Enhancing Self-Determination in Children with Autism via Behavioural Interventions

Devon M. Ramey

A thesis submitted to Trinity College Dublin, the University of Dublin, in partial fulfilment of the requirements for the Degree of Doctor of Philosophy (PhD) in Psychology

2019

Supervisor: Dr. Olive Healy (Trinity College Dublin)
Declaration

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

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

I have read and I understand the plagiarism provisions in the General Regulations of the University Calendar for the current year, found at: http://www.tcd.ie/calendar.

I have also completed the Online Tutorial on avoiding plagiarism ‘Ready, Steady, Write’, located at http://tcd-ie.libguides.com/plagiarism/ready-steady-write.

_______________________________
Devon M. Ramey
# Table of Contents

Summary .............................................................................................................................................i

Acknowledgements ..........................................................................................................................iii

Dedication ..........................................................................................................................................v

Publications and Conference Presentations Resulting from this Thesis ........................................vi

List of Tables ......................................................................................................................................vii

List of Figures ...................................................................................................................................ix

1. Introduction ....................................................................................................................................1

   1.1 Autism Spectrum Disorder (ASD) ..........................................................................................2

   1.2 Quality of Life .......................................................................................................................3

       1.2.1 Quality of Life and ASD ...............................................................................................4

   1.3 Self-Determination ................................................................................................................6

       1.3.1 Outcomes of Self-Determination ...................................................................................8

       1.3.2 Self-Determination and ASD .......................................................................................10

       1.3.2a Teaching Self-Determination to Individuals with ASD .............................................11

   1.4 Choice and Self-Determination ............................................................................................12

       1.4.1 Choice and ASD ............................................................................................................14

   1.5 Measuring Quality of Life ......................................................................................................15

       1.5.1 Measuring Happiness as a Quality of Life Outcome ...................................................17

       1.5.2 Applied Behaviour Analysis and Measuring Happiness .............................................20

   1.6 Research Aims ......................................................................................................................22

       1.6.1 Use of Single-Subject Experimental Designs ..............................................................24

2. Mood as a Dependent Variable in Behavioural Interventions for Individuals with ASD: A Systematic Review ................................................................................................................26
2.1 Introduction........................................................................................................27

2.2 Method..................................................................................................................30

2.2.1 Search Procedures.............................................................................................30

2.2.1a Inclusion and Exclusion Criteria......................................................................31

2.2.2 Data Extraction...................................................................................................35

2.2.2a Percentage of Non-Overlapping Data (PND).................................................35

2.2.2b Scientific Merit Rating Scale (SMRS).............................................................36

2.2.3 Reliability of Screening and Data Extraction Procedures.............................36

2.3 Results...................................................................................................................37

2.3.1 Participant(s) and Setting..................................................................................52

2.3.1a Participant Characteristics................................................................................52

2.3.1b Setting Characteristics.....................................................................................52

2.3.2 Experimental Design..........................................................................................53

2.3.3 Mood Assessment..............................................................................................54

2.3.3a Operational Definitions....................................................................................54

2.3.3b Measurement Procedures................................................................................55

2.3.3c Interobserver Agreement (IOA).......................................................................56

2.3.4 Intervention Procedures....................................................................................57

2.3.4a Behavioural Interventions...............................................................................57

2.3.4b Comparing Two Interventions/Conditions.......................................................59

2.3.4c Generalisation and Maintenance.....................................................................61

2.3.5 Intervention Effects on Mood............................................................................61

2.3.5a Behavioural Interventions...............................................................................62
3.2.7b Percentage of Non-Overlapping Data (PND)………………..85

3.3 Pilot Study: Results……………………………………………………………..86
  3.3.1 Amy……………………………………………………………………………86
  3.3.2 Richard………………………………………………………………………88

3.4 Pilot Study: Discussion………………………………………………………90

3.5 Main Study: Method…………………………………………………………91
  3.5.1 Participants……………………………………………………………………91
  3.5.2 Setting…………………………………………………………………………92
  3.5.3 Dependent Variables………………………………………………………..93
  3.5.4 Measurement…………………………………………………………………96
    3.5.4a Data Collection……………………………………………………………96
    3.5.4b Interobserver Agreement (IOA)………………………………………..97
    3.5.4c Cohen’s Kappa……………………………………………………………98
  3.5.5 Procedure……………………………………………………………………98
  3.5.6 Experimental Design………………………………………………………100
  3.5.7 Data Analysis………………………………………………………………100
    3.5.7a Scientific Merit Rating Scale (SMRS)……………………………………100

3.6 Main Study: Results…………………………………………………………101
  3.6.1 Jesse…………………………………………………………………………..101
  3.6.2 Daniel…………………………………………………………………………103
  3.6.3 Ryan…………………………………………………………………………..105
  3.6.4 Jacob…………………………………………………………………………107
  3.6.5 Joel……………………………………………………………………………108
3.6.6 Louis.................................................................110
3.6.7 Seth....................................................................113
3.6.8 Jack....................................................................114
3.6.9 Trevor.................................................................117

3.7 Main Study: Discussion.................................................118
3.7.1 Limitations...............................................................121
3.7.2 Future Direction.......................................................123
3.7.3 Conclusion...............................................................125


4.1 Introduction...............................................................127
4.2 Pilot Study: Method......................................................129
4.2.1 Participants..............................................................129
4.2.2 Setting.................................................................130
4.2.3 Dependent Variables...............................................130
4.2.4 Measurement........................................................131
4.2.5 Procedure............................................................131
4.2.5a Paired-Choice Preference Assessment.......................132
4.2.5b Preference Condition.............................................133
4.2.5c Choice Condition................................................134
4.2.6 Experimental Design..............................................135
4.2.7 Data Analysis.......................................................135
4.3 Pilot Study: Results.....................................................135
4.3.1 Amy.................................................................136
4.3.2 Richard.................................................................138

4.4 Pilot Study: Discussion..................................................140

4.5 Main Study: Method.........................................................142
  4.5.1 Participants.............................................................142
  4.5.2 Setting.................................................................143
  4.5.3 Dependent Variables..................................................143
  4.5.4 Measurement..........................................................145
    4.5.4a Data Collection....................................................145
    4.5.4b General Child Affect Rating Scale (GCARS)................145
    4.5.4c Interobserver Agreement (IOA)............................145
    4.5.4d Cohen’s Kappa....................................................146
  4.5.5 Procedure.............................................................147
    4.5.5a Paired-Choice Preference Assessment.....................147
    4.5.5b Preference Condition..........................................148
    4.5.5c Choice Condition..............................................149
  4.5.6 Experimental Design................................................150
  4.5.7 Data Analysis.......................................................150

4.6 Main Study: Results.......................................................150
  4.6.1 Daniel...............................................................151
  4.6.2 Ryan.................................................................153
  4.6.3 Jacob...............................................................156
  4.6.4 Joel.................................................................159
  4.6.5 Louis...............................................................162
5. The Impact of Combined Within- and Across-Activity Choices on the Indices of Happiness and Unhappiness of Children with ASD

5.1 Introduction

5.2 Method

5.2.1 Participants

5.2.2 Setting

5.2.3 Dependent Variables

5.2.4 Measurement

5.2.4a Data Collection

5.2.4b Interobserver Agreement (IOA)

5.2.4c Cohen’s Kappa

5.2.5 Procedure

5.2.5a Multiple Stimulus Without Replacement (MSWO) Preference Assessment

5.2.5b Baseline

5.2.5c Intervention

5.2.5d Treatment Acceptability Questionnaire
6.2.5a Multiple Stimulus Without Replacement (MSWO) Preference Assessment .......................... 218
6.2.5b Baseline .............................................................. 219
6.2.5c Choice of Reinforcer (CR) ................................. 219
6.2.5d Choice of Activity (CA) ........................................ 220
6.2.5e Choice of Materials (CM) ................................. 220
6.2.5f Open-Ended Social Validity Questionnaire .................. 221
6.2.6 Experimental Design ........................................... 221
6.2.7 Data Analysis .......................................................... 222
6.3 Results ........................................................................ 222
6.3.1 Joel ....................................................................... 223
   6.3.1a CA ................................................................. 223
   6.3.1b CA + CR .......................................................... 224
   6.3.1c CM ................................................................. 225
   6.3.1d CM + CR .......................................................... 226
   6.3.1e CR ................................................................. 226
   6.3.1f CA + CM .......................................................... 227
   6.3.1g CA + CM + CR (Choice Intervention Package) ............ 228
6.3.2 Jack ....................................................................... 232
   6.3.2a CR ................................................................. 232
   6.3.2b CM ................................................................. 232
   6.3.2c CM + CR .......................................................... 233
   6.3.2d CA ................................................................. 234
   6.3.2e CA + CR .......................................................... 235
6.3.2f CA + CM…………………………………………………………236
6.3.2g CA + CM + CR (Choice Intervention Package)………………237
6.3.3 Open-Ended Social Validity Questionnaire……………………242
6.4 Discussion………………………………………………………………243
6.4.1 Limitations……………………………………………………………248
6.4.2 Future Research…………………………………………………..249
6.4.3 Conclusion…………………………………………………………250

7. Improving the Self-Determination of Students with Disabilities through Choice: A Teaching Protocol……………………………………………………………………………..251

7.1 Background………………………………………………………………252
7.2 Steps to Implementation………………………………………………….252
  7.2.1 Step One: Teach Choice-Making Skills…………………………253
  7.2.2 Step Two: Identify Mood Indicators………………………..254
  7.2.3 Step Three: Complete the Model of Choice Diversity Table………257
  7.2.4 Step Four: Implement the Choice Intervention………………..259

8. General Discussion…………………………………………………………262

8.1 Overview of Research Aims…………………………………………263
8.2 Summary of Findings…………………………………………………..266
8.3 Theoretical Implications………………………………………………270
  8.3.1 Use of Mood as an Intervention Outcome……………………270
  8.3.2 Applying Choice-Based Interventions in the Classroom…………272
  8.3.3 Improving the Self-Determination and QoL of Young Children with ASD………………………………………………………………………………...274
8.4 Limitations of Research………………………………………………...275
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.4.1 Number of Participants</td>
<td>276</td>
</tr>
<tr>
<td>8.4.2 Applied Setting</td>
<td>276</td>
</tr>
<tr>
<td>8.4.3 Skill Level of the Tutors</td>
<td>277</td>
</tr>
<tr>
<td>8.4.4 Length of Intervention</td>
<td>278</td>
</tr>
<tr>
<td>8.4.5 Risk of bias</td>
<td>279</td>
</tr>
<tr>
<td>8.4.6 Results for On-Task Behaviour</td>
<td>279</td>
</tr>
<tr>
<td>8.4.7 Lack of Additional Assessment</td>
<td>281</td>
</tr>
<tr>
<td>8.5 Future Research</td>
<td>282</td>
</tr>
<tr>
<td>8.5.1 Treatment Fidelity and Maintenance Measures</td>
<td>282</td>
</tr>
<tr>
<td>8.5.2 Differences in DTT Procedures</td>
<td>283</td>
</tr>
<tr>
<td>8.5.3 Social-Emotional Curriculum</td>
<td>283</td>
</tr>
<tr>
<td>8.5.4 Self-Determination-Based Curriculum and Self-Determination Measures</td>
<td>285</td>
</tr>
<tr>
<td>8.5.5 Physiological Measures</td>
<td>286</td>
</tr>
<tr>
<td>8.6 Conclusion</td>
<td>287</td>
</tr>
<tr>
<td>References</td>
<td>289</td>
</tr>
<tr>
<td>Appendices</td>
<td>322</td>
</tr>
<tr>
<td>Appendix A</td>
<td>322</td>
</tr>
<tr>
<td>Appendix B</td>
<td>324</td>
</tr>
<tr>
<td>Appendix C</td>
<td>325</td>
</tr>
<tr>
<td>Appendix D</td>
<td>326</td>
</tr>
<tr>
<td>Appendix E</td>
<td>327</td>
</tr>
<tr>
<td>Appendix F</td>
<td>328</td>
</tr>
<tr>
<td>Appendix G</td>
<td>329</td>
</tr>
</tbody>
</table>
Appendix H..................................................................................................................336
Appendix I.........................................................................................................................337
Appendix J........................................................................................................................338
Appendix K........................................................................................................................339
Appendix L........................................................................................................................340
Appendix M........................................................................................................................341
Appendix N........................................................................................................................343
Summary

Improving the quality of life (QoL) of individuals with autism spectrum disorder (ASD) is often the rationale given for the provision of behaviour analytic services. There is a consensus among practitioners that one of the most important components of QoL is individual happiness. Happiness is considered a private event that cannot be directly observed, so individuals must rely on the verbal self-reports of others to determine their degree of happiness. However, individuals diagnosed with ASD are characterised by social and communication deficits, and this can make it difficult for them to express their emotions in conventional ways. As a result, practitioners must observe the overt behaviours that are theorised to be associated with their mood instead. These behaviours are frequently called indices of happiness or unhappiness, and research has demonstrated that they can be operationally defined and reliably measured in individuals with disabilities.

Self-determination is another key component of QoL. Self-determination is defined as the ability to exercise control over one’s own life, without undue influence from others. Self-determination develops autonomy, which in turn, improves the overall QoL of an individual. Choice-making is necessary for self-determination. When children with ASD are provided with opportunities for choice, their self-determination and overall QoL is improved. Despite this, children with ASD are often given limited opportunities for choice, although they are capable of making a choice response. Therefore, the purpose of this research was to improve the self-determination and overall QoL of young children with ASD through the provision of a choice-based intervention. As an indicator of QoL, individualised indices of happiness and unhappiness were measured as an outcome during the choice-based intervention.
Chapter 2 includes a systematic review that summarises the current state of literature involving mood as a dependent variable in interventions designed for individuals with ASD. Chapter 3 examines whether individualised indices of happiness and unhappiness can be operationally defined and reliably measured in young children with ASD. Chapter 4 evaluates the differential effects of preference versus choice on the indices of happiness, indices of unhappiness, and on-task behaviour of young children with ASD. Chapter 5 investigates the effects of a choice intervention package on the same three dependent variables. Chapter 6 examines the choice-intervention package further by employing a component analysis. Finally, Chapter 7 provides a teaching protocol that outlines the provision of choice within the special education classroom. The findings from this thesis are summarised below.

First, the systematic literature review found that objective indicators of mood can be reliably measured in individuals with ASD and that behavioural interventions can be implemented to improve these mood indicators. Chapter 3 demonstrated that indices of happiness and unhappiness can be operationally defined and reliably measured in young children with ASD. Chapter 4 concluded that a choice of reinforcer may be equally effective, but not more effective, than providing a preferred alternative. Further experimentation in Chapter 5 revealed that a choice intervention package, which included additional within- and across-activity choices, was more beneficial than providing a single choice of reinforcer. The component analysis completed in Chapter 6 demonstrated that all three types of choice were necessary for the choice intervention package to be the most effective for young children with ASD. In conclusion, Chapter 7 recommended that practitioners provide all three types of choice, in addition to other choice varieties, to better improve the self-determination and overall QoL of students with disabilities. The findings from this research are discussed in terms of clinical recommendations and implications for future research.
Acknowledgements

This achievement would not have been possible without the endless support of my parents. They have been my biggest cheerleaders and have always believed in me, even when I didn’t believe in myself. Moving to Ireland to complete my studies was not easy for them, but I am forever grateful for their patience and love during this time. Mom and Dad - words cannot express how grateful I am for everything you have done for me. Thank you for giving me this opportunity and for never giving up on me. I love you!

I would like to thank my supervisor, Olive, for her guidance during the past 3.5 years. I feel privileged to have worked with someone as respected in the field as you. You have been a wonderful mentor and I have really enjoyed learning from you. Your faith in me has given me the confidence to achieve this goal, which was something I never thought possible five years ago. Thank you for your contributions to this thesis and the time you have dedicated to me. You are an inspiration!

I must acknowledge Dr. Russell Lang, who inspired me to become a better behaviour analyst and researcher. Without your mentorship, I would not be here. I would also like to extend my gratitude to both of my appraisers – Dr. Ladislav Timulak and Dr. Charlotte Wilson – thank you for your constructive feedback and guidance during our meetings. Finally, I couldn’t have completed this thesis without the assistance of Emma McEnaney, Laura Gormley, and Nathan Pullen. I know it was a lot of work at times and I can’t thank you enough for your help!

I would also like to recognise all my new Irish friends – you know who you are! Thank you for befriending me and having my back since day one. I was terrified to move to a new country on my own, but you have made the transition much easier. I will never forget the
kindness you have shown me, and I will carry our memories with me forever. I hope to never be too far from any of you, so we can continue to make memories in the future.

And last, but certainly not least, I would like to thank the teachers, families, and students I was lucky enough to work with during my research. I am so thankful for the teachers who were willing to accommodate me, even with their own busy schedules. I will never forget your patience and kindness. To the children I had the privilege of working with – thank you for playing with me and putting a smile on my face every day! And to the parents of these angels – thank you for allowing me to work with your children. You have provided me with invaluable information regarding the happiness and self-determination of children with ASD. Without you, this thesis would have been impossible. I wish the best for you in the future.
Dedication

This thesis is dedicated to my grandmother, GiGi, who helped shape me into the woman I am today. This is also for my dog, Melody, who sadly passed away during the time I was away. I love you both!
Publications and Conference Presentations Resulting from this Thesis

Publications:


Publications in Preparation:


Presentations:


List of Tables

Chapter 2

Table 2.1: Summary of the studies included in the review………………………………………38

Chapter 3

Table 3.1: Indices of happiness and unhappiness for the pilot study participants…………80
Table 3.2: Happy and unhappy conditions identified for the pilot study participants………83
Table 3.3: Participant characteristics of the main study participants…………………………92
Table 3.4: Indices of happiness and unhappiness for the main study participants……………94
Table 3.5: Mean IOA for indices of happiness and unhappiness……………………………97
Table 3.6: Happy and unhappy conditions identified for the main study participants………99

Chapter 4

Table 4.1: Stereotypy and challenging behaviour for the main study participants………144
Table 4.2: Mean IOA for indices of happiness, indices of unhappiness, and on-task
behaviour……………………………………………………………………………………………………………………………………146

Chapter 5

Table 5.1: Mean IOA for indices of happiness, indices of unhappiness, and on-task
behaviour……………………………………………………………………………………………………………………………………186
Table 5.2: Academic tasks and within-activity choice options for Joel, Jack, and Louis…..191
Table 5.3: Individual Tau-U scores and overall omnibus effect sizes for the choice
intervention package…………………………………………………………………………………………………………………201
Table 5.4: Mean treatment acceptability scores………………………………………………202
Chapter 6

Table 6.1: Mean IOA for indices of happiness, indices of unhappiness, and on-task behaviour..................................................................................................................................................................................217

Table 6.2: Individual Tau-U scores and overall omnibus effect sizes for each condition......240

Table 6.3: Selected responses to open-ended social validity questionnaire......................242
List of Figures

Chapter 2

Figure 2.1: Flow diagram showing the four-step search procedure........................................33
Figure 2.2: Flow diagram showing exclusion process for the initial studies..............................34

Chapter 3

Figure 3.1: Amy’s indices of happiness..................................................................................87
Figure 3.2: Amy’s indices of unhappiness..............................................................................88
Figure 3.3: Richard’s indices of happiness............................................................................89
Figure 3.4: Richard’s indices of unhappiness........................................................................90
Figure 3.5: Jesse’s indices of happiness...............................................................................102
Figure 3.6: Jesse’s indices of unhappiness............................................................................103
Figure 3.7: Daniel’s indices of happiness.............................................................................104
Figure 3.8: Daniel’s indices of unhappiness.........................................................................105
Figure 3.9: Ryan’s indices of happiness................................................................................106
Figure 3.10: Ryan’s indices of unhappiness..........................................................................106
Figure 3.11: Jacob’s indices of happiness.............................................................................107
Figure 3.12: Jacob’s indices of unhappiness.........................................................................108
Figure 3.13: Joel’s indices of happiness................................................................................109
Figure 3.14: Joel’s indices of unhappiness............................................................................110
Figure 3.15: Louis’ indices of happiness...............................................................................111
Figure 3.16: Louis’ indices of unhappiness...........................................................................112
Figure 3.17: Seth’s indices of happiness................................................................................113
Figure 3.18: Seth’s indices of unhappiness........................................................................114
Figure 3.19: Jack’s indices of happiness........................................................................115
Figure 3.20: Jack’s indices of unhappiness....................................................................116
Figure 3.21: Trevor’s indices of happiness....................................................................117
Figure 3.22: Trevor’s indices of unhappiness.................................................................118

Chapter 4
Figure 4.1: Amy’s indices of happiness..........................................................................136
Figure 4.2: Amy’s indices of unhappiness.......................................................................137
Figure 4.3: Amy’s on-task behaviour.............................................................................138
Figure 4.4: Richard’s indices of happiness....................................................................139
Figure 4.5: Richard’s indices of unhappiness.................................................................139
Figure 4.6: Richard’s on-task behaviour......................................................................140
Figure 4.7: Daniel’s indices of happiness......................................................................151
Figure 4.8: Daniel’s indices of unhappiness.................................................................152
Figure 4.9: Daniel’s on-task behaviour.........................................................................153
Figure 4.10: Ryan’s indices of happiness......................................................................154
Figure 4.11: Ryan’s indices of unhappiness...................................................................155
Figure 4.12: Ryan’s on-task behaviour.........................................................................156
Figure 4.13: Jacob’s indices of happiness.....................................................................157
Figure 4.14: Jacob’s indices of unhappiness.................................................................158
Figure 4.15: Jacob’s on-task behaviour........................................................................159
Figure 4.16: Joel’s indices of happiness.................................................................160
Figure 4.17: Joel’s indices of unhappiness ......................................................... 161

Figure 4.18: Joel’s on-task behaviour ............................................................ 162

Figure 4.19: Louis’ indices of happiness .......................................................... 163

Figure 4.20: Louis’ indices of unhappiness .................................................... 163

Figure 4.21: Louis’ on-task behaviour ............................................................ 164

Figure 4.22: Seth’s indices of happiness ......................................................... 165

Figure 4.23: Seth’s indices of unhappiness .................................................... 166

Figure 4.24: Seth’s on-task behaviour ............................................................ 167

Figure 4.25: Jack’s indices of happiness ......................................................... 168

Figure 4.26: Jack’s indices of unhappiness .................................................... 169

Figure 4.27: Jack’s on-task behaviour ............................................................ 170

Figure 4.28: Trevor’s indices of happiness .................................................... 171

Figure 4.29: Trevor’s indices of unhappiness ................................................ 172

Figure 4.30: Trevor’s on-task behaviour ....................................................... 173

Chapter 5

Figure 5.1: Indices of happiness and unhappiness for Joel, Jack, and Louis .......... 199

Figure 5.2: On-task behaviour for Joel, Jack, and Louis ................................... 200

Chapter 6

Figure 6.1: Joel’s indices of happiness and unhappiness during the complete component analysis ................................................................. 230

Figure 6.2: Joel’s on-task behaviour during the complete component analysis .......... 231
Figure 6.3: Jack’s indices of happiness and unhappiness during the complete component analysis ......................................................238

Figure 6.4: Jack’s on-task behaviour during the complete component analysis ..........239

Chapter 7

Figure 7.1: Mood scale (Dunlap & Koegel, 1980) ......................................................256

Figure 7.2: Model of Choice Diversity table (Brown et al., 1993) .................................258

Figure 7.3: Flowchart/fidelity checklist ...........................................................................260
Chapter 1:

Introduction
1.1 Autism Spectrum Disorder (ASD)

According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-V; American Psychiatric Association [APA], 2013), autism spectrum disorder (ASD) is a neurodevelopmental disorder that is characterised by two separate symptom domains: (a) deficits in social communication and social interaction, and (b) restricted, repetitive behaviours. The DSM-V adopts a monothetic approach that requires an individual to demonstrate deficits in each of the following social-communicative criteria to qualify for a diagnosis: social-emotional reciprocity; nonverbal communication, and social relationships (APA, 2013). On the other hand, the DSM-V uses a polythetic approach for restricted and repetitive behaviours, in which the individual must demonstrate at least two of the following four symptoms: (a) stereotyped or repetitive motor movements or use of speech; (b) inflexibility in routines or ritualised behaviour; (c) highly restricted, fixated interests that are abnormal in intensity, and (d) hyper- or hypo-reactivity to sensory input and/or having unusual sensory interests (APA, 2013). The individual must demonstrate these symptoms in the early developmental period and they must have clinically significant impairments in functioning for a diagnosis to be made (APA, 2013). Males are four times more likely to be diagnosed with ASD than females (Baio et al., 2018).

Individuals with ASD can demonstrate other non-diagnostic symptoms such as gastrointestinal dysfunction (Gorrindo et al., 2012), sleep disturbances (Delians, Leproult Schmitz, Destrebecqz, & Peigneux, 2015), toileting problems (Leader, Francis, Mannion, & Chen, 2018), and/or motor difficulties (Matson, Matson, & Beighley, 2011). Furthermore, it is estimated that 93% of children with ASD will demonstrate some form of challenging behaviour, such as aggression or self-injurious behaviour (McTiernan, Leader, Healy, & Mannion, 2011). ASD will often co-occur with other conditions, including, but not limited to:
Introduction

language disorder, attention deficit hyperactivity disorder (ADHD), intellectual disability (ID), sensory integration disorder, oppositional defiant disorder, mood disorders, anxiety or phobic disorders, epilepsy, encephalopathy, Down syndrome, and/or Fragile X syndrome (Levy et al., 2010).

The prevalence of ASD is rising globally. The Global Burden of Disease (GBD) has estimated that ASD affects around 62.2 million people worldwide. This is a 12.3% change in the number of incidences from 2005 to 2015 (GBD 2015 Disease and Injury Incidence and Prevalence Collaborators, 2016). Similarly, the Centers for Disease Control and Prevention (CDC) has estimated that ASD currently affects 1 in 59 children living in the United States, which is an increase from the 2012 estimate of 1 in 68 children (Baio et al., 2018). There is no known cure for ASD and it is considered a lifelong condition. Research has shown that there is a small percentage of individuals who have “recovered” from ASD (i.e., lost a diagnosis) later in life, but this outcome may be attributable to specific individual characteristics such as higher intelligence, communication and language abilities, and motor development (Helt et al., 2008).

1.2 Quality of Life

In the late 20th century, the concept of quality of life (QoL) developed as a formal construct within disability services (Brown, 2017). During this time, practitioners moved away from segregation and institutionalisation, which had previously dominated the field of disability services from the 1920s to 1970s (Berkowitz, 1987). The deinstitutionalisation and normalisation movements of the 1960s and 1970s led to gradual improvements in the quality of services provided to individuals with disabilities and enhancing one’s QoL became a common goal among service providers (Schalock, 2000). By the 1990s, there was significant
progress towards understanding QoL, and the construct became a key focus within special education as it guided programme development and outcome-based evaluation (Schalock, 2000; Wehmeyer & Schalock, 2001).

As QoL emerged as a treatment objective, multiple operational definitions have been developed. The World Health Organization (WHO) has defined QoL as an “individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns” (The WHOQOL Group, 1995, p. 1405). Differences in cultural and personal values among various populations have resulted in countless definitions of QoL. Liu (1976) has suggested that there are “as many QoL definitions as people” (as cited in Felce & Perry, 1995, p. 52) and Cummins (1997) has estimated that over 100 definitions and models of QoL exist. Despite the variability among the operational definitions of QoL, there has been considerable overlap among practitioners regarding which domains are important for measurement (Felce & Perry, 1995). Researchers have generally agreed that QoL is a multidimensional construct that includes eight core domains: emotional well-being, physical well-being, material well-being, social inclusion, interpersonal relationships, self-determination, rights, and personal development (Schalock & Verdugo, 2002). This is a definition that is widely accepted in the field of disability services (Arias et al., 2018).

1.2.1 Quality of Life and ASD

Although the prevalence of ASD is growing, there is a paucity of research focused on the QoL of individuals with ASD. To the author’s knowledge, there has been only one quantitative review (van Heijst & Geurts, 2015) and five qualitative reviews (Chiang & Wineman, 2014; Ikeda, Hinckson, & Krägeloh, 2014; Kamp-Becker et al., 2011; Kamp-
Becker, Schröder, Remschmidt, & Bachmann, 2010; Tavernor, Barron, Rodgers, & McConachie, 2013) that have synthesised the existing literature on QoL in individuals with ASD. Between these six reviews, only 30 studies have been identified.

Based on the results of these reviews, a few conclusions can be made. First, individuals with ASD are thought to experience a much lower QoL than individuals without this diagnosis across the lifespan (van Heijst & Geurts, 2015). Notwithstanding, individuals with ASD are believed to have a better health-related QoL than other psychiatric disorders such as schizophrenia (Kamp-Becker et al., 2011; Kamp-Becker et al., 2010). There are several factors found to be associated with poor QoL in children with ASD, such as older age, behaviour problems, social impairment, maladaptive behaviour, continued special education, and comorbid conditions (Chiang & Wineman, 2014). For adults with ASD, behaviour problems and a lack of leisure activities have been associated with poor QoL (Chiang & Wineman, 2014).

