane, Ouss and Shah, 2020), increase college enrolment amongst minorities (Bettinger et al., 2012) and triple attendance at cervical cancer screening appointments (Cuesta et al., 2021). We thus hypothesise that simplifying the

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9 In a meta-analysis of 47 experimental tests of intention-behaviour relations, Webb and Sheeran (2006) found that a medium-to-large change in intentions (d=0.66) lead to a small-to-medium change in behaviour (d=0.36).

10 In a series of RCTs the authors showed that simplifying the format of a claim notice (shortening it or making it more visually appealing) raised claim take-up rates by nine percentage points.
registration process will increase registrations and therefore, attendance, albeit to a lesser extent due to the intention-behaviour gap.

4.2 Defaults

Defaults represent the most prominent category of nudges (Loewenstein and Chater, 2017). Default nudges assign individuals to a pre-selected choice option, while preserving their right to freely, and easily, opt out of the default option if desired (Thaler and Sunstein, 2008; 2022). Default choices have been shown to be sticky in a wide range of contexts (Beshears and Kosowsky, 2020). This is attributed to their ability to successfully exploit cognitive biases documented in the behavioural literature, including inertia (Samuelson and Zeckhauser, 1988); loss aversion (Tversky and Kahneman, 1991); present bias (O’Donoghue and Rabin, 1999) and procrastination. Deviating from the default requires action, which involves immediate effort. The stickiness of a default will depend on the effort that individuals must incur in order to switch to a non-default alternative or to exit completely (Bar-Gill and Ben-Shahar, 2021), as well as the extent to which the default behaviour is interpreted as an implicit recommendation or endorsement (McKenzie, Liersch, and Finkelstein, 2006).

Jachimowicz et al.’s (2019) meta-analysis of nudges highlighted the effectiveness of defaults in changing behaviour across multiple domains including promoting healthier choices (Hansen, Schilling and Malthesen, 2021); eliminating gender differences in the propensity to compete for promotions (He, Kang and LaCetera, 2021); increasing enrolment in company savings and pension schemes (Thaler and Benartzi, 2004) and increasing investment in socially responsible investment funds (Gajewski, Heimann and Meunier, 2021). In certain contexts, default effects may also persist over time (Venema, Kroese and DeRidder, 2018).

Default nudges have a proven track record in increasing participation rates. For example, Mehta et al. (2018) found that opt-out messaging increased participation in colorectal screening by 19.5 percentage points versus an opt-in group and Lonnberg et al. (2012) found that opting women into scheduled appointments increased attendance at cervical cancer screening by 17 percentage points relative to the control group. There is, however, evidence that default nudges may be more effective when aligned with pre-existing preferences (Banerjee and John, 2021; Dinner et al, 2011). We hypothesise that pre-registering employees for

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11 Hansen, Schilling and Malthesen (2021) reported a tendency for men to opt out of default vegetarian menu choices. However, other studies, e.g., Vetter and Kutzner (2016), found no evidence of attenuated default effects for participants with strong pre-existing attitudes towards the default behaviour, emphasising the role of context.
one of the EDI wellness events should increase attendance on the basis that a large proportion of pre-registered employees are likely to stick with the default option and remain registered, thus increasing the likelihood of attendance, intention-behaviour gaps notwithstanding.

4.3 Changing the messenger

Research shows that the choice of messenger, i.e., the person who delivers the call for action, can be important when seeking to change behaviour and influence choices as it can be interpreted as a personal endorsement (Maclean, Buckell and Marti, 2019). The extent to which this triggers action will depend on the context and on the identity of the messenger. Source credibility theory (Hovland and Weiss, 1951) claims that information is given more credence when provided by someone who is perceived to be believable and trustworthy, for example an expert or authority figure. The extent to which the source is perceived as likeable (source attractiveness theory, McGuire 1968; Cialdini, 2007) or similar to the recipient (congruence) also shapes how the message will be processed. Conversely, using the wrong messenger may result in the information being irrationally ignored or discarded, particularly if the messenger subconsciously triggers negative emotions (Dolan et al., 2012).

In the context of participation, Hewitson et al. (2011) found that sending patients a personally addressed endorsement letter from their doctor increased participation in a colorectal screening scheme by 5.8 percentage points. Chohan, Bicknell and Psychol (2019) found that employees who received an email from an authority source encouraging them to complete an e-learning course were 80 percentage points more likely to comply than employees who received an email with no source attributed. Perceived organisational support, or the visible commitment of senior managers to the promotion of employee wellbeing, has been shown to play a particularly important role in boosting participation in WWPs (Ghesmaty-Sangachin and Cavuto, 2018; Hassard et al., 2012; Hoert, Herd and Hambrick, 2016), as have endorsements from peers/employee representatives (Crump et al., 1996; Belle and Cantarelli, 2021). We thus hypothesise that changing the messenger should have a positive effect on attendance, assuming the ‘right’ messenger (sufficiently high-profile and/or appealing) is chosen.

4.4 Social proof

People care about what others think (Axelrod, 1986) and “like to do what most people actually do” (Thaler and Sunstein, 2008 p.191). It is now widely accepted that utility depends not only on tastes but also on norms as to how people think that they (and others) should behave (Akerlof and Kranton, 2005; Benabou and
Tirole, 2006). Social norms signal behavioural expectations within a group (Dolan et al., 2012) and provide a behavioural cue under uncertain conditions. There is a long history in behavioural economics of using social norms, in particular descriptive norms, which describe what most people are doing, to encourage desired behaviour (Cialdini, Kallgren and Reno, 1991). As Dur et al. (2021) explained, descriptive norms operate through two mechanisms. Firstly, they persuade people to emulate the target behaviour, on the basis that if most people are doing it, it must be the ‘right’ thing to do (Cialdini, Kallgren and Reno, 1990). Secondly, they tap into the desire for individuals to avoid the disutility associated with failing to conform with the behavioural expectations for their group (Bond and Smith, 1996).\(^{12}\)

Providing social proof, or information about others’ behaviour, has been shown to successfully change behaviour in the areas of energy consumption (Brandon et al., 2017), over-prescribing (Hallsworth et al., 2016) and adoption of computer security features (Das et al., 2014). Personalising the norm can increase its effectiveness, for example linking social proof to the region in which the respondent lives (Team B.I, 2012). More recently, attention has switched to using dynamic social norms (Sparkman and Waltman, 2017) which indicate whether the target behaviour is increasing or decreasing (Tummers, 2019).\(^{13}\) There is also evidence, however, that normative nudges may not always work.\(^{14}\)

With respect to attendance at EDI wellness events, providing social proof may help to correct for misconceptions or ignorance on the part of employees as to the number of their colleagues who usually attend such events by providing a reference point. Depending on the figure provided, this may trigger increased attendance through the channels described above. For example, Von Wagner et al., (2019) showed that providing feedback on the uptake rates for colorectal screening which exceeded participants’ expectations, significantly increased the intention to participate.

In the context of promoting attendance at workplace events, Belle and Cantarelli (2021) used a series of RCTs to show that employees are significantly more (less) likely to get a flu shot and advocate vaccination when they have been informed

\(^{12}\) This process may be automatic (Belle and Cantorelli, 2021). Social norms may trigger the availability heuristic, in which thoughts that come quickly to mind disproportionately shape behaviour (Tversky and Kahneman, 1973), triggering conformity (Thaler and Sunstein, 2008).

\(^{13}\) Loschelder et al. (2019) found that informing individuals that ‘more and more customers are switching from to-go cups to a sustainable alternative’ and urging them to ‘be part of this movement’, increased the use of reusable mugs by 4.1 percentage points (17%).

\(^{14}\) For example, Dimant, van Kleef and Shalvi (2020) documented high-powered null findings for a series of norm interventions aimed at increasing honesty, a finding which they partially attributed to the tendency of participants to mis-remember information contained in norm-nudges so as to support their underlying behaviour preferences.
that the majority of their colleagues typically do (do not) get vaccinated. As highlighted by Schultz et al., (2007), however, the effectiveness of social proof nudges depends on prior behaviour. Social proof nudges can be destructive and produce a boomerang effect if individuals learn that their behaviour is below the norm. In light of the empirical evidence, we hypothesise that providing social proof as to the number of employees who have already registered for the events should increase attendance rates, but only if the figure cited exceeds employee expectations.

4.5 Reminders

A lack of reminders has been identified as a barrier to participation in WWPs (Bardus et al., 2014). For example, forgetting to schedule an appointment is one of the key barriers to attending cancer screening clinics (Marlow et al., 2017). Reminder nudges in the form of timely phone, SMS, email, or letter reminders, are frequently used to narrow the intention-behaviour gap caused by forgetfulness and/or people not having found an opportune moment to act on their intentions. Reminders work by prompting recall (Sunstein, 2014) and pinning the desired action at the forefront of the recipient’s mind (Beshears and Kosowsky, 2020).

There are numerous empirical examples of how timely reminders can improve attendance rates at gyms (Calzolari and Nardotto, 2017), outpatient (Taylor et al., 2012) and cancer screening clinics (Camilloni et al., 2013), dental check-ups (Altmann and Traxler, 2014), health promotion events (Chen et al., 2008) and urban tree planting events (Hand et al., 2019). In two recent RCTs, Dai et al. (2021) showed that SMS reminders sent to participants the day after they received notice of vaccine eligibility, increased appointments and vaccination rates by 6.1 and 3.6 percentage points respectively. Similarly, Milkman et al.’s (2021b) mega-study found that SMS reminders increased attendance at flu vaccination clinics by 3 percentage points.

Similar to other nudges, however, reminders by no means guarantee attendance. Tagliabue (2022) warned that reminders can backfire if employees’ preferences diverge from the targeted behaviour or if they are unable to respond to the call to action (due to work requirements etc.). Given that our needs analysis highlighted high levels of work burden and time pressure, which are typically associated with a higher level of distraction and/or procrastination, we

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15 For example, Mahmud, Asch and Sung’s (2021) RCT found that issuing text message reminders produced no significant difference in appointment attendance at bowel cancer screening clinics. Text reminders have also had very mixed success in prompting witness court attendance (Monnington-Taylor et al., 2019).
hypothesise that sending out a reminder is likely to increase registrations and thus attendance.

4.6 Nudge combination effects

While the effectiveness of individual nudges is widely documented, relatively little is known about the implications of combining one or more nudges. Howley and Ocean (2021) used a randomised survey experiment to investigate whether using two nudges (injunctive norm and social signalling) that targeted different psychological mechanisms in tandem would crowd out the marginal effectiveness of each individual nudge. They found limited evidence of significant crowding-out effects. With the exception of Brandon (2019), who found no evidence of crowding-out, we are not aware of any other studies which have sought to examine the impact of combining different types of nudges in a field experiment context.