A number of recent studies that have measured the QoL of individuals with ASD have corroborated the findings of these reviews. A study conducted by Barneveld and colleagues (2014) found that adults with ASD had a poorer QoL than adults diagnosed with ADHD, disruptive behaviours, or affective disorders. Egilson, Ólafsdóttir, Leósdóttir, and Saemundsen (2017) compared the self- and proxy-reports of children with ASD with a control group and found that the children with ASD had lower QoL scores in all related domains. Arias et al. (2018) found that children with comorbid ASD and ID had similar scores as children with ID alone within most of the QoL domains after the effects of gender, ID severity, and support needs were controlled (Arias et al., 2018). However, the children with a comorbid diagnosis of ASD had lower QoL scores in the domains of interpersonal relationships, social inclusion, and physical well-being (Arias et al., 2018). This finding would suggest that an ASD diagnosis is
directly related to poor interpersonal relationships, social inclusion, and physical well-being, while the severity of ID and the level of support needs have a significant impact on children with comorbid ASD and ID (Arias et al., 2018).

Previous research has highlighted the need for a disorder-specific QoL instrument that can account for the unique characteristics of ASD symptomatology (Ikeda et al., 2014; Tavernor et al., 2013), but it is only in recent months that a QoL measure has been developed for this population as an add-on “module” to another QoL instrument (ASQoL; McConachie et al., 2018). Prior to the development of this assessment, the QoL of individuals with ASD had been determined through generic QoL instruments. However, the use of generic QoL instruments with this population has resulted in threats to validity because of differences in how these individuals interpret the items within these assessments. Individuals with ASD are thought to experience the following six complications when completing a generic QoL instrument: misinterpretation of the items; difficulty in using Likert scales; inability to generalise; high levels of anxiety; difficulty in social functioning, and difficulty with emotional vocabulary (Tavernor et al., 2013). Furthermore, researchers have proposed the need for an appropriate self-reported QoL measure that can address all levels of functioning (Ikeda et al., 2014). Previous studies have found large discrepancies between self-reports and proxy-reports, as children and youth with ASD often score themselves as having a higher QoL than what their parents score them (Egilson et al., 2017; Tavernor et al., 2013).

1.3 Self-Determination

One of the key components of QoL is self-determination, and people who are more self-determined have a higher QoL than people who lack self-determination (Lachapelle et al., 2005; Wehmeyer & Schwartz, 1998). Self-determination is considered a fundamental human
right, and it can be defined as “acting as the primary causal agent in one’s life and making choices and decisions regarding one’s quality of life free from undue external influence or interference” (Wehmeyer, 1996, p. 24). During the 1990s, self-determination was established as an important construct within disability services (Wehmeyer & Schalock, 2001). This was the result of other related social movements, such as the disability rights, self-advocacy, and normalisation movements (Ward & Meyer, 1999), as well as a federally funded initiative by the United States Department of Education (Wehmeyer & Schalock, 2001).

In 1988, the United States Office of Special Education and Rehabilitative Services (OSERS) introduced a self-determination-based initiative that allowed people with disabilities to have more control in the decisions that affected their lives (Ward & Kohler, 1996). This initiative resulted in 26 model demonstration projects that taught students with disabilities the following seven skills: (a) how to evaluate their skills; (b) how to recognise their limits; (c) how to set goals; (d) how to identify options; (e) how to accept responsibility; (f) how to communicate preferences and needs, and (g) how to self-monitor and evaluate their own progress (Ward, 1996). This initiative paved the way for other legislative acts such as the Americans with Disabilities Act (ADA) of 1990 (P.L. 101-336), the Individuals with Disabilities Education Act (IDEA) Amendments of 1997 (P.L. 105-117), and the Workforce Investment Act (WIA) of 1998 (P.L. 105-220; Ward & Meyer, 1999). Together, these legislative acts brought awareness to the importance of self-determination for individuals with disabilities.

Self-determined behaviour is identified by four essential characteristics: (a) the person acted autonomously; (b) the behaviour was self-regulated; (c) the person initiated and responded to events in a psychologically empowered manner, and (d) the person acted in a self-realising manner (Wehmeyer & Schalock, 2001). A person demonstrates autonomy if s/he
acts independently, according to his or her own preferences, interests, and/or abilities, without undue influence from others (Wehmeyer, 1996). A person has self-regulation if s/he is able to examine their environments and responses for coping with those environments, make decisions on how to act, subsequently act, then evaluate the outcomes of those actions and revise their plans as necessary (Whiteman, 1990). A person acts in a psychologically empowered manner when s/he has control over the circumstances that are important to them; they possess the necessary skills to achieve a desired outcome and choose to apply those skills to reach this outcome (Wehmeyer, 1996). Finally, a person is self-realising if s/he has accurate knowledge of themselves, including their strengths and limitations, and acts in such a way as to capitalise on this knowledge (Wehmeyer, 1996).

These four essential characteristics develop over time as individuals acquire a set of interrelated component elements. Each of the following component elements are needed for self-determination to emerge: (a) choice making; (b) decision making; (c) problem solving; (d) goal setting and attainment; (e) self-observation, evaluation, and reinforcement; (f) internal locus of control; (g) positive attributions of efficacy and outcome expectancy; (h) self-awareness, and (i) self-knowledge (Wehmeyer, 1996). These component elements are typically present by adolescence and individuals demonstrate fully-developed self-determined behaviour by the secondary level of education (Doll, Sands, Wehmeyer, & Palmer, 1996). When an individual does not meet specific developmental milestones related to these component elements, interventions can be introduced to teach these skills (Doll et al., 1996).

1.3.1 Outcomes of Self-Determination

Self-determination is an important educational outcome for individuals with disabilities and teaching self-determination is considered best practice in the education of
these individuals (Shogren, 2013). Self-determination improves the QoL of individuals with disabilities and contributes to a number of other desirable outcomes. For example, self-determination-based learning strategies have assisted students with disabilities to achieve various academic and transition goals (Shogren, Palmer, Wehmeyer, Williams-Diehm, & Little, 2012). Furthermore, these strategies have helped students with disabilities to access the general education curriculum (Agran, Cavin, Wehmeyer, & Palmer, 2010; Lee, Wehmeyer, Palmer, Soukup, & Little, 2008; Shogren et al., 2012; Wehmeyer, Field, Doren, Jones, & Mason, 2004). By promoting self-determination as a curriculum augmentation, teachers are more capable of meeting the IDEA Amendments of 1997 (P.L. 105-117), which require all students, regardless of disability, to have access to the general education curriculum (Lee et al., 2008).

Previous research has found a positive correlation between self-determination and the academic skills (e.g., productivity, organisation) of students with disabilities (Fowler, Konrad, Walker, Test, & Wood, 2007). In addition, self-determination has been linked to the academic performance (Chao & Chou, 2017) and academic achievement of these students (Gaumer Erickson, Noonan, Zheng, & Brussow, 2015). A review of the literature conducted by Ju, Zeng, and Landmark (2017) found that self-determination was necessary for the academic success of students with disabilities, particularly during postsecondary education. More specifically, Petcu, Van Horn, and Shogren (2017) concluded that three of the four essential characteristics of self-determination were required for this success. Individuals with disabilities who demonstrated autonomy and psychological empowerment were more likely to be enrolled in postsecondary education, while self-realisation was predictive of completing their education (Petcu et al., 2017).
In a study by Wehmeyer and Schwartz (1997), self-determined youth with ID were found to have more positive adult outcomes than their peers with lower self-determination one year out of high school. These outcomes included living outside the family home, having a bank account, and having employment with a better hourly wage. This study was extended by Wehmeyer and Palmer (2003), and they discovered that these outcomes persisted three years after graduation. In addition, the researchers found that the self-determined young adults with disabilities were more likely to obtain job benefits within these three years after graduation (Wehmeyer & Palmer, 2003). Similar outcomes were found by Shogren and colleagues (2015), in that the self-determination status of students with disabilities strongly predicted their employment outcomes and access to the community one and two years after high school. Together, these findings suggest that self-determination is important for both the academic success and adult outcomes of students with disabilities.

1.3.2 Self-Determination and ASD

Individuals with ASD are thought to experience a lower QoL, which would suggest that they also lack self-determination, based on the correlation between these two concepts. However, there is a lack of research to date focused on the self-determination of individuals with ASD (Chou, Wehmeyer, Palmer, & Lee, 2017a; Wehmeyer, Shogren, Zager, Smith, & Simpson, 2010). Algozzine and colleagues (2001) conducted a meta-analysis on studies that had promoted the component elements of self-determined behaviour and found that less than 10% of the included students had a diagnosis of ASD. Prior to the study conducted by Chou, Wehmeyer, Shogren, Palmer, and Lee (2017b), no other studies had utilised a standardised measure of self-determination specifically with the ASD population. Regarding the essential characteristics of self-determined behaviour, Chou and colleagues (2017a) found that students with ASD had significantly lower levels of autonomy than students with ID or learning
disability (LD), and significantly lower levels of psychological empowerment than the students with LD. However, these findings should be considered with caution, as this a relatively under-researched area and more research on self-determination and ASD is needed.

1.3.2a. Teaching self-determination to individuals with ASD. Differences within the self-determination domains, and the social and communication deficits intrinsic to ASD, suggest that these individuals may benefit from a self-determination-based curriculum that has been developed specifically for their instructional needs (Chou et al., 2017a; Wehmeyer et al., 2010). In 2000, Wehmeyer and colleagues developed the Self-Determined Learning Model of Instruction (SDLMI), an empirically validated model of teaching to promote self-determination among students with disabilities. However, this teaching model has only been validated with children and adolescents diagnosed with ID and LD. Wehmeyer and Shogren (2008) and Wehmeyer et al. (2010) proposed a social-ecological model of intervention to teach self-determination skills to individuals with ASD. Within this hypothetical model, research-based strategies that are commonly employed with this population (e.g., task analysis, discrete trial training [DTT], self-monitoring) would be applied to teach the component elements of self-determination (Wehmeyer et al., 2010). To the author’s knowledge, this self-determination-based curriculum has not yet been developed for the ASD population.

The development of self-determination requires a bidirectional approach. First, individuals with ASD must be taught the component elements of self-determination. Then, practitioners must provide meaningful educational opportunities for these individuals to practice these skills, express their self-determination, and have their choices and decisions honoured (Chou et al., 2017a; Wood, Fowler, Uphold, & Test, 2005). Individuals with ASD have a tendency to demonstrate over-reliant behaviour because they are not provided with
enough opportunities to engage in self-determined behaviour (Wehmeyer et al., 2010). They are told “what they can do, with whom they can do it, and when, where, and how they can do it” (Carr et al., 2002, p. 6). It is important that practitioners are facilitating age-appropriate opportunities for individuals with ASD to practice and refine their self-determination skills, beginning in early education (Abery & Zajac, 1996).

Neurotypical infants demonstrate early self-determination skills as young as 10-12 months old, and they continue to develop these skills throughout childhood (Doll et al., 1996). Since self-determination begins to develop at an early age, these skills should be targeted within the early education curriculum (Heller et al., 2011; Malian & Nevin, 2002). Teachers acknowledge the importance of self-determination, but this perception does not always translate into instructional activities that promote the self-determination of students with disabilities (Wehmeyer, Agran, & Hughes, 2000). This is particularly true in the case of young children with disabilities. Algozzine and colleagues (2001) identified a single study focused on teaching self-determination skills to children with disabilities under the age of five years. It is apparent that more research in the area of self-determination and ASD is needed.

1.4 Choice and Self-Determination

Choice-making is one of the nine component elements of self-determination and providing choice-making opportunities to children with disabilities is a simple way to promote their self-determination (Heller et al., 2011; Wehmeyer, 1996). By providing choice-making opportunities to children with disabilities, practitioners allow these children to act as the causal agents within their lives. This, in turn, is believed to improve their self-determination and overall quality of life (Wehmeyer & Schalock, 2001). In spite of this, individuals with disabilities are often given limited opportunities for choice, although they are capable of
making a choice response (Brotherson, Cook, Cunconan-Lahr, & Wehmeyer, 1995; Stancliffe & Wehmeyer, 1995). The lack of real choice opportunities provided to individuals with disabilities has been associated with overdependence (Palmer et al., 2012) and learned helplessness (Guess, Benson, & Siegel-Causey, 2008). Learned helplessness has been linked to further negative outcomes, such as lack of motivation, frustration, low self-esteem, low grades, and dysphoria (McKean, 1994). By providing even basic choice opportunities to individuals with disabilities, practitioners are preventing learned helplessness and implementing interventions that are more “person-centred, less instructor dominated, and more respectful of quality of life issues” (Dibley & Lim, 1999, p. 130).

Earlier studies have shown that choice can be easily embedded into the curriculum of individuals with disabilities without compromising any required activities or the fidelity of those procedures (Dibley & Lim, 1999; Elliott & Dillenburger, 2016). Furthermore, these studies have demonstrated that the provision of choice is not burdensome with regard to time or resources (Tiger, Toussaint, & Roath, 2010). There are numerous ways to include choice within the learning environment. For choice to be meaningful to individuals with disabilities, a range of choices should be provided throughout the day and across all activities within the learning environment (Brown, Belz, Corsi, & Wenig, 1993). Brown and colleagues (1993) first described the Model of Choice Diversity, which outlined seven different types of choice that could be provided to individuals with disabilities within the classroom. These categories of choice are identified as: within-activity, between-activity, refusal, who, where, when, and terminate (Brown et al., 1993). These choice opportunities are described in the following paragraph utilising a hypothetical painting activity.

During a within-activity choice, the individual selects what type of materials to use within an activity (e.g., the student chooses what colour of paint to use). A between-activity
choice allows the individual to select among different activities (e.g., the student chooses between his painting or reading during free time). A refusal is when the individual decides to not participate in an activity (e.g., the student chooses to not paint). A choice of “who” allows the individual to select the person(s) to be included during an activity (e.g., the student chooses to paint with Tutor A rather than Tutor B). During a “where” choice, the individual selects the location s/he would like to complete an activity (e.g., the student chooses to paint at his desk rather than the group table). A “when” choice allows the individual to decide what time s/he will initiate an activity (e.g., the student chooses to start his painting now vs. 10 minutes from now). Finally, a choice to terminate allows an individual to end an activity once it has started (e.g., the student chooses to end the painting activity once he has painted a tree).

1.4.1 Choice and ASD

Providing choice-making opportunities to individuals with ASD is an effective intervention for this population. Previous studies have shown that choice-making opportunities improve the intervention outcomes of individuals with ASD, regardless of the type of choice offered (Reutebuch, El Zein, & Roberts, 2015). Choice has been used both as an antecedent-based intervention and as a consequence-based intervention within behaviour analytic studies designed to modify the behaviours of individuals with ASD. As the former, a choice opportunity is provided before an activity so that the individual with ASD is more motivated to participate in that activity. For example, a student is given a choice of which task to complete (i.e., between-activity choice) and/or what materials to use within the activity (i.e., within-activity choice). In this example, choice acts as an abolishing operation for any escape-maintained challenging behaviour, as the student is less likely to engage in challenging behaviour if s/he has more control over the aversiveness of the setting (Rispoli et al., 2013; Romaniuk & Miltenberger, 2001).
As a consequence-based intervention, a choice opportunity is typically provided after a behaviour has been completed, as reinforcement for that behaviour. For example, once a student with ASD has completed a task, s/he is given a choice of an item as the reinforcer. In this example, choice acts as a conditioned reinforcer because it is associated with increased access to preferred stimuli over time (Fisher, Thompson, Piazza, Crosland, & Gotjen, 1997). Choice as a reinforcer improves the efficacy of reinforcement-based interventions because students are able to express temporary changes in preference; therefore, reinforcer satiation is prevented (Fisher et al., 1997; Tiger et al., 2010).

In previous research on individuals with ASD, choice has successfully been used to increase desired behaviours such as correct responding (Koegel, Singh, & Koegel, 2010; Moes, 1998; Tiger et al., 2010), task engagement/on-task behaviour (Mechling, Gast, & Cronin, 2006; Smeltzer, Graff, Ahearn, & Libby, 2009; Ulke-Kurkuoglu & Kircaali-Iftar, 2010), initiating and maintaining play (Carter, 2001), homework completion (Moes, 1998), and interest/affect (Koegel et al., 2010; Moes, 1998). Choice has also been utilised to effectively decrease a number of undesired behaviours such as disruptive/competing behaviour (Carter, 2001; Koegel et al., 2010; Moes, 1998; Newman, Needelman, Reinecke, & Robek, 2002; Peterson, Caniglia, & Royster, 2001; Rispoli et al., 2013), off-task behaviour (Rispoli et al., 2013), disrobing and urinary incontinence (Carlson, Luiselli, Slyman, & Markowski, 2008), delayed echolalia (Rispoli et al., 2013), and inappropriate vocalisations (Smeltzer et al., 2009). Furthermore, choice has been used to decrease more serious problem behaviours such as aggression, elopement, property destruction, tantrums, and/or self-injury (Carr & Carlson, 1993; Dyer, Dunlap, & Winterling, 1990; Foxx & Meindl, 2007; Koegel et al., 2010; Rispoli et al., 2013; Smeltzer et al., 2009).

1.5 Measuring Quality of Life
As QoL became the focus of disability services, the need for a valid assessment became more apparent (Verdugo, Schalock, Keith, & Stancliffe, 2005). There have been countless theoretical frameworks and definitions of QoL that have been proposed; consequently, many different instruments have been developed to measure this construct. For example, in a review of the literature, Chiang and Wineman (2014) found 11 different instruments that have been utilised to measure the QoL of individuals with ASD. Most QoL instruments do share commonalities, however, such as what they measure and how these measures are obtained. A majority of QoL instruments include both subjective measures (i.e., level of satisfaction experienced by the person) and objective measures (i.e., objective indicators of environmental conditions; Verdugo et al., 2005). Furthermore, most QoL instruments collect data through Likert-type scales and/or questionnaires, either by self-report or proxy report (Verdugo et al., 2005; Vries & Geurts, 2015).

As discussed in Section 1.2.1, only one condition-specific QoL assessment has been developed for individuals with ASD (ASQoL; McConachie et al., 2018). Although this QoL measure is a significant development for the field, it is intended for adults with ASD and not children. To date, a condition-specific QoL instrument has not yet been developed for children with ASD, and generic QoL assessments are often used as an alternative. The following three generic QoL instruments have frequently been employed with these children: the Child Health Questionnaire (CHQ), the Pediatric Quality of Life Inventory (PedsQL), and the KIDSCREEN (Waters et al., 2009). Despite the popularity of these instruments, Waters and colleagues (2009) highlighted a number of limitations found within generic QoL assessments.

First, many of the QoL instruments identified by the researchers focused on functioning (i.e., what the child can do) rather than well-being (Waters et al., 2009). Furthermore, these QoL instruments lacked consultation with the target populations for which
they were developed. Professionals within the field (e.g., researchers, clinicians) determined which domains were important to these QoL instruments, without involving the direct consumers (Waters et al., 2009). The researchers also found that some of the QoL instruments included negatively-worded items that had the potential to affect the self-esteem of children with disabilities (Waters et al., 2009). Finally, the researchers noted a lack of self-report measures and an overreliance on proxy reports within many of the QoL instruments (Waters et al., 2009). QoL is defined as the “individual’s perception of their position in life…” (The WHOQOL Group, 1995, p. 1405), so it is recommended that a child’s QoL is assessed using an appropriate self-report measure whenever possible (Ikeda et al., 2014).

Although generic QoL assessments are often used with children with ASD, there are several characteristics inherent to the condition that can create issues for these children when completing these assessments. First, children with ASD have a limited capacity for self-reflection because they are typically unable to identify their own emotions (Tavernor et al., 2013). Second, children with ASD have interests that usually differ from neurotypical children, and this may affect how they view certain key domains (e.g., interpersonal relationships) within generic QoL instruments (Tavernor et al., 2013). Finally, children with ASD likely have differences in how they approach certain items within generic QoL instruments due to their social-communicative impairments (Tavernor et al., 2013). These limitations are discussed further in Section 1.2.1.

1.5.1 Measuring Happiness as a Quality of Life Outcome

A person’s QoL is not only measured by self-determination, but by other elements as well. One of the eight core domains of QoL is emotional well-being (i.e., happiness) and the degree to which one experiences happiness determines their overall QoL (Felce & Perry,
Within the field of disability services, there is a consensus among practitioners that individual happiness is one of the most important aspects of QoL (Carr, 2007; Parsons, Reid, Bentley, Inman, & Lattimore, 2012; Stasolla & Caffo, 2013). There has been a growing societal trend in acknowledging the importance of the individual and the individual’s personal evaluation of his/her life conditions. This has resulted in more research being dedicated to the conceptualisation and evaluation of subjective well-being, and various corresponding measures have been developed (Wallander & Koot, 2016).

Like QoL, the emotional well-being of an individual is typically measured through self-report (Felce & Perry, 1995). Despite the extensive amount of literature on the subjective well-being and happiness of the general population, there is a limited amount of research focused on the emotional well-being of individuals with disabilities (Uppal, 2006). To the author’s knowledge, an emotional well-being scale has not yet been developed specifically for the ASD population. Generic QoL instruments such as the PedsQL and KIDSCREEN have previously been utilised to assess the subjective well-being of children with ASD (Payakachat, Tilford, Kovacs, & Kuhlthau, 2012). However, these instruments rely on proxy reports, in that the emotional well-being of the child is rated through the parent’s perspective (Vries & Geurts, 2015; Ikeda et al., 2014).

When measuring the happiness of individuals with disabilities – and in particular, children with ASD – there are two issues that can arise. First, emotional well-being scales that rely on self-reports require the individual to have more advanced language skills and the ability to understand abstract concepts (Felce & Perry, 1995). Children with ASD typically lack these prerequisite skills; therefore, self-report measures are problematic for this population (Parsons et al., 2012). Second, previous research has shown that there are considerable differences between self- and proxy reports, as proxy reports tend to
underestimate the QoL of children and adolescents with ASD. Parents have a propensity to report lower QoL scores than what the children report themselves, including within the emotional well-being domain (Egilson et al., 2017). The use of proxy reports is also considered more subjective and less meaningful than the use of objective measures (Brown, 2017).

With the growing emphasis on QoL and emotional well-being in the field of disability services, it would seem necessary to target and measure happiness directly as an outcome to intervention (Parsons et al., 2012). The need for an objective measure of emotional well-being is even more apparent when evaluating the QoL of individuals with limited communication, such as children with ASD (Dillon & Carr, 2007). The communication and social deficits associated with ASD make it difficult for these children to acknowledge and express their own emotions in conventional ways (Parsons et al., 2012). Although there is a need for an objective measure of happiness among individuals with ASD, there remains a dearth of research in this area.

A preliminary search of the literature indicates only eight behaviour analytic studies that have incorporated an objective measure of happiness to evaluate the emotional well-being of individuals with ASD. Two of these studies assessed the mood indicators of adults with ASD (Lattimore, Parsons, & Reid, 2009; Parsons et al., 2012), while another six studies measured these mood indicators among children with ASD (Arbogast & Fryling, 2015; Geiger et al., 2012; Spector & Charlop, 2017; Stasolla, Perilli, & Damiani, R., 2014a; Stasolla et al., 2014b; Vernon, Koegel, Dauterman, & Stolen, 2012). Of the published literature that has focused on objective measures of mood, most identified studies have targeted individuals with severe/profound ID or profound multiple disabilities (see Dillon & Carr, 2007; Lancioni,
Singh, O’Reilly, Oliva, & Basila, 2005, for reviews of this literature). Consequently, more research with the ASD population is warranted.

1.5.2 Applied Behaviour Analysis and Measuring Happiness

Applied behaviour analysis (ABA) is a scientific discipline that systematically applies the principles of behaviour to improve the socially significant behaviours of individuals (Cooper, Heron, & Heward, 2007). ABA is an empirically validated science with a large body of research supporting its efficacy with individuals with ASD. There have been 27 evidence-based practices identified for individuals with ASD, and almost all of them are based on the principles of ABA (Wong et al., 2015). Despite the popularity of ABA with this population, it is a misconception to believe that ABA can only be implemented with individuals with ASD. The principles of ABA can be applied to all individuals, with or without disabilities, to help improve a wide variety of behaviours.

There are seven dimensions of ABA: applied, behavioural, analytic, technological, conceptually systematic, effective, and generality (Baer, Wolf, & Risley, 1968). Baer, Wolf, and Risley (1968) argued that for a behavioural intervention to be applied, it must change meaningful behaviours that improve the overall QoL and well-being of an individual. Likewise, Van Houten and colleagues (1988) proposed six consumer rights, one of which is the right to services whose overriding goal is personal welfare. Based on these perspectives from international proponents of ABA, it could be argued that QoL has been an overriding theme within the field since the early days. Although behaviour analysts agree that improving QoL is the objective of ABA, there is an issue with how to measure the emotional well-being of individuals with ASD, as happiness is considered a private event (Pietro, Silvia, & Giuseppe, 2014).
Behaviour analysts concentrate on measurable and observable behaviours, which may explain the paucity of research that has targeted happiness as a dependent variable. In behavioural terms, a person’s happiness or mood is considered a private event that cannot be directly observed (Green & Reid, 1996). With that said, mood is still a type of behaviour, albeit a covert behaviour, based on Skinner’s theory of radical behaviourism (Johnston, 2013; Skinner, 1957). While direct measures of mood are not readily available, there are overt behaviours theorised to be associated with mood that can be observed instead. These public indicators of mood are sometimes called indices of happiness or unhappiness, and previous research has demonstrated that they can be operationally defined and reliably measured in individuals with disabilities (Dillon & Carr, 2007; Green & Reid, 1996). Based on this research, mood is considered a behaviour that can be systematically manipulated through environmental events (Parsons et al., 2012).

Individuals with ASD are thought to engage in similar mood indicators (e.g., laughing, crying) as those without disabilities (Reid & Green, 2006). Nevertheless, behaviour analysts spend a considerable amount of time measuring challenging behaviour as an indicator of happiness rather than these indices. Practitioners assume that challenging behaviour is negatively correlated with happiness, but it is possible for an individual with ASD to feel unhappy and not engage in any mood indicators. Likewise, an intervention that reduces the challenging behaviour of a student with ASD might not be enjoyable for the student (Machalicek, O’Reilly, Beretvas, Sigafoos, & Lancioni, 2007). Individuals with ASD also engage in some forms of challenging behaviour (e.g., stereotypy) when they feel happy. For example, laughter is a mood indicator that is typically associated with happiness, but it is also a form of vocal stereotypy for some individuals with ASD (Ahearn, Clark, & MacDonald, 2007). With this in mind, it is important for behaviour analysts to individualise the operational
definitions of happiness and unhappiness for each client (Dillon & Carr, 2007). By measuring the indices of happiness and unhappiness theorised to be associated with an individual’s mood, researchers have a more objective approach to assessing this behaviour.

Theoretically, these mood indicators could be evaluated as an outcome to an agency’s services (Parsons et al., 2012). By employing a more objective assessment of mood, a practitioner can quickly determine the efficacy of an intervention designed to improve the emotional well-being and QoL of an individual with ASD. Any intervention that results in an increase in indices of unhappiness could potentially be modified or eliminated from programming (Lattimore et al., 2009; Parsons et al., 2012; Stasolla et al., 2014b). In addition, the social validity of an intervention could be supported by measured increases in indices of happiness; an intervention that improves the mood of the individual with ASD could be considered a more socially acceptable treatment (Schwartz & Baer, 1991; Toole, Bowman, Thomason, Hagopian, & Rush, 2003).

1.6 Research Aims

Based on the current findings, the following conclusions can be made. First, individuals with ASD experience a much lower QoL than individuals without disabilities across the lifespan. Self-determination is essential for QoL, but individuals with ASD lack opportunities for self-determination within their daily lives. Teaching self-determination skills to individuals with ASD is important because self-determination improves their overall QoL and it brings about other positive educational outcomes. One of the simplest ways to teach early self-determination skills to children with ASD is to provide opportunities for choice. Previous research has demonstrated that choice is an effective intervention for individuals with ASD. Finally, there is a need for an objective measure of mood within behaviour analytic
research when determining the efficacy of interventions designed to improve the QoL of individuals with ASD.

The aim of this research is to objectively measure indices of happiness and unhappiness as an outcome during a self-determination-based intervention. More specifically, this research will investigate how choice-making opportunities will affect the mood and task engagement of young children with ASD when they are embedded within an established evidence-based intervention such as DTT. It is hypothesised that these additional choice-making opportunities will improve the self-determination and happiness of young children with ASD, which in turn, will enhance their overall QoL.

Chapter 2 will provide an up-to-date systematic review of the current state of literature involving mood as a dependent variable within behavioural interventions designed for individuals with ASD. To the author’s knowledge, this is the first review to date that will evaluate mood as a dependent variable during interventions with this population. Chapter 3 will investigate whether individualised indices of happiness and unhappiness can be operationally defined and reliably measured in young children with ASD. A prerequisite to measuring happiness is to have a valid way of identifying and operationally defining happiness (Parsons et al., 2012). Consequently, the purpose of this study will be to validate a method of identifying individualised indicators of mood among young children with ASD. Additionally, this study will determine whether these mood indicators can be systematically manipulated through environmental events.

Chapter 4 will evaluate the differential effects of choice versus preference on the mood and on-task behaviour of young children with ASD during DTT. The efficacy of choice-based interventions is well established, but there is still the question as to whether it is the choice
Introduction

opportunity itself, or the influence of preference, that affects intervention outcomes (Dunlap et al., 1994). Previous findings related to choice and preference have been mixed; therefore, this study will add to the existing literature by further investigating these two separate variables.

Chapter 5 will measure the effects of a choice-based intervention package on the mood and on-task behaviour of young children with ASD. This intervention package will include both within- and across-activity choices, as well as a choice of reinforcer. Chapter 6 will further investigate the separate components of this choice-intervention package to determine which type of choice or choice combination is the most effective for improving the mood and on-task behaviour of the children with ASD. During the component analysis, the children will be exposed to each type of choice (e.g., reinforcer, within-activity, across-activity) alone, and in different combinations, to establish which choice-making opportunity is the most powerful. Finally, Chapter 7 will provide practitioners with a teaching protocol that will outline the steps of applying choice within the special education classroom.

1.6.1 Use of Single-Subject Experimental Designs

All studies within the current research base will utilise single-subject research methodology. Single-subject research methodology is a quantitative experimental approach, in which the participants serve as their own control (Gast & Ledford, 2014). That is, each participant is exposed to both a control condition (i.e., baseline) and an experimental condition. “Single-subject” does not mean there is only one participant in a study; rather, this term refers to a study in which each participant serves as his/her own control and the participants’ data are graphed and analysed separately (Cooper et al., 2007). Single-subject experimental designs (SSEDs) are ideal for behaviour analytic research, where the unit of concern is the individual (Horner et al., 2005). Furthermore, SSEDs are appropriate for this
research because they provide a practical methodology for testing educational or behavioural interventions within the educational setting (Horner et al., 2005). Group designs will not be employed within the current research for the following two reasons. First, group designs can mask variability within the data and they do not represent the performance of individual participants. Second, group designs do not allow for intrasubject replication, which provides a more convincing demonstration of a functional relation (Cooper et al., 2007).

Within single-subject research methodology, the dependent variable is repeatedly measured within the context of different SSEDs. These designs differ, in that the baseline and experimental conditions are systematically introduced (or withdrawn) with each participant at different times (Gast & Ledford, 2014). Experimental control is established when a SSED clearly demonstrates an experimental effect at three different points in time, either with a single participant (i.e., within-subject replication) or across multiple participants (i.e., inter-subject replication; Horner et al., 2005). Data from individual participants are presented on a line graph, and visual analysis is applied to evaluate the success of an intervention. Single-subject research methodology traditionally relies on the visual analysis of graphic data, rather than statistical analysis, to interpret the effects of an independent variable. Parametric statistical analysis is of less value when applied to the individual, as it only provides information on mean group performance. In fact, the use of inferential statistics to analyse an individual’s behaviour can result in problems with interpretation (Johnston & Pennypacker, 2009). A visual analysis provides a more forthright examination of how individual participants respond over time (Johnston & Pennypacker, 2009). All data to be collected within the current research will be analysed for variability, level, and trend within each condition. Conclusions regarding the efficacy of the choice-based intervention will be made based on visual analysis.
Chapter 2:

Mood as a Dependent Variable in Behavioural Interventions for Individuals with ASD: A Systematic Review
2.1 Introduction

Applied behaviour analysis (ABA) is a science in which the principles of behaviour are systematically applied to improve socially significant behaviours of individuals (Cooper, Heron, & Heward, 2007). In 1968, Baer, Wolf, and Risley wrote their seminal article outlining the seven dimensions of ABA, which are: applied, behavioural, analytic, technological, conceptually systematic, effective, and generality. By applied, they argued that ABA interventions are focused on changing meaningful behaviours that will improve the overall quality of life (QoL) and well-being of individuals (Baer et al., 1968). Montrose M. Wolf (1978) later discussed the purpose of the Journal of Applied Behavior Analysis, in which he defended the idea of changing behaviours of social importance. Although the subjective concept of “social importance” presented challenges, Wolf called for the assessment of social acceptability when evaluating interventions and their outcomes (i.e., social validity measures). He believed these measures could provide information regarding the appropriateness of procedures in relation to how they improve the life quality of individuals (Wolf, 1978). Similarly, Van Houten and colleagues’ (1988) paper identified six client rights that were intended to “direct both the ethical and appropriate application of behavioural treatment” (p. 381). Among these client rights was the right to behavioural services whose overriding goal is personal welfare. Considering this, it could be argued that improving the QoL of recipients of behavioural services has been a consistent and central theme of ABA since the early days of the field.

Over time, there have been notable improvements and advances in the quality of services provided to individuals with disabilities. Although QoL was an important concept in the founding of ABA, it was not until more recently that service providers began to use empirical measurements of QoL, and life quality has become a more direct focus of some
intervention programmes (McDougall, Evans, & Baldwin, 2010). In fact, it was not until the late 1980s and 1990s that QoL began to develop as a formal construct within the field of intellectual and developmental disabilities (Brown, 2017). Researchers have proposed different theories over what variables and characteristics best constitute the concept of QoL, and there have been numerous definitions developed over the years (Felce & Perry, 1995). One definition of QoL widely accepted in the field of disability services was developed by Schalock and Verdugo (Arias et al., 2018). Within this definition, QoL is described as having eight different domains – emotional well-being, physical well-being, material well-being, social inclusion, interpersonal relationships, self-determination, rights, and personal development (Schalock & Verdugo, 2002). Regardless of the definition used, there is a consensus among practitioners that individual happiness is one of the key components of QoL (Carr, 2007; Parsons, Reid, Bentley, Inman, & Lattimore, 2012). The notion that happiness is related to QoL has clear surface validity. Simply, if an individual is happy, their QoL is likely better than if they were unhappy.

Individuals without disabilities can typically identify and describe their personal well-being, and their QoL is often measured through self-reports (Felce & Perry, 1995). However, the communication and social deficits associated with autism spectrum disorder (ASD) may make expressing private events, and emotional states in particular, difficult for these individuals (American Psychiatric Association [APA], 2013; Parsons et al., 2012). Further, the sole reliance on self-report measures can be problematic with any population sample. Although individuals with ASD may be unable to verbally express their feelings, they are thought to still engage in similar indicators of mood (e.g., smiling, laughing) as individuals without disabilities (Reid & Green, 2006).
In behavioural terms, a person’s happiness or mood is considered a private event which cannot be observed directly (Green & Reid, 1996). Although mood is not directly observable, it could be argued that it is still a type of behaviour, albeit a covert behaviour (Johnston, 2013; Skinner, 1957). Although an individual’s mood cannot be directly observed, the overt (i.e., public) behaviours theorised to be associated with the individual’s feelings can be. Behavioural indicators of mood are sometimes called indices of happiness (or unhappiness), and they can be operationally defined, measured, and evaluated for likely correspondence with mood (Green & Reid, 1996). Like other behaviours, indices of happiness and unhappiness are influenced by environmental events and it has been suggested that practitioners should take this into consideration when applying behavioural interventions (Parsons et al., 2012).

For example, observable indices of mood could be defined and measured as dependent variables, and behavioural interventions could be developed to increase these indices (and overall QoL) of individuals with ASD (Dillon & Carr, 2007; Green & Reid, 1996; Iwata, 1991). If QoL is a focus of rehabilitation, then it would seem necessary to target and measure indices of happiness and unhappiness as an outcome to an agency’s services (Parsons et al., 2012). By measuring indicators of mood among service users, a provider could additionally assess the efficacy of interventions intended to increase the well-being of an individual with ASD; any interventions which result in an increase in indices of unhappiness could potentially be modified or eliminated (Lattimore, Parsons, & Reid, 2009; Parsons et al., 2012; Stasolla et al., 2014b). Furthermore, the social acceptability of two different interventions could be compared by documenting the relevant changes in mood of the individual receiving such interventions; an intervention that increases the happiness of the individual could be argued to be more socially acceptable (Toole, Bowman, Thomason, Hagopian, & Rush, 2003). Socially
valid interventions are more likely to be implemented with fidelity over time, which may contribute to overall intervention success (Kennedy, 2002).

Despite arguments for including a mood measurement to evaluate interventions provided to individuals with disabilities, mood is not a common dependent variable found within behaviour analytic literature (Green & Reid, 1996). Behaviour analysts rely on measurable and observable (i.e., overt) behaviours, which may explain the paucity of studies that have incorporated a measure of covert behaviour such as mood. Of the published studies that have focused on indicators of mood in individuals with disabilities, a majority have targeted individuals with severe/profound intellectual disability (ID) or profound multiple disabilities (PMD) (see Dillon & Carr, 2007; Lancioni, Singh, O’Reilly, Oliva, & Basila, 2005, for reviews of this literature). Therefore, the current review provided an examination of the extant literature involving mood as either a primary or secondary dependent variable in behavioural interventions designed for individuals with ASD. To the author’s knowledge, this is the first review to date that has evaluated mood as a dependent variable in interventions with this population.

2.2 Method

The methods for this systematic literature review followed the guidelines outlined by the PRISMA statement (Moher, Liberati, Tetzlaff, & Altman, 2009).

2.2.1 Search Procedures

A four-step systematic search was conducted to identify the studies to be included in the current literature review. First, an online search was conducted across three electronic databases – ERIC, PsycINFO, and PubMed – to identify potential studies for inclusion. Within each database, the following terms were entered in the keywords field: “happiness”,

30
“unhappiness”, “mood”, “emotion”, and “affect”. Each of these terms were combined with the term “autis*” or “Asperger” (i.e., happiness AND (autis* OR Asperger)). This online search was limited to English-written, peer-reviewed studies, but there was no restriction on year of publication. Next, the title of each study identified through the database search was screened; any study that did not meet inclusion criteria was eliminated from the third step of the screening process. For example, if the title outlined a pharmacological treatment, the study was automatically eliminated because this did not meet inclusion criteria. This title screening resulted in 607 initial studies. These initial studies were further screened to determine which ones met the inclusion criteria outlined below. In a final step of the search process, the reference lists of all studies meeting inclusion criteria were reviewed to identify any additional studies for possible inclusion. This four-step search procedure occurred from March 2018 to April 2018, and a total of 672 studies were screened for inclusion (see Figure 2.1).

**2.2.1a Inclusion and exclusion criteria.** To be included in this review, each study met the following criteria. First, the study must have employed a single-subject experimental design (SSED). Second, the study must have included at least one participant with a primary diagnosis of ASD. Finally, the study must have incorporated a direct measurement of mood as a dependent variable to evaluate the effects of an intervention. The mood measure must have been operationally defined in the study and recorded using a type of observational system, such as event recording or interval recording. Studies using the General Child Affect Rating Scale (GCARS; e.g., Dunlap & Koegel, 1980), interest/enthusiasm scale (e.g., Koegel & Egel, 1979), or Mood Scale and Related Interview Questions (MSRIQ; e.g., Carr, McLaughlin, Giacobbe-Grieco, & Smith, 2003) were included because these Likert-type scales offer scores that have been anchored to direct observation of overt behaviours.
Studies were excluded from the literature review for the following reasons: (a) the participant(s) had a comorbid diagnosis of a mood disorder; (b) the study did not employ a SSED; (c) the study measured mood using only subjective questionnaires, inventories, and/or temperament measures; (d) the study focused on measuring and/or teaching empathy, emotion recognition, or emotion regulation; (e) the study focused on teaching affective behaviour (e.g., how to smile, how to express dislike), or lastly, (f) the study investigated the effects of a pharmacological treatment or used brain imaging to study changes in mood. Furthermore, dissertations and published literature reviews were also excluded from this review. This elimination process for the screened studies is depicted in Figure 2.2.
Figure 2.1. Flow diagram showing the four-step search procedure.

Identification

Articles identified through database search
\((n = 12,536)\)

Additional studies identified through references
\((n = 65)\)

Screening

Articles after duplicates removed
\((n = 12,601)\)

Eligibility

Articles excluded based on review of title
\((n = 11,929)\)

Articles excluded based on review of abstract
\((n = 495)\)

Full-text articles assessed for eligibility
\((n = 177)\)

Included

Studies included in qualitative synthesis
\((n = 29)\)
Figure 2.2. Flow diagram showing exclusion process for the initial studies.

- Total initial studies
  - \( N = 672 \)

  - No ASD diagnosis; comorbid diagnosis of mood disorder
    - \( N = 619 \)

  - Not a single-subject experimental design
    - \( N = 418 \)

  - Used questionnaires, surveys, inventories, or temperament measures
    - \( N = 305 \)

  - Measuring or teaching empathy, emotion recognition/regulation; teaching affective behaviour
    - \( N = 287 \)

  - Pharmacological treatment or brain imaging study
    - \( N = 282 \)

  - Literature review, discussion, or dissertation
    - \( N = 177 \)

  - No data presented; no operational definition for mood; mood not measured
    - \( N = 29 \)
2.2.2 Data Extraction

All included studies were reviewed and summarised in terms of the following variables: (a) participant and setting characteristics; (b) experimental design; (c) approach to mood assessment; (d) intervention procedures, and, (e) intervention effects on mood. Within the summary of intervention effects on mood, the treatment efficacy of each study was determined by calculating the percentage of non-overlapping data score. The methodological rigour of each study was assessed using the Scientific Merit Rating Scale of the National Autism Center [NAC] (2009).

2.2.2a Percentage of non-overlapping data (PND). Treatment efficacy was determined for each study that presented a visual display of data for the mood variable by calculating a PND score. PND is a non-parametric statistic that is calculated by determining the percentage of intervention data points that do not overlap with baseline data points (Scruggs, Mastropieri, & Castro, 1987). For studies that implemented an alternating treatments design, PND was calculated by comparing the two conditions on a point-by-point basis. For example, the first data point of one condition was compared with the first data point of the other condition, the second with the second, third with third, and so on (Wolery, Gast, & Hammond, 2010). An intervention with a PND score greater than 90% was considered “very effective”, while a score of 70–90% was considered “effective” (Scruggs & Mastropieri, 1998). A score of 50–70% was considered “questionable” and a score below 50% was considered “ineffective” (Scruggs & Mastropieri, 1998). If a study did not provide a visual display for the mood variable, or any baseline data points, a PND score could not be calculated.
2.2.2b Scientific Merit Rating Scale (SMRS). The SMRS was developed by the NAC to objectively measure the strength of methods used within studies designed for participants with ASD (NAC, 2009). The SMRS was used to evaluate the experimental rigour of each study in the current review based on the following characteristics: (a) research design; (b) measurement of the dependent variable; (c) measurement of the independent variable (i.e., procedural integrity); (d) participant ascertainment, and (e) generalisation and maintenance of treatment effects. For each study, each of these variables was given a score ranging from zero to five (with 0 representing a “poor” score and 5 representing a “strong” score). The resulting scores for each variable were then combined to produce a composite SMRS score for each study (NAC, 2009). To calculate the composite SMRS score, the following formula was used: research design (0.30) + dependent variable (0.25) + participant ascertainment (0.20) + procedural integrity (0.15) + generalisation (0.10) (NAC, 2009). A composite SMRS score of 3, 4, or 5 indicated that sufficient scientific rigour had been applied in the study. A composite SMRS score of 2 provided initial evidence of the treatment effects, but more rigorous research was necessary. A composite SMRS score of 1 or 0 indicated that insufficient scientific rigour had been applied in the study (NAC, 2009).

2.2.3 Reliability of Screening and Data Extraction Procedures

A second rater independently screened the abstracts of 220 (32.7%) of the 672 initial studies identified through database searches to determine whether these studies met the inclusion criteria. The inter-rater reliability of the screening process was calculated by using the following formula to obtain a percentage: (number of agreements) ÷ (number of agreements + number of disagreements) x 100. Initial agreement as to whether a study should be included in this review was attained for 207 (94.1%) of the 220 identified studies. In the
cases of non-agreement, consensus was reached between raters through discussion until 100% agreement was achieved.

The accuracy of the data extraction procedure was assessed on a seven-item checklist which contained the following questions: (a) Is this an accurate description of the participant(s) and setting?; (b) Is this an accurate description of the experimental design?; (c) Is this an accurate description of the mood measurement?; (d) Is this an accurate description of the intervention?; (e) Is this an accurate description of intervention outcomes?, and, (f) Is this an accurate description of the SMRS score? A second rater independently completed the checklist for each of the included studies and the inter-rater reliability of the coding process was calculated. Items identically coded by both raters were marked as an agreement. The inter-rater reliability percentage was then calculated using the same formula above: \( \frac{\text{number of agreements}}{\text{number of agreements} + \text{number of disagreements}} \times 100 \). Initial agreement for the coding process was 92% (range = 66.7-100%). Consensus was reached between raters through discussion until 100% agreement was achieved across all studies.

2.3 Results

Of the 672 initial studies screened for inclusion, 29 studies met the inclusion criteria and were subsequently reviewed for data extraction. The variables coded from each study are summarised in Table 2.1.
Table 2.1. Summary of the studies included in the review.

<table>
<thead>
<tr>
<th>Study</th>
<th>Participant(s) &amp; Setting</th>
<th>Experimental Design</th>
<th>Type of Mood Measurement</th>
<th>Intervention</th>
<th>Outcomes for Mood</th>
<th>SMRS Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arbogast &amp; Fryling (2015)</td>
<td>N = 2 (1 male); 6-9 yo ($M$ = 7.6); both with autism Setting: Home</td>
<td>ATD</td>
<td>Indices of happiness – 10s partial interval recording for any facial expression or vocalisation typically associated with happiness in people without disabilities (e.g., smiling &amp; laughing)</td>
<td>Compared two conditions (a) Non-ABA condition: access to preferred items/activities &amp; an adult not associated with ABA therapy; &amp; (b) ABA condition: preferred items/activities &amp; an ABA therapist providing ABA-based interventions (e.g., DTT)</td>
<td>Indices of happiness were higher in the ABA condition ($M$ = 44.8%; range = 23-90%) than the Non-ABA condition ($M$ = 14.1%; range = 3-25%) for both participants PND: Very effective; MC: NR; G: NR</td>
<td>1</td>
</tr>
<tr>
<td>Baker (2000)</td>
<td>N = 3 (2 males); 5-6 yo ($M$ = 5:10); all with autism Setting: University clinic</td>
<td>MB across participants</td>
<td>Child affect – composite affect score obtained using the GCARS (consisting of two Likert subscales for interest &amp; happiness)</td>
<td>Incorporating participants’ PIs into a Bingo game, prompts &amp; prompt fading</td>
<td>Child affect was higher during intervention ($M$ = 4; range = 3.6-4.3) than baseline ($M$ = 2.2; range = 2-2.5) for all participants PND: Questionable; MC: Maintained in absence of adult prompts &amp; during 1- &amp; 3-mo follow-ups; G: NR</td>
<td>3</td>
</tr>
<tr>
<td>Baker et al. (1998)</td>
<td>N = 3 (1 male); 5-8 yo ($M$ = 7:2); all with autism Setting: School</td>
<td>MB across participants</td>
<td>Child affect – composite affect score obtained using the GCARS (consisting of two Likert subscales for interest &amp; happiness)</td>
<td>Incorporating participants’ PIs into common playground games (e.g., tag, follow-the-leader), prompts &amp; prompt fading</td>
<td>Child affect was higher during intervention ($M$ = 4.3; range = 3.5-4.8) than baseline ($M$ = 2.2; range = 1.7-2.9) for all participants</td>
<td>2</td>
</tr>
<tr>
<td>Study</td>
<td>Sample Characteristics</td>
<td>Methodology</td>
<td>Findings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------</td>
<td>-------------</td>
<td>----------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Blakeley-Smith et al. (2009)</strong></td>
<td>N = 6 (3 males); 4-13 yo (M = 8:4); 4 with autism, 2 with Asperger’s</td>
<td>MB across participants</td>
<td>Happiness subscale included (a) <em>Unhappy</em>: cries, pouts, tantrums, appears sad, angry, or frustrated, not enjoying self (0-1); (b) <em>Neutral</em>: may smile or frown occasionally, overall seems neutral (2-3); &amp; (c) <em>Happy</em>: smiles, laughs, enjoying self (4-5)</td>
<td>PND: Effective; MC: Maintained in absence of adult prompts &amp; during 1- &amp; 2-mo follow-ups; G: NR</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Carr et al. (2003)</strong></td>
<td>N = 8* (5 males); 29-48 yo (M = 35:5); 5 with autism; all with mild-profound ID</td>
<td>MB across participants</td>
<td>Affect – affect rating obtained using the MSRIQ (consisting of one Likert scale)</td>
<td>For all participants, post-intervention mood ratings of 3-5 were obtained following only one (M = 33.5% of sessions; range = 16.7-62.5%), two (M = 37.8% of sessions; range = 6.3-57.2%), or three (M = 28.7% of sessions; range = 21.4-33.3%) presentations of the intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Participants</td>
<td>Setting</td>
<td>Measure</td>
<td>Procedure</td>
<td>Results</td>
<td></td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------</td>
<td>------------------</td>
<td>----------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Dunlap (1984)</td>
<td>N = 5 (4 males); 4-10 yo ($M = 7.7$); all with autism</td>
<td>University clinic</td>
<td>ATD</td>
<td>Child affect – composite affect score obtained using the GCARS (consisting of four Likert subscales for enthusiasm, interest, happiness, &amp; general behaviour)</td>
<td>Compared three conditions (a) Constant task condition: massed practice approach, prompts &amp; prompt fading, differential reinforcement; (b) Varied-acquisition-task condition: random rotation of tasks, prompts &amp; prompt fading, differential reinforcement; &amp; (c) Varied-with-maintenance-task condition: random rotation of tasks with maintenance tasks, prompts &amp; prompt fading, differential reinforcement</td>
<td>Child affect was higher during the Varied-with-maintenance-task condition ($M = 3.6$; range = 3.0-4.0) than both the Constant task ($M = 2.5$; range = 1.7-2.9) &amp; Varied-acquisition-task ($M = 3.1$; range = 2.6-3.7) conditions for all participants</td>
</tr>
<tr>
<td>Dunlap &amp; Koegel (1980)</td>
<td>N = 2 (both females); 5-7 yo ($M = 6.3$); both with autism</td>
<td>University clinic</td>
<td>MB across behaviours; embedded reversal for one participant</td>
<td>Child affect – composite affect score obtained for one participant only using the GCARS (consisting of four Likert subscales for enthusiasm, interest, happiness, &amp; general behaviour)</td>
<td>Random rotation of tasks, prompts, reinforcement</td>
<td>Child affect was higher during intervention (neutral/positive) than baseline (neutral/negative) for two of the three tasks for the participant</td>
</tr>
</tbody>
</table>

PND: N/A; MC: NR; G: NR

2
<table>
<thead>
<tr>
<th>Study</th>
<th>Sample</th>
<th>Setting</th>
<th>Measures</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geiger et al. (2012)</td>
<td>N = 2</td>
<td>School</td>
<td>Affective behaviour – 15s partial interval recording for positive affect (e.g., smiling, laughing, clapping, positive statements) &amp; negative affect (e.g., frowning, crying, yelling, negative statements)</td>
<td>Compared two conditions (a) Traditional DTT: presentation of $S^p$, prompts, reinforcement; &amp; (b) Embedded DTT: incorporating participants’ perseverative interests into $S^p$, prompts, reinforcement. Positive affect was higher in the Traditional DTT condition ($M = 48%$; range = 17-100%) than the Embedded DTT condition ($M = 34%$; range = 18-66%) for Participant 1, while positive affect was higher in the Embedded DTT condition ($M = 44%$; range = 5-81%) than the Traditional DTT condition ($M = 17%$; range = 0-50%) for Participant 2; Negative affect was higher in the Traditional DTT condition ($M = 11%$; range = 0-40%; $M = 9%$; range = 0-77%) than the Embedded DTT condition ($M = 3%$; range = 0-11%; $M = 1%$; 0-14%) for both participants.</td>
</tr>
<tr>
<td>Gengoux (2015)</td>
<td>N = 4</td>
<td>MB across participants</td>
<td>Child affect – affect rating obtained using the GCARS (consisting of one Likert scale)</td>
<td>Priming of game/activity to be used during next day probe in the inclusive setting, reinforcement to teach game, prompts to initiate play during probe. Child affect was higher during intervention ($M = 4$; range = 2-5) than baseline ($M = 3.2$; range = 1-5) for all participants.</td>
</tr>
</tbody>
</table>

**Notes:**
- **PND:** Not practical
- **MC:** Not reported
- **G:** Not reported
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>N = ? (both males); 4-5 yo (M = 2.5); both with autism</th>
<th>Setting</th>
<th>Intervention</th>
<th>Indices of happiness &amp; unhappiness</th>
<th>PND:</th>
<th>MC:</th>
<th>G:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jenkins &amp; Reed (2013)</td>
<td>7* (6 males); 6-14 yo (M = 9:6); all with ASD, 2 with tuberous sclerosis, 1 with verbal &amp; motor apraxia</td>
<td>Afterschool programme</td>
<td>MB across participants</td>
<td>Indices of happiness &amp; unhappiness – 10s MTS for any facial expression or vocalisation typically associated with happiness (e.g., smiling &amp; laughing) or unhappiness (e.g., frowning &amp; crying) in people without disabilities</td>
<td>Therapeutic horseback riding</td>
<td>Indices of happiness were higher during baseline (M = 6%; range = 0-37%) than intervention (M = 2.8%; range = 0-25%) for all participants; Indices of unhappiness were marginally higher during intervention (M = 0.2%; range = 0-6%) than baseline (M = 0.2%; range = 0-5%) for all participants</td>
<td>Ineffective; NR; NR</td>
</tr>
<tr>
<td>Jull &amp; Mirenda (2011)</td>
<td>2 (both males); 4-5 yo (M = 5:2); both with autism</td>
<td>Home</td>
<td>Reversal</td>
<td>Child affect – affect rating obtained using the GCARS (consisting of one Likert scale) Affect scale included (a) Negative affect: appears discontent (i.e., frowns, cries), avoids participation (i.e., tantrums, leaves activity), not enjoying self (i.e., frustrated, tense, impatient) (0-1); Neutral affect: may engage in activity but not interested or enthusiastic, not stressed or relaxed (2-3); Positive affect: Parent-implemented contextually supported play dates with TD peer</td>
<td>Child affect was higher during intervention (M = 3.5; range = 3-4) than baseline (M = 2.15; range = 2-2.3) for only one participant</td>
<td>N/A; NR; NR</td>
<td>NR</td>
</tr>
</tbody>
</table>
### Kennedy (1994)*

*Phase 2 only

<table>
<thead>
<tr>
<th>Participants</th>
<th>Positive social affect</th>
<th>Antecedent manipulations</th>
<th>PND:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 3 (2 males); all 20 yo; 1 with autism, 1 with cerebral palsy, 1 with quadriplegia &amp; hydrocephalus, all with moderate-profound ID</td>
<td>Frequency per minute for smiling, laughing, nodding “yes”, &amp; positive verbalisations</td>
<td>(i.e., low demand, high comment), gradual increase of demands if problem behaviour remained low</td>
<td>Very effective; MC: Maintained during 4-mo follow-up; G: NR</td>
</tr>
</tbody>
</table>

### Koegel & Egil (1979)

<table>
<thead>
<tr>
<th>Participants</th>
<th>Enthusiasm</th>
<th>Prompting</th>
<th>PND:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 3 (2 males); 6-12 yo (M = 10:1); all with autism</td>
<td>Enthusiasm rating obtained using one Likert scale</td>
<td>Prompting (verbal prompting for two participants, prompting package for third participant)</td>
<td>NR</td>
</tr>
<tr>
<td>MB across participants; embedded reversal for one participant</td>
<td>Enthusiasm included (a) Negative enthusiasm: tries to leave, tantrums, kicks, screams, throws, cries, pushes, noncompliant (0); remains in chair but noncompliant, unrelated vocalisations &amp; motor behaviour (i.e., yawning, rocking) (1); Neutral enthusiasm: complies but fidgety, staring, inattentive, “toying” with materials, wiggling (2); complies but not readily, occasionally focused (3); Positive enthusiasm: readily complies, frequently attends (4); attends quickly, laughs, smiles, watches</td>
<td>Enthusiasm was higher in intervention (M = 4.1; range = 4-5) than baseline (M = 0.8; range = 0-1) for all participants when their responding remained correct</td>
<td>N/A; MC: NR; G: NR</td>
</tr>
<tr>
<td>Author</td>
<td>N =? (Gender); Age (Mean = Median); Setting</td>
<td>MB across participants</td>
<td>Affect measure</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------------</td>
<td>------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Koegel et al. (2012)</td>
<td>N = 3 (2 males); 5-6 yo (M = 5:4); 2 with autism, 1 with Asperger’s</td>
<td>Nonconcurrent MB across participants</td>
<td>Child affect – affect rating obtained using the GCARS (consisting of one Likert scale)</td>
</tr>
<tr>
<td>Koegel et al. (2016)</td>
<td>N = 5 (3 males); 20-37 yo (M = 27:9); all with ASD</td>
<td>MB across participants</td>
<td>Affect and conversational interest – affect/interest rating obtained using one Likert scale</td>
</tr>
</tbody>
</table>