In this study we test the impact of a stand-alone simplification nudge, as well as the impact of three ‘combination nudges’ (simplification + messenger; simplification + social proof; simplification + default). Due to the lack of evidence of any crowding out effects in the extant literature, we hypothesise that combination nudges will prove more effective than simplification on its own.

4.7 Nudge heterogeneity

There is some evidence that the effectiveness of nudges may vary between groups (Tummers, 2019; Peer et al., 2020). Mrkva et al.’s (2021) review provided some evidence of increased susceptibility of less wealthy and less expert consumers to consumer nudges. To the extent that income or expertise correlate with seniority, it is plausible that junior employees may be more susceptible to nudges. However, the relationship between nudge effectiveness and seniority in the workplace has not, to the authors’ knowledge, been tested.

Similarly, there is currently scant evidence to suggest that gender significantly impacts nudge susceptibility. There is some evidence that default nudges may affect women more than men. For example, DeBresser and Knoef (2019) found that savings reduction default nudges are more effective for women, and Altmann et al. (2019) found that women are four percentage points more likely to stick to a donation default. Based on the little evidence available, we do not expect to find significant heterogeneity in treatment effects for the sub-groups analysed (men, women, junior and senior employees).

5. Data
5.1 Research site and sample

We designed and implemented the study in partnership with one of the largest public sector organisations in Ireland. The organisation has approximately 7,200 employees, the majority of whom are female (62%) and aged between thirty and sixty years (83%). While the organisation operates nationally across multiple worksites, at the time of this study, approximately 90% of employees were working from home due to the COVID-19 pandemic. Most employees are engaged in desk-bound, office-type work and similar to other Irish public sector bodies, the organisational structure is extremely hierarchical. Figure A1 in the appendix depicts the various grades/levels in the Irish Civil Service. All 6,998 employees who were engaged in active work at the time of the study were invited to participate in three events organised by the organisation’s well-being committee in November 2021.16 The break-down of the sample by gender and grade is depicted in Table A1 in the appendix. Random assignment at the individual employee level, with no blocking or stratification, was used to create a control group and four treatment groups. The groups are well balanced on gender and occupational grade (Table A1).

5.2 The events

The nudges aimed to increase live attendance at three virtual EDI themed wellness events organised by the well-being committee. The aim of the events was to decrease homeworking-induced social isolation by bringing employees from all parts of the organisation together in an informal, relaxed setting and to increase bonding by encouraging them to learn a new (non-work-related) skill. All three events were held at lunchtime during the week 16th – 19th November 2021. The first event (Tuesday, November 16th, 12.30-1pm) comprised a thirty-minute introduction to Irish Sign Language (ISL) which was provided by a staff member. The second event (Wednesday, November 17th, 12-1pm) consisted of a sixty-minute live ‘cook-along’ with a chef from Healthy Workforce Ireland who was accompanied by a sign-language interpreter. The final event (Friday, November 19th, 12.30-1pm) comprised a thirty minute ‘Lunch ‘n Learn’ event delivered by staff members which aimed to ensure that employees were aware of their rights within the organisation and to offer guidance on how employees could increase their own and their colleagues’ well-being by promoting equality in the workplace.

5.3 Measures

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16 Staff who were not currently engaged in work (for example, staff on sick-leave, maternity leave etc.) were excluded. In addition, two staff members chose to opt out of the study.
This study uses two outcome measures. The first outcome is registrations, namely the number of employees who register for one or more of the live EDI events. This figure includes net pre-registrations (employees in the default condition who were defaulted into pre-registering for an event, less any defaulted employees who opted out and did not switch to a different event) plus voluntary self-registrations (employees in the other four conditions who chose to register for one or more events). The second outcome is attendance, namely the number of employees who attended one or more of the live EDI events. Note, attendance was restricted to those employees who had registered for that particular event.

6. Experiment design

6.1. Randomisation

A power analysis was conducted to determine the minimum sample size required to identify significant differences between the treatment and control groups, assuming $\alpha=5\%$, power=0.8, and a required minimum detectable effect size of 2 percentage points which lies in the range of the average effect sizes of 1.4% - 8.7% reported in Della Vigna and Linos’ (2022) review of 126 nudge RCTs. This resulted in a required minimum sample size for each condition of 1,400.

All 6,998 employees were assigned in equal proportions to one of five conditions – the control condition plus four treatment arms – as follows:

- Control group: 1,399 employees
- Treatment group 1 (Simplification): 1,399 employees
- Treatment group 2 (Simplification + Messenger): 1,400 employees
- Treatment group 3 (Simplification + Social Proof): 1,397 employees
- Treatment group 4 (Simplification + Default): 1,403 employees

Participants in the default group were further randomly allocated in equal proportions to one of the three events. Figure 1 sets out the randomisation process.

---

**Figure 1. Randomisation process**

17 Della Vigna and Linos (2022) compared treatments effects for 126 RCTs involving 23 million individuals, including all trials run by two of the largest Nudge Units in the USA and a sample of published nudge trials from two recent meta-analyses. While they found a large effect size for published trials (8.7 percentage point increase), the average treatment effect in nudge unit trials was considerably smaller (1.4 percentage points).
6.2 Intervention design

The trial was initiated as the organisation was concerned about the impact of COVID-19-induced homeworking on worker well-being. While several virtual well-being webinars had been organised since the outbreak of the pandemic, employee attendance had been low. Our needs analysis revealed that while over 90% of employees were aware of the existence of the well-being committee, 85% of those surveyed had never attended a live wellness webinar and 81% had never accessed a recorded wellness webinar. Management wished to encourage participation in future events using low-cost, easily implementable interventions, which would not preclude any employee from attending or involve the use of monetary incentives. Given the well-documented potential for nudges to boost attendance in other domains (see Section 4), the authors were invited by the well-being committee to collaborate on the design and implementation of an RCT which would test the impact of nudges on employee participation.

Prior to the experiment, the organisation used a relatively clunky registration process for wellness events. Employees were invited to participate via a standard email from the well-being committee which provided a brief summary of the timing and content of the event. Employees who were interested in attending were asked to confirm their interest by clicking on a link to a return email address and indicating in that email that they would like to register for the event.
Employees who responded to the email were then sent a link to the event. In our experiment, employees in the control condition continued to receive this standard email.

The intervention design was informed by existing research which characterises participation in WWPs as a function of individual-level factors and organisation-level (contextual) factors. As organisations have more control over contextual factors, and thus a greater ability to change them, we focused primarily on nudges that target organisation-level factors and have proven effectiveness in increasing participation rates, while being practically feasible and acceptable to the organisation. The selection of individual nudges was informed by the Fogg Behaviour Model (Fogg, 2009; 2011; 2013), a framework for understanding the drivers of human behaviour which is frequently used to design persuasive technologies aimed at changing established behaviours (see for example, Bonneux et al., 2021; Tack, 2021). Fogg’s model asserts that for an individual to perform a target behaviour, such as attending a wellness event, he or she must be simultaneously sufficiently motivated, able to perform the behaviour and ‘triggered’ into action. A high level of motivation alone is unlikely to change behaviour if the task is difficult to perform, whereas even an employee with low motivation may be persuaded to act if the action is made sufficiently simple.

Given the central role of ability in Fogg’s model, as well as feedback from employees that the current registration process was overly cumbersome, we elected to use simplification as the cornerstone of our nudge design. The ‘simplification’ nudge aimed to reduce behavioural frictions by providing an embedded registration link within the invitation email, thus simultaneously prompting and facilitating action. This group’s invitation email was identical in wording and format to the control invitation, with the exception of the embedded link.

The ‘default’ nudge sought to make registering for an event even easier (as the employee had to take no action at all), thus simultaneously simplifying the registration process and tackling inertia and procrastination. This group received the same email as the simplification group but were informed that they had been “specially selected” to attend one of the three events. If they wished to attend the selected event, then no further action was required, in which case they would be emailed a link to the online event twenty-four hours in advance. If they wished to switch to another event or to opt out entirely, they could do so, but it required additional effort (clicking on a link which took them to a webpage in which they
could tick a box which enabled them to switch to one of the other two events or to opt out completely).\textsuperscript{18}

The Fogg model offers a useful framework for tailoring the design of nudges to take account of individual differences in attitudes and motivation (Dai et al., 2020).\textsuperscript{19} Given that our needs analysis revealed a very wide range of attitudes and motivations in relation to wellness initiatives, we also included two additional treatments in the experimental design to specifically target employees’ motivation to attend the events by harnessing social acceptance. The ‘messenger’ and ‘social proof’ treatments both incorporated the simplification treatment (employees could click on an embedded registration link) but added additional nudge layers. Employees in the messenger treatment received an email with the addition of the electronic signature of a senior manager in the organisation\textsuperscript{20} and additional text in which she personally endorsed the events and urged her colleagues to join her in supporting the events.\textsuperscript{21} The social proof condition aimed to exploit social norms and peer effects by using the reminder email to inform recipients of the actual number of their colleagues (n=231) who had already registered for one or more of the events and urged them to do the same.\textsuperscript{22}

Fogg’s model also asserts that without an appropriate and timely trigger, or behavioural cue, the target behaviour will not occur, even if both motivation and ability are high. Our intervention design thus included a reminder email that was sent to all 6,998 employees five days prior to the events. The reminder targeted forgetfulness by reminding employees of the events and informing them that it was still not too late to register, thus acting as a timely signal to those employees with sufficient levels of motivation and ability to act. With the exception of the

\textsuperscript{18}The wording comprised “We are pleased to inform you that you have been specially selected to attend the Introduction to Irish Sign Language event. You will be sent a link to the live event 24 hours before it commences. Alternatively, if you would prefer to switch to one of the other two events, or to not attend any of the events, then please click on the link below”.

\textsuperscript{19}For example, if individuals have no interest in attending the event, nudges should make it easier for them to participate and / or seek to increase their motivation to attend by emphasising the benefits, harnessing social norms etc. If, on the other hand, individuals are interested in attending the event, but are unlikely to do so due to other barriers (busy schedules, forgetfulness etc.), nudges should instead target barriers such as procrastination.

\textsuperscript{20}The messenger was of Assistant Secretary grade. As it was not possible to send the email directly from the messenger’s email address, the emails were sent by the well-being committee. However, the text made it clear that the emails were from the messenger and contained her electronic signature.

\textsuperscript{21}The wording comprised “Diversity and Inclusion Week is taking place November 15th -19th. I’m sure you’ll agree that this is an important initiative that I, for one, am really looking forward to. I am excited to announce our live events planned for the week...If you would like to join me in supporting this important initiative by registering your interest for any of these webinars, please click on the link below.”

\textsuperscript{22}The wording comprised “It’s not too late to sign-up if you haven’t already done so! 231 of your colleagues have already expressed their support for this important initiative by securing their places. Why don’t you join them by clicking on here to register your interest.”
social proof group, all of the reminder emails mirrored the language and format of the original invitation. The full text of the initial and follow-up emails used in all conditions is provided in Figures A2 and A3 in the appendix.

7. Experiment implementation

The pre-registered (AEARCTR-0008479) field experiment was conducted between the 4th and 19th of November 2021. Random assignment was completed using an individual probability randomisation strategy into one of five groups. Randomisation was completed using employees’ work email addresses which were then entered into separate excel spreadsheets to create five mailing lists. The 1,403 employees in the default condition were ‘opted in’ (i.e., pre-registered), at random, and in equal proportions, to attend one of the three scheduled events. 467 employees were pre-registered for the sign language event and 468 for the cooking and human rights events respectively.

All five groups received an initial email from the well-being committee on November 4th inviting them to register for one or more of the three events. All five groups also received a follow-up email on November 15th, five days before the first event, reminding them to register if they had not already done so. In line with nudge RCT standard practice (for example, see Halpern, 2015), the participants were not explicitly made aware that they were part of a study.23 Employees who self-registered (or who were pre-registered by virtue of being in the default condition) were sent an electronic Skype link to the event 24 hours before the event was due to take place.24 They were instructed to log-in to the event using their work email address. Only registered employees could attend.

Registration data was collected by the organisation’s well-being committee using the registration emails sent to the committee in the case of the control group, and the embedded registration link in the case of the simplification, social proof, and messenger groups. All employees in the default condition were automatically registered for the event to which they had been randomly assigned unless they

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23 However, in adherence with ethics committee requirements, the emails included some additional text at the end of the email which informed the recipients that the well-being committee would be reviewing the registration and participation rates associated with these events in order to improve engagement with well-being committee initiatives and advising them to email the committee if they wished to participate in the events without having their registration status recorded. Only two employees chose to exercise this option.

24 In line with standard operating procedures, the invitation emails also informed all recipients that the events would be recorded and that the recordings would be made available for them to watch at a time convenient to them. Assuming that recipients actually read this section of the email, it is likely that this may have influenced ‘live’ attendance rates. Employees did not have to register to subsequently watch the recordings which were posted on the organisation’s well-being website. As of 4/2/2022, only 6 employees had accessed the recorded events (sign language: 5 views; cookalong: 3 views).
actively chose to switch events (16 employees) or to opt out completely using the corresponding registration links (70 employees). Attendance data was collected by recording the number of employees who logged into the events using their work-email addresses as instructed.\textsuperscript{25} Registration and attendance data were matched to the treatment conditions, anonymised, and send to the research team.

8. Results

8.1 Registrations

In total, 24.4\% of employees (1,708) registered for one or more event. 6.6\% of non-pre-registered employees (367) self-registered\textsuperscript{26}. All employees in the default condition (1,403) were pre-registered to one of the three events on a random basis. 86 employees in the default condition chose to opt-out of their pre-assigned event, with 16 registering for another event and 70 opting out entirely.\textsuperscript{27} The effective registration rate for the default group was thus 95.6\%. Excluding pre-registered employees, the sign language event attracted the highest level of registrations (257), followed by the cook-along (228), with the human rights talk proving least popular (145). Figure 2 shows the registration rates by condition.

\textbf{Figure 2. Registration rates by condition}

\textsuperscript{25} This was not universally adhered to, resulting in a failure to identify 39 attendees who are excluded. 
\textsuperscript{26} 3.5\% (214) self-registered for one event, 1.7\% (107) for two events and 0.7\% (46) for all three events. 
\textsuperscript{27} 23 employees who were opted into the cooking event, 38 employees who were opted into the human rights event and 25 employees who were opted into the sign language event opted out completely or switched events.
Table 1 shows the registration rates by condition. The first row compares the four treatment groups of simplification, messenger (simplification + messenger), social proof (simplification + social proof) and default (simplification + default) to the control.

Table 1. Differences in registrations by condition

<table>
<thead>
<tr>
<th>Base Condition</th>
<th>Simplification</th>
<th>Simplification + Messenger</th>
<th>Simplification + Social Proof</th>
<th>Simplification + Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (5%)</td>
<td>6.3%</td>
<td>7.7%***</td>
<td>7.2%**</td>
<td>95.2%***</td>
</tr>
<tr>
<td>Simplification (6.3%)</td>
<td>7.7%</td>
<td>7.2%</td>
<td></td>
<td>95.2%***</td>
</tr>
</tbody>
</table>

Note: Pearson chi-square test for differences in number of employees registering between control or simplification and each treatment condition. *** indicates p-value <.01; ** indicates p-value <.05; * indicates p-value <.1. n=6,998

Using a Pearson chi-square test reveals significantly higher registrations rates for the messenger, social proof, and default groups, but not for the simplification
group, relative to the control. Note that, by design, the default condition exhibits the highest registration rate.

To isolate the impact of overlaying an additional nudge onto the simplification nudge, row two of Table 1 compares the registrations rates for the messenger, social proof, and default treatments to registrations in the pure simplification treatment. While registrations in the simplification + messenger and simplification + social proof groups are higher than those in the pure simplification group, the increases are not statistically significant. This suggests that while overlaying the messenger or social proof nudges may amplify the effect of simplification, by an additional 1.4 and 0.9 percentage points respectively, it would appear that simplification is the key driver of the increase. As expected, registrations for the default group are significantly higher than those of the simplification group, which reflects the low numbers of employees who elected to completely opt out and de-register from their assigned event.

One potential issue which may impact these results concerns the analysis of rare events. Relatively small proportions of employees either registered or attended the events leading to a large number of zeros in the binary outcomes. As noted by King and Zeng (2001), the use of chi-square tests may underestimate the probability of rare events, thus potentially biasing the results. Thus, we also use a penalised logistic model to reduce any small sample bias that is associated with maximum likelihood estimation when there is a small number of cases in the rarer of two binary outcomes, in our case, the registration rate.

Table A2 in the appendix presents the marginal effects on registration of being in each treatment group relative to the control group. The results reflect those presented in Table 1 and are summarised in Figure 3. The penalised logit analysis shows that being allocated to any of the treatment groups increased the percentage of employees who registered for one or more events relative to the control, although the simplification treatment effect is not significant. As before, we find the largest marginal effect for the default treatment.

Figure 3. Registrations – marginal treatment effects (n=6,998)
In sum, the findings allow us to partially accept our hypothesis that nudges increase registration rates, in that while the messenger, social proof and default nudges significantly increase registration rates relative to the control group, the simplification nudge, on its own, does not. In relation to our hypothesis regarding combined nudges, we find no evidence that combined nudges are more effective than individual nudges, with the exception of the default treatment.

8.2 Attendance

In total, 4.1% of employees (289 individuals) attended one or more event, representing 2.8% of self-registered employees and 9.5% of employees in the default condition. This compares to an average attendance rate of approximately 200 employees (2-3%) for previous online events organised by the well-being committee. In total, 3.3% (234) attended one event, 0.7% (50) attended two events and 0.1% (5) attended all three events. The cook-along event attracted the highest attendance (158), followed by the sign language event (121), with the human rights themed event, once again, proving least popular (70).

Figure 4 displays attendance by condition. It shows that the simplification and social proof groups report lower attendance than the control, whereas the opposite is the case for the messenger and default groups.

Figure 4. Attendance rates by condition
Table 2 tests for differences across the groups using Pearson chi-square tests. The default treatment alone results in significantly higher attendance rates, more than trebling the attendance rate reported by the control group (9.5% v 2.8%).

### Table 2. Differences in attendance rates by condition

<table>
<thead>
<tr>
<th>Base Condition</th>
<th>Simplification n</th>
<th>Simplification n + Messenger</th>
<th>Simplification + Social Proof</th>
<th>Simplification + Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (2.8%)</td>
<td>2.0%</td>
<td>3.8%</td>
<td>2.5%</td>
<td>9.5%***</td>
</tr>
<tr>
<td>Simplification</td>
<td>3.8%***</td>
<td>2.5%</td>
<td></td>
<td>9.5%***</td>
</tr>
</tbody>
</table>

Note: Pearson chi-square test for differences in number of employees attending between control or simplification and each treatment condition *** indicates p-value <.01 ** indicates p-value <.05; * indicates p-value <.1; n=6,998

Row two of Table 2 attempts to isolate the impact of layering the messenger, social proof, and default nudges on top of the simplification nudge. All three treatments increase attendance relative to the pure simplification condition, significantly so in the case of the messenger and default nudges. This suggests
that, while simplifying the registration process may increase the registration rate, the simplification nudge is not sufficient on its own to produce significantly higher attendance rates compared to the control group. Table A3 in the appendix presents the marginal effects associated with each condition using a penalised logistic regression model which are summarised in Figure 5.

**Figure 5. Attendance – marginal treatment effects by condition (n=6,998)**

In sum, we find only partial support for our hypothesis that all four nudges would increase attendance, such that the default condition is the only treatment which produces a significant increase in attendance.

### 8.3. Intention-behaviour gap

The failure of registrations to convert into attendance is consistent with the well-documented intention-behaviour gap discussed in Section 3. As hypothesised, the majority of the 1,708 employees who were registered for an event, failed to attend, with just 16.9% (289) of registered employees converting their intentions into behaviour. At the event level, 17.3% of registrations converted into actual attendance. The event itself appears to influence the size of the gap, with arguably the most ‘fun’ event, the cook-along, registering the highest conversion rate (21.7%) and the human rights event registering the lowest conversion rate (11.7%). This finding also holds for the default group, with the event for which they were pre-registered influencing the likelihood of attendance (p<.001). Once again, the cook-along event was associated with the highest level of conversion (15.2%), whereas only 8.7% and 7.7% of employees in the default group who were pre-
registered for the sign language and human rights events respectively, attended those events. Furthermore, this does not appear to be explained by differential opt-out rates (see Section 6.8.1).

**Table 3** repeats the analysis in Table 1 but restricts the sample to the 1,708 employees who registered for any one of the three events. This allows us to test the impact of the nudges on attendance, conditional on registration. We use Pearson chi-square tests to compare the intention-behaviour gaps across conditions.