Notes: N/PND: Number of participants; PND: Post-treatment follow-up; MC: Maintenance; ASD: Autism Spectrum Disorder; MB: Multimodal Behavior; GCARS: General Classroom Assessment Rating Scale; a: different affects included as possible values (e.g., Low affect/interest: appears discontent, not enjoying self (0-1); Medium affect/interest:...
<table>
<thead>
<tr>
<th>Study</th>
<th>Sample Size</th>
<th>Setting</th>
<th>Intervention Details</th>
<th>Child Affect/Interest</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Koegel et al. (1988)</td>
<td>N = 4 (3 males); 3-11 yo (M = 8.1); 3 with autism, 1 with developmental delays</td>
<td>University clinic</td>
<td>Reversal</td>
<td><strong>Child Affect</strong> – composite affect score obtained using the GCARS (consisting of four Likert subscales for enthusiasm, interest, happiness, &amp; general behaviour)</td>
<td>Compared two conditions (a) Motor speech: reinforcement of successive improvements in motor speech (i.e., shaping); &amp; (b) Verbal attempts: reinforcement of any verbal attempts</td>
</tr>
<tr>
<td>Koegel et al. (1998)</td>
<td>N = 3 (2 males); 4-5 yo (M = 5); 2 with autism, 1 with mixed developmental disorder</td>
<td>Home</td>
<td>MB across participants</td>
<td><strong>Child Happiness</strong> – happiness rating obtained for two participants using the GCARS (consisting of one Likert scale)</td>
<td>Parent training to teach parents how to implement environmental arrangements &amp; FCT, prompts &amp; prompt fading used by clinician</td>
</tr>
<tr>
<td>Study</td>
<td>Sample Size</td>
<td>Age Range</td>
<td>Setting</td>
<td>Intervention Details</td>
<td>Child Affect</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------</td>
<td>-----------</td>
<td>---------</td>
<td>----------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Koegel et al. (2009)</td>
<td>N = 3 (all males); 3:2-3:5 yo (M = 3:3); all with autism</td>
<td>Reversal; embedded ATD for one participant</td>
<td>Child affect – composite affect score obtained using the GCARS (consisting of two Likert subscales for interest &amp; happiness)</td>
<td>Compared two conditions (a) Non-embedded: PRT paradigm followed; &amp; (b) Embedded: PRT paradigm followed, social interaction embedded into reinforcement</td>
<td>Child affect was higher in the Embedded condition (M = 4.3; range = 3.5-5) than the Non-embedded condition (M = 2.5; range = 1-3) for all participants</td>
</tr>
<tr>
<td>Koegel et al. (2005)</td>
<td>N = 2 (1 male); 8-9 yo (M = 8:6); both with autism</td>
<td>MB across participants; embedded reversal for one participant</td>
<td>Child affect – affect rating obtained using the GCARS (consisting of one Likert scale)</td>
<td>Embedding social activities with mutually reinforcing properties for both the participant &amp; TD peer, cooperative arrangements set up by adults</td>
<td>Child affect was higher during intervention (M = 4.1; range = 4-5) than baseline (M = 2.9; range = 2-3) for both participants</td>
</tr>
<tr>
<td>Lang et al. (2014)</td>
<td>N = 3 (2 males); 3:6-3:10 yo (M</td>
<td>MB across participants; embedded</td>
<td>Child mood – mood rating obtained using the MSRIQ</td>
<td>Play intervention (prompts, RIRD, &amp; reinforcement) with</td>
<td>Child mood was higher during intervention (M = 3.7; range = 3-4) than baseline (M = 2.8;</td>
</tr>
</tbody>
</table>

46
| Lattimore et al. (2009) | N = 4 (all males); 31-44 yo (M = 37); all with autism & profound ID | MP across participants | **Indices of happiness & unhappiness** - 15s partial interval recording for individualised indices of three participants  
*Happiness* – Participant 1: any facial expression or vocalisation typically  
*Unhappiness* – Participant 1: negative facial expression or vocalisation typically | Intensive teaching (i.e., repeated trials, task analyses & chaining, prompts, programming common stimuli, reinforcement)  
During intervention, indices of happiness were observed in two participants only (M = 58.5%; range = 17-100%) & indices of unhappiness were not observed in any participants | PND: N/A; MC: NR; G: NR | 2 |
| --- | --- | --- | --- | --- | --- | --- |
|  | Setting: Residential facility &  | reversal for two participants | (consisting of one Likert scale)  
Mood scale included (a) **Bad mood**: yelling, pouting, appears irritable, angry, or frustrated, not enjoying things (0-1); (b) **Neutral**: may smile or frown occasionally, overall seems neutral (2-3); **Good mood**: smiles, laughs, enjoying things (4-5)  
**Child affect** – composite affect score obtained using the GCARS (consisting of two Likert subscales for interest & happiness)  
Happiness subscale included (a) **Unhappy**: cries, pouts, tantrums, appears sad, angry, or frustrated, not enjoying self (0-1); (b) **Neutral**: may smile or frown occasionally, overall seems neutral (2-3); & (c) **Happy**: smiles, laughs, enjoying self (4-5) | without lag schedules of reinforcement | range = 2-3) for all participants; Child affect was higher during intervention (M = 3.8; range = 3-5) than baseline (M = 2.9; range = 2.5-3) for all participants | PND: N/A; MC: NR; G: NR |
<table>
<thead>
<tr>
<th>Study</th>
<th>Sample Description</th>
<th>Methodology</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moes (1998)</td>
<td>N = 4 (all males); 5-9 yo (M = 7:6); all with autism</td>
<td>Reversal</td>
<td>Compared two conditions: (a) No-choice condition: tutor selected order of activities, order of specific items/questions, &amp; stimulus materials, prompts, reinforcement; &amp; (b) Choice condition: child choice for order of activities, order of specific items/questions, &amp; stimulus materials, prompts, reinforcement. Child affect was higher in the Choice condition (neutral/positive) than the No-choice condition (neutral/negative) for all participants.</td>
</tr>
</tbody>
</table>

Supported work environment

- Associated with happiness in people without disabilities (e.g., smiling & laughing):
  - Participant 2: patting person on the back, laughing, smiling;
  - Participant 3: making “wee/mee” vocalisations, smiling

Unhappiness – Participant 1: any expression or vocalisation typically associated with unhappiness in people without disabilities (e.g., frowning, crying);
  - Participant 2: hitting head, pressing finger on eye, signing “finish”, turning over furniture, physical with staff;
  - Participant 3: Yelling, biting hand, hitting head, head butting others

Moes (1998) N = 4 (all males); 5-9 yo (M = 7:6); all with autism Setting: University clinic

Child affect – composite affect score obtained using the GCARS (consisting of three Likert subscales for enthusiasm, interest, & happiness)

- Happiness subscale included (a) Unhappy: cries, pouts, tantrums, appears sad, angry, or frustrated, not enjoying self (0-1); Neutral: may smile or frown occasionally, overall seems neutral (2-3); Happy: smiles, laughs, enjoying self (4-5)
<table>
<thead>
<tr>
<th>Study</th>
<th>N =</th>
<th>Participant details</th>
<th>Environment</th>
<th>ATD</th>
<th>Indices of happiness &amp; unhappiness - 10s partial interval recording for individualised indices of three participants</th>
<th>Compared two conditions</th>
<th>PND:</th>
<th>MC:</th>
<th>G:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parsons et al. (2012)</td>
<td>3</td>
<td>males; 22-41 yo ($M = 33:4$); all with autism &amp; severe ID, 1 with severe hearing loss, 1 with a seizure disorder</td>
<td>Supported work environment, group home, &amp;/or residential facility</td>
<td>ATD</td>
<td>Indices of happiness &amp; unhappiness - 10s partial interval recording for individualised indices of three participants&lt;br&gt;<strong>Happiness</strong> – Participant 1: patting person on back, laughing, smiling; Participant 2: responding to social interaction with a playful response, smiling, laughing; Participant 3: running, patting leg or stomach, laughing, smiling&lt;br&gt;<strong>Unhappiness</strong> – Participant 1: hitting head, crying, pressing finger on eye, signing “finish”, turning over furniture, physical with staff; Participant 2: moving items for no reason, property destruction, not responding to social interactions, crying, yelling, frowning; Participant 3: biting hand, crying, yelling, frowning</td>
<td>Compared two conditions&lt;br&gt;(a) Happy: Participant 1 – providing a sketch pad to draw, Participant 2 – providing a break in the lounge, Participant 3 – provided with a leisure item to hold, social interaction; &amp; (b) Unhappy: Participant 1 – sitting at table with no materials present, no social interaction, Participant 2 – demands given with prompting &amp; verbal feedback, Participant 3 – not provided with leisure item to hold, no social interaction</td>
<td>Indices of happiness were higher in the Happy condition than the Unhappy condition for two participants; Indices of unhappiness were higher in the Unhappy condition than the Happy condition for two participants</td>
<td>Effective; NR; NR</td>
<td></td>
</tr>
<tr>
<td>Sigafoos et al. (2006)</td>
<td>1</td>
<td>male; 12 yo; autism &amp; severe ID</td>
<td>School</td>
<td>Reversal</td>
<td>Mood – scored at the end of each interval as “bad”, “neutral”, or “good”&lt;br&gt;<strong>Bad mood:</strong> at least one instance of yelling &amp;/or screaming during interval (1); <strong>Neutral mood:</strong> no instances of yelling/screaming or laughing/smiling during</td>
<td>Compared two conditions&lt;br&gt;(a) Embedded instruction: manding opportunities embedded within activities, prompts, reinforcement; &amp; (b) DTT: imitation or receptive trials, prompts, reinforcement</td>
<td>Mood was higher during the Embedded instruction condition ($M = 2.3$; range = 2-3) than the DTT condition ($M = 1.5$; range = 1-2.3) for the participant</td>
<td>Effective; NR; NR</td>
<td></td>
</tr>
</tbody>
</table>

2
<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Setting</th>
<th>Methodology</th>
<th>Indices of Happiness</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spector &amp; Charlop (2017)</td>
<td>N = 3 (all males); 6-9 yo (M = 7); all with ASD</td>
<td>Clinic</td>
<td>Nonconcurrent MB across participants</td>
<td>Happiness – 10s partial interval recording for smiling (i.e., corners of mouth turned upwards)</td>
<td>Happiness was higher during intervention than baseline for all participants</td>
</tr>
<tr>
<td>Stasolla et al. (2014a)</td>
<td>N = 2 (both males); 7:6-8:6 yo (M = 8); both with ASD &amp; presenting symptoms of ADHD</td>
<td>School</td>
<td>Nonconcurrent MB across participants</td>
<td>Indices of happiness – 10s partial interval recording for smiling, laughing, excited body movements with or without vocalisations, singing</td>
<td>Indices of happiness were higher during intervention (M = 89.9%; range = 66-100%) than baseline (M = 29.7%; range = 20-38%) for both participants</td>
</tr>
<tr>
<td>Stasolla et al. (2014b)</td>
<td>N = 3 (all males); 8-10 yo (M = 9:4); all with ASD &amp; severe-profound ID</td>
<td>Home</td>
<td>Reversal</td>
<td>Indices of happiness – 15s partial interval recording for smiling, laughing, excited body movements with or without vocalisations</td>
<td>Indices of happiness were higher during Intervention B (M = 83.3%; range = 59-96%) than both Intervention A (M = 78.3%; range = 48-92%) &amp; Baseline (M = 26.7%; range = 5-63%) for all participants</td>
</tr>
<tr>
<td>Vernon et al. (2012)</td>
<td>N = 3 (all males); 2-4 yo (M = 3:2); all with autism</td>
<td>Home &amp; community</td>
<td>MB across participants</td>
<td>Child positive affect – frequency &amp; duration of visible &amp;/or audible indications of happiness &amp; enjoyment (e.g., smiling, laughing)</td>
<td>Child affect was higher during intervention (M = 18.7 occurrences; M = 150.5s) than baseline (M = 3.1 occurrences; M = 8.5s) for all participants</td>
</tr>
</tbody>
</table>
Systematic Literature Review

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Intervention</th>
<th>Child affect</th>
<th>Comparison</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vismara &amp; Lyons (2007)</td>
<td>N = 3 (all males); 2-3 yo (M = 2:8); all with autism</td>
<td>Phase reversal with embedded ATD</td>
<td>Child affect - affect rating obtained using the GCARS (consisting of one Likert scale)</td>
<td>Compared two conditions (a) PI stimuli: parent implementation of PRT with PI stimuli; &amp; (b) NP stimuli: parent implementation of PRT with NP stimuli</td>
<td>Child affect was higher during the PI stimuli condition (M = 3.8; range = 1-5) than both the NP stimuli condition (M = 2.9; range = 1-4) &amp; Baseline (M = 2.6; range = 1-4) for all participants</td>
</tr>
</tbody>
</table>

PND: Very effective; MC: Maintained during 1-wk follow-up; G: Generalised to non-training sessions

SMRS = Scientific Merit Rating Scale; ATD = alternating treatments design; ABA = applied behaviour analysis; DTT = discrete trial training; PND = percentage of non-overlapping data; MC = maintenance check; NR = not reported; G = generalisation; MB = multiple baseline; GCARS = General Child Affect Rating Scale; PI = perseverative interest; MSRIQ = Mood Scale & Related Interview Questions; ID = intellectual disability; SD = discriminative stimulus; MTS = momentary time sampling; TD = typically developing; MP = multiple probe; ASD = autism spectrum disorder; FCT = functional communication training; PRT = pivotal response treatment; RIRD = response interruption & redirection; NLP = Natural Language Paradigm; NP = non-perseverative interest
2.3.1 Participant(s) and Setting

2.3.1a Participant characteristics. Table 2.1 presents the participant and setting characteristics for each study. Overall, there were a total of 99 participants who took part across the 29 included studies; 92 of these participants (92.9%) had a primary diagnosis of ASD. A majority of the studies \((n = 24; 82.8\%)\) involved children or adolescents (0–17 years), while five of the studies involved adults (18+ years; Carr et al., 2003; Kennedy, 1994; Koegel, Navab, Ashbaugh, & Koegel, 2016; Lattimore et al., 2009; Parsons et al., 2012). Of the participants, 75.8% were male \((n = 75)\) and 24.2% were female \((n = 24)\). Beyond the primary diagnosis of ASD, 22 (22.2%) of the total participants had a secondary diagnosis of mild to profound ID. Other diagnoses included the following: symptoms of attention deficit hyperactivity disorder \((ADHD; n = 2)\); tuberous sclerosis \((n = 2)\); developmental delays \((n = 1)\); mixed developmental disorder \((n = 1)\); cerebral palsy \((n = 1)\); quadriplegia and hydrocephalus \((n = 1)\); verbal and motor apraxia \((n = 1)\); severe hearing loss \((n = 1)\), and seizure disorder \((n = 1)\).

2.3.1b Setting characteristics. Seven of the studies (24.1%) took place in a school classroom or school playground. Eight studies (27.6%) were carried out in a clinical or residential setting and five studies were conducted in the participants’ home (Arbogast & Fryling, 2015; Jull & Mirenda, 2011; Koegel, Stiebel, & Koegel, 1998; Koegel, Vernon, & Koegel, 2009; Stasolla et al., 2014b). Two studies were completed in an afterschool programme or day camp setting (Gengoux, 2015; Jenkins & Reed, 2013). Six studies took place across multiple settings, including a supported work environment, group home, and/or residential facility (Parsons et al., 2012); residential facility and supported work environment (Lattimore et al., 2009); home and community (Vernon, Koegel, Dauterman, & Stolen, 2012);
home or school (Blakeley-Smith, Carr, Cale, & Owen-DeSchryver, 2009); home or community (Koegel, Werner, Vismara, & Koegel, 2005), and clinic or home (Vismara & Lyons, 2007). The setting was not specified in one study (Koegel & Egel, 1979).

2.3.2 Experimental Design

The experimental design for each study is described in Table 2.1. All studies utilised a SSED. Eighteen of the studies (62.1%) implemented a multiple-baseline design or multiple-probe design; of these, 15 used a multiple-baseline across participants design (51.7%) and one used a multiple-baseline across behaviours design (Dunlap & Koegel, 1980). Two studies used a multiple-probe across participants design (Kennedy, 1994; Lattimore et al., 2009). Of the remaining 11 studies, seven implemented a reversal design (Jull & Mirenda, 2011; Koegel, O'Dell, & Dunlap, 1988; Koegel et al., 2009; Moes, 1998; Sigafoos et al., 2006; Stasolla et al., 2014b; Vismara & Lyons, 2007). However, Stasolla et al. (2014b) implemented a variation of the reversal design by using an $ABB^1AB^1$ design, where $B^1$ represented the same intervention with different reinforcement contingencies. The remaining four studies implemented an alternating treatments design (Arbogast & Fryling, 2015; Dunlap, 1984; Geiger et al., 2012; Parsons et al., 2012).

To further examine intervention effects, six studies embedded their experimental design with another design type. Three studies chose to embed a multiple-baseline across participants design with a reversal design for at least one participant (Koegel & Egel, 1979; Koegel et al., 2005; Lang et al., 2014). Dunlap and Koegel (1980) embedded a multiple-baseline across behaviours design with a reversal design for one participant, while Koegel et al. (2009) and Vismara and Lyons (2007) both embedded a reversal design with an alternating treatments design for at least one participant.
2.3.3 Mood Assessment

All the included studies used either in-vivo (i.e., observed directly) or in-vitro (i.e., observed through videotape) observation to measure the mood of participants during intervention. The majority of studies \( n = 20; 69\% \) used in-vitro observation by coding video probes for the presence or absence of the mood indicator. Information regarding the mood measurement for each study is provided in Table 2.1.

Five (17.2\%) of the identified studies in this review targeted mood as the primary dependent variable (Arbogast & Fryling, 2015; Carr et al., 2003; Jenkins & Reed, 2013; Koegel et al., 1988; Parsons et al., 2012). The other 24 studies (82.8\%) targeted other primary dependent variables, such as academic, play, social, and/or adaptive skills, that were the main focus of intervention. In these studies, the mood indicator was included as a secondary or ancillary measure.

2.3.3a Operational definitions. Operational definitions for the mood variable differed, with 18 studies (62.1\%) opting to measure some type of affect and eight studies (27.6\%) employing a measure of indices of happiness and/or unhappiness. Three studies defined their dependent variable specifically as “mood” (Carr et al., 2003; Lang et al., 2014; Sigafoos et al., 2006), while Koegel and Egel (1979) defined “enthusiasm” as a measure of mood. Lang and colleagues (2014) selected both “child affect” and “child mood” as measurements of the mood variable, while Koegel et al. (2016) labelled the dependent variable mood as “affect and conversational interest”. All the studies included within this review employed some type of behavioural indicator of mood in their operational definitions. For example, Geiger and colleagues (2012) defined “positive affect” as “smiling, laughing, clapping, and making positive statements about the activity” (p. 51). Table 2.1 provides a summary of the type of
mood measurement used across all included studies and the operational definitions utilised by the authors.

2.3.3b Measurement procedures. The measurement procedures employed by each study are described in Table 2.1. Koegel and Egel (1979) originated a six-point Likert-type scale to rate the enthusiasm of their participants during observations. From this original enthusiasm scale, the GCARS was developed by Dunlap and Koegel (1980), and the researchers in 13 other studies (44.8%) employed the GCARS to score the mood of their participants. Similar to the GCARS, the MSRIQ was first implemented by Carr et al. (2003), and this scale was subsequently used in two studies included in this review (Blakeley-Smith et al., 2009; Lang et al., 2014). These observation scales rated the level of mood demonstrated by the participants with labels such as “Unhappy/Bad Mood”, “Neutral”, or “Happy/Good Mood”. The mood level scored for each participant was based on the observation of specific behavioural indicators. For example, in Koegel et al. (2005), child affect was coded by the following labels: “Negative affect” (Score of 0-1) defined as, “appears discontent (i.e., frowns, cries), avoids participation (i.e., tantrums, leaves activity), not enjoying self (i.e., frustrated, tense, inpatient)”; “Neutral affect” (Score of 2-3) defined as, “may engage in activity, but not interested or enthusiastic, not stressed or relaxed”, or “Positive affect” (Score of 4-5) defined as, “enjoying self (i.e., smiles, laughs), interested (i.e., actively involved), appears relaxed and comfortable)” (p. 97). Sigafoos et al. (2006) developed a mood scale for their study, which was similar to the MSRIQ, but with only three mood scores. With this scale, the following mood levels were marked at the end of each interval: “Bad mood” (Score of 1), “Neutral mood” (Score of 2), or “Good mood” (Score of 3). Koegel and colleagues (2016) developed a three-point rating scale for “affect and conversational interest” which was based on the
GCARS. With this scale, the following mood labels were scored: “Low affect/interest” (Score of 0-1), “Medium affect/interest” (Score of 2-3), or “High affect/interest” (Score of 4-5).

Eight studies (27.6%) used partial-interval recording or momentary time sampling (MTS) to code the presence or absence of operationally defined indices of mood (Arbogast & Fryling, 2015; Geiger et al., 2012; Jenkins & Reed, 2013; Lattimore et al., 2009; Parsons et al., 2012; Spector & Charlop, 2017; Stasolla, Perilli, & Damiani, 2014a; Stasolla et al., 2014b). The final two studies implemented a frequency measure to count the number of discrete occurrences of each mood indicator (Kennedy, 1994; Vernon et al., 2012). Vernon and colleagues (2012) also opted to include a duration measure to calculate the number of seconds the participants engaged in each of these behavioural indicators.

The risk of bias within each study was assessed by reviewing the mood measurement to determine if blind raters were used during observation. While 26 of the 29 studies measured interobserver agreement, 16 of the studies (55.2%) included at least one blind observer who was unaware of the experimental design or research hypotheses.

2.3.3c Interobserver agreement (IOA). IOA for the mood variable was measured in 26 of the 29 included studies (89.7%). For these 26 studies, the reliability of the mood measurement was reported as acceptable (i.e., > 80%; Cooper et al., 2007) in 24 of the studies. Six studies applied Cohen’s kappa to calculate the reliability of the mood variable (Gengoux, 2015; Koegel, Kuriakose, Singh, & Koegel, 2012; Koegel et al., 2016; Koegel et al., 2009; Vernon et al., 2012; Vismara & Lyons, 2007). Among these six studies, one study reported fair agreement (Koegel et al., 2016), while one study reported moderate agreement (Vernon et al., 2012). One study reported substantial agreement (Vismara & Lyons, 2007), while two
studies reported almost perfect agreement (Koegel et al., 2012; Koegel et al., 2009). Gengoux (2015) indicated that there was fair to substantial agreement across the four participants.

### 2.3.4 Intervention Procedures

Intervention procedures are outlined in Table 2.1. Each study included in the current review was categorised as utilising either a single behavioural intervention or a behavioural intervention package, or the study provided a comparison of the effects of two different interventions or conditions. The target behaviours and treatment procedures for each category of intervention are subsequently described.

#### 2.3.4a Behavioural interventions

A total of 19 studies (65.5%) focused on increasing the academic, social, or adaptive skills of participants through specific behavioural interventions or intervention packages. Six of these studies used antecedent-based interventions as the independent variable (Blakeley-Smith et al., 2009; Carr et al., 2003; Dunlap & Koegel, 1980; Gengoux, 2015; Kennedy, 1994; Koegel & Egel, 1979). Specifically, Blakeley-Smith and colleagues (2009) used task analyses and modified task demands to meet the competency of their participants (i.e., good environmental fit). Kennedy (1994) used an antecedent-based intervention in which the instructor provided high rates of social comments while fading task demands to target the work productivity of participants. Similarly, Dunlap and Koegel (1980) randomly rotated the delivery of tasks to increase the independent responding of participants. Carr et al. (2003) used a mood induction procedure to increase the motivation of participants. In their study, stimuli associated with a “good mood” were delivered to participants prior to task demands if at that time the participants were demonstrating indices of a “bad mood”. This mood induction procedure continued until the participants demonstrated a post-intervention mood rating of 3-5. Lastly, Gengoux (2015)
used priming procedures to prepare participants for future social activities, while prompting procedures were used by Koegel and Egel (1979) to increase the on-task behaviour of participants in their study.

Three additional studies used a special type of antecedent-based intervention as their independent variable. Specifically, Baker (2000), Baker, Koegel, and Koegel (1998), and Koegel et al. (2005) embedded the environment with the preferred items or perseverative interests of participants. Perseverative interests were defined as preoccupations or obsessions that an individual continually seeks out (Carnett et al., 2014). Both Baker (2000) and Baker et al. (1998) embedded the perseverative interests of participants into either board games (e.g., Bingo) or playground games (e.g., tag, follow-the-leader), respectively. On the other hand, Koegel et al. (2005) encouraged cooperative opportunities using preferred activities that both the participants and their neurotypical peers enjoyed. A form of embedded pivotal response training (PRT) was evaluated by Vernon et al. (2012), in which a motivating social interaction was embedded into the delivery of non-social preferred stimuli.

The final nine studies implementing a specific behavioural intervention or intervention package used a wide variety of procedures. Jenkins and Reed (2013) measured the effects of animal-assisted therapy in the form of horseback riding on several different dependent variables. Stasolla et al. (2014a) measured on-task behaviour by teaching participants how to use a self-monitoring system. The researchers reinforced the implementation of this self-monitoring system with a token economy. Koegel et al. (1998) used parent training to teach guardians how to implement functional communication training (FCT) procedures and design environmental arrangements. The results of the guardians’ implementation of these procedures were measured across participants. Similarly, Spector and Charlop (2017) trained the siblings
of children with ASD to implement a Natural Language Paradigm (NLP) intervention, and the results of this sibling-mediated intervention were evaluated across participants. Social interactions were the focus of both Koegel et al. (2012) and Jull and Mirenda (2011). More specifically, Koegel and colleagues (2012) evaluated the use of initiations training to increase the social interactions of participants, while Jull and Mirenda (2011) assessed the effectiveness of parent-implemented contextually supported play dates to support the children’s social interactions.

Behavioural treatment packages were used by three studies (Koegel et al., 2016; Lang et al., 2014; Lattimore et al., 2009). Koegel et al. (2016) focused on teaching the reframing of negative statements by first providing a brief training package, which included an explanation of reframing, modelling, and role-play. The researchers subsequently used video-feedback to practice reframing and the participants were taught a self-management procedure to monitor their use of this skill. To teach appropriate play skills, Lang and colleagues (2014) used the following strategies: prompting, positive reinforcement, response interruption and redirection (RIRD), and lag schedules of reinforcement. Finally, Lattimore et al. (2009) used intensive teaching in the form of chaining, prompting, programming common stimuli, and positive reinforcement to teach their participants the steps of a task analysis. A description of each behavioural intervention can be found in Table 2.1.

2.3.4b Comparing two interventions/conditions. Different types of teaching procedures or conditions were compared in 10 (34.5%) of the included studies. Traditional discrete trial training (DTT) was compared with embedded instruction in two studies (Geiger et al., 2012; Sigafoos et al., 2006). Geiger and colleagues (2012) inspected these two teaching procedures further by including a concurrent-chains preference evaluation in which the
participants had an opportunity to select which type of instruction they preferred (DTT or embedded). Constant task instruction was compared with varied task instruction in one study (Dunlap, 1984). In this study, there were two different types of varied task instruction evaluated: varied with acquisition targets and varied with both acquisition and mastered targets. Moes (1998) evaluated the differential effects of a choice condition (i.e., within- and across-activity choice) and a no-choice condition on the motivation of participants. Koegel et al. (1988) compared the following two conditions: reinforcement of successive improvements in motor speech (i.e., shaping), and reinforcement of any verbal attempt. Similarly, Stasolla et al. (2014b) compared the following two reinforcement conditions: reinforcing adaptive responding skills with or without challenging behaviour and reinforcing adaptive responding skills without challenging behaviour. These researchers focused on adaptive responding in the form of microswitch activations used by participants.

PRT procedures with and without embedded social interactions were compared in Koegel et al. (2009). Similar to the study conducted by Vernon et al. (2012), a motivating social interaction was included in the delivery of non-social stimuli within the embedded PRT intervention. Vismara and Lyons (2007) also evaluated the effects of PRT with and without the embedded perseverative interests of participants. Specifically, daily play activities such as puzzles, books, and card games were embedded with perseverative interests such as alphabet letters and numbers within the embedded PRT condition.

In Parsons et al. (2012) and Arbogast and Fryling (2015), two different conditions were compared in an alternating treatments fashion, and the direct effects of these conditions on indices of happiness and unhappiness were evaluated. Parsons and colleagues (2012) evaluated the effects of a “happy” condition versus an “unhappy” condition for each
participant. These conditions were similar to the conditions utilised within an experimental functional analysis (e.g., control condition, attention condition), and were individualised for each participant. Finally, Arbogast and Fryling (2015) investigated the effects of an ABA condition versus a non-ABA condition on indices of happiness. The ABA condition included structured DTT procedures with differential reinforcement and prompting, while the non-ABA condition included natural interactions with an adult who was not an ABA therapist. A description of the comparative interventions or conditions can be found in Table 2.1.

2.3.4c Generalisation and maintenance. A total of nine studies (31%) collected generalisation and/or maintenance measures to evaluate the effects of intervention outside of the training context (see Table 2.1). Generalisation data for the mood variable were collected in four studies (Jenkins & Reed, 2013; Koegel et al., 2012; Koegel et al., 2016; Vernon et al., 2012) and maintenance data were collected in eight studies (Baker, 2000; Baker et al., 1998; Kennedy, 1994; Koegel et al., 2012; Koegel et al., 2016; Koegel et al., 1998; Stasolla et al., 2014a; Vernon et al., 2012).