**Table 3. Difference in attendance rates conditional on registration by condition**

<table>
<thead>
<tr>
<th>Base Condition</th>
<th>Simplification</th>
<th>Simplification + Messenger</th>
<th>Simplification + Social Proof</th>
<th>Simplification + Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (55.7%)</td>
<td>31.8%***</td>
<td>49.1%</td>
<td>34.7%***</td>
<td>9.8%***</td>
</tr>
<tr>
<td>Simplification (31.8%)</td>
<td>49.1%***</td>
<td>34.7%</td>
<td>9.8%***</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Pearson chi-square test for differences in number of registered employees who actually attended the event for which they registered between control or simplification and each treatment condition. *** indicates p-value <.01; ** indicates p-value <.05; * indicates p-value <.1; n=1,708*

While the control group reported the lowest rate of self-registrations (5%), it is associated with the highest conversion rate into actual attendances, with 55% of those who self-registered for one or more events actually attending. **Table 3** shows that none of the other treatments were more effective at closing the intention-behaviour gap than the control. As the control group had to overcome a cumbersome registration process, this additional effort, which increased the sunk cost of registering, may account for their reduced intention-behaviour gap.

Despite a low opt-out rate, the intention-behaviour gap for the default group is considerably larger than that reported in the other treatment groups, with only 9.8% of pre-registered employees attending their registered event. This likely reflects the fact that these employees did not actively choose to register for an event. The very act of being pre-registered may also have triggered an element of reactance, alternatively, the low conversion rate may simply reflect a lack of engagement on the employees’ part with the message as a whole. The messenger treatment comes closest to matching the control group, with a conversion rate of
49.1%. In sum, these findings allow us to accept our hypothesis that the majority of registrations fail to convert into attendances. Thus, these results suggests that the nudges encouraged employees to register, but not to actually attend.

8.4. Reminder effects

The reminder email, which was sent a few days prior to the first event, was designed to encourage employees to register for an event. The default group has been excluded from this analysis, given that all employees in this group were automatically pre-registered and were therefore not required to take any further action unless they wished to register for additional events.

Figure 6. Distribution of self-registrations by registration date

As Figure 6 illustrates, the largest number of self-registrations occurred on the day that the reminder email was sent out (15/11/2022), with the second largest occurring on the day that the initial email was delivered. Registrations tapered off fairly rapidly thereafter. As hypothesised, the reminder email increased registrations across all conditions (control, simplification, messenger, and social proof). Of the 367 employees who self-registered for one or more events, 46.3% (170) registered prior to receiving the reminder email and 53.7% (197) registered after receiving the reminder email.
As all employees received a reminder, we cannot explicitly test the effect of receiving a reminder versus not receiving a reminder. However, given that the reminders received by each condition varied in content, typically mirroring the initial invitation (see Figure A3 in the appendix), we run a Pearson chi-square analysis to test for differences in the percentage of employees in each condition who self-registered after receiving the reminder email. We find a significant difference across conditions ($p=.009$) (see Table A4 and Table A5 in the appendix). Self-registrations in all three treatment groups (simplification, messenger and social proof) more than doubled after the reminder was issued, whereas the increase reported for the control was considerably smaller. It is, however, not possible to isolate the effect of the reminder from the treatment itself.

Given that the social proof information was only contained in the reminder email, we attempt to isolate the effect of social proof using a Pearson chi-square test to examine differences in the percentage of employees in the social proof group who registered after receiving the reminder email versus the control. We find a significant difference ($p=.004$), with 59% of social proof group registrations occurring after the reminder was received, compared to just 37% for the control.

Finally, we examine whether the reminder increased attendance rates. Figure A4 sets out the marginal effects of registering before or after receiving the reminder email on attendance rates. Reminders do not appear to have been effective in terms of driving attendance. Individuals who registered after a reminder was sent out were 8.7% less likely to attend one or more of the events than individuals who registered prior to the reminder being sent. Employees who registered earlier may be more motivated to attend the events than those who required the reminder to initiate their registration.

### 8.5 Heterogeneity analysis

Previous research has suggested that participation in worker well-being initiatives may vary systematically with personal characteristics such as gender, age, education etc. (Section 4.7). To investigate whether individual factors may predict firstly, attendance at wellness events and secondly, susceptibility to nudges, we repeat the above analysis for men/women and for senior/junior employees in all conditions.²⁸

#### 8.5.1 Gender

²⁸ While we do not have data on age, given the hierarchical organisational structure and reported low rates of staff turnover in the organisation, seniority is likely to be positively correlated with age and thus provides us with a useful indication of the likely effects of nudges on older employees. We use a binary seniority variable, which codes employees of CO/EO/Other grades = 0 (“Junior”; 72.4%) and all other employees = 1 (“Senior”; 27.6%).
Overall, we find little evidence of gender-related treatment heterogeneity for registrations or attendances. In line with previous research (Beck et al., 2016; Hall et al., 2017), women are more likely to self-register than men (8.1% versus 3.9%; \(p<.001\)). Women are also significantly more likely to attend, with 5.0% of women attending one or more of the events, compared to 2.6% of men (\(p<.001\)). These results hold for all three events. These results are described in more detail below.

8.5.1.1 Registrations

Table 4 presents the treatment effects on registrations by gender and condition. Both treated women (30.9% v 5.8%; \(p<.001\)) and men (26.4% v 3.7%; \(p<.001\)) are significantly more likely to have registered for one or more events than their control counterparts. However, while all nudge treatments significantly increase registrations by women (relative to women in the control), the default nudge is the only treatment which significantly increases registrations by men (relative to their control counterparts). This suggests that while women may be more impacted than men by behavioural nudges in terms of registrations, defaults are equally effective at increasing registrations rates amongst men and women.\(^{29}\)

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Simplification</th>
<th>Simplification + Messenger</th>
<th>Simplification + Social Proof</th>
<th>Simplification + Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Women</strong></td>
<td>5.8%</td>
<td>8.1%*</td>
<td>9.5%***</td>
<td>9.0%**</td>
<td>95.8%***</td>
</tr>
<tr>
<td><strong>Men</strong></td>
<td>3.7%</td>
<td>3.1%</td>
<td>4.6%</td>
<td>4.4%</td>
<td>95.1%***</td>
</tr>
</tbody>
</table>

Note: Pearson chi-square test for differences in number of employees registering between control and each treatment condition. *** indicates \(p\)-value <.01; ** indicates \(p\)-value <.05; * indicates \(p\)-value <.1. N= 6,998

To further investigate the gender effects of nudges, we run a regression with ‘registered’ as the dependent variable, ‘treated’ as the independent variable, and ‘gender’ and a ‘treatment*gender’ interaction term as controls (see column 1 in Table A6 in the appendix). The interaction term is non-significant (\(p=.174\)) suggesting there is no evidence of heterogeneity by gender. Furthermore, to investigate whether women / men may be more susceptible to particular nudges, we regress registrations on control and on each individual treatment in turn and on gender, including an interaction term (see Figure A5(1)). For all treatments, with the exception of simplification, the interaction coefficients are not significant.

\(^{29}\) Table A8 in the appendix sets out the marginal effects for registrations by gender and condition.
The interaction coefficient for men in the simplification treatment is negative and significant ($p=.079$), suggesting that simplification may be more effective at increasing registrations amongst women than men.

### 8.5.1.2 Attendance

Table 5 presents the differences between the attendance rates of men and women by condition.

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Simplification</th>
<th>Messenger</th>
<th>Social Proof</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>3.6%</td>
<td>2.6%</td>
<td>4.8%</td>
<td>2.9%</td>
<td>11.2%***</td>
</tr>
<tr>
<td>Men</td>
<td>1.5%</td>
<td>1.0%</td>
<td>2.1%</td>
<td>1.8%</td>
<td>6.6%***</td>
</tr>
</tbody>
</table>

Note: Pearson chi-square test for differences in number of male and female employees attending between control and each treatment condition. *** indicates $p$-value <.01; ** indicates $p$-value <.05; * indicates $p$-value <.1. N = 6,998

We find little evidence of gender heterogeneity. Both treated men and women are significantly more likely to attend an event than their control counterparts. 5.4% of treated women attended one or more events compared to 3.6% of women in the control ($p=.031$). 2.9% of treated men attended one or more event, corresponding to an increase of 1.4 percentage points ($p=.069$) over the control (1.5%). The default nudge is the only treatment which produces a significant increase in attendance for both men and women ($p<.001$). While the proportion of women attending in the default group is larger than that of men attending in the default group, relative to their respective control groups this constitutes a proportionally larger increase for men (x 3.4 increase) than for women (x 2.1 increase) in the default group.

To further investigate gender effects, we run a regression with attendance as the dependent variable, ‘treated’ as the independent variable, and ‘gender’ and a ‘treatment*gender’ interaction term as controls (see column 1 of Table A7 in the appendix). While the gender term is significant, the treatment*gender interaction term is not ($p=.679$), suggesting that there is no significant difference in how men

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30 Table A9 in the appendix sets out the marginal effects for attendance by gender and condition. 31 100 women in the default group attended versus 31 women in the control. 34 men in the default group attended versus 8 men in the control.
and women respond to nudges overall in terms of attendance. We also investigate gender heterogeneity in relation to specific nudges (see Figure A5(2)) but find no significant effects.

8.5.2 Seniority
We also examine whether more senior employees are more likely to register and/or attend the EDI wellness events and whether they may be more or less susceptible to nudging. We find no evidence of seniority-related heterogeneity for registrations or attendances. These results are described in more detail below.

8.5.2.1 Registrations
Senior employees are significantly more likely to register for an event than more junior employees (26.3% v 23.6%; \( p = .014 \)). Senior employees are also more likely to self-register (8.8% versus 5.6%; \( p < .001 \)) and attend one or more of the events (5.5% v 3.6%; \( p < .001 \)) than junior employees.

Table 6 presents the differences between the registration rates of junior and senior employees by condition. Nudges have a significantly positive impact on the registration rates of both groups, with 28.6% of treated junior employees registered for at least one event, compared to 4.2% of non-treated junior employees (\( p < .001 \)) and 31.0% of treated senior employees registering versus 7.3% of non-treated senior employees (\( p < .001 \)).

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Simplification</th>
<th>Messenger</th>
<th>Social Proof</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior</td>
<td>4.2%</td>
<td>5.8%*</td>
<td>6.8%***</td>
<td>5.8%*</td>
<td>96.1%***</td>
</tr>
<tr>
<td>Senior</td>
<td>7.3%</td>
<td>7.5%</td>
<td>10.0%</td>
<td>10.8%*</td>
<td>94.4%***</td>
</tr>
</tbody>
</table>

Note: Pearson chi-square test for differences in number of employees registering between control and each treatment condition. *** indicates \( p\)-value < .01 ; ** indicates \( p\)-value < .05; * indicates \( p\)-value < .1.

All four treatments significantly increased the registration rate of junior employees relative to their control counterparts, whereas social proof and default

---

32 We also investigate heterogeneity in individual treatment effects and find no significant interaction terms.
33 The senior category is evenly distributed amongst the control and treatment groups (see Table A1 in the appendix).
34 Table A12 in the appendix sets out the marginal effects for registrations by seniority and condition.
are the only nudges which significantly increased the registration rate of senior employees relative to senior employees in the control group. This suggests that junior employees may be marginally more susceptible to nudges.

To further investigate seniority effects on registration, we run a regression analysis with ‘registered’ as the dependent variable, ‘treated’ as the independent variable, and ‘senior’ and a ‘treatment*senior’ interaction term as controls. As shown in column 1 in Table A10 in the appendix, there is no evidence of heterogeneity overall. To investigate whether junior / senior employees may be more susceptible to particular types of nudges, we regress registrations on control and each individual treatment in turn and on seniority, including an interaction term (see Figure A6(1)). For all treatments, with the exception of the default, the interaction coefficients are non-significant. The interaction coefficient for senior employees in the default group is negative and significant (p=.014), suggesting that defaults may be more effective at increasing registrations amongst junior employees.

8.5.2.2 Attendance
In terms of attendance, we also find evidence of a significant positive association between seniority and attendance, with 5.5% of senior employees attending at least one event, compared to 3.7% of junior employees (p<.001). However, Pearson chi-square tests suggest that nudges may have a proportionally larger effect on junior employees. The use of nudges almost doubled the attendance rate amongst junior employees, with 4.0% of treated junior employees attending at least one event, versus 1.9% of junior employees in the control (p=.001). While the use of nudges is also associated with a higher average attendance rate amongst senior employees (5.6% v 5.2% in the control), the difference is not significant (p=.746).

In terms of treatment effects across conditions, we find a similar pattern for junior and senior employees, with larger effects reported for junior employees (see Table 7). The messenger treatment has a greater influence on junior employees’ attendance, producing a statistically significant increase of 1.7 percentage points (p=.020). The default treatment is the only nudge which significantly boosts attendance in both groups. While the proportion of senior employees attending in the default group is larger than the proportion of junior employees attending in the default group, relative to their respective control groups this constitutes a proportionally larger increase for junior employees (x 3.5 increase) than for senior employees (x 1.3 increase).

Table A13 in the appendix sets out the marginal effects for attendance by seniority and condition.

35
Table 7. Mean attendance by condition and seniority

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Simplification</th>
<th>Messenger</th>
<th>Social Proof</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior</td>
<td>1.9%</td>
<td>1.9%</td>
<td>3.6%**</td>
<td>2.0%</td>
<td>8.5%***</td>
</tr>
<tr>
<td>Senior</td>
<td>5.2%</td>
<td>2.2%**</td>
<td>4.4%</td>
<td>3.7%</td>
<td>12.0%***</td>
</tr>
</tbody>
</table>

Note: Pearson chi-square test for differences in number of employees attending between control and each treatment condition. *** indicates p-value <.01; ** indicates p-value <.05; * indicates p-value <.1. Numbers in italics refer to senior and numbers in non-italics refer to junior employees. N = 6,998

To further investigate seniority effects on attendance, we run a regression with 'attendance' as the dependent variable, ‘treated’ as the independent variable and ‘seniority’ and a ‘seniority*treatment’ interaction term as controls (see column 1 of Table A11 in the Appendix). While the treated and seniority terms are significant, the treatment*senior interaction term is not.

The results allow us to accept our hypothesis of null effects regarding heterogenous effects with respect to both the registration and attendance outcomes. While our findings suggest that there may be some significant differences in how women and men and junior and senior employees respond to individual nudges versus their control counterparts, the overall interaction effects are not significant. In particular, the default nudge significantly increases the registration and attendance rates of all sub-groups analysed relative to the control group.

9. Discussion

This trial addresses a simple question with important implications for behavioural economics and organisations, namely can employees be nudged into participating in employee-focused wellness events? The results demonstrate the importance of the default with regards to changing behaviour. In particular, automatically defaulting employees into attending events, while giving them the autonomy to opt out if desired, leads to significantly higher attendance rates.

36 We also investigate heterogeneity in individual treatment effects (see Figure A6(2)) and find no significant interactions with the exception of simplification, which is associated with a negative interaction term for senior employees (p=.045), suggesting that simplification may be more effective at increasing attendance amongst junior employees.
The finding that the default nudge significantly increased attendance by almost seven percentage points suggests that such nudges may offer considerable potential as an intervention aimed at boosting employee participation in WWPs. Furthermore, the effects were robust across all sub-groups, suggesting that defaults may have wide applicability for organisations seeking a low cost, light-touch tool to increase employee participation. We attribute the effectiveness of the default nudge to its ‘stickiness’. Just 4.7% of pre-registered employees elected to opt out of their assigned event, despite the relatively low barriers to doing so. While further research is required to fully understand the mechanisms which might explain this, we speculate that both the nature of the events themselves and the workplace environment may have played a role. The needs analysis conducted prior to the intervention design showed that a substantial portion of employees often feel overwhelmed and exhausted by their workload. Thus, they may be more susceptible to the cognitive biases of inertia and procrastination, and thus to the power of defaults. In addition, the possibility that these EDI wellness events may be perceived as relatively minor events, with attendance (or lack thereof) unlikely to result in serious consequences, may cause employees to reflect less on their underlying preferences for these events, thus potentially amplifying the power of defaults (Banerjee and John, 2021).

The results also show that some nudges may be more effective at boosting employee intentions (registration) rather than actual behaviour (attendance). All four nudges increased the registration rate relative to the control group, although in the case of simplification the increase was not significant. As simplifying the invitation by incorporating an embedded link did not, on its own, produce a significant effect, while using a ‘simplification plus’ treatment did, this suggests that simplification alone may be too subtle an intervention, thus requiring the overlaying of an additional nudge to amplify its effect.

The results caution against relying exclusively on nudges to target normative behaviour by influencing motivation or behavioural intentions. With the exception of the default treatment, none of the nudges were effective at increasing attendance, despite three of the four nudges significantly increasing registrations. Thus, these nudges failed to close the substantial intention-behaviour gap. Evidence that the control group reports the highest ‘conversion rate’ of registrations into attendance, and the simplification group the lowest, may have inadvertently led to self-selection, with only employees who were already highly intrinsically motivated and/or interested in the events, choosing to undergo the cumbersome standard registration process. Reducing the barriers to registration for all other groups, may have reduced their investment in the events, thus making them less likely to follow through on their initial intentions. This suggests that
nudges (other than defaults) which specifically target intention-behaviour gaps in employee participation need to be developed.

Alternatively, organisations could focus on removing structural barriers to attendance (for example, by holding the events during work hours rather than lunch time) or by making the events themselves more appealing or relevant so that they effectively ‘sell themselves’ to employees. The idea that the nature of the events themselves may play a role in participation is supported by the different conversion rates for the three events, with the human rights talk attracting the lowest conversion rate. It is possible that employees sign-up for ostensibly worthy (but not necessarily appealing) EDI wellness events as they feel that they ‘should’ attend, but that the resulting gap between their intentions and true underlying preferences erodes their motivation to actually show up.

The design of the messenger and social proof nudges may account for their failure to close the intention-behaviour gap. As it was not feasible for the invitation or reminder emails to be sent directly from the messenger’s email address, its effect may have been diluted. It is also possible that the wrong messenger was selected. Although the well-being committee were able to testify to the messenger being well-known and well-liked within the organisation, the use of a female messenger may have reduced her perceived similarity to male employees (or disproportionately increased her appeal to female employees). This may also explain why the messenger treatment significantly increased registrations for women but not for men. Alternatively, her seniority may have diminished her appeal by reducing peer effects.

We speculate that the failure of the social proof nudge to increase attendance relates to the nature of the social proof provided. While the figure included in the follow-up email (“231 of your colleagues have already expressed their support for this important initiative by securing their places”) is higher than the historic average attendance rate at other online wellness events in the organisation, employees may systematically over-estimate the number of employees who typically attend these events. Disclosing that only 231 out of 7,000 co-workers had registered, may have inadvertently produced a boomerang effect, by providing proof that not attending was, in fact, the majority course of action. A dynamic social norm, which positioned employee participation as admittedly small, but nonetheless increasing relative to previous events, may have proved more effective as recently evidenced in Milkman et al.’s (2021a) mega-study.

37 However, when we regress registrations on the messenger treatment and gender, the interaction coefficient is non-significant.
An alternative explanation for the lack of effect may be that the social proof information was only contained in the reminder email. It is possible that employees who had already decided that they did not want to attend (or who had already decided to attend) may have ignored the reminder. Alternatively, given that the social proof information was positioned in the middle of the email, it may have been insufficiently salient and may have been missed. Another possibility is that the social proof nudge may have triggered psychological reactance if employees felt coerced or manipulated into attending or if attending was incompatible with their preferences around wellness events (Tagliabue, 2021).

The study has some limitations which could potentially be addressed by future research. In relation to nudge design, future studies could benefit by examining the impact of using different types of messengers and/or social norms (for example dynamic or personalised norms). It would also be insightful to collect additional survey data on employees’ prior expectations of attending wellness events and/or experimental data on how employees process information provided by authority and peer figures within their organisation. A further limitation is that combining simplification with the messenger and social norm nudges, and sending all conditions the reminder email, precluded us from isolating individual nudge effects. Future large-scale, multi-arm RCT designs could shed light on the effects of combining different nudges by including pure/combined and reminder/non-reminder treatment arms in the same study.

Another potential issue concerns the analysis of rare events. However, as we show, the results using penalised logistic models are largely consistent with the main results. A further limitation relates to the generalisability of our findings to other organisational contexts (for example private sector v public sector; Ireland v the rest of the world; white-collar v blue-collar employees etc.). As with all nudge RCTs, external validity would be enhanced by further studies which sought to replicate our results in different contexts.

Finally, it is possible that our results may be event specific. The events which form the core of this study are not traditional well-being events. Rather, they aimed to increase awareness of EDI issues in the organisation and bring employees together to reduce social isolation and increase social bonding by learning a new skill in a relaxed, group setting. It is possible that interventions which directly target well-being (e.g., a stress management programme) could be more susceptible to nudges. That said, there is evidence that improved EDI is associated with improved well-being (Huong, Zheng and Fujimoto, 2016; Saunders, 2015) and produces similar outcomes for organisations e.g., improved job satisfaction (Fulford, 2005).
In addition, prior events organised by the well-being committee, which specifically focused on promoting well-being, had similar, if not lower, attendance rates.