2.3.5 Intervention Effects on Mood

The effects of intervention on mood were analysed for each study (see Table 2.1). The results are summarised by the type of intervention procedures described above. Quantifiable data sets (i.e., mean affect scores, percentage of intervals) were reported in 75.9% (n = 22) of the included studies. The remaining seven studies did not provide these data sets but presented visual displays of the mood measurement as outcome data which could be analysed (Dunlap & Koegel, 1980; Koegel et al., 1988; Kennedy, 1994; Koegel et al., 2012; Moes, 1998; Parsons et al., 2012; Spector & Charlop, 2017).
2.3.5a Behavioural interventions. For the 19 included studies that implemented a specific behavioural intervention or intervention package, the treatment led to increases in mood for all participants in 14 of these studies. Blakeley-Smith et al. (2009) found that by ensuring good environmental fit, the affect ratings for all participants increased. Similarly, the affect ratings for all four participants in Gengoux (2015) increased with the implementation of the priming intervention. Within Kennedy (1994), antecedent manipulations resulted in an increased frequency of positive social affect for all participants. Meanwhile, Koegel and Egel (1979) reported that prompting procedures resulted in increased enthusiasm ratings of all three participants. However, this finding only maintained when the participants were responding correctly.

In both Baker (2000) and Baker et al. (1998), the composite affect scores were higher for all participants when their perseverative interests were embedded into play activities. Moreover, Koegel et al. (2005) found that embedding social activities with reinforcing properties for both the participants and their typically-developing peers resulted in higher affect ratings for both participants. Vernon et al. (2012) recorded the frequency as well as duration of each affective response and both measures increased for all three participants during the embedded PRT intervention.

Stasolla et al. (2014a) also reported positive findings, concluding that the percentage of intervals with indices of happiness increased for both participants when the self-monitoring system and token economy were employed. All participants in Koegel et al. (2012) demonstrated mostly negative (sometimes neutral) affect during baseline and had increases in affect towards the positive range following initiations training. Koegel et al. (1998) measured the happiness of two participants within their study and found that the parent implementation
of FCT led to higher happiness ratings for both participants. Spector and Charlop (2017) reported similar findings, demonstrating that a sibling-mediated NLP intervention resulted in more happiness for all three participants. Finally, Lang and colleagues (2014) found that the intervention package employed to teach play skills resulted in increases in both the mood ratings and composite affect scores of all three participants when rated by their mothers who were blind to the conditions.

Carr and colleagues (2003) determined that the mood ratings of all participants could be systematically increased with the application of the mood induction procedure utilised in their study, and the procedure was successful for all participants in three applications or less. In effect, two-thirds of the sessions required only one or two applications of the mood induction procedure and the intervention was demonstrated to be successful in 30 minutes or less.

Mixed results were reported in four of the included studies. Specifically, Jull and Mirenda (2011) found that child affect ratings were higher during contextually supported play dates for one of two participants. A training package which included both video feedback and self-management increased the affect/interest scores of four of five participants in Koegel et al. (2016). Dunlap and Koegel (1980) measured the affect of one of the two participants in their study. During varied task instruction, the composite affect score of this participant increased within two of the three target tasks. Lattimore et al. (2009) demonstrated that indices of happiness were observed for two of the four participants within their study. During intervention, indices of happiness for these participants were noted in 17% and 100% of the observation intervals, respectively. However, the authors reported that indices of happiness were never observed for the remaining two participants, and indices of unhappiness were
never observed for any of the participants. Negative outcomes were reported in only one study (Jenkins & Reed, 2013). In this study, therapeutic horseback riding led to a slight increase in indices of unhappiness, while indices of happiness were higher during baseline for all participants. The effects of the behavioural interventions on mood are described in Table 2.1.

2.3.5b Comparing two interventions/conditions. For the 10 included studies that compared two or more interventions, eight of these identified a favourable treatment through a reversal or alternating treatments design. Dunlap (1984) found that varied task instruction (in comparison to constant task instruction) resulted in higher composite affect scores for all five participants. In addition, the authors discovered that varied task instruction with mastered targets led to greater increases in composite affect than varied task instruction with acquisition targets. For the single participant in Sigafoos et al. (2006), embedded instruction was found to increase the mood of the adolescent more so than traditional DTT. Alternatively, Arbogast and Fryling (2015) determined that an ABA-based condition produced more indices of happiness for both participants in comparison to a non-ABA condition.

In Vismara and Lyons (2007), it was established that PRT embedded with the perseverative interests of participants led to higher affect ratings for all three children than PRT with non-perseverative stimuli. Koegel et al. (2009) also found that embedded PRT (in comparison to typical PRT) resulted in greater increases in composite affect scores for all participants. Meanwhile, Moes (1998) demonstrated that the choice condition better improved the motivation of all participants than the no-choice condition. Koegel and colleagues (1988) found that composite affect scores were higher when reinforcing any verbal attempts than when reinforcing successive approximations in motor speech. Finally, Stasolla et al. (2014b) reported that reinforcing adaptive responses without challenging behaviour led to more
intervals with indices of happiness than reinforcing adaptive responses with or without challenging behaviour.

For the remaining two studies that compared two or more interventions or conditions, the results were mixed. In Geiger et al. (2012), embedded instruction (in comparison to traditional DTT) led to increases in affect for only one of two participants. More specifically, the percentage of intervals with positive affect increased more during embedded instruction for one participant, while this percentage increased more during traditional DTT for the other participant. In this study, the percentage of intervals with negative affect increased for both participants during traditional DTT (Geiger et al., 2012).

Parsons et al. (2012) found that the “happy” condition appeared to increase the indices of happiness for only two of the three participants. For these two participants, the percentage of indices of happiness increased, while the percentage of indices of unhappiness decreased, during the “happy” condition. During the “unhappy” condition for these two participants, the opposite was found (i.e., indices of happiness decreased while indices of unhappiness increased). The results for each comparative intervention or condition are outlined in Table 2.1.

2.3.5c PND. The PND scores are reported in Table 2.1. The PND score could not be calculated for 11 studies (37.9%) due to either a missing baseline or visual display of data (Blakeley-Smith et al., 2009; Carr et al., 2003; Dunlap, 1984; Geiger et al., 2012; Jull & Mirenda, 2011; Koegel & Egel, 1979; Koegel et al., 2016; Koegel et al., 1998; Lang et al., 2014; Lattimore et al., 2009; Spector & Charlop, 2017). Of the remaining 18 studies, eight were determined to be very effective (Arbogast & Fryling, 2015; Kennedy, 1994; Koegel et al., 2012; Koegel et al., 2009; Koegel et al., 2005; Stasolla et al., 2014a; Stasolla et al., 2014b;
Vernon et al., 2012), while three studies were determined to be effective (Baker et al., 1998; Parsons et al., 2012; Sigafoos et al., 2006). Four studies were considered questionable (Baker, 2000; Dunlap & Koegel, 1980; Koegel et al., 1988; Moes, 1998), and three studies were found to be ineffective (Gengoux, 2015; Jenkins & Reed, 2013; Vismara & Lyons, 2007).

2.3.5d Generalisation and maintenance. Nine studies collected data on the generalisation and/or maintenance of the mood measurement (Baker, 2000; Baker et al., 1998; Jenkins & Reed, 2013; Kennedy, 1994; Koegel et al., 2012; Koegel et al., 2016; Koegel et al., 1998; Stasolla et al., 2014a; Vernon et al., 2012). Generalisation probes were collected in four studies. Jenkins and Reed (2013) found that the intervention did not produce changes in indices of happiness or unhappiness during home visit probes with the participants. Conversely, Koegel et al. (2012) found that the affect ratings generalised to settings where the interventionist was not present for all three participants. Vernon et al. (2012) also found that child positive affect generalised to non-treatment settings for all participants. Koegel et al. (2016) measured the affect/interest of four of the five participants in their study and concluded that the results generalised to probes in which the participants had a conversation with a typically-developing peer in the natural environment.

Maintenance data were collected in seven included studies. Composite affect scores remained high during a one-month and three-month follow-up in Baker (2000), and during a one-month and two-month follow-up in Baker et al. (1998). In Kennedy (1994), positive social affect continued to occur more frequently during a four-month follow-up. Positive affect also occurred more frequently and for longer durations one week after intervention for all three participants in Vernon et al. (2012). A maintenance check was implemented for one of the participants in the study reported by Koegel et al. (2012), and it showed that the affect ratings...
maintained three months following intervention for this individual. Koegel et al. (2016) collected maintenance data for four of the five participants in their study and reported that increases in affect/interest continued during a two-month follow-up. Finally, Koegel et al. (1998) concluded that happiness ratings remained high during a six-month and one-year follow-up for one participant, and during a four-month follow-up for the second participant. The results from the generalisation and maintenance measures can be found in Table 2.1.

2.3.6 SMRS Scores

The SMRS was used to evaluate the experimental rigour of each study (see Table 2.1). Of the 29 studies included in the current review, one received an SMRS score of 4 (Spector & Charlop, 2017), but none received an SMRS score of 5. Ten studies (34.5%) received an SMRS score of 3, while a majority of studies \( n = 17; 58.6\% \) received an SMRS score of 2. A composite SMRS score of 2 provided initial evidence of the treatment effects, but more rigorous research was necessary (NAC, 2009). Studies that received a score of 2 typically lacked treatment integrity measures and/or generalization measures. Furthermore, these studies often employed weaker research designs (e.g., small number of participants, fewer sessions per phase). The remaining study received an SMRS score of 1 (Arbogast & Fryling, 2015). None of the studies received a score of 0.

2.4 Discussion

Within recent literature, there has been a growing trend in the promotion and measurement of QoL in people with disabilities, and researchers have proposed that one of the main components of QoL is individual happiness (Lancioni et al., 2005). However, to date, there remains a paucity of studies that have specifically measured happiness as a dependent variable in behaviour analytic research for people with disabilities (Green & Reid, 1996,
Within the few published reviews that have focused on measuring indicators of mood, all participants have had a primary diagnosis of severe/profound ID or PMD (see Dillon & Carr, 2007; Lancioni et al., 2005). Therefore, this review offers an original examination of the current state of literature involving mood as a dependent variable in behavioural interventions for individuals with ASD.

Of the 29 published studies included in this review, 22 studies (75.9%) reported positive effects on mood for all participants. Of the 19 studies that implemented a single behavioural intervention or intervention package, 14 reported positive effects on the mood of all participants. These results suggest that certain behavioural interventions may influence the mood of individuals with ASD. In some cases, change in mood was directly targeted (e.g., Carr et al., 2003), and in other studies mood was conceptualised as a collateral behaviour change not directly targeted by intervention components (e.g., Lang et al., 2014). Regardless of whether mood change was an intended intervention outcome, this review supports the conclusion that intervention may influence mood. However, these findings need to be considered with caution due to several limitations found within the literature.

2.4.1 Limitations

First, because only SSEDs were examined in this review, the number of participants were limited in each study. Further, only nine of the reviewed studies (31%) included some type of generalisation or maintenance measure. Therefore, generalisation of this review’s findings to larger groups of individuals with ASD remains uncertain and the extent to which desirable changes persist over time requires additional research.

A second limitation is that the PND scores could not be calculated for over a third of the studies ($n = 11; 37.9\%$); therefore, the efficacy of the interventions employed within these
Systematic Literature Review

studies could not be evaluated. Of the 18 studies with a PND score calculation, four were shown to be questionable and three were found to be ineffective in affecting mood. Furthermore, because changes in mood and affect were not always the primary intervention goal, research controls (e.g., IOA, minimum number of data points per phase) were often focused on other dependent variables. Therefore, definite conclusions regarding the influence of behavioural interventions on mood remain tentative and should be considered with caution.

A third limitation is the risk of bias within and across studies. Only 16 of the included studies (55.2%) included at least one blind observer within the mood assessment, which could suggest a risk of observer bias within the other 13 studies. There may also be a risk of publication bias across the included studies, but this outcome is more difficult for the author to determine. In other words, a majority of the studies reported positive outcomes for the mood variable, but there may be other unpublished studies that have found negative outcomes for mood. Nevertheless, there has been a call for the reporting of unsuccessful interventions within behaviour analytic literature, as these studies can provide useful information for future researchers (Tincani & Travers, 2018). This was demonstrated in the current review, as one study reported negative outcomes for the mood variable (Jenkins & Reed, 2013).

A fourth limitation was that over half of the studies \((n = 17; 58.6\%)\) yielded an SMRS score of 2, which suggested that the methodological rigour of these studies was questionable, and more rigorous research is necessary to make definitive conclusions regarding the effects of behavioural interventions on mood. Only one study in the current review demonstrated an SMRS score of 4 or 5 (Spector & Charlop, 2017).

A final limitation found within the research was that only five of the studies directly targeted mood as the primary dependent variable (Arbogast & Fryling, 2015; Carr et al., 2003;
Jenkins & Reed, 2013; Koegel et al., 1988; Parsons et al., 2012). All other studies measured mood as a secondary or collateral dependent variable (Ledbetter-Cho, Lang, Watkins, O’Reilly, & Zamora, 2017). It could be argued that had mood been the primary dependent variable in the remaining 24 studies, the intervention effects may have been more pronounced. However, the results of this current review indicate that more research targeting mood as the primary dependent variable is warranted.

2.4.2 Notable Findings

Several important findings emerged from this review. Specifically, 19 of the studies (65.5%) used a Likert-type scale to code the mood of participants. One could argue that these types of scales are less rigorous than other direct measurement procedures such as direct observation employing frequency or interval recording. In addition, these mood scales frequently used mentalistic language such as “appears frustrated” (e.g., Dunlap, 1984) or “seems to be enjoying self” (e.g., Dunlap & Koegel, 1980). Mentalistic terms such as “frustration” and “enjoyment” are not phenomena that can be objectively measured, and they are considered incomplete explanations to human behaviour (Hayes & Brownstein, 1986).

Objective description and measurement of behaviours is considered best practice in ABA. Rather than relying solely on emotional referents such as “frustrated”, an interventionist should describe and measure the behaviour in observable terms (e.g., “the participant screamed, cried, threw body onto floor”). Although some studies used considerably less-rigorous measurement procedures, of the 26 studies that reported IOA data, 24 reported to have good reliability within their measurement procedures. This finding suggests that different types of measurement systems (e.g., rating scales, direct observation) can yield reliable measures of mood.
One of the most notable findings is that individualised indices of happiness were only used in two of the studies (Lattimore et al., 2009; Parsons et al., 2012). It is hypothesised that individuals with disabilities engage in similar behavioural indicators of mood as individuals without disabilities (e.g., smiling, laughing, frowning) and that the same measures of mood used with individuals without disabilities could be applied to individuals with disabilities (Green & Reid, 1996; Lancioni et al., 2005). This assumption stems from the fact that individuals who lack communication skills are less likely to purposefully display an emotion that they are not feeling, which is considered a more advanced social skill (Green & Reid, 1996, 1999). Nevertheless, individuals with ASD do tend to demonstrate idiosyncratic overt behaviours that differ from those of their typically-developing peers (Donnellan, Hill, & Leary, 2013). For example, Faso, Sasson, and Pinkham (2015) found that the emotional expressivity of six adults with ASD was rated as more intense and less natural than their neurotypical peers. Furthermore, laughter, which would typically be correlated with a good mood, could be classified as a form of vocal stereotypy in a person with ASD (Ahearn, Clark, & MacDonald, 2007). As a result, it would be appropriate to individualise the operational definition of mood for each participant, just like with any other target behaviour.

It should be noted that all measurement systems described in this literature review only provided indirect evidence of the mood of the participants (Lang et al., 2014). From a behavioural perspective, mood is considered a private event that cannot be directly observed. Behavioural indicators of mood are only presumed to represent the private event in question, and due to this correlational relationship, conclusions regarding the internal feelings of an individual cannot be made with certainty (Green & Reid, 1996). For instance, an individual with ASD may engage in conventional indicators of happiness (e.g., smiling, laughter) as a form of stereotypy or echolalia, but he/she may not feel happy. In fact, research has suggested
that individuals with ASD may engage in stereotypy more frequently and for longer durations during times of distress than during times of elation (Willemsen-Swinkels, Buitelaar, Dekker, & van Engeland, 1998). Therefore, it is recommended that practitioners include a physiological measure (e.g., electrodermal activity) or modified self-report to further validate the behavioural observations of mood for individuals with ASD (Adams & Oliver, 2011; Lancioni et al., 2005).

2.4.3 Suggestions for Future Research

Based on this literature review, a few recommendations can be made regarding future research involving behavioural indicators of mood as a dependent variable in interventions for individuals with ASD. First, more research should focus on mood as the primary dependent variable as to determine the direct effects various interventions have on the well-being of individuals with ASD. Second, the operational definitions of mood for each participant should be individualised so that idiosyncratic indicators of happiness and/or unhappiness are accounted for across participants. Like other target behaviours, behavioural definitions of mood need to be individually tailored for individuals who may express their feelings in unconventional ways. Third, more rigorous research designs and observational methods should be employed in studies measuring mood changes as a result of behavioural interventions. Generalisation and maintenance measures should also be considered for any intervention that is targeting mood. Finally, the observational method of mood should be paired with a self-report or physiological measure to further validate the outcomes of intervention.
Chapter 3:

Defining and Measuring Indices of Happiness and Unhappiness in Children with ASD
3.1 Introduction

Although the concept of quality of life (QoL) is multidimensional, it could be argued that personal happiness is one of the most important aspects of QoL (Carr, 2007; Stasolla & Caffò, 2013). For most individuals, happiness and QoL are commonly measured through either self-report or parent/caregiver report (Felce & Perry, 1995; Vries & Geurts, 2015). However, the communication deficits that are present in individuals with autism spectrum disorder (ASD) can complicate the use of self-reports to measure happiness and mood (Parsons, Reid, Bentley, Inman, & Lattimore, 2012). Furthermore, proxy reports will often differ from self-reports, and guardians have been found to rate the QoL of individuals with ASD as lower than what the individuals would rate themselves (Tavernor, Barron, Rodgers, & McConachie, 2013). Parent/caregiver reports are also considered more subjective and less meaningful than objective measures (Brown, 2017). With QoL becoming a more common theme within disability services, it would seem necessary to target and measure happiness directly as an outcome to intervention. Despite this need for objective measures of mood to evaluate interventions designed to increase or decrease behaviours in individuals with ASD, mood is not a common dependent variable found within behaviour analytic research (Green & Reid, 1996).

The findings from Chapter 2 highlight the paucity of research in this area. For example, a basic search of the term “applied behaviour analysis” combined with the term “intervention” generates 1,092 results within the PsycINFO database. However, a systematic search across three separate databases (e.g., ERIC, PsycINFO, PubMed) only yielded 29 studies that have incorporated an objective measure of mood for individuals with ASD (Table 2.1). The limited amount of research examining this variable could theoretically be explained by the nature of the field of applied behaviour analysis (ABA). ABA is a science focused on
Defining and Measuring Indices of Happiness and Unhappiness

observable and measurable behaviours, while happiness, by definition, is a private event that cannot be directly observed. While verbal self-reports are often used to measure private events such as mood, Baer, Wolf, and Risley (1968) would argue that a true behaviour analyst would not accept this measure of mood until it was independently substantiated. Thus, practitioners must find a way to quantify mood in an objective manner. By measuring the indices of happiness and unhappiness theorised to be associated with an individual’s mood (e.g., smiling, crying), researchers can employ a more objective approach to evaluating this behaviour.

Green and Reid (1996) first operationalised indices of happiness and unhappiness to measure the affective behaviour of five participants with profound multiple disabilities (PMD). The researchers defined the mood indicators as “any facial expression or vocalisation typically considered to be an indicator of happiness (or unhappiness) among people without disabilities” (Green & Reid, 1996, p. 69). These indices were confirmed through a two-step validation procedure and systematically manipulated through environmental arrangements (Green & Reid, 1996). The methodology introduced by Green and Reid (1996) was subsequently used by several other studies (Dillon & Carr, 2007). Although these earlier studies are noteworthy for paving the way in this research area, many of them targeted individuals with severe/profound intellectual disability (ID) or PMD. Hence, more research with other diagnostic categories including the ASD population was warranted.

The findings from Chapter 2 indicate that indices of happiness and unhappiness can be reliably measured in individuals with ASD, and that these indicators can be affected by behavioural interventions. Of the 29 studies included in the systematic literature review, 22 reported positive effects on mood for all participants with the use of a behaviour analytic intervention (Table 2.1). Nevertheless, there were several limitations identified within the existing research that will be addressed in the present study. First, mood was not targeted as
Defining and Measuring Indices of Happiness and Unhappiness

the primary dependent variable in the majority of the studies, but as a collateral measure (Ledbetter-Cho, Lang, Watkins, O’Reilly, & Zamora, 2017). Additionally, the operational definitions of mood were individualised in only two of the studies (Lattimore, Parsons, & Reid, 2009; Parsons et al., 2012). While traditional indices of happiness and unhappiness can be used with some individuals with ASD, they are not representative of all individuals within this population (Lattimore, Parsons, & Reid, 2007). Second, less rigorous and more subjective measurement procedures (e.g., Likert scales) were implemented in over half of the studies, and these measurement systems can threaten the reliability of the data collected. Third, the percentage of non-overlapping data (PND) could not be calculated for 11 of the 21 studies, so the efficacy of these interventions could not be evaluated. Finally, of the two studies that included individualised operational definitions of mood, only one of these studies (Parsons et al., 2012) included some type of secondary validation measure to confirm the indices of happiness and unhappiness identified for each participant. According to Green and Reid (1996), the most important part of objectively measuring mood in individuals who cannot self-report their happiness in conventional ways is to ensure that “what is being observed is intended to be observed” (p. 76).

A prerequisite for measuring happiness is to have a valid way of identifying and operationally defining happiness (Parsons et al., 2012). While Green and Reid (1996) used the same traditional indices (e.g., smiling, crying) across all participants, it is considered best practice to individualise the operational definitions of mood for different individuals. This is even more imperative when measuring the mood of individuals with communication deficits or for those who have difficulties in expressing affect in conventional ways (Dillon & Carr, 2007). Parsons and colleagues (2012) outlined a procedure to systematically identify and measure individualised indices of happiness and unhappiness in adults with ASD. The current
study aimed to replicate the procedures from Parsons et al. (2012) with preschool-aged children with ASD. The purpose of this study was to determine whether individualised indices of happiness and unhappiness could be operationally defined and reliably measured in this younger population. A further goal of this study was to address some of the limitations found within existing research.

3.2 Pilot Study: Method

Prior to conducting the main study, a pilot study was completed to evaluate the feasibility of the study’s procedures. The purpose of the pilot study was to evaluate the following: (a) the practicality of the intended procedures; (b) the appropriateness and sensitivity of the measurement system; (c) the resources and skills required to implement the conditions, and (d) the participants’ preliminary responses to the procedures.

3.2.1 Participants

The participants for the pilot study were recruited from a local private preschool for children with special needs. To be considered for the study, the participants had to meet the following inclusion criteria: (a) have a DSM-V (American Psychiatric Association [APA], 2013) diagnosis of ASD from an independent Clinical Psychologist; (b) have functional communication skills (i.e., able to meet needs through speech, Picture Exchange Communication System (PECS), or an augmentative and alternative communication (AAC) device; (c) have the ability to choose between two or more items or pictures, and (d) have signed parental consent for participation. Two participants met the inclusion criteria and were included in the pilot study. Amy was a Caucasian female, aged 5 years 9 months. Richard was an Asian male, aged 3 years 10 months. Both participants communicated using short phrases and sentences, and according to records, neither participant presented with a secondary
Defining and Measuring Indices of Happiness and Unhappiness

diagnosis at the time of the study. The names of the participants have been changed to protect confidentiality.

3.2.1a Social Communication Questionnaire (SCQ). The level of severity of ASD symptomology was assessed using the Lifetime form of the Social Communication Questionnaire (SCQ; Rutter, Bailey, & Lord, 2003). The SCQ Lifetime form included 40 items that were completed in a yes/no format by an adult familiar with each child (Appendix A). For each item, a score of 1 was given for the presence of an abnormal behaviour, and a score of 0 was given for its absence (Rutter et al., 2003). A Total Score was obtained by adding items 2-40 for children who spoke using short phrases or sentences, or items 8-40 for children who did not have vocal speech; a cut-off score of 15 or greater suggested the presence of ASD (Rutter et al., 2003). In general, the higher the SCQ Total Score, the more severe the symptoms experienced by the participant. The SCQ Lifetime form was completed by each participant’s lead teacher. At the start of the pilot study, Amy had a Total Score of 13, while Richard had a Total Score of 16.

3.2.2 Setting

All sessions were conducted in the hallway outside of the preschool classroom. The hallway contained a set of stairs, large play items (e.g., trampoline, hopper ball), and a door that connected to the bathroom. To avoid any distractions, the play items were placed underneath the stairs and the tutors were asked to redirect the other children away from where the sessions were taking place.

3.2.3 Dependent Variables

The two dependent variables for the pilot study were the individualised indices of happiness and unhappiness identified for each participant. These behaviours were identified
through the Indices of Happiness and Unhappiness Questionnaire, and subsequently defined through direct observation. This non-standard questionnaire was developed specifically for the study based on the survey questions utilised by Parsons et al. (2012). The individualised indices of happiness and unhappiness for the pilot study participants are operationally defined in Table 3.1 below.

**3.2.3a Indices of Happiness and Unhappiness Questionnaire.** For each participant, three adults who were familiar with the child (e.g., parent, lead teacher, tutor) completed the Indices of Happiness and Unhappiness Questionnaire (Appendix B). The questionnaire asked the adults what specific overt behaviours the child would engage in when s/he was deemed to be happy, and when s/he was deemed to be unhappy. In addition, the questionnaire asked the adults what type of setting or situation would evoke these happy and unhappy behaviours. The responses to the questionnaire were compared, and any indices of happiness or unhappiness that were agreed upon by at least two adults were selected for observation. The researcher then spent one to two days informally observing the participants to confirm the presence of these happy and unhappy indicators. During these observations, the researcher observed the participants during their regularly scheduled activities and noted the topography of their mood indicators as they naturally occurred. Based on these observations, which were logged in written format, the indices of happiness and unhappiness were operationally defined for each participant.

For Amy, only one unhappy indicator was agreed upon by the adults familiar with her (i.e., crying). However, during informal observation, the researcher never observed Amy crying. Rather, it was noted that Amy would engage in vocalisations during the times she was deemed to be unhappy. Consequently, a follow-up questionnaire was given to the adults to complete (Appendix C). The adults were asked if Amy would engage in vocalisations during
an unhappy situation, and they were required to answer yes, no, or sometimes. As all three adults responded with yes or sometimes, it was determined that vocalisations would be included as a second indicator of unhappiness for this participant (Table 3.1).

During informal observation with Richard, the researcher noticed that he would rarely engage in crying but would cover his ears when he was denied access to something. In addition, Richard’s lead teacher had stated that he would sometimes engage in pinching but she was unsure of the function of this behaviour. The teacher could not determine whether the pinching occurred during unhappy situations for Richard or if it was a sensory-related behaviour. Therefore, a follow-up questionnaire was also completed for Richard (Appendix D). The three adults were asked if Richard would cover his ears or pinch when denied access to an item, and they were required to answer yes, no, or sometimes. For covering his ears, all three adults responded with sometimes, so it was determined that covering his ears would be included as a third indicator of unhappiness for Richard. For pinching, all three adults responded no; therefore, this behaviour was not included as an indicator of unhappiness (Table 3.1).

Table 3.1. Indices of happiness and unhappiness for the pilot study participants.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Indices of Happiness</th>
<th>Indices of Unhappiness</th>
</tr>
</thead>
</table>
| Amy         | **Laughing:** giggling and/or chuckling to make an audible noise; accompanied by smiling  
**Running:** skipping or jogging on her toes; sometimes accompanied with hand flapping  
**Vocalisations:** a loud “ahh” sound above conversational level that lasts 1-3 seconds | **Crying:** whining and/or wailing accompanied by facial contraction with or without tears |
Richard

**Laughing:** giggling and/or chuckling to make an audible noise; accompanied by smiling

**Smiling:** upward curvature of the mouth (i.e., grinning) with or without showing teeth

**Crying:** whining and/or wailing accompanied by facial contraction with or without tears

**Stomping:** bringing one or two feet down forcibly to the ground

**Covering ears:** covering his ears with the palms of his hands, or by pushing against the tragus of his ear with one or two fingers. This may also include covering his ears by leaning his head against his shoulder

### 3.2.4 Measurement

The researcher used an iPad to record the participants during all sessions. During both conditions, 10-s partial interval recording was used to code the occurrence or non-occurrence of the happy and unhappy indicators for each participant (Kennedy, 2005). Each 5-minute session consisted of 30, 10-s intervals, and the researcher used in-vitro observation to record the presence or absence of the mood indicators during each interval. A percentage of intervals was then calculated for both behaviours using the following formula: Number of intervals with indices of happiness (or unhappiness) ÷ 30 X 100.

### 3.2.5 Procedure

All sessions were conducted by each participant’s tutor while their behaviours were video recorded by the researcher. Two sessions were conducted with each participant daily. These sessions were separated by at least one hour to control for carryover effects. In addition, if a participant was informally observed to be engaging in high frequencies of happy or unhappy indicators prior to the start of a session, the session was delayed until the participant was displaying neutral behaviours for at least five minutes.
**3.2.5a Happy and unhappy conditions.** The purpose of this study was to validate the indices of happiness and unhappiness identified for each participant. To achieve this, the participants were exposed to two different conditions that represented idiosyncratic happy and unhappy situations. The specific conditions selected for each participant depended on the responses given to the Indices of Happiness and Unhappiness Questionnaire (Appendix B). For each participant, the same three familiar adults were asked what type of setting or situation would evoke the child’s happy and unhappy behaviours; any situation agreed upon by two or more adults was identified by the researcher. If there was more than one situation identified for either the happy or unhappy condition, the researcher only included the environmental variables that could be implemented with more ease (i.e., less time consuming, less resources needed).