In conclusion, our study demonstrates that default nudge techniques may help organisations to increase employee attendance at WWP events. Nudges are not, however, without their issues. They are not always effective and can backfire. Even when they do work, the effects may not scale up or replicate in different contexts. Furthermore, the ethical implications of using nudges in the workplace need to be considered. Opting employees into EDI wellness events implicitly assumes that participation in such events is welfare enhancing. This may not necessarily always be the case. Finally, while the effect size for the default treatment is large, post-treatment participation rates were still relatively low. We share the view of Benartzi et al. (2017) that nudges should be viewed not as panaceas, but as ‘cost-effective complements’. While our findings suggest that the potential for nudges to boost employee participation in WWPs should be further explored, this should not detract from organisations helping to ensure that the accessibility, content, and timing of their wellbeing events meet their employees’ needs.

Acknowledgements
We would like to thank Liam Delaney, Margaret Samahita and Kate Laffan for their detailed comments. We are also grateful to Shane Timmons, Leonhard Lades, David Madden, Benjamin Elsner, the participants of the UCD PhD economics seminar and Behavioural Science Lab series for their helpful suggestions. This study is approved by the UCD Human Research Ethics Committee. Funding from the Irish Research Council (GOIPG/2020/59) is gratefully acknowledged.

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Appendix

Figure A1: Grade Structure in the Irish Civil Service
Table A1. Sample characteristics (full sample and by condition)
<table>
<thead>
<tr>
<th>Gender</th>
<th>Control</th>
<th>Simplification</th>
<th>Messenger</th>
<th>Social Proof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Number of Employees (% of total)</td>
<td>Number of Employees (% of condition)</td>
<td>Number of Employees (% of condition)</td>
<td>Number of Employees (% of condition)</td>
</tr>
<tr>
<td>Female</td>
<td>4,372 (62.5%)</td>
<td>859 (61.4%)</td>
<td>881 (62.9%)</td>
<td>856 (61.3%)</td>
</tr>
<tr>
<td>Male / Other</td>
<td>2,618 (37.5%)</td>
<td>540 (38.6%)</td>
<td>519 (37.1%)</td>
<td>541 (37.8%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade</th>
<th>Control</th>
<th>Simplification</th>
<th>Messenger</th>
<th>Social Proof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade</td>
<td>Number of Employees (% of total)</td>
<td>Number of Employees (% of condition)</td>
<td>Number of Employees (% of condition)</td>
<td>Number of Employees (% of condition)</td>
</tr>
<tr>
<td>Clerical Officer</td>
<td>2,653 (37.9%)</td>
<td>513 (36.7%)</td>
<td>562 (40.1%)</td>
<td>528 (37.8%)</td>
</tr>
<tr>
<td>Executive Officer</td>
<td>2,272 (32.5%)</td>
<td>483 (34.4%)</td>
<td>439 (31.3%)</td>
<td>440 (31.4%)</td>
</tr>
<tr>
<td>Other</td>
<td>80 (1.1%)</td>
<td>17 (1.2%)</td>
<td>9 (0.6%)</td>
<td>21 (1.5%)</td>
</tr>
<tr>
<td>Administrative Officer</td>
<td>328 (4.7%)</td>
<td>59 (4.2%)</td>
<td>60 (4.3%)</td>
<td>66 (4.7%)</td>
</tr>
<tr>
<td>Higher Executive Officer</td>
<td>960 (13.7%)</td>
<td>194 (13.9%)</td>
<td>175 (12.5%)</td>
<td>187 (13.3%)</td>
</tr>
<tr>
<td>Assistant Principal</td>
<td>549 (7.8%)</td>
<td>102 (7.3%)</td>
<td>124 (8.9%)</td>
<td>108 (7.7%)</td>
</tr>
<tr>
<td>Principal Officer</td>
<td>133 (1.9%)</td>
<td>29 (2.1%)</td>
<td>28 (2.0%)</td>
<td>26 (1.8%)</td>
</tr>
<tr>
<td>Assistant Secretary / Commissioner</td>
<td>23 (0.3%)</td>
<td>2 (0.1%)</td>
<td>3 (0.2%)</td>
<td>5 (0.4%)</td>
</tr>
</tbody>
</table>

\[ p-value = .614 \]
<table>
<thead>
<tr>
<th>Seniority</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior (CO/EO/ Other)</td>
<td>4,925</td>
<td>1,013</td>
<td>998</td>
<td>1,010</td>
<td>989</td>
<td>995</td>
</tr>
<tr>
<td></td>
<td>(71.2%)</td>
<td>(72.4%)</td>
<td>(71.3%)</td>
<td>(72.1%)</td>
<td>(70.8%)</td>
<td>(70.9%)</td>
</tr>
<tr>
<td>Senior (AO grade or higher)</td>
<td>1,993</td>
<td>386</td>
<td>401</td>
<td>390</td>
<td>408</td>
<td>408</td>
</tr>
<tr>
<td></td>
<td>(28.8%)</td>
<td>(27.6%)</td>
<td>(28.7%)</td>
<td>(27.9%)</td>
<td>(29.2%)</td>
<td>(29.1%)</td>
</tr>
</tbody>
</table>
Figure A2. Initial email invitations for each condition

**Control Group**

Colleagues,

Revenue’s Diversity and Inclusion Week is taking place **November 15th -19th**. We are excited to announce our live events planned for the week:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday 16th</td>
<td>12.30-13.00</td>
<td>Introduction to Irish Sign Language</td>
<td>A 30-minute introduction to sign language with our colleagues Eddie Redmond and Grainne Mackin</td>
</tr>
<tr>
<td>Wednesday 17th</td>
<td>12.00-13.00</td>
<td>Cooking Demonstration</td>
<td>Join Ronan Dillon from Healthy Workforce Ireland and learn how to prepare some quick easy and tasty meals with everyday ingredients. Accompanied by ISL interpreter.</td>
</tr>
<tr>
<td>Friday 19th</td>
<td>12.30-13.00</td>
<td>Lunch and Learn – Human Rights and Equality</td>
<td>A 30-minute lunchtime talk from Training Branch on Public Sector Equality and Human Rights Duty with Mary Gregg (RTB) and Sharon Briody (CSD)</td>
</tr>
</tbody>
</table>

If you would like to register your interest for any of these webinars, please click on [here](#).

If you have any questions relating to diversity and inclusion week please email the committee csd-edi21@revenue.ie

Regards,

*The Equality, Diversity and Inclusion Committee.*

RevWell will review the registration and participation rates in these events to improve engagement with initiatives. If you do not wish your registration status to be recorded, please email csd-edi21@revenue.ie indicating that you wish to attend the event, but do not wish
to have your registration status recorded. The webinars will be recorded, and the video will be made available to watch back at a time convenient to you.

Treatment Group 1 (Simplification)

Colleagues,

Diversity and Inclusion Week is taking place November 15th -19th. We are excited to announce our live events planned for the week:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday 16th</td>
<td>12.30-13.00</td>
<td>Introduction to Irish Sign Language</td>
<td>A 30-minute introduction to sign language with our colleagues Eddie Redmond an ISL user, Niamh Curtis (CSD) and DLO Grainne Mackin</td>
</tr>
<tr>
<td>Wednesday 17th</td>
<td>12.00-13.00</td>
<td>Cooking Demonstration</td>
<td>Join Ronan Dillon from Healthy Workforce Ireland and learn how to prepare some quick easy and tasty meals with everyday ingredients. Accompanied by ISL interpreter.</td>
</tr>
<tr>
<td>Friday 19th</td>
<td>12.30-13.00</td>
<td>Lunch and Learn – Human Rights and Equality</td>
<td>A 30-minute lunchtime talk from Training Branch on Public Sector Equality and Human Rights</td>
</tr>
</tbody>
</table>
If you would like to register your interest for any of these webinars, please click on the link below:

If you have any questions relating to diversity and inclusion week please email the committee csd-edi21@revenue.ie

Regards,
The Equality, Diversity and Inclusion Committee.

will review the registration and participation rates in these events to improve engagement with initiatives. If you do not wish your registration status to be recorded, please email csd- indicating that you wish to attend the event, but do not wish to have your registration status recorded. The webinars will be recorded, and the video will be made available to watch back at a time convenient to you.

**Treatment Group 2 (Messenger)**

Colleagues,

Diversity and Inclusion Week is taking place November 15th -19th. I’m sure you’ll agree that this is an important initiative that I, for one, am really
looking forward to. I am excited to announce our live events planned for the week:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday 16th</td>
<td>12.30-13.00</td>
<td>Introduction to Irish Sign Language</td>
<td>A 30-minute introduction to sign language with our colleagues Eddie Redmond an ISL user, Grainne Mackin.</td>
</tr>
<tr>
<td>Wednesday 17th</td>
<td>12.00-13.00</td>
<td>Cooking Demonstration</td>
<td>Join Ronan Dillon from Healthy Workforce Ireland and learn how to prepare some quick easy and tasty meals with everyday ingredients. Accompanied by ISL interpreter.</td>
</tr>
<tr>
<td>Friday 19th</td>
<td>12.30-13.00</td>
<td>Lunch and Learn – Human Rights and Equality</td>
<td>A 30-minute lunchtime talk from Training Branch on Public Sector Equality and Human Rights Duty with Mary Gregg (RTB) and Sharon Briody (CSD).</td>
</tr>
</tbody>
</table>

If you would like to join me in supporting this important initiative by registering your interest for any of these webinars, please click on the link below:

If you have any questions relating to diversity and inclusion week please email the committee at csd-edi21@revenue.ie

Hope to see you there!

Regards,

[Name] Assistant Secretary

[Name] will review the registration and participation rates in these events to improve engagement with initiatives. If you do not wish your registration status to be recorded, please email csd-edi21@revenue.ie indicating that you wish to attend the event, but do not wish to have your registration status recorded. The webinars will be recorded, and the video will be made available to watch back at a time convenient to you.
**Treatment Group 3 (Social Proof)**

Colleagues,

Revenue’s Diversity and Inclusion Week is taking place **November 15th -19th**. We are excited to announce our live events planned for the week:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday 16th</td>
<td>12.30-13.00</td>
<td>Introduction to Irish Sign Language</td>
<td>A 30-minute introduction to sign language with our colleagues Eddie Redmond an ISL user, Niamh Curtis (CSD) and Grainne Mackin</td>
</tr>
<tr>
<td>Wednesday 17th</td>
<td>12.00-13.00</td>
<td>Cooking Demonstration</td>
<td>Join Ronan Dillon from Healthy Workforce Ireland and learn how to prepare some quick easy and tasty meals with everyday ingredients. Accompanied by ISL interpreter.</td>
</tr>
</tbody>
</table>
Friday 19th
12.30-13.00
Lunch and Learn – Human Rights and Equality

A 30-minute lunchtime talk from Training Branch on Public Sector Equality and Human Rights Duty with [REDACTED]

If you would like to register your interest for any of these webinars, please click on the link below:

If you have any questions relating to diversity and inclusion week please email the committee [REDACTED]

Regards,
The Equality, Diversity and Inclusion Committee.