For Amy’s unhappy condition, the first two settings identified by the adults were eliminated due to ethical reasons. All three adults had agreed that loud noises (e.g., balloons popping, fireworks) and other children crying were both aversive situations for Amy. The researcher deemed it unethical to create loud noises that could be damaging to Amy’s ears, or to purposefully evoke crying in other children, so neither of these situations were selected for the participant. Instead, the follow-up questionnaire inquired about a third setting (Appendix C). The adults were asked if Amy would engage in indices of unhappiness when denied access to preferred toys, and they were to answer *yes, no, or sometimes*. As all three adults responded *yes* or *sometimes*, denied access to toys was the situation selected for Amy’s unhappy condition.

During both conditions, the participants were exposed to their idiosyncratic environmental variables for a total of five minutes. Importantly, both conditions involved naturally occurring situations that the participants experienced on a regular basis. That is,
Defining and Measuring Indices of Happiness and Unhappiness

neither condition involved contrived settings that the participant would not normally encounter in a typical school day. To minimise the distress the participants experienced during the unhappy condition, the sessions were kept short (i.e., five minutes), and they were to be terminated based on individualised criteria for each participant. Although these criteria were set in place, none of the sessions for the unhappy condition had to be terminated for either participant. The happy and unhappy conditions identified for each participant are described in Table 3.2.

Table 3.2. Happy and unhappy conditions identified for the pilot study participants.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Happy Condition</th>
<th>Unhappy Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amy</td>
<td>Playing with preferred toys with peers</td>
<td>Denied access to toys</td>
</tr>
<tr>
<td>Richard</td>
<td>Playing with preferred toys with peers</td>
<td>Denied access to toys</td>
</tr>
</tbody>
</table>

3.2.5b Mood scale. To further validate the indices of happiness and unhappiness identified for each participant, the participants completed a brief, modified self-report following each session. More specifically, the participants were shown a simple mood scale that had three different emojis (i.e., smiley faces) which aligned to the following emotions – happy, okay (neutral), and sad (Appendix E). The neutral option was included to help differentiate the happy and sad options. By only providing two options, the participants would have been forced to make a choice between two extremes, and this may have led to inaccurate responding. For example, a participant may not feel either happy or sad, but with only two options, they might select an emotion that does not accurately represent their mood.

Following each session, the researcher asked each participant, “How do you feel?” and then waited for the participant’s response. The self-report was modified, as the participants
could respond vocally or by pointing to one of the smiley faces. The participants were given five seconds to respond, and if no response was made, the researcher marked no response on the data sheet. All other responses were marked accordingly. It was hypothesised that if the indices of happiness and unhappiness were correctly identified for each participant, then they would systematically increase (or decrease) depending on the condition, and the participants’ responses to the mood scale would validate the objective measures collected during each session.

3.2.6 Experimental Design

The pilot study implemented a single-subject experimental design (SSED). To compare the effects each condition had on the indices of happiness and unhappiness for each participant, an alternating treatments design (ATD) without a baseline was implemented (Barlow & Hayes, 1979). The order of the conditions was randomly alternated across sessions through a coin toss. However, to help counterbalance the happy and unhappy conditions, neither one was conducted for more than two consecutive sessions. For Amy, the study comprised of 10 sessions. For Richard, the study comprised of 11 sessions due to his additional availability.

3.2.7 Data Analysis

3.2.7a Visual analysis. Single-subject research methodology traditionally relies on the visual analysis of graphic data, rather than statistical analysis, to interpret the effects of an independent variable. Since parametric statistical analysis can only provide information on mean group performance, it is of less value when applied to the individual, who is the unit of concern for single-subject research (Horner et al., 2005). In fact, the use of inferential statistics to analyse behavioural data on an individual basis can lead to problems with interpretation.
Defining and Measuring Indices of Happiness and Unhappiness

(Johnston & Pennypacker, 2009). Therefore, only a visual analysis was employed during the pilot study to interpret the results, as a visual analysis provided a more forthright examination of how the participants responded over time (Johnston & Pennypacker, 2009).

The participants’ data were analysed for variability, level, and trend within each condition. In terms of variability, the “80%-25%” criterion was applied to each data series to determine the stability of the data (Gast & Spriggs, 2014). More precisely, if at least 80% of the data points fell within 25% of the median value, the data were considered stable. If less than 80% of the data points fell within this stability envelope, the data were considered variable (Gast & Spriggs, 2014). When describing the level of the data, the general location of the data points on the ordinate scale was identified. The following levels were then used to describe the data within each condition: “high” (67-100%), “moderate” (33-67%), and “low” (0-33%) (Cooper, Heron, & Heward, 2007). The split-middle line of progress was drawn for each data series to determine the trend within each condition (White & Haring, 1980). This method only provided an estimate of the overall trend, but it is considered more reliable than freehand methods and less time-consuming than linear regression methods (Cooper et al., 2007; Gast & Spriggs, 2014). When examining the trend of each data series, the following terms were used: “increasing”, “decreasing”, and “no trend” (Cooper et al., 2007).

3.2.7b Percentage of non-overlapping data (PND). In addition to variability, level, and trend, PND was calculated to help quantify the differences between the two conditions. PND is a non-parametric statistic that was calculated by comparing the two conditions on a point-by-point basis. For example, the first data point of the happy condition was compared with the first data point of the unhappy condition, the second with second, third with third, and so on (Wolery, Gast, & Hammond, 2010). A PND score of 100% showed clear superiority of one condition over the other (Richards, 2017). If one condition had more measurements due to
randomisation (i.e., more sessions in that condition), some data were left unused for the comparison. In other words, a data point was only included in the quantification if it had a corresponding data point for comparison. PND is considered the most important statistic when comparing two conditions within an ATD (Wolery et al., 2010).

3.3 PILOT STUDY: RESULTS

For both participants, individualised indices of happiness occurred more frequently during the happy condition relative to the unhappy condition. Similarly, individualised indices of unhappiness occurred more frequently during the unhappy condition relative to the happy condition for both participants. Neither of the participants consistently responded to the mood scale following either condition. The findings for each participant are outlined below.

3.3.1 AMY

The results for Amy are depicted in Figures 3.1 and 3.2. Amy demonstrated more indices of happiness during the happy condition ($M = 48.3\%, SD = 23$) relative to the unhappy condition ($M = 8.3\%, SD = 8.4$). A visual analysis of Figure 3.1 indicates that Amy’s indices of happiness were variable during both conditions. Despite this, her indices of happiness had a gradually increasing trend at a mostly moderate-to-high level during the happy condition. During the unhappy condition, Amy’s indices of happiness occurred at a low level. The happy condition was superior to the unhappy condition in 4 of 4 sessions, yielding a PND score of 100%.
Amy demonstrated more indices of unhappiness during the unhappy condition ($M = 12.5\%, \ SD = 7.4$) relative to the happy condition ($M = 7.8\%, \ SD = 11.5$). A visual analysis of Figure 3.2 indicates that Amy’s indices of unhappiness had a variable, gradually decreasing trend during both conditions. Yet, her indices of unhappiness occurred at a marginally higher level during the unhappy condition relative to the happy condition. The unhappy condition was superior to the happy condition in only 2 of 4 sessions, yielding a PND score of 50%. 

*Figure 3.1. Amy’s indices of happiness.*
Figure 3.2. Amy’s indices of unhappiness.

Amy’s responses to the mood scale matched the given condition following two of the 10 sessions (20%). Amy responded with happy following Sessions 6 and 7 of the happy condition. Within these two sessions, Amy’s indices of happiness occurred at a moderate level, so it could be argued that her happy responses supported the data from these two sessions. Amy did not respond to the mood scale following Sessions 1 and 2, and her responses to the remaining six sessions did not match the given condition. Therefore, Amy’s general responding to the mood scale did not corroborate either the happy or unhappy condition.

3.3.2 Richard

The results for Richard are depicted in Figures 3.3 and 3.4. Richard demonstrated more indices of happiness during the happy condition ($M = 58.3\%, SD = 11.3$) relative to the unhappy condition ($M = 25.3\%, SD = 14.3$). A visual analysis of Figure 3.3 indicates that Richard’s indices of happiness had a stable, gradually decreasing trend during the happy
condition, but at a mostly moderate level. On the other hand, his indices of happiness were highly variable at a mostly low level during the unhappy condition. The happy condition was superior to the unhappy condition in 5 of 5 sessions, yielding a PND score of 100%.

*Figure 3.3.* Richard’s indices of happiness.

Richard demonstrated more indices of unhappiness during the unhappy condition (*M* = 19.3%, *SD* = 36.2) relative to the happy condition (*M* = 3.9%, *SD* = 8). A visual analysis of Figure 3.4 indicates that Richard’s indices of unhappiness were variable at a low level during both conditions. However, this was not found in Session 2 of the unhappy condition, where his indices of unhappiness occurred at a high level. This resulted in a rapidly decreasing trend within the unhappy condition. The unhappy condition was superior to the happy condition in only 2 of 5 sessions, yielding a PND score of 40%.
Richard’s responses to the mood scale matched the given condition following two of the 11 sessions (18.2%). Richard responded with happy following Sessions 9 and 10 of the happy condition. Within these two sessions, Richard’s indices of happiness occurred at a moderate level, so it could be argued that his happy responses supported the data from these two sessions. Richard did not respond to the mood scale following the first seven sessions, and his responses to Sessions 8 and 11 did not match the condition. Therefore, Richard’s general responding to the mood scale did not corroborate either the happy or unhappy condition.

3.4 Pilot Study: Discussion

The purpose of the pilot study was to determine the feasibility of the intended procedures. The findings suggest that the procedures were likely to be effective in identifying and measuring indices of happiness and unhappiness in young children with ASD. In addition, the results validated the measurement system to be used within subsequent studies. Some procedural limitations were identified within the pilot study. First, there was a limited number
of sessions completed with each participant due to time constraints and staff availability. It was decided that a minimum of 15 sessions would be conducted within the main study to address this issue. Second, interobserver agreement (IOA) was not calculated during the pilot study, so the reliability of the measurement procedures could not be determined. Therefore, for the main study, IOA was determined to be necessary to address this limitation.

Finally, the setting for the pilot study (i.e., hallway) presented with some challenges. This was not a natural setting for the participants, so they were frequently distracted throughout the sessions. For example, other children would unintentionally interrupt the sessions as they walked through the hallway to the bathroom. The hallway also contained a window that faced the car park, so the children would spend time looking outside or asking for their parents. It was determined that the hallway was not an ideal setting for the main study, and that all future sessions would be conducted in a natural environment (e.g., classroom, playroom). This decision was also based on the high student-to-teacher ratios within the preschool. This meant that the tutors were not readily available to assist with the sessions. By conducting the sessions within the classroom, it was hypothesised that staff availability and participation would improve.

3.5 Main Study: Method

3.5.1 Participants

The participants for the main study were recruited from a private preschool for children with special needs that was different from the one described in the pilot study. To be included in the study, the participants had to meet the same inclusion criteria outlined in the pilot study (Section 3.2.1). Nine Caucasian males met the inclusion criteria and were included in the study. The participants ranged in age from 3 years 2 months to 6 years 1 month ($M =$
4.7, $SD = 1.2$). The mode of communication used by each participant differed. According to records, six of the participants presented with a secondary diagnosis at the time of the study.

The SCQ Lifetime form (Section 3.2.1a) was completed by each participant’s lead teacher and their individual Total Scores are reported in Table 3.3 below. The names of the participants have been changed to protect confidentiality.

Table 3.3. Participant characteristics of the main study participants.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age (year:month)</th>
<th>Gender/Ethnicity</th>
<th>SCQ Score</th>
<th>Functional Communication</th>
<th>Secondary Diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jesse</td>
<td>5:3</td>
<td>Male/Caucasian</td>
<td>23</td>
<td>PECS</td>
<td>GDD</td>
</tr>
<tr>
<td>Daniel</td>
<td>6:1</td>
<td>Male/Caucasian</td>
<td>21</td>
<td>One-word requests and PECS</td>
<td>ID</td>
</tr>
<tr>
<td>Ryan</td>
<td>6:1</td>
<td>Male/Caucasian</td>
<td>25</td>
<td>PECS</td>
<td>ID</td>
</tr>
<tr>
<td>Jacob</td>
<td>3:9</td>
<td>Male/Caucasian</td>
<td>26</td>
<td>PECS</td>
<td>Right-sided hemiparesis; GDD; language delay</td>
</tr>
<tr>
<td>Joel</td>
<td>3:4</td>
<td>Male/Caucasian</td>
<td>19</td>
<td>PECS</td>
<td>N/A</td>
</tr>
<tr>
<td>Louis</td>
<td>4:3</td>
<td>Male/Caucasian</td>
<td>27</td>
<td>Short phrases and sentences</td>
<td>N/A</td>
</tr>
<tr>
<td>Seth</td>
<td>5:11</td>
<td>Male/Caucasian</td>
<td>18</td>
<td>PECS</td>
<td>GDD</td>
</tr>
<tr>
<td>Jack</td>
<td>3:2</td>
<td>Male/Caucasian</td>
<td>26</td>
<td>One-word requests and PECS</td>
<td>N/A</td>
</tr>
<tr>
<td>Trevor</td>
<td>4:10</td>
<td>Male/Caucasian</td>
<td>26</td>
<td>AAC device</td>
<td>ID</td>
</tr>
</tbody>
</table>

SCQ = Social Communication Questionnaire; PECS = Picture Exchange Communication System; GDD = Global developmental delay; ID = intellectual disability; AAC = augmentative and alternative communication

3.5.2 Setting

The setting for each participant was unique, as it was determined through the Indices of Happiness and Unhappiness Questionnaire (Appendix B). However, all sessions were
conducted inside a familiar classroom or playroom located within the preschool. Each classroom included individual desks, chairs, shelves, a large group table, and other items typically found within an early education classroom such as visual aids, toys, and books. The playroom included large play and sensory items such as a slide, trampoline, tunnel, steamroller, bean bag chairs, mats, and a ball pit. For consistency purposes, other students and tutors were present during the study. Research has shown that changes in routine can lead to stress in children with ASD, and this can inadvertently lead to challenging behaviour (Gomot & Wicker, 2012). For this reason, the researcher kept the environment as consistent as possible to avoid affecting the outcomes of the study. To avoid interruptions by other students, the tutors were asked to redirect the children away from where the sessions were taking place.

3.5.3 Dependent Variables

The Indices of Happiness and Unhappiness Questionnaire (Section 3.2.3a) was completed by three adults familiar with each participant. The same procedures outlined in Section 3.2.3 were implemented to identify and define the individualised mood indicators for each participant. For Louis, only two indices of happiness were agreed upon by the adults familiar with him – giggling and positive talk. However, during informal observation, the researcher noted that Louis rarely engaged in positive talk, but quite frequently engaged in smiling during the times he was deemed to be happy. Consequently, a follow-up questionnaire was given to the adults to complete (Appendix F). The adults were asked if Louis would engage in smiling during a happy situation, and they were to answer yes, no, or sometimes. As all three adults responded with yes or sometimes, it was determined that smiling would be included as a third indicator of happiness for this participant. The individualised indices of happiness and unhappiness for the participants are operationally defined in Table 3.4.
Defining and Measuring Indices of Happiness and Unhappiness

Table 3.4. Indices of happiness and unhappiness for the main study participants.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Indices of Happiness</th>
<th>Indices of Unhappiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jesse</td>
<td><strong>Jumping:</strong> two or more consecutive occurrences of bouncing or jumping in place while in a seated, standing, or kneeling position</td>
<td><strong>Flopping:</strong> lying body down on the floor or table when not asked to do so</td>
</tr>
<tr>
<td></td>
<td><strong>Laughing:</strong> giggling and/or chuckling to make an audible noise; accompanied by smiling</td>
<td><strong>Hitting:</strong> using an open or closed hand to strike another person</td>
</tr>
<tr>
<td></td>
<td><strong>Smiling:</strong> upward curvature of the mouth (i.e., grinning) with or without showing teeth</td>
<td><strong>Screaming:</strong> a high-pitched vocalisation above normal conversational level</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Crying:</strong> whining and/or wailing accompanied by facial contraction with or without tears</td>
</tr>
<tr>
<td>Daniel</td>
<td><strong>Laughing:</strong> giggling and/or chuckling to make an audible noise; accompanied by smiling</td>
<td><strong>Crying:</strong> whining and/or wailing accompanied by facial contraction with or without tears</td>
</tr>
<tr>
<td></td>
<td><strong>Clapping:</strong> rapidly bringing hands together to generate an audible noise; does not count if engaging in indices of unhappiness</td>
<td><strong>Hitting:</strong> using an open or closed hand to strike another person or to repeatedly pat the table at a mild to moderate intensity</td>
</tr>
<tr>
<td></td>
<td><strong>Vocalisations:</strong> any audible noise that is not considered a functional word/sentence and is unrelated to the present situation</td>
<td><strong>Flopping:</strong> lying body down on the floor or table when not asked to do so</td>
</tr>
<tr>
<td>Ryan</td>
<td><strong>Laughing:</strong> giggling and/or chuckling to make an audible noise; accompanied by smiling</td>
<td><strong>Self-injurious behaviour (SIB):</strong> slapping head with an open or closed hand</td>
</tr>
<tr>
<td></td>
<td><strong>Smiling:</strong> upward curvature of the mouth (i.e., grinning) with or without showing teeth</td>
<td><strong>Crying:</strong> whining and/or wailing accompanied by facial contraction with or without tears</td>
</tr>
<tr>
<td></td>
<td><strong>Hugging:</strong> bringing his body close to an adult to receive a hug; wrapping his arms around an adult’s body</td>
<td><strong>Bouncing:</strong> two or more consecutive occurrences of bouncing up and down in chair while seated. Bottom must leave chair with high intensity</td>
</tr>
<tr>
<td></td>
<td><strong>Vocalisations:</strong> vowel-like sounds (e.g., “eee”, “ooo”, “ehh”) that are unrelated to the present</td>
<td></td>
</tr>
</tbody>
</table>

94
<table>
<thead>
<tr>
<th></th>
<th>Situation; whistling does not count</th>
<th>Jacob</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Smiling: upward curvature of the mouth (i.e., grinning) with or without showing teeth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Giggling: an auditory light laughter accompanied by smiling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crying: whining and/or wailing accompanied by facial contraction with or without tears</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIB: biting hand or banging head off floor if he is laying on the ground</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Swiping: using one or two hands to successfully or unsuccessfully (i.e., attempt is blocked) push items off the table or away from him</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kicking: using one foot or two feet to strike another person</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flopping: lying body down on the floor or table when not asked to do so</td>
</tr>
<tr>
<td></td>
<td>Joel</td>
<td>Smiling: upward curvature of the mouth (i.e., grinning) with or without showing teeth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Laughing: giggling and/or chuckling to make an audible noise; accompanied by smiling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hugging: bringing his body close to an adult, or leaning on an adult to receive a hug; wrapping his arms around an adult’s body</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crying: whining and/or wailing accompanied by facial contraction with or without tears</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flopping: lying or sitting body down on the floor or table when not asked to do so</td>
</tr>
<tr>
<td></td>
<td>Louis</td>
<td>Giggling: an auditory light laughter accompanied by smiling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smiling: upward curvature of the mouth (i.e., grinning) with or without showing teeth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Positive talk: making positive statements such as “awesome”, “good job”, “that’s funny”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crying: whining and/or wailing accompanied by facial contraction with or without tears</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hitting: using an open or closed hand to strike another person or item</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative talk: making negative statements such as “no”, “what’s wrong”, or asking for a tissue repeatedly when crying (e.g., “tissue”, “wipe”)</td>
</tr>
</tbody>
</table>
### Defining and Measuring Indices of Happiness and Unhappiness

<table>
<thead>
<tr>
<th>Name</th>
<th>Smiling:</th>
<th>Hand flapping:</th>
<th>Jumping:</th>
<th>Running:</th>
<th>Crying:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seth</td>
<td>upward curvature of the mouth (i.e., grinning) with or without showing teeth</td>
<td>shaking one or two hands either in an up/down or side-to-side motion repeatedly</td>
<td>two or more consecutive occurrences of bouncing or jumping in place while in a standing position</td>
<td>moving feet quickly in a jogging and/or skipping manner</td>
<td>vocalisation accompanied by a facial contraction with or without tears; with or without rubbing his eyes or covering his ears</td>
</tr>
<tr>
<td>Jack</td>
<td>upward curvature of the mouth (i.e., grinning) with or without showing teeth</td>
<td>giggling and/or chuckling to make an audible noise; accompanied by smiling</td>
<td>using a high-pitched “ahh”, “ehh”, or “yay” sound</td>
<td>lying body down on the floor when not asked to do so</td>
<td></td>
</tr>
<tr>
<td>Trevor</td>
<td>upward curvature of the mouth (i.e., grinning) with or without showing teeth</td>
<td>giggling and/or chuckling to make an audible noise; accompanied by smiling</td>
<td>whining and/or wailing accompanied by facial contraction with or without tears</td>
<td>two or more consecutive occurrences of bouncing up and down in chair while seated</td>
<td>shaking one or two hands either in an up/down or side-to-side motion repeatedly</td>
</tr>
</tbody>
</table>

#### 3.5.4 Measurement

**3.5.4a Data collection.** The data collection procedures were identical to those implemented during the pilot study (Section 3.2.4) with the addition of an IOA assessment. The researcher used an iPad to record the participants during all sessions and 10-s partial interval recording was used to code the presence or absence of the mood indicators. For each
session, a percentage of intervals was calculated for each participant’s indices of happiness and indices of unhappiness.

### 3.5.4b Interobserver agreement (IOA)

An independent rater was trained in the data collection procedures so that IOA could be assessed. This secondary observer was trained in two phases. During the first phase, the observer was given the operational definitions of the individualised indices of happiness and unhappiness for each participant. In addition, examples and non-examples of these behaviours were given. In the second phase, the observer viewed a video clip of each participant along with the researcher. The observer practiced collecting data and compared their results with the researcher. Any discrepancies were identified and discussed.

The interobserver independently observed at least 26.7% of all sessions for each participant (Kennedy, 2005), and IOA was calculated on an interval-by-interval basis. For each 10-s interval, an agreement was marked if both observers coded an occurrence or non-occurrence. A disagreement was marked if one observer coded an occurrence or non-occurrence, and the second observer coded the opposite. For each coded session, IOA was calculated for both behaviours using the following formula: Number of agreements ÷ 30 X 100. The mean IOA across both dependent variables and all participants was 95% (SD = 6.9), which was considered acceptable (i.e., >80%; Cooper et al., 2007). Table 3.5 presents the mean IOA for each participant’s indices of happiness and unhappiness.

**Table 3.5. Mean IOA for indices of happiness and unhappiness.**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Indices of Happiness</th>
<th>Indices of Unhappiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jesse</td>
<td>$M = 96.7%, SD = 4.1$</td>
<td>$M = 97.3%, SD = 4.4$</td>
</tr>
<tr>
<td>Daniel</td>
<td>$M = 91.7%, SD = 8.8$</td>
<td>$M = 96.7%, SD = 6.7$</td>
</tr>
</tbody>
</table>
### 3.5.4c Cohen’s Kappa.

In addition to IOA, Cohen’s Kappa was calculated to determine the inter-rater reliability of the dependent measures (Cohen, 1960). Cohen’s Kappa is a statistical measure that accounts for any chance agreement that may have occurred when calculating the inter-rater reliability of categorical items (Ayres & Ledford, 2014). The following formula was used to calculate Kappa: $Pr(a) - Pr(e) / 1 - Pr(e)$, where $Pr(a)$ represented total agreement, and $Pr(e)$ represented chance agreement. According to Landis and Koch (1977), a Kappa value of 0-.20 suggests “slight agreement”, 0.21-0.40 suggests “fair agreement”, 0.41-0.60 suggests “moderate agreement”, 0.61-0.80 suggests “substantial agreement”, and 0.81-1.00 suggests “almost perfect agreement”. The Statistical Package for the Social Sciences (SPSS), version 25.0 for Windows was used to calculate Kappa (IBM Corp., 2017). The inter-rater reliability for the study was found to be $\kappa = 0.8$ ($p < 0.001$), indicating substantial agreement.

#### 3.5.5 Procedure

All sessions were conducted by each participant’s tutor while their behaviours were video recorded by the researcher. The study’s procedures were identical to those implemented...
in the pilot study (Section 3.2.5). First, the happy and unhappy conditions were identified for each participant. It must be noted that the setting first identified for Daniel and Ryan’s unhappy condition was eliminated due to ethical concerns. Daniel and Ryan were twins, and the first unhappy situation agreed on for both children was the other brother crying. The researcher deemed it unethical to evoke crying in one brother so that the unhappy condition could be conducted with the other. Therefore, this situation was not selected for either of the children, and the second agreed upon situation was selected instead.

Following the identification of the conditions, the participants were exposed to their idiosyncratic environmental variables for a total of five minutes. Following each session, the participants completed the mood scale described in Section 3.2.5b. The unique happy and unhappy conditions identified for each participant are described in Table 3.6.

Table 3.6. Happy and unhappy conditions identified for the main study participants.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Happy Condition</th>
<th>Unhappy Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jesse</td>
<td>Playing with preferred toys</td>
<td>Denied access to toys</td>
</tr>
<tr>
<td>Daniel</td>
<td>Playing with iPad; adult attention</td>
<td>Denied access to toys</td>
</tr>
<tr>
<td>Ryan</td>
<td>Eating preferred edibles and playing with preferred items/sensory toys; adult attention</td>
<td>Denied access to food and/or toys</td>
</tr>
<tr>
<td>Jacob</td>
<td>Physical sensory activities (e.g., spin chair, trampoline, bouncy ball, being spun around)</td>
<td>Arts and crafts or cooking activities (i.e., any activity that required his hands to get messy)</td>
</tr>
<tr>
<td>Joel</td>
<td>Playing with preferred toys; adult attention</td>
<td>Structured work tasks at the table; hearing SpongeBob sound toy</td>
</tr>
<tr>
<td>Louis</td>
<td>Playing with iPad or balloon; adult attention</td>
<td>Working on difficult or acquisition tasks at the table</td>
</tr>
<tr>
<td>Seth</td>
<td>Playing in the playroom; dancing to music</td>
<td>Having to share with peers</td>
</tr>
<tr>
<td>Jack</td>
<td>Playing with preferred toys</td>
<td>Denied access to toys</td>
</tr>
<tr>
<td>Trevor</td>
<td>Playing with iPad or preferred toys</td>
<td>Denied access to toys</td>
</tr>
</tbody>
</table>
3.5.6 Experimental Design

Identical to the pilot study, the main study employed an alternating treatments design (ATD) without a baseline (Barlow & Hayes, 1979). The order of the conditions was randomly alternated across sessions through a coin toss, but to help counterbalance the happy and unhappy conditions, neither one was conducted for more than two consecutive sessions. For Jesse only, the study comprised of 18 sessions due to his availability. For the remaining eight participants, the study comprised of 15 sessions.

3.5.7 Data Analysis

The data analysis procedures were identical to those described in the pilot study (Section 3.2.7). A visual analysis of the graphic data was utilised, and the participants’ data were evaluated for variability, level, and trend within each condition. To help quantify the differences between the two conditions, a PND score was calculated for each dependent variable.

3.5.7a Scientific Merit Rating Scale (SMRS). In addition to the data analysis procedures described in the pilot study, an SMRS score was calculated to evaluate the strength of methods employed within the main study. One of the limitations found within the literature is that a majority of the studies have yielded an SMRS score of 2 (Section 2.4.1). This suggests that the methodological rigour of previous studies that have involved mood as a dependent variable in behavioural interventions designed for individuals with ASD has been questionable.

Developed by the National Autism Center [NAC] in 2009, the SMRS is used to measure the strength of procedures implemented by studies developed for individuals with ASD. The same procedures described in Section 2.2.2b were applied in this study. A
composite SMRS score of 3, 4, or 5 indicated that sufficient scientific rigour had been applied in the study, while a composite SMRS score of 2 provided initial evidence that the study had been established, but more rigorous research was necessary. A composite SMRS score of 1 or 0 indicated that insufficient scientific rigour had been applied in the study (NAC, 2009).

3.6 Main Study: Results

This study yielded an SMRS score of 3. This indicated that sufficient scientific rigour had been applied. For all but one participant, individualised indices of happiness occurred more frequently during the happy condition relative to the unhappy condition. Similarly, for all but one participant, individualised indices of unhappiness occurred more frequently during the unhappy condition relative to the happy condition. None of the participants consistently responded to the mood scale following either condition. The findings for each participant are outlined below.

3.6.1 Jesse

The results for Jesse are depicted in Figures 3.5 and 3.6. Jesse demonstrated more indices of happiness during the happy condition ($M = 23\%, SD = 21.3$) relative to the unhappy condition ($M = 1\%, SD = 2.5$). A visual analysis of Figure 3.5 indicates that Jesse’s indices of happiness had a highly variable, gradually decreasing trend during the happy condition. Despite that, his indices of happiness were rare during the unhappy condition, as they only occurred during one session. During this session, Jesse’s indices of happiness occurred at a low level. The happy condition was superior to the unhappy condition in 6 of 7 sessions, yielding a PND score of 85.7%.
Defining and Measuring Indices of Happiness and Unhappiness

Figure 3.5. Jesse’s indices of happiness.

Jesse demonstrated more indices of unhappiness during the unhappy condition ($M = 57.6\%, SD = 27.9$) relative to the happy condition ($M = 0.6\%, SD = 1.4$). A visual analysis of Figure 3.6 indicates that Jesse’s indices of unhappiness were highly variable during the unhappy condition, but they had a gradually increasing trend at a mostly moderate-to-high level. Jesse’s indices of unhappiness only occurred during two sessions of the happy condition. During these sessions, his indices of unhappiness occurred at a low level. The unhappy condition was superior to the happy condition in 7 of 7 sessions, yielding a PND score of 100\%. 

102
Jesse’s responses to the mood scale matched the given condition following four of the 18 sessions (22.2%). During the happy condition, Jesse responded with happy following five sessions (Sessions 6, 7, 9, 11, and 14). Of these five sessions, his indices of happiness occurred at a moderate-to-high level during Sessions 6 and 7 only. Therefore, it could be argued that Jesse’s happy responses only supported the data from these two sessions. For the remainder of the sessions within the happy condition, Jesse had two okay responses (Sessions 4 and 18), one sad response (Session 16), and three no responses (Sessions 1, 2, and 13).

During the unhappy condition, Jesse responded with sad following two sessions (Sessions 3 and 12). His indices of unhappiness occurred at a high level during both sessions, so his sad responses supported the data for these two sessions. For the remainder of the sessions within the unhappy condition, Jesse had four okay responses (Sessions 8, 10, 15, and 17) and one no response (Session 5). Overall, Jesse’s general responding to the mood scale did not corroborate either the happy or unhappy condition.

3.6.2 Daniel
The results for Daniel are displayed in Figures 3.7 and 3.8. Surprisingly, Daniel demonstrated more indices of happiness during the unhappy condition ($M = 41.4\%, SD = 15.2$) relative to the happy condition ($M = 30.4\%, SD = 30.2$). A visual analysis of Figure 3.7 indicates that Daniel’s indices of happiness were highly variable at a mostly low-to-moderate level during both conditions. His indices of happiness had a gradually increasing trend during the happy condition, but they had a rapidly increasing trend during the unhappy condition. The unhappy condition was superior to the happy condition in only 4 of 7 sessions, yielding a PND score of 57.1%.

*Figure 3.7. Daniel’s indices of happiness.*

Daniel’s indices of unhappiness only occurred during the unhappy condition ($M = 27.1\%, SD = 12.5$). During this condition, Daniel’s indices of unhappiness were variable at a low-to-moderate level. The unhappy condition was superior to the happy condition in 7 of 7 sessions, yielding a PND score of 100% (Figure 3.8).
Daniel did not respond to the mood scale following any of the sessions. His lack of responding did not corroborate either the happy or unhappy condition.

3.6.3 Ryan

The results for Ryan are displayed in Figures 3.9 and 3.10. Ryan demonstrated more indices of happiness during the happy condition ($M = 54.4\%, SD = 22.1$) relative to the unhappy condition ($M = 20.6\%, SD = 12.6$). A visual analysis of Figure 3.9 indicates that Ryan’s indices of happiness were highly variable during the happy condition, but they occurred at a mostly moderate-to-high level. During the unhappy condition, his indices of happiness had a variable, gradually decreasing trend at a low-to-moderate level. The happy condition was superior to the unhappy condition in 6 of 6 sessions, yielding a PND score of 100%.
Ryan’s indices of unhappiness were rare, as they only occurred during one session of the unhappy condition ($M = 7.8\%,\ SD = 19.1$). During this session, his indices of unhappiness occurred at a moderate level. The unhappy condition was superior to the happy condition in only 1 of 6 sessions, yielding a PND score of 16.7% (Figure 3.10).

*Figure 3.9.* Ryan’s indices of happiness.

*Figure 3.10.* Ryan’s indices of unhappiness.
Ryan did not respond to the mood scale following any of the sessions. His lack of responding did not corroborate either the happy or unhappy condition.

### 3.6.4 Jacob

The results for Jacob are displayed in Figures 3.11 and 3.12. Jacob demonstrated more indices of happiness during the happy condition ($M = 53.8\%, SD = 18.2$) relative to the unhappy condition ($M = 12.1\%, SD = 23.2$). A visual analysis of Figure 3.11 indicates that Jacob’s indices of happiness were variable in both conditions. Yet, his indices of happiness occurred at a moderate-to-high level during the happy condition, while they occurred at a mostly low level during the unhappy condition. The happy condition was superior to the unhappy condition in 6 of 7 sessions, yielding a PND score of 85.7%.

*Figure 3.11. Jacob’s indices of happiness.*

![Indices of Happiness for Jacob](image)

Jacob’s indices of unhappiness only occurred during the unhappy condition ($M = 14.2\%, SD = 7.3$). During this condition, his indices of unhappiness were variable at a low
level. The unhappy condition was superior to the happy condition in 7 of 7 sessions, yielding a PND score of 100% (Figure 3.12).

*Figure 3.12. Jacob’s indices of unhappiness.*

Jacob had only one session (6.7%) where his response matched the given condition. During the happy condition, Jacob responded with *happy* following Session 1. Within this session, his indices of happiness occurred at a moderate level, so it could be argued that Jacob’s *happy* response supported the data from this session. For the remainder of the sessions across both conditions, Jacob did not respond to the mood scale. Therefore, his lack of responding did not corroborate either the happy or unhappy condition.

### 3.6.5 Joel

The results for Joel are displayed in Figures 3.13 and 3.14. Joel demonstrated more indices of happiness during the happy condition ($M = 42.4\%, SD = 20.7$) relative to the unhappy condition ($M = 13.3\%, SD = 11.3$). A visual analysis of Figure 3.13 indicates that Joel’s indices of happiness were highly variable in both conditions. Although his indices of
happiness had a gradually decreasing trend during the happy condition, they occurred at a mostly moderate-to-high level. During the unhappy condition, Joel’s indices of happiness occurred at a low level. The happy condition was superior to the unhappy condition in 7 of 7 sessions, yielding a PND score of 100%.

*Figure 3.13. Joel’s indices of happiness.*

Joel demonstrated more indices of unhappiness during the unhappy condition (\(M = 6.3\%, SD = 8.8\)) relative to the happy condition (\(M = 1\%, SD = 2.5\)). A visual analysis of Figure 3.14 indicates that Joel’s indices of unhappiness were variable at a low level during the unhappy condition. Despite this, his indices of unhappiness were rarer during the happy condition, as they were only observed during one session. During this session, Joel’s indices of unhappiness occurred at a low level. The unhappy condition was superior to the happy condition in only 3 of 7 sessions, yielding a PND score of 42.9%.
Joel’s responses to the mood scale matched the given condition following two of the 15 sessions (13.3%). During the happy condition, Joel responded with happy following Sessions 2 and 8. Within these two sessions, his indices of happiness occurred at a moderate-to-high level, so it could be argued that Joel’s happy responses supported the data from these two sessions. For the remainder of the sessions within the happy condition, Joel did not respond to the mood scale.

During the unhappy condition, Joel never had any sad responses. Within this condition, he had four happy responses (Sessions 4, 6, 7, and 12) and four no responses (Sessions 3, 9, 11, and 14). Nevertheless, during Sessions 6, 7, and 12 of the unhappy condition, Joel did demonstrate more indices of happiness than indices of unhappiness. His happy responses supported the data from these three sessions, but this result did not support the hypothesis. Overall, Joel’s general responding to the mood scale did not corroborate either the happy or unhappy condition.

3.6.6 Louis
The results for Louis are displayed in Figures 3.15 and 3.16. Louis demonstrated more indices of happiness during the happy condition ($M = 22.9\%, SD = 7.7$) relative to the unhappy condition ($M = 2.4\%, SD = 2.5$). A visual analysis of Figure 3.15 indicates that Louis’ indices of happiness were variable at a low level during both conditions. However, his indices of happiness occurred at a relatively higher level during the happy condition, and they occurred less frequently during the unhappy condition. The happy condition was superior to the unhappy condition in 7 of 7 sessions, yielding a PND score of 100%.

*Figure 3.15. Louis’ indices of happiness.*

Louis’ indices of unhappiness only occurred during one session of the unhappy condition ($M = 1\%, SD = 2.5$). During this session, his indices of unhappiness occurred at a low level. The unhappy condition was superior to the happy condition in only 1 of 7 sessions, yielding a PND score of 14.3% (Figure 3.16).
Figure 3.16. Louis’ indices of unhappiness.

Louis’ responses to the mood scale matched the given condition following one of the 15 sessions (6.7%). During the happy condition, Jesse responded with happy following four sessions (Sessions 1, 3, 6, and 12). Of these four sessions, his indices of happiness occurred at a moderate level in Session 6 only. Therefore, it could be argued that Louis’ happy response only supported the data from this one session. For the remainder of the sessions within the happy condition, Louis had three okay responses (Sessions 9, 13, and 15) and one sad response (Session 4).

During the unhappy condition, Louis responded with sad following one session (Session 11). He did not demonstrate any indices of unhappiness during this session, so his sad response did not support the data. For the remainder of the sessions within the unhappy condition, Louis had three happy responses (Sessions 2, 7, and 14), two okay responses (Sessions 8 and 10), and one no response (Session 5). During Sessions 7 and 14, Louis did engage in some indices of happiness (3.3% and 6.7%, respectively), but his indices of happiness occurred less frequently during these two sessions than during any of the sessions of
the happy condition. Therefore, his *happy* responses following Sessions 7 and 14 did not support the data from these two sessions. Overall, Louis’ general responding to the mood scale did not corroborate either the happy or unhappy condition.

### 3.6.7 Seth

The results for Seth are displayed in Figures 3.17 and 3.18. Seth demonstrated more indices of happiness during the happy condition ($M = 76.7\%, SD = 22.2$) relative to the unhappy condition ($M = 20\%, SD = 8.4$). A visual analysis of Figure 3.17 indicates that Seth’s indices of happiness were stable at a mostly high level during the happy condition. During the unhappy condition, his indices of happiness were variable at a low level. The happy condition was superior to the unhappy condition in 6 of 6 sessions, yielding a PND score of 100%.

*Figure 3.17. Seth’s indices of happiness.*

Seth did not demonstrate any indices of unhappiness during either the happy or unhappy condition (Figure 3.18).
Seth did not respond to the mood scale following any of the sessions. In fact, the presentation of the mood scale became aversive for him, so it was discontinued after the 10th session. When Seth was shown the visual, he would engage in avoidance behaviour such as aggression (e.g., hitting) and running from the researcher. The researcher theorised that the termination of the happy sessions (i.e., having to turn the music off and leave the playroom) became a conditioned negative reinforcer for Seth, because he had to leave a preferred activity and return to his work in the classroom. Consequently, the mood scale (i.e., the visual) became a discriminative stimulus for his avoidance behaviour, as it signalled that this behaviour could delay his return to the classroom. This is supported by the finding that Seth did not demonstrate any avoidance behaviours when shown the mood scale following the unhappy sessions (i.e., sharing with peers in the classroom). Seth’s lack of responding to the mood scale did not corroborate either the happy or unhappy condition.

3.6.8 Jack
The results for Jack are displayed in Figures 3.19 and 3.20. Jack demonstrated more indices of happiness during the happy condition \((M = 25.8\%, \ SD = 17.3)\) relative to the unhappy condition \((M = 5.2\%, \ SD = 6.9)\). A visual analysis of Figure 3.19 indicates that Jack’s indices of happiness had a highly variable, gradually decreasing trend during both conditions. Despite this, his indices of happiness occurred at a marginally higher level during the happy condition relative to the unhappy condition. The happy condition was superior to the unhappy condition in 6 of 7 sessions, yielding a PND score of 85.7%.

*Figure 3.19. Jack’s indices of happiness.*

![Indices of Happiness for Jack](image)

Jack demonstrated more indices of unhappiness during the unhappy condition \((M = 6.7\%, \ SD = 13.7)\) relative to the happy condition \((M = 0.4\%, \ SD = 1.2)\). A visual analysis of Figure 3.20 indicates that Jack’s indices of unhappiness were rare in both conditions. Nevertheless, his indices of unhappiness were marginally more frequent during the unhappy condition, as they occurred during two sessions rather than just one. During these two sessions, Jack’s indices of unhappiness occurred at a low-to-moderate level. The unhappy
condition was superior to the happy condition in only 2 of 7 sessions, yielding a PND score of 28.6%.

*Figure 3.20. Jack’s indices of unhappiness.*

![Indices of Unhappiness for Jack](image)

Jack’s responses to the mood scale did not match the given condition following any of the sessions. During the happy condition, Jack responded with *happy* following Sessions 6 and 9. Within these two sessions, his indices of happiness occurred at a low level; therefore, it could be argued that Jack’s *happy* responses did not support the data from these two sessions. For the remainder of the sessions within the happy condition, Jack had one *sad* response (Session 3) and five *no responses* (Sessions 1, 7, 10, 13, and 15).

During the unhappy condition, Jack never had any *sad* responses. Within this condition, he had two *happy* responses (Sessions 5 and 8) and five *no responses* (Sessions 2, 4, 11, 12, and 14). However, during Session 5, Jack did demonstrate more indices of happiness than indices of unhappiness. His *happy* response following Session 5 supported the data from this session, but it did not support the hypothesis. Overall, Jack’s general responding to the mood scale did not corroborate either the happy or unhappy condition.
3.6.9 Trevor

The results for Trevor are displayed in Figures 3.21 and 3.22. Trevor demonstrated more indices of happiness during the happy condition ($M = 31.9\%$, $SD = 22.7$) relative to the unhappy condition ($M = 11.3\%$, $SD = 9.2$). A visual analysis of Figure 3.21 indicates that Trevor’s indices of happiness were highly variable during both conditions. However, during the happy condition, his indices of happiness had a gradually increasing trend at a mostly moderate-to-high level. During the unhappy condition, Trevor’s indices of happiness had a gradually decreasing trend at a low level. The happy condition was superior to the unhappy condition in 6 of 7 sessions, yielding a PND score of 85.7%.

*Figure 3.21. Trevor’s indices of happiness.*

Trevor’s indices of unhappiness only occurred during the unhappy condition ($M = 8.3\%$, $SD = 11.7$). During this condition, his indices of unhappiness were highly variable at a low level, but they had a gradually increasing trend. The unhappy condition was superior to the happy condition in only 4 of 7 sessions, yielding a PND score of 57.1% (Figure 3.22).
Trevor’s responses to the mood scale did not match the given condition following any of the sessions. During the happy condition, he did not respond to the mood scale following any of the sessions. During the unhappy condition, Trevor had four happy responses (Sessions 2, 3, 8, and 9) and four no responses (Sessions 5, 11, 12, and 14). Nevertheless, during Sessions 3 and 8 of the unhappy condition, Trevor did demonstrate more indices of happiness than indices of unhappiness. His happy responses may have supported the data from these two sessions, but they did not support the hypothesis. Overall, Trevor’s general responding to the mood scale did not corroborate either the happy or unhappy condition.

3.7 Main Study: Discussion

Improving the QoL of children and adolescents with disabilities has become a central focus of disability research (King, Tucker, Baldwin, & LaPorta, 2006), and the emotional well-being (i.e., happiness) of an individual is considered an important component of their QoL (Felce & Perry, 1995). Although practitioners are interested in the pursuit of happiness, there is an issue with how to measure this private event (Pietro, Silvia, & Giuseppe, 2014). If
QoL is to be the focus of disability services, then a reliable system is needed to measure happiness and unhappiness as an outcome to intervention. The need for an objective measure of mood is especially important when evaluating the QoL of individuals who have communication deficits and who might not express emotion in conventional ways (Dillon & Carr, 2007). The main purpose of this study was to determine whether indices of happiness and unhappiness could be operationally defined and reliably measured in young children with ASD.

The results from this study corroborate the findings from Parsons et al. (2012). Through the Indices of Happiness and Unhappiness Questionnaire, the researcher identified at least two indices of happiness and two indices of unhappiness unique to each participant. Following this, the researcher systematically manipulated these indices through specific environmental arrangements and reliably measured them through in-vitro observation. Eight of the nine participants demonstrated more indices of happiness during the happy condition relative to the unhappy condition. Although indices of happiness were variable in both conditions, there was very little overlap between the data paths for each participant, and the happy condition was more superior to the unhappy condition with a mean PND score of 87.3% ($SD = 18.1$).

Similarly, eight of the nine participants demonstrated more indices of unhappiness during the unhappy condition relative to the happy condition. Although the mean PND score was only 51.1% ($SD = 40.2$), the superiority of the unhappy condition was evident based on a visual analysis of the graphs. During the unhappy condition, indices of unhappiness occurred at a low level for most participants or they did not occur at all. Indices of unhappiness were even more rare in the happy condition, with most participants never demonstrating unhappy indicators during any of the sessions. While the absence of indices of unhappiness during both
conditions led to more overlap between the data paths, and thus, lower PND scores, it could be considered favourable from an ethical standpoint.

This study differed from the Parsons et al. (2012) study in a few ways. Unlike Parsons et al. (2012), the current study did not incorporate a follow-up measure for any of the participants. A follow-up probe is typically taken to determine whether a response has maintained following the termination of an intervention (Cooper et al., 2007). Yet, the follow-up procedures in Parsons et al. (2012) did not measure indices of happiness and unhappiness as a result of either condition being terminated. Rather, the happy and unhappy conditions were repeated at 12-29 weeks for one participant, and the mood indicators were observed again (Parsons et al., 2012). This follow-up measure was found to be a replication of the procedures, rather than a demonstration of response maintenance, and it further validated the hypothesis that the selected conditions were effective in evoking the indices of happiness and unhappiness for this participant. Through inter-subject replication across eight participants in the current study, it was determined that the selected happy and unhappy conditions were indeed effective at increasing the individualised indices of happiness and unhappiness of each participant, respectively. Therefore, a similar follow-up probe was not deemed necessary.

A second difference was the validation measure used within the current study to confirm the individualised indices of happiness and unhappiness identified for each participant. In Parsons et al. (2012), the researchers conducted a choice comparison with their participants at least once a day. The participants were asked to make a choice between their happy and unhappy conditions, and the selected setting was immediately presented. The researchers hypothesised that the situation in which participants demonstrated more indices of happiness (i.e., happy condition) would be selected more often than the unhappy condition (Parsons et al., 2012). In the current study, a modified self-report (i.e., mood scale) was used
Defining and Measuring Indices of Happiness and Unhappiness

as the secondary validation measure. It was hypothesised that the participants would be more likely to respond to the mood scale with happy following the sessions in which the participants demonstrated more indices of happiness (i.e., happy condition). A choice comparison was not implemented in the current study, as the effects of choice will be evaluated in subsequent studies.

3.7.1 Limitations

The current study presented with several limitations. First, there was a risk of bias in determining the SMRS score of this study, as the researcher calculated the experimental rigour of the procedures without a secondary rating to compare (i.e., IOA). A second limitation for this study was that the indices of unhappiness could not be validated for Seth, as he did not engage in any unhappy indicators during either condition. One explanation for this was that the selected situation for Seth’s unhappy condition (i.e., sharing with peers) was no longer aversive to the participant. Anecdotally, the tutors had noted that sharing was a social skill that they had previously worked on with Seth because he would engage in tantrums when asked to share an item prior to the study. To teach this skill, the tutors would reinforce Seth’s behaviour each time he shared with a peer or cooperated during a game in which he had to take turns. As a result, the participant appeared to have developed an understanding of this contingency as he would share with his peers more often. Due to ethical reasons, the researcher could not ask the tutors to discontinue this intervention for the sake of the study. When asked if there were any other potentially aversive situations for Seth, the tutors could not agree on one. Despite this, the researcher did observe Seth to engage in crying during an informal observation, so the presence of his indices of unhappiness were confirmed.
Another limitation for this study was the results of the secondary validation measure, as none of the participants consistently responded to the mood scale. When the participants did respond, their responses seldomly corroborated the data from the completed sessions. As a result, the mood scale did not help validate the objective measures collected by the researcher. This outcome was unexpected, as it was hypothesised that the modified self-report would accommodate for any expressive language difficulties. Nevertheless, previous research has shown that children with ASD can demonstrate alexithymia, or the inability to identify and describe one’s own emotions (Griffin, Lombardo, & Auyeung, 2016; Nemiah, Freyberger, & Sifneos, 1976). This should have been taken into consideration by the researcher, and the lack of any training prior to the introduction of the mood scale was a considerable limitation for this study. If the participants had been taught how to identify and label their own emotions prior to the start of the study, the reliability of their responses to the mood scale would have likely improved, and the findings for this study would have been further supported. Emotional self-awareness needs to be taught to young children with ASD before a mood scale is applied during intervention. Practitioners should bear this in mind, as similar mood scales (e.g., Incredible 5-Point Scale; Buron, 2015) are frequently used in ABA classrooms. This is discussed as a potential area for future research (see Section 8.5.2).

Although not necessarily a limitation, the findings for Daniel may be considered somewhat surprising. Daniel engaged in more indices of happiness during the unhappy condition relative to the happy condition. This result may be explained by a few different events. One explanation is that Daniel’s teachers had been working on the social skill of “accepting no” prior to the onset of the study. Daniel would previously engage in tantrums when he was told no or when he was blocked from accessing preferred toys. To teach this skill, the tutors would set up contrived situations in which Daniel’s preferred items (e.g., iPad,
Defining and Measuring Indices of Happiness and Unhappiness

slinky) were visible, but out of reach. When he requested or reached for an item, he was told no. If Daniel accepted this outcome, his behaviour was reinforced with a less-preferred item (e.g., book) and social praise. At the time of the study, the tutors were still working on this skill and the researcher could not ask for the intervention to be discontinued for ethical reasons. In addition to this, the researcher could not control for specific motivating operations (MOs). Daniel often had access to his iPad and adult attention prior to his daily sessions, and as a result, Daniel may have satiated on these stimuli. His satiation may have acted as an establishing operation (EO) for his “accepting no” behaviour.

Another explanation for these results is that Daniel often engaged in stereotypy during the unhappy condition. Daniel’s unhappy condition was similar to an alone condition of an experimental functional analysis (Iwata, Dorsey, Slifer, Bauman, & Richman, 1994). This meant Daniel did not have access to any items or attention, and he would often engage in stereotypy as a form of self-stimulation during these sessions. His stereotypy included clapping, which was also identified as one of his indices of happiness. This could explain why his indices of happiness frequently occurred during the unhappy condition. Finally, it must be noted that the situation selected for Daniel’s unhappy condition was not the first setting identified. Originally, his mother and tutors had identified his brother crying as the most aversive situation for him. The researcher had decided against this setting for ethical reasons, but this resulted in an unhappy condition that may have not been as aversive to Daniel.

3.7.2 Future Direction

This study demonstrated that indices of happiness and unhappiness can be systematically manipulated through environmental arrangements. Theoretically, these overt indicators of mood could be measured as a direct outcome to intervention. With the use of this
technology, interventions that are intended to improve the QoL of a child with ASD could be evaluated for their efficacy based on how they affect the child’s mood. In fact, this technology could be considered one of the few methods available that can be used to objectively validate the programming for individuals with disabilities, regardless of their functioning level (Ivancic, Barrett, Simonow, & Kimberly, 1997). Although QoL is considered a goal of disability services, it is frequently measured through subjective instruments that include proxy reports when the individual is too young or has language impairments that impedes their ability to complete a self-report (Ikeda, Hinckson, & Krägeloh, 2014). In addition, research has shown that the social acceptability of interventions designed for individuals with developmental disabilities is often determined through the opinions of professionals or caregivers rather than direct measures (Toole, Bowman, Thomason, Hagopian, & Rush, 2003). By measuring individualised indices of happiness and unhappiness directly, a practitioner could objectively evaluate the emotional well-being and overall QoL of a child with ASD and adjust interventions accordingly. This technology is considered to be “consistent with the philosophies of person-centred planning and self-determination” (Dillon & Carr, 2007, p. 239).

One potential area of research that would benefit from the use of this technology is the implementation of choice-based interventions. Choice-based interventions are thought to benefit individuals with disabilities because they help to enhance their self-determination and overall QoL (Shogren, Faggella-Luby, Bae, & Wehmeyer, 2004; Wehmeyer & Schalock, 2001). Research has shown that choice-making opportunities can improve the academic performance, motivation, and appropriate behaviours of students with ASD, while also reducing their inappropriate behaviours (Reutebuch, El Zein, & Roberts, 2015). In spite of the research endorsing choice as an intervention for individuals with ASD, only one identified
study has objectively evaluated mood as an outcome to a choice intervention (Moes, 1998). To address this paucity of research, Chapter 4 will evaluate the effects of choice on the indices of happiness, indices of unhappiness, and on-task behaviour of young children with ASD. This choice-based intervention will be compared with a preference-based intervention to evaluate the differential effects of these two independent variables.

3.7.3 Conclusion

In conclusion, the current study demonstrated that there is a systematic process for identifying and defining indices of happiness and unhappiness in young children with ASD. This study confirmed that these mood indicators can be reliably measured in this population. The current findings also contributed to the existing literature in several ways. First, this study confirmed that individualised, overt indicators of mood can be reliably measured in a younger population of preschool-aged children with ASD. This study also included more participants ($n = 9$) than what was reported in previous literature ($M = 3.4, SD = 1.6$). Second, this study investigated mood as the primary dependent variable rather than as a collateral measure. Only five studies identified within the systematic literature review directly targeted mood as the primary dependent variable (Table 2.1). Finally, this study implemented more rigorous experimental procedures. Over half of the studies ($n = 18$) identified in the literature review had an SMRS score of 2 (Table 2.1), while this study yielded an SMRS score of 3. The experimental rigour of this study was demonstrated with the use of individualised operational definitions, more objective measures (i.e., partial-interval recording), and more in-depth analysis procedures (i.e., PND).
Chapter 4:

The Differential Effects of Choice Versus Preference on the Indices of Happiness and Unhappiness in Children with ASD
4.1 Introduction

In the 1990s, the United States Department of Education introduced several federally funded initiatives that aimed to improve the quality of services provided to those with disabilities. As a result of these initiatives, self-determination was established as an educational outcome within disability services (Wehmeyer & Schalock, 2001). This focus on self-determination was largely due in part to the emerging awareness that individuals with disabilities are given limited opportunities for choice within their daily lives (Brotherson, Cook, Cunconan-Lahr, & Wehmeyer, 1995). Self-determination is considered a fundamental human right, and it can be defined as “acting as the primary causal agent in one’s life and making choices and decisions regarding one’s quality of life free from undue external influence or interference” (Wehmeyer, 1996, p. 24). Self-determination begins to develop at an early age; therefore, self-determination skills should be targeted within the school curriculum, beginning in the early elementary years (Heller et al., 2011; Malian & Nevin, 2002).

Providing choices to young children with disabilities is a simple way to promote their self-determination (Heller et al., 2011). Choice-making opportunities allow children with disabilities to act as causal agents within their own lives, which in turn, can improve their self-determination and overall quality of life (QoL; Shogren, Faggella-Luby, Bae, & Wehmeyer, 2004). Previous research has shown that choice-making opportunities are associated with improved intervention outcomes for individuals with autism spectrum disorder (ASD), regardless of the type of choice offered (e.g., choice of reinforcer, across-activity choice, within-activity choice; Reutebuch, El Zein, & Roberts, 2015). In this regard, choice-making could be considered a pivotal skill because it improves the self-determination of individuals with ASD and results in other desired outcomes (Rispoli et al., 2013).
For choice to be meaningful to children with ASD, choice should be integrated into all facets of the learning environment, not just in one context (Brown, Belz, Corsi, & Wenig, 1993). One area of teaching that could benefit from having more choice-making opportunities is discrete trial training (DTT). DTT is one of the most commonly used evidence-based practices for individuals with ASD, but it is criticised for being too teacher-driven and it often lacks opportunities for choice within its procedures (Elliott & Dillenburger, 2016). DTT follows a strict teaching sequence that includes the following three components: (a) a discriminative stimulus that elicits behaviour, (b) the behaviour itself, and (c) the delivery of a reinforcing consequence (Smith, 2001). For DTT to be successful, reinforcing stimuli must be identified through a preference assessment. This preference assessment is usually conducted prior to the teaching session, and the highly-preferred items are used as consequences during DTT. While it is important to include a student’s preferences within DTT, knowing a child’s preferences should not preclude opportunities for choice (Cannella, O’Reilly, & Lancioni, 2005). Yet, no other forms of choice are typically included within teaching beyond the initial preference assessment (Elliott & Dillenburger, 2016), and students are often limited to one or two preferred items during DTT (Mechling, Gast, & Cronin, 2006). Assessing for a child’s preferences, but not including opportunities for choice, is inconsistent with self-determination (Wood, Fowler, Uphold, & Test, 2005).