[REDACTED] will review the registration and participation rates in these events to improve engagement with [REDACTED] initiatives. If you do not wish your registration status to be recorded, please email [REDACTED] indicating that you wish to attend the event, but do not wish to have your registration status recorded. The webinars will be recorded, and the video will be made available to watch back at a time convenient to you.

Treatment Group 4 (Default)

Colleagues,
Revenue’s Diversity and Inclusion Week is taking place November 15th-19th. We are excited to announce our live events planned for the week:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday 16th</td>
<td>12.30-</td>
<td>Introduction to Irish Sign Language</td>
<td>A 30-minute introduction to sign language with our colleagues Eddie Redmond an ISL user, Niamh Curtis (CSD) and DLO Grainne Mackin.</td>
</tr>
<tr>
<td></td>
<td>13.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wednesday 17th</td>
<td>12.00-</td>
<td>Cooking Demonstration</td>
<td>Join Ronan Dillon from Healthy Workforce Ireland and learn how to prepare some quick easy and tasty meals with everyday ingredients. Accompanied by ISL interpreter.</td>
</tr>
<tr>
<td></td>
<td>13.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday 19th</td>
<td>12.30-</td>
<td>Lunch and Learn – Human Rights and Equality</td>
<td>A 30-minute lunchtime talk from Training Branch on Public Sector Equality and Human Rights Duty with Mary Gregg (RTB) and Sharon Briody.</td>
</tr>
<tr>
<td></td>
<td>13.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We are pleased to inform you that you have been specially selected to attend the Introduction to Irish Sign Language event. You will be sent a link to the live event 24 hours before it commences. Alternatively, if you would prefer to switch to one of the other two events, or to not attend any of the events, then please click on the link below:

If you have any questions relating to diversity and inclusion week please email the committee at csd-edi21@revenue.ie

We hope you enjoy your event!

Regards,
The Equality, Diversity and Inclusion Committee.

We will review the registration and participation rates in these events to improve engagement with initiatives. If you do not wish your registration status to be recorded, please email csd-edi21@revenue.ie indicating that you wish to attend the event, but do not
wish to have your registration status recorded. The webinars will be recorded, and the video will be made available to watch back at a time convenient to you.

Figure A3. Follow-up Reminder Emails for each condition

Control and Simplification Groups

Colleagues,

Diversity and Inclusion Week is taking place November 15th -19th. We have three great events planned. It’s not too late to sign-up if you have not already done so!

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday 16th</td>
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</tr>
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<td>12.00-13.00</td>
<td>Cooking Demonstration</td>
<td>Join Ronan Dillon from Healthy Workforce Ireland and learn how to prepare some quick easy and tasty meals with everyday ingredients.</td>
</tr>
<tr>
<td>Day</td>
<td>Time</td>
<td>Event</td>
<td>Details</td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
<td>--------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Friday 19th</td>
<td>12.30-13.00</td>
<td>Lunch and Learn – Human Rights and Equality</td>
<td>A 30-minute lunchtime talk from Revenue Training Branch on Public Sector Equality and Human Rights Duty with Mary Gregg (RTB) and Sharon Briody (CSD)</td>
</tr>
</tbody>
</table>

If you would like to register your interest for any of these webinars, please click [here](#).

**Accessing the Webinar**

1. The webinars will be hosted on MS Teams
2. Copy and paste the link for the event to your personal email address.
3. Open your personal email in Google Chrome outside of the Citrix environment.
4. If an MS Teams account is already connected on the device you are using you will need to log out of MS Teams and sign in again.
5. Follow this guide for accessing MS Teams.

Remember to use your [email address](#) as your screen name when you join the meeting. See the screen below.

Hope to see you there!

Regards,

*The Equality, Diversity and Inclusion Committee.*

Please note that [Revenue](#) cannot guarantee that any personal and sensitive data, sent in plain text via standard email, is fully secure. Customers who choose to use this channel are deemed to have accepted any risk involved. The alternative communication methods offered by Revenue include standard post and the option to use our (encrypted) My Enquiries service which is available within my Account and ROS. You can register for either my Account or ROS on the Revenue website. RevWell will review the registration and participation rates in these events to improve engagement with initiatives. If you do not wish your registration status to be recorded, please email [revwell@revenue.ie](mailto:revwell@revenue.ie) indicating that you wish to attend the event, but do not wish to have your registration status
The webinars will be recorded, and the video will be made available to watch back at a time convenient to you.

**Messenger Group**

Colleagues,

Revenue’s Diversity and Inclusion Week is taking place November 15th - 19th. I am really excited about the three great events that we have planned. It’s not too late to join me by getting involved and signing-up if you haven't already done so!

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Join Ronan Dillon from Healthy Workforce Ireland and learn how to prepare some quick easy and tasty meals with everyday ingredients. Accompanied by ISL interpreter.</td>
</tr>
<tr>
<td>Friday 19th</td>
<td>12.30-13.00</td>
<td>Lunch and Learn – Human Rights and Equality</td>
<td>A 30-minute lunchtime talk from Training Branch on Public Sector Equality and Human Rights Duty with Mary Gregg (RTB) and Sharon Briody (CSD)</td>
</tr>
</tbody>
</table>

If you too would like to support this important initiative by registering your interest for any of these webinars, please click on here.

**Accessing the Webinar**

1. The webinars will be hosted on MS Teams
2. Copy and paste the link for the event to your personal email address.
3. Open your personal email in Google Chrome outside of the Citrix environment.
4. If an MS Teams account is already connected on the device you are using you will need to log out of MS Teams and sign in again.
5. Follow this guide for accessing MS Teams.

Remember to use your email address as your screen name when you join the meeting. See the screen below.

Hope to see you there!

Regards,

[Name]
Assistant Secretary

Please note that cannot guarantee that any personal and sensitive data, sent in plain text via standard email, is fully secure. Customers who choose to use this channel are deemed to have accepted any risk involved. The alternative communication methods offered by include standard post and the option to use our (encrypted) MyEnquiries service which is available within myAccount and . You can register for either myAccount or on the website. will review the registration and participation rates in these events to improve engagement with initiatives. If you do not wish your registration status to be recorded, please email indicating that you wish to attend the event, but do not wish to have your registration status recorded. The webinars will be recorded, and the video will be made available to watch back at a time convenient to you.

Social Proof Group

Colleagues,

's Diversity and Inclusion Week is taking place November 15th -19th. We have three great events planned. It’s not too late to sign-up if you haven't already done so! 231 of your colleagues have already expressed their support for this
important initiative by securing their places. Why don’t you join them by clicking on here to register your interest.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

**Accessing the Webinar**

1. The webinars will be hosted on MS Teams
2. Copy and paste the link for the event to your personal email address.
3. Open your personal email in Google Chrome **outside** of the Citrix environment.
4. If an MS Teams account is already connected on the device you are using you will need to log out of MS Teams and sign in again.
5. Follow this guide for accessing MS Teams.

Remember to use your email address as your screen name when you join the meeting. See the screen below

Hope to see you there!

Regards,

*The Equality, Diversity and Inclusion Committee.*
Please note that Revenue cannot guarantee that any personal and sensitive data, sent in plain text via standard email, is fully secure. Customers who choose to use this channel are deemed to have accepted any risk involved. The alternative communication methods offered by Revenue include standard post and the option to use our (encrypted) MyEnquiries service which is available within myAccount and ROS. You can register for either myAccount or ROS on the Revenue website. Revenue will review the registration and participation rates in these events to improve engagement with initiatives. If you do not wish your registration status to be recorded, please email revwell@revenue.ie indicating that you wish to attend the event, but do not wish to have your registration status recorded. The webinars will be recorded, and the video will be made available to watch back at a time convenient to you.

Default Group

Colleagues,

This is just to remind you that you have been specially selected to attend the Introduction to Irish Sign Language event as part of Revenue's Diversity and Inclusion Week. You will be sent a link to the live event 24 hours before it commences. Alternatively, if you would prefer to switch to one of the other two events we have planned (see below), or to not attend any of the events, then please copy and paste the link below into your browser outside of citrix to access the registration page:

Revenue's Diversity and Inclusion Week is taking place November 15th - 19th. We have three great events planned.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>A 30-minute introduction to sign language with our colleagues Eddie Redmond an ISL user, Niamh Curtis (CSD) and DLO Grainne Mackin</td>
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<tr>
<td>Wednesday 17th</td>
<td>12.00-13.00</td>
<td>Cooking Demonstration</td>
<td>Join Ronan Dillon from Healthy Workforce Ireland and learn how to prepare some quick easy and</td>
</tr>
<tr>
<td><strong>Friday 19th</strong></td>
<td><strong>12.30-13.00</strong></td>
<td>Lunch and Learn – Human Rights and Equality</td>
<td>A 30-minute lunchtime talk from Revenue Training Branch on Public Sector Equality and Human Rights Duty with [redacted] and [redacted].</td>
</tr>
</tbody>
</table>

Registrations for the events are operated by [redacted] through Qualtrics software.

We hope you enjoy your event!

Regards,

*The Equality, Diversity and Inclusion Committee.*

Please note that [redacted] cannot guarantee that any personal and sensitive data, sent in plain text via standard email, is fully secure. Customers who choose to use this channel are deemed to have accepted any risk involved. The alternative communication methods offered by [redacted] include standard post and the option to use our (encrypted) MyEnquiries service which is available within myAccount and [redacted]. You can register for either myAccount or [redacted] on the [redacted] website. [redacted] will review the registration and participation rates in these events to improve engagement with [redacted] initiatives. If you do not wish your registration status to be recorded, please email [redwell@revenue.ie](mailto:revwell@revenue.ie) indicating that you wish to attend the event, but do not wish to have your registration
Table A2: Penalised logistic regression – marginal effects (registration)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Change in % of employees in treatment group registering for any event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplification</td>
<td>0.012</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
</tr>
<tr>
<td>Messenger</td>
<td>0.027***</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
</tr>
<tr>
<td>Social Proof</td>
<td>0.022**</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
</tr>
<tr>
<td>Default</td>
<td>.901***</td>
</tr>
<tr>
<td></td>
<td>(.008)</td>
</tr>
<tr>
<td>Observations</td>
<td>6,998</td>
</tr>
</tbody>
</table>

Penalised logistic regression marginal effects. Marginal effects represent the percentage change in registration for each treatment group relative to the control group. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Dependent variable measures whether or not an employee registered for one or more events.