Despite the success of choice-based interventions in previous research, the question remains whether it is the choice opportunity itself, or the influence of preference, that affects the outcome of an intervention (Dunlap et al., 1994; Shogren et al., 2004). Preference and choice have been discussed as separate, but related variables, with some researchers suggesting that opportunities for choice provide additional advantages over assigning a preferred alternative (Cosden, Gannon, & Haring, 1995; Dunlap et al., 1994; Dyer, Dunlap, &
Winterling, 1990; Koegel, Singh, & Koegel, 2010; Moes, 1998), while others have found no difference between the two variables (Bambara, Ager, & Koger, 1994; Cole, Davenport, Bambara, & Ager, 1997; Killu, Clare, & Im, 1999; Parsons, Reid, Reynolds, & Bumgarner, 1990; Smith, Iwata, & Shore, 1995). As a result, the findings to date related to choice and preference have been mixed.

Previous research evaluating choice and preference has been limited to adults and school-aged children with severe/profound developmental disabilities, attention deficit hyperactivity disorder (ADHD), or mood disorders. A majority of this research was conducted over 15 years ago and only two of these studies included an objective measure of mood as a dependent variable (Koegel et al., 2010; Moes, 1998). Therefore, the purpose of this study was to further evaluate the differential effects of choice versus preference on the mood and on-task behaviour of preschool-aged children with ASD. The effects of choice and preference were evaluated within daily DTT sessions to determine whether choice-making opportunities could provide additional benefits to this evidence-based procedure.

4.2 Pilot Study: Method

Similar to Study 1, a pilot study was completed prior to Study 2 so that the feasibility of the study’s procedures could be evaluated. The purpose of the pilot study was to evaluate the following: (a) the practicality of the intended procedures; (b) the appropriateness and sensitivity of the measurement system; (c) the resources and skills required to implement the conditions, and (d) the participants’ preliminary responses to the procedures.

4.2.1 Participants

Amy and Richard had previously participated in the first pilot study and were invited to participate in the second pilot study. The participant characteristics and the Social
Communication Questionnaire (SCQ) Total Scores for these two participants are described in Section 3.2.1.

4.2.2 Setting

All sessions were conducted at a desk inside the hallway outside of the preschool classroom. The hallway contained a set of stairs, large play items (e.g., trampoline, hopper ball), and a door that connected to the bathroom. The desk was placed at the end of the hallway, facing the wall, to prevent any distractions. In addition to this, all play items were placed underneath the stairs and the tutors were asked to redirect other children away from where the sessions were taking place.

4.2.3 Dependent Variables

For each participant, the two primary dependent variables were the individualised indices of happiness and unhappiness identified in the first pilot study (Chapter 3). These overt behaviours were first identified through the Indices of Happiness and Unhappiness Questionnaire (Appendix B), and then validated through the implementation of idiosyncratic happy and unhappy conditions. The unique indices of happiness and unhappiness for Amy and Richard are operationally defined and presented in Table 3.1.

The secondary dependent variable was on-task behaviour. On-task behaviour was operationally defined as “looking at the tutor or materials and completing the given task(s) without needing redirection, and without engaging in stereotypy or challenging behaviour”. Individuals diagnosed with ASD will often engage in stereotypy, which is defined as “stereotyped or repetitive motor movements, use of objects, or speech” (American Psychiatric Association [APA], 2013). In fact, the presentation of restricted and repetitive behaviours is a core diagnostic criterion for ASD (APA, 2013). Stereotypy and challenging behaviour are
Differential Effects of Choice vs. Preference
detrimental to individuals with ASD because they can interfere with learning opportunities and social interactions (Matson & Nebel-Schwalm, 2007). For this reason, these behaviours were being monitored by the preschool tutors and a participant was not considered to be on-task if s/he was engaging in either.

Amy’s stereotypies were hand flapping, hand wringing, and spinning. Hand flapping was defined as “shaking one or two hands either in an up/down or side-to-side motion repeatedly”. Hand wringing was defined as “clasping her hands together and twisting them in a washing hands motion”. Spinning was defined as “turning her body 360 degrees in either direction”. Amy did not engage in any challenging behaviour. Richard did not have any stereotypies, but his challenging behaviour was hitting, which was defined as “using an open or closed hand to strike another person”.

4.2.4 Measurement

An iPad was used to video record all sessions and in-vitro observation was employed by the researcher to code for all dependent variables. For the two primary dependent variables, 15-s partial interval recording was used to record the presence or absence of the happy and unhappy indicators for each participant (Kennedy, 2005). For the secondary dependent variable, 15-s whole interval recording was used. During each interval, the researcher coded the presence of on-task behaviour only if it occurred throughout the entire interval (Kennedy, 2005). Whole interval recording was selected over partial interval recording because on-task behaviour was a continuous behaviour with a longer duration (Ayres & Ledford, 2014; Cooper, Heron, & Heward, 2007; Mayer, Sulzer-Azaroff, & Wallace, 2014). Each session was 12.5 minutes long and consisted of 50, 15-s intervals. A percentage of intervals was calculated
Differential Effects of Choice vs. Preference

for each dependent variable using the following formula: Number of intervals with (dependent variable) ÷ 50 X 100.

4.2.5 Procedure

All sessions within the pilot study were conducted by the researcher. As there was a high student-to-teacher ratio within the preschool, the lead teachers were not readily available to assist with the sessions. Moreover, the tutors were not trained in DTT, so there was a threat to the fidelity of the procedures. The researcher conducted two sessions with each participant daily. These sessions were separated by at least one hour to control for carryover effects. In addition, if a participant was informally observed to be engaging in high frequencies of happy or unhappy indicators prior to the start of a session, the session was delayed until the participant was displaying neutral behaviours for at least five minutes.

4.2.5a Paired-choice preference assessment. Prior to the beginning of the pilot study, the researcher conducted a paired-choice preference assessment with each participant (Fisher et al., 1992). This widely used assessment is implemented by practitioners to help determine an individual’s preferences for stimuli that could be used as potential reinforcers during operant conditioning. Fisher and colleagues (1992) compared this assessment to the single-stimulus method first described by Pace, Ivancic, Edwards, Iwata, and Page (1985), and determined that the paired-stimulus method was more accurate at identifying potential reinforcers. Furthermore, the paired-stimulus method resulted in a more distinct ranking of items and had more consistent results when compared to the multiple-stimulus method described by Windsor, Piche, and Locke (1994).

During the assessment, each participant was asked to make a choice between two different items presented to them. Upon completion of the choice response, the participants
were given 10 seconds to manipulate or play with their selected item. This choice opportunity was repeated until each item had been paired with every other item in a randomised order. Ten total items were compared, and a hierarchy of preference was determined based on the frequency of selection. The top three items selected during the assessment were labelled as high-preference, and the last three items were labelled as low-preference. The paired-choice preference assessment used by the researcher can be found in Appendix G.

4.2.5b Preference condition. During the preference condition, preference was emphasised over choice. That is, the participants were given a single choice between three highly-preferred items at the beginning of each session, but no other choices were given. Prior to each session, the researcher asked the participants, “What do you want to work for?”, and they selected one of their three highly-preferred items, as determined by the preference assessment. Once their selection was made, the teaching session began. Throughout the teaching session, DTT was implemented. This teaching method consisted of the following three steps: the presentation of an academic task, the participant completing the task accurately or inaccurately, and a consequence (reinforcement or correction). Correct responding to the task resulted in social praise (e.g., verbal praise, high fives, tickles), while incorrect responding or no responding resulted in an error-correction procedure specific to the given task.

Following 10 minutes of DTT, the participants’ responses were reinforced with their selected item if they were demonstrating on-task behaviour at the end of the 10-minute interval. If the participants were not demonstrating on-task behaviour at the end of the 10-minute interval, their item was withheld until they were demonstrating on-task behaviour for at least 10 seconds so that any stereotypy and/or challenging behaviour would not be reinforced. Following delivery of the selected item, the participants were permitted to play
with their items for 2 minutes and 30 seconds. The FI 10-minute schedule of reinforcement was selected for the preference condition because these procedures were similar to the daily teaching sessions already implemented within the preschool. During these regular teaching sessions, the participants selected a reinforcer, the tutors implemented DTT for 10 minutes, then the children were reinforced with their selected item at the end of this interval. During the preference condition, the participants were given only one choice opportunity, but the choice was between three highly-preferred items.

4.2.5c Choice condition. During the choice condition, choice was emphasised over preference. That is, the participants were given several choice opportunities throughout each teaching session, but their choices were limited to three low-preferred items. Low-preferred items were used rather than highly-preferred items to help control for the effects of preference (Waldron-Soler, Martella, Marchand-Martella, & Ebey, 2000). With the use of low-preferred items, choice is in direct competition with preference (Fisher, Thompson, Piazza, Crosland, & Gotjen, 1997). At the beginning of each session, the participants were not provided with a choice of an item to work for and DTT immediately began. The same teaching procedures described in Section 4.2.5b were implemented.

Following two minutes of DTT, the participants were given a choice opportunity if they were demonstrating on-task behaviour at the end of the 2-minute interval. If the participants were not demonstrating on-task behaviour at the end of the 2-minute interval, the choice opportunity was withheld until they demonstrated on-task behaviour for at least 10 seconds. During this choice opportunity, the researcher said, “Great job working! What do you want?” and presented the three low-preferred items. The participants selected an item and following delivery, they were given 30 seconds to play with their item. The item was then removed, and the teaching session continued. The FI 2-minute schedule of reinforcement was
selected for the choice condition to help compensate for the effects of preference. It was theorised that a single choice opportunity between three low-preferred items would not have been comparable to a single choice opportunity between three highly-preferred items (i.e., preference condition), and that the effects of preference (high vs. low) would have superseded the effects of choice. Therefore, several choice opportunities were presented within the choice condition. During the choice condition, the participants were given up to five separate choice opportunities, but the choices were between three low-preferred items.

4.2.6 Experimental Design

The pilot study implemented a single-subject experimental design (SSED). To compare the effects each condition had on the dependent variables for each participant, an alternating treatments design without a baseline was implemented (ATD; Barlow & Hayes, 1979). Beginning with the preference condition, the conditions were alternated with each session. For Amy, the study comprised of 14 sessions and for Richard, the study comprised of 15 sessions.

4.2.7 Data Analysis

The same data analysis procedures described in Section 3.2.7 were applied in this study. Specifically, a visual analysis of the graphic data was used to determine the effects of the choice and preference conditions. For each dependent variable, the variability, level, and trend were analysed within each condition. Additionally, the percentage of non-overlapping data (PND) was calculated to help quantify the differences between the two conditions.

4.3 Pilot Study: Results

The results for the pilot study were mixed. Amy displayed more indices of happiness during the choice condition relative to the preference condition, while Richard displayed more
indices of happiness during the preference condition relative to the choice condition. Both participants displayed more indices of unhappiness during the choice condition. For on-task behaviour, the preference condition was superior for Amy, while the choice condition was superior for Richard. The findings for each participant are presented and discussed below.

4.3.1 Amy

The results for Amy are depicted in Figures 4.1-4.3. Amy demonstrated more indices of happiness during the choice condition ($M = 10.6\%, SD = 18$) relative to the preference condition ($M = 8.6\%, SD = 12.9$). A visual analysis of Figure 4.1 indicates that Amy’s indices of happiness were highly variable at a low level during both conditions. Despite this, the maximum value during the choice condition (Session 12) was marginally higher than the maximum value of the preference condition (Session 3). The choice condition was superior to the preference condition in only 3 of 7 sessions, yielding a PND score of 42.9%.

*Figure 4.1. Amy’s indices of happiness.*
Amy demonstrated more indices of unhappiness during the choice condition ($M = 17.1\%, SD = 13.8$) relative to the preference condition ($M = 9.4\%, SD = 10.3$). A visual analysis of Figure 4.2 indicates that Amy’s indices of unhappiness had a highly variable, gradually decreasing trend during both conditions. However, her indices of unhappiness occurred at a marginally higher level during the choice condition relative to the preference condition. The choice condition was superior to the preference condition in only 4 of 7 sessions, yielding a PND score of 57.1%.

*Figure 4.2.* Amy’s indices of unhappiness.

![Graph showing Amy's Indices of Unhappiness](image)

Amy demonstrated more on-task behaviour during the preference condition ($M = 63.1\%, SD = 22.6$) relative to the choice condition ($M = 51.7\%, SD = 18.5$). A visual analysis of Figure 4.3 indicates that Amy’s on-task behaviour had a highly variable, gradually increasing trend during both conditions. Nevertheless, her on-task behaviour occurred at a marginally higher level during the preference condition relative to the choice condition. The preference condition was superior to the choice condition in only 4 of 7 sessions, yielding a PND score of 57.1%.
Figure 4.3. Amy’s on-task behaviour.

![Graph showing Amy's on-task behaviour](Image)

4.3.2 Richard

The results for Richard are depicted in Figures 4.4-4.6. Richard demonstrated more indices of happiness during the preference condition ($M = 48.3\%, SD = 15.7$) relative to the choice condition ($M = 42.9\%, SD = 14.3$). A visual analysis of Figure 4.4 indicates that Richard’s indices of happiness were variable at a mostly moderate level during both conditions. However, his indices of happiness had a gradually increasing trend during the preference condition while they showed no trend during the choice condition. The preference condition was superior to the choice condition in only 3 of 7 sessions, yielding a PND score of 42.9\%. 

42%
Richard’s indices of unhappiness were rare, as they only occurred during one session of the choice condition ($M = 0.3\%, SD = 0.8$). During the choice condition, his indices of unhappiness occurred at a low level. The choice condition was superior to the preference condition in only 1 of 7 sessions, yielding a PND score of 14.3%.

**Figure 4.4.** Richard’s indices of happiness.

**Figure 4.5.** Richard’s indices of unhappiness.
Richard demonstrated more on-task behaviour during the choice condition \((M = 58.9\%, \ SD = 10.5)\) relative to the preference condition \((M = 56\%, \ SD = 13.7)\). A visual analysis of Figure 4.6 indicates that Richard’s on-task behaviour occurred at a mostly moderate to high level during both conditions. Yet, his on-task behaviour was stable during the choice condition and variable during the preference condition. The choice condition was superior to the preference condition in only 4 of 7 sessions, yielding a PND score of 57.1%.

*Figure 4.6. Richard’s on-task behaviour.*

4.4 Pilot Study: Discussion

The purpose of the pilot study was to determine the feasibility of the intended procedures. The preliminary findings from the pilot study did not support the research hypothesis, but there were several procedural limitations found within the study that were considered to need review. First, the hallway was not an ideal setting for the study because it had multiple distractions. Additionally, interobserver agreement (IOA) data were not collected during the study, therefore the reliability of the measurement procedures could not be determined.
The lack of resources within the preschool also proved to be a limitation. Due to a high student-to-teacher ratio, the lead teachers were unable to assist with the sessions. The tutors were not trained in DTT, so all sessions were conducted by the researcher to ensure treatment fidelity. This may have resulted in experimenter bias. In addition, the researcher did not have an established rapport with the participants. This could have inadvertently led to noncompliance, which would have affected the participants’ on-task behaviour during the sessions. Furthermore, the lack of rapport with the participants may have affected their mood. Research has shown that rapport-building can have a positive effect on both appropriate and inappropriate behaviours of individuals with disabilities (McLaughlin & Carr, 2005).

Finally, there were several limitations found within the implementation of the conditions. First, the order of the conditions was not randomly allocated and there was no counterbalancing between the two participants due to a scheduling conflict. The preference condition had to be conducted in the mornings due to the unavailability of some materials needed for the choice condition. During the morning schedule, the tutors focused on fine motor activities, so the pegs, bead maze, and blocks were usually unavailable during the first half of the day. These materials were required to conduct the choice condition with both participants.

Another limitation was that there was no stimulus discrimination used within the pilot study. That is, external stimuli were not used to help the participants distinguish between the two conditions. This is considered a requirement for an ATD, especially when an intervention is provided as a consequence rather than as an antecedent (Wolery, Gast, & Hammond, 2010). The researcher theorised that a pre-session choice of reinforcer within the preference condition (i.e., “What do you want to work for?”) signalled the start of this condition, while the lack of
pre-session choice signalled the start of the choice condition. This was misguided, and salient visual stimuli were introduced in the main study.

Finally, the reinforcement schedule for the two conditions was different, and this may have affected the results. The preference condition implemented a FI 10-minute schedule of reinforcement, while the choice condition implemented a FI 2-minute schedule of reinforcement. Therefore, the response effort needed for reinforcement was higher during the preference condition, regardless of the quality of the reinforcers. On a similar note, the preference condition provided a single choice between three highly-preferred items, while the choice condition provided five choice opportunities. Although these choice opportunities included three low-preferred items, the number of choices within this condition, rather than the act of choosing itself, may have been a confounding variable. These limitations were addressed accordingly in designing the subsequent main study.

4.5 Main Study: Method

4.5.1 Participants

The same nine participants from Study 1 were invited to participate in Study 2. The participants had previously met the inclusion criteria described in Section 3.2.1. Of the nine participants, eight were included in this study. Jesse was unable to participate due to a withdrawal in parental consent. At the time of the study, he was engaging in high frequencies of challenging behaviour in both the home and school settings, which prevented him from sitting at the table for more than a few minutes. His parents were concerned about his participation, so they had requested for him to be withdrawn prior to his third session. At the beginning of the study, the participants ranged in age from 3 years 3 months to 6 years 2
months ($M = 4.8; SD = 1.2$). The characteristics for each participant and their SCQ Total Scores can be found in Table 3.3.

### 4.5.2 Setting

All sessions were conducted at each participant’s work desk within a familiar classroom. Each classroom included individual desks, chairs, shelves, a large group table, and other items typically found within an early education classroom such as visual aids, toys, and books. To encourage consistency, other students and tutors were present during the study, but they were asked to not interfere with the procedures.

### 4.5.3 Dependent Variables

The two primary dependent variables for each participant were the individualised operationally defined indices of happiness and unhappiness identified in Study 1. The unique indices of happiness and unhappiness for each participant are operationally defined in Table 3.4. The secondary dependent variable was on-task behaviour, which is defined above (Section 4.2.3). Each participant had some form of stereotypy and/or challenging behaviour that had been identified by the lead teachers prior to the start of the study. The form of stereotypy and/or challenging behaviour demonstrated by each participant was unique. The operational definitions for these behaviours can be found in Table 4.1 below.

It must be noted that some of the identified stereotypies and challenging behaviours were also included as indices of happiness or unhappiness for seven of the participants (see Daniel, Ryan, Jacob, Louis, Seth, Jack, and Trevor). These behaviours were being targeted for reduction by the preschool tutors because they often interrupted learning opportunities. For example, Daniel would engage in brief clapping outbursts during his work, which required the
Differential Effects of Choice vs. Preference

tutor to block his hands and redirect him back to the task. Although these behaviours resulted in off-task behaviour, the researcher still considered them to be useful as measures of mood.

Table 4.1. Stereotypy and challenging behaviour for the main study participants.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Stereotypy</th>
<th>Challenging Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daniel</td>
<td><strong>Clapping</strong>: rapidly bringing hands together to generate an audible noise</td>
<td><strong>Hitting</strong>: using an open or closed hand to strike another person or to repeatedly pat the table at a mild to moderate intensity</td>
</tr>
<tr>
<td>Ryan</td>
<td><strong>Hand stereotypy</strong>: clapping his hands repeatedly, flipping his fingers in front of his eyes, and/or placing his hands on his face</td>
<td><strong>Self-injurious behaviour (SIB)</strong>: slapping head with an open or closed hand</td>
</tr>
<tr>
<td>Jacob</td>
<td><strong>Mouthing</strong>: placing hand inside his mouth or placing non-edible items inside the mouth; using his hand to repeatedly move his chewy tube back in forth inside his mouth</td>
<td><strong>Swiping</strong>: using one or two hands to successfully or unsuccessfully (i.e., attempt is blocked) push items off the table or away from him</td>
</tr>
<tr>
<td>Joel</td>
<td><strong>Mouthing</strong>: placing non-edible items inside his mouth or placing his lips onto non-edible items (does not include the chain for his chewy tube)</td>
<td><strong>Refusing to sit</strong>: standing up from his chair and not returning to his seat within 5 seconds after being asked to sit down</td>
</tr>
<tr>
<td>Louis</td>
<td>N/A</td>
<td><strong>Hitting</strong>: using an open or closed hand to strike another person or item</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Throwing</strong>: pushing or throwing learning materials away from the table</td>
</tr>
<tr>
<td>Seth</td>
<td><strong>Hand flapping</strong>: shaking one or two hands either in an up/down or side-to-side motion repeatedly</td>
<td><strong>Pushing/hitting</strong>: using an open or closed hand to push or strike another person</td>
</tr>
<tr>
<td>Jack</td>
<td><strong>Stimming</strong>: head against knee/hand, squinting with one eye with head to side, shaking head, and/or moving open palms back and forth</td>
<td><strong>Flopping</strong>: lying body down on the floor when not asked to do so</td>
</tr>
<tr>
<td>Trevor</td>
<td><strong>Hand flapping</strong>: shaking one or two hands either in an up/down or side-to-side motion repeatedly</td>
<td>N/A</td>
</tr>
</tbody>
</table>
4.5.4 Measurement

4.5.4a Data collection. The data collection procedures were identical to those implemented during the pilot study (Section 4.2.4) with the addition of an IOA assessment. An iPad was used to video record all sessions. The researcher used 15-s partial interval recording to code for the presence or absence of the mood indicators and 15-s whole interval recording to code for the presence of on-task behaviour. Each session varied in length (see Section 4.5.5 below), so the number of intervals per session ranged between 44 to 64. A percentage of intervals was calculated for each dependent variable using the following formula: Number of intervals with (dependent variable) ÷ Total number of intervals X 100.

4.5.4b General Child Affect Rating Scale (GCARS). Although not a limitation per se, the pilot study lacked a secondary measure to validate the mood indicators. Therefore, the GCARS was included in the main study for six of the participants (see Jacob, Joel, Louis, Seth, Jack, and Trevor). This brief Likert-type scale resulted in a composite affect score based off a tutor’s subjective evaluation of a participant’s general interest and happiness during each teaching session (Dunlap & Koegel, 1980). To calculate the composite affect score following each session, the “interest” score and “happiness” score from the assessment were added then divided by two (Appendix H). The GCARS has been successfully used in previous research to rate the general states of happiness and unhappiness of participants, and it was included in this study to further validate the objective measures described above (see Table 2.1 for a review of this research).

4.5.4c Interobserver agreement (IOA). The same IOA procedures described in Section 3.5.4b were applied in this study. A secondary observer independently observed at least 26.7% of all sessions for each participant (Kennedy, 2005), and IOA was calculated on
an interval-by-interval basis for all three dependent variables. The initial mean IOA across all participants and variables was 87.9% which was considered acceptable (i.e., >80%; Cooper, Heron, & Heward, 2007). However, due to observer drift, the mean IOA for a few participants did not meet this criterion. Therefore, the co-rater was retrained in the data collection procedures, which included reviewing the operational definitions of all dependent variables and coding one video per participant with the researcher. During this practice coding session, any discrepancies were identified and discussed. After this follow-up training, the mean IOA increased to 91% ($SD = 8$). Table 4.2 presents the final mean IOA for each participant’s indices of happiness, indices of unhappiness, and on-task behaviour.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Indices of Happiness</th>
<th>Indices of Unhappiness</th>
<th>On-Task Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daniel</td>
<td>$M = 91.3%, SD = 4.1$</td>
<td>$M = 96.9%, SD = 6.1$</td>
<td>$M = 89.9%, SD = 4.6$</td>
</tr>
<tr>
<td>Ryan</td>
<td>$M = 87.1%, SD = 6.8$</td>
<td>$M = 99.6%, SD = 0.9$</td>
<td>$M = 84.2%, SD = 1.3$</td>
</tr>
<tr>
<td>Jacob</td>
<td>$M = 76.2%, SD = 10.4$</td>
<td>$M = 100%$</td>
<td>$M = 83.7%, SD = 7.3$</td>
</tr>
<tr>
<td>Joel</td>
<td>$M = 82.1%, SD = 3.8$</td>
<td>$M = 97%, SD = 2.8$</td>
<td>$M = 91.4%, SD = 4.7$</td>
</tr>
<tr>
<td>Louis</td>
<td>$M = 85.8%, SD = 7.2$</td>
<td>$M = 100%$</td>
<td>$M = 98%, SD = 2$</td>
</tr>
<tr>
<td>Seth</td>
<td>$M = 86%, SD = 5.1$</td>
<td>$M = 100%$</td>
<td>$M = 90.4%, SD = 2.8$</td>
</tr>
<tr>
<td>Jack</td>
<td>$M = 90.1%, SD = 5.4$</td>
<td>$M = 99.6%, SD = 0.9$</td>
<td>$M = 85.5%, SD = 6.8$</td>
</tr>
<tr>
<td>Trevor</td>
<td>$M = 88.9%, SD = 5.4$</td>
<td>$M = 94.5%, SD = 9.7$</td>
<td>$M = 88.4%, SD = 7.8$</td>
</tr>
</tbody>
</table>

4.5.4d Cohen’s Kappa. In addition to IOA, Cohen’s Kappa was calculated to determine the inter-rater reliability of the dependent measures. A description of this statistical
measure can be found in Section 3.5.4c. The inter-rater reliability for this study was found to be $\kappa = 0.8 \ (p < 0.001)$, indicating almost perfect agreement.

### 4.5.5 Procedure

All sessions were conducted by each participant’s tutor while their behaviours were video recorded by the researcher. Sessions lasted between 11 to 16 minutes each, and at least one session was implemented with each participant daily. If two sessions took place with a participant due to additional time, or the absence of other participants, they were separated by at least one hour to control for carryover effects. In addition, if a participant was informally observed to be engaging in high frequencies of happy or unhappy indicators prior to the start of a session, the session was delayed until the participant was displaying neutral behaviours for at least five minutes.

#### 4.5.5a Paired-choice preference assessment

A limitation of the paired-stimulus preference assessment is that it is more time consuming than the multiple-stimulus method (DeLeon & Iwata, 1996). Due to time constraints, this assessment was not conducted by the researcher. Rather, the preschool tutors conducted this assessment with each participant prior to the beginning of the study. This assessment was routinely completed by the tutors at the following five times during the year: the beginning of each school term, the week following Easter break, and the week following each midterm break.

The same assessment procedures outlined in Section 4.2.5a were implemented by the tutors. However, this assessment differed in that only six total items were compared, and each item was paired with every other item twice in a randomised order. The top three items selected during the assessment were labelled as high-preference, and the last three items were
labelled as low-preference. The paired-choice preference assessment used by the tutors can be found in Appendix I.

**4.5.5b Preference condition.** The preference condition for the main study differed from the pilot study in three important ways. First, the participants were not given a choice of highly-preferred items at the beginning of each session. Instead, the participants were given a tutor-delivered, highly-preferred item prior to each session. Second, the reinforcement schedule of the main study was changed from a FI 10-minute schedule of reinforcement to a FI 2-minute schedule of reinforcement. Third, a coloured visual stimulus was used during each reinforcement opportunity to help discriminate the preference condition from the choice condition.

At the beginning of each session, the tutors asked the participants to come to their work desks and sit down. Upon completion of this request, the adults provided the participants with access to one of their three highly-preferred items. Prior to delivering the item, the adults showed the participants an 8.5 in. x 6 in. visual unique to the preference condition (i.e., stimulus discrimination). This visual was coloured blue and had a single Velcro spot where the item’s picture was attached (Appendix J). Depending on what item was being delivered, the picture on the visual stimulus changed. When the visual stimulus was presented, the tutors used specific verbal praise to explain the contingency (e.g., “Great job coming to the table, you can have your (item)”). Once a preferred item was delivered to a participant, the child had 30 seconds to play or manipulate the item.

After 30 seconds had passed, the item was removed, and the teaching session began. Throughout the teaching session, DTT was implemented using the same procedures outlined in Section 4.2.5b. Following two minutes of DTT, each participant was shown the preference
visual again, but this time a different highly-preferred item was depicted and delivered. If the participants were not demonstrating on-task behaviour at the 2-minute interval, the item was withheld until they were engaged for at least 10 seconds. The teaching session continued until each participant had been delivered a highly-preferred item five separate times, including the initial delivery for coming to the table. Sessions varied in length based on the cooperation of the participants. During this condition, preference was emphasised over choice, as the participants were given teacher-delivered, highly-preferred items.

4.5.5c Choice condition. The choice condition for the main study only differed from the pilot study in that there was a coloured visual used during each reinforcement opportunity to help discriminate the choice condition from the preference condition. Like the preference condition, the participants were first asked to come to their work desks and sit down. Once they complied with this request, the participants were given a choice between three low-preferred items. During this choice opportunity, the tutors showed the participants an 8.5 in. x 6 in. visual stimulus unique to the choice condition (i.e., stimulus discrimination). This visual stimulus was coloured yellow and had three Velcro spots where the pictures of the items were attached (Appendix K). When the visual was presented, the tutors used specific verbal praise to explain the contingency (e.g., “Great job coming to the table, choose one”). Once a participant had selected an item, the child had 30 seconds to play or manipulate the item.

After 30 seconds had passed, the selected item was removed, and the teaching session began. The same teaching procedures described in Section 4.2.5b were implemented. Following two minutes of DTT, each participant was shown the choice visual again, and they selected another item from the three low-preferred items. If the participants were not demonstrating on-task behaviour at the 2-minute interval, the choice opportunity was withheld until they were engaged again. The teaching session continued until each participant had been
given five choice opportunities, including the initial choice for coming to the table. Sessions varied in length based on the cooperation of the participants. During this condition, choice was emphasised over preference, as the participants were allowed to choose between three low-preferred items.

4.5.6 Experimental