Table A3: Penalised logistic regression – marginal effects (attendance)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Change in % of employees in treatment group attending any event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplification</td>
<td>-0.008</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
</tr>
<tr>
<td>Treatment</td>
<td>Effect</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Messenger</td>
<td>0.009</td>
</tr>
<tr>
<td>Social Proof</td>
<td>-0.002</td>
</tr>
<tr>
<td>Default</td>
<td>.067***</td>
</tr>
</tbody>
</table>

Observations 6,998

Penalised logistic regression marginal effects. Marginal effects represent the percentage change in attendance for each treatment group relative to the control group. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Dependent variable measures whether or not an employee attended one or more live events.
Table A4: Percentage of registrations by condition pre-and post the issuance of the reminder email

<table>
<thead>
<tr>
<th>Condition</th>
<th>Control</th>
<th>Simplification</th>
<th>Messenger</th>
<th>Social Proof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered pre-reminder</td>
<td>62.9%</td>
<td>38.6%</td>
<td>50.0%</td>
<td>40.6%</td>
</tr>
<tr>
<td>Registered post-reminder</td>
<td>37.1%</td>
<td>61.4%</td>
<td>50.0%</td>
<td>59.4%</td>
</tr>
</tbody>
</table>

Pearson chi2(3) = 11.5846; \( p = 0.009 \)

Table A5. Percentage increase in registrations occurring after the issuance of the reminder (by condition)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Control</th>
<th>Simplification</th>
<th>Simplification + Messenger</th>
<th>Simplification + Social Proof</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 59% (26 employees)</td>
<td>+ 59% (26 employees)</td>
<td>+157% (55 employees)</td>
<td>+100% (55 employees)</td>
<td>+146% (60 employees)</td>
</tr>
</tbody>
</table>
Figure A4. Marginal effects of registering before or after receiving the reminder email on Attendance

Adjusted predictions with 95% CIs

% of employees who registered for and attended an event

Employee registered after receiving the reminder email

Yes

No
<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Registered for any event</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treated</td>
<td>0.250***</td>
<td>0.242***</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.008)</td>
</tr>
<tr>
<td>Male</td>
<td>-0.021*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td></td>
</tr>
<tr>
<td>Treated # Male</td>
<td>-0.024</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.058***</td>
<td>0.050***</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(0.005)</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>6,998</td>
<td>6,998</td>
</tr>
<tr>
<td><strong>R-squared</strong></td>
<td>0.053</td>
<td>0.050</td>
</tr>
</tbody>
</table>
Table A7. LPM: Treatment * gender interaction (attendance)

<table>
<thead>
<tr>
<th></th>
<th>(1) Includes an interaction term</th>
<th>(2) No interaction term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attended any event</td>
<td>Attended any event</td>
</tr>
<tr>
<td>Treated</td>
<td>0.013**</td>
<td>0.016***</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>Female</td>
<td>0.021**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td></td>
</tr>
<tr>
<td>Treated # Female</td>
<td>0.004</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OLS Regression 1</td>
<td>OLS Regression 2</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Constant</td>
<td>0.014***</td>
<td>0.027***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>Observations</td>
<td>6,998</td>
<td>6,998</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.005</td>
<td>0.001</td>
</tr>
</tbody>
</table>

OLS regression. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Dependent variable measures whether or not an employee attended one or more events. The treated variable is a binary indicator variable which is coded 0 for the control group and 1 for all four of the treatment groups.

Figure A5. Gender*Condition Interaction graphs - Registrations and Attendance

Note: Graphs plots the gender*condition interaction coefficients for male/other and female participants in relation to registrations (1) and attendance (2)
Table A8. Penalised logistic regression – marginal effects by treatment and gender (Registration)

<table>
<thead>
<tr>
<th></th>
<th>Change in % of female employees in treatment group registering for any event v control</th>
<th>Change in % of male employees in treatment group registering for any event v control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplification</td>
<td>.023*</td>
<td>-.006</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(.011)</td>
</tr>
<tr>
<td>Messenger</td>
<td>0.037***</td>
<td>.009</td>
</tr>
<tr>
<td></td>
<td>(.012)</td>
<td>(.012)</td>
</tr>
<tr>
<td>Social Proof</td>
<td>0.032**</td>
<td>.007</td>
</tr>
<tr>
<td></td>
<td>(.012)</td>
<td>(.012)</td>
</tr>
<tr>
<td>Default</td>
<td>.069***</td>
<td>.908***</td>
</tr>
<tr>
<td></td>
<td>(.013)</td>
<td>(.012)</td>
</tr>
<tr>
<td>Observations</td>
<td>4,372</td>
<td>2,618</td>
</tr>
</tbody>
</table>

Penalised logistic regression marginal effects. Marginal effects represent the percentage change in registrations for women and men in each treatment group relative to women and men in the control group. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Dependent variable measures whether or not an employee registered for one or more events.
Table A9: Penalised logistic regression – marginal effects by treatment and gender (attendance)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Change in % of female employees in treatment group attending any event</th>
<th>Change in % of male employees in treatment group attending any event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplification</td>
<td>-0.010</td>
<td>-0.005</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(.007)</td>
</tr>
<tr>
<td>Messenger</td>
<td>0.011</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>(.009)</td>
<td>(.008)</td>
</tr>
<tr>
<td>Social Proof</td>
<td>-.006</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>(.008)</td>
<td>(.008)</td>
</tr>
<tr>
<td>Default</td>
<td>.076***</td>
<td>.051***</td>
</tr>
<tr>
<td></td>
<td>(.012)</td>
<td>(.012)</td>
</tr>
<tr>
<td>Observations</td>
<td>4,372</td>
<td>2,618</td>
</tr>
</tbody>
</table>

Penalised logistic regression marginal effects. Marginal effects represent the percentage change in attendance for women and men in each treatment group relative to women and men in the control group. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Dependent variable measures whether or not an employee attended one or more live events
Table A10. LPM – Treatment * seniority interaction (registrations)

<table>
<thead>
<tr>
<th></th>
<th>(1) Includes an interaction term</th>
<th></th>
<th>(2) No interaction term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Registered for any event</td>
<td>Registered for any event</td>
<td></td>
</tr>
<tr>
<td>Treated</td>
<td>0.244***</td>
<td>0.241***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.008)</td>
<td></td>
</tr>
<tr>
<td>Senior Employee</td>
<td>0.031**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treated # Senior Employee</td>
<td>-.006</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.041***</td>
<td>0.050***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.005)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>6,998</td>
<td>6,998</td>
<td></td>
</tr>
</tbody>
</table>
OLS regression. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Dependent variable measures whether or not an employee registered for one or more events. The treated variable is a binary indicator variable which is coded 0 for the control group and 1 for all four of the treatment groups.

Table A11. LPM Regression analysis – Treatment * seniority interaction (attendance)

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Includes interaction term</td>
<td>No interaction term</td>
</tr>
<tr>
<td>Attended any event</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treated</td>
<td>0.018***</td>
<td>0.016***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.005)</td>
</tr>
</tbody>
</table>
### OLS regression

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Employee</td>
<td>0.023*</td>
<td>(0.012)</td>
</tr>
<tr>
<td>Treated # Senior Employee</td>
<td>-0.007</td>
<td>(0.014)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.022***</td>
<td>(0.004)</td>
</tr>
<tr>
<td></td>
<td>0.027***</td>
<td>(0.004)</td>
</tr>
</tbody>
</table>

Observations: 6,998
R-squared: 0.003

*OLS regression. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Dependent variable measures whether or not an employee attended one or more events. The treated variable is a binary indicator variable which is coded 0 for the control group and 1 for all four of the treatment groups.*

**Figure A6. Interaction graphs: Treatment*seniority (registrations and attendance)**
A6 (1): Registrations

A6 (2): Attendance
Adjusted predictions of condition#seniority with 95% CIs

% of employees registering for one or more event

Control  Simplification  Messenger  Social Proof  Default

Junior  Senior
Note: Graphs plots the seniority*condition interaction coefficients for junior and senior participants in relation to registrations (1) and attendance (2).

Table A12. Penalised Logistic Regression – Marginal effects by treatment and seniority (registration)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Change in % of junior employees in treatment group registering for any event v control</th>
<th>Change in % of senior employees in treatment group registering for any event v control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>Marginal Effect</td>
<td>Standard Error</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Simplification</td>
<td>.017*</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(.019)</td>
</tr>
<tr>
<td>Messenger</td>
<td>0.027***</td>
<td>.027</td>
</tr>
<tr>
<td></td>
<td>(.010)</td>
<td>(.020)</td>
</tr>
<tr>
<td>Social Proof</td>
<td>0.016*</td>
<td>.035*</td>
</tr>
<tr>
<td></td>
<td>(.009)</td>
<td>(.021)</td>
</tr>
<tr>
<td>Default</td>
<td>.914***</td>
<td>.866***</td>
</tr>
<tr>
<td></td>
<td>(.009)</td>
<td>(.017)</td>
</tr>
</tbody>
</table>

Penalised logistic regression marginal effects. Marginal effects represent the change in registration for junior and senior employees in each treatment group relative to junior and senior employees in the control. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Dependent variable measures whether or not an employee registered for one or more events.
Table A13: Penalised Logistic Regression – marginal effects by treatment and seniority (attendance)

<table>
<thead>
<tr>
<th></th>
<th>Change in % of junior employees in treatment group attending any event</th>
<th>Change in % of senior employees in treatment group attending any event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplification</td>
<td>-0.003</td>
<td>-0.022</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>Messenger</td>
<td>0.012*</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>(.007)</td>
<td>(.016)</td>
</tr>
<tr>
<td>Social Proof</td>
<td>-.000</td>
<td>-.010</td>
</tr>
<tr>
<td></td>
<td>(.006)</td>
<td>(.015)</td>
</tr>
<tr>
<td>Default</td>
<td>.064***</td>
<td>.076***</td>
</tr>
<tr>
<td></td>
<td>(.009)</td>
<td>(.021)</td>
</tr>
<tr>
<td>Observations</td>
<td>5,333</td>
<td>1,665</td>
</tr>
</tbody>
</table>

Penalised logistic regression marginal effects. Marginal effects represent the % change in attendance for junior and senior employees in each treatment relative to junior and senior employees in the control. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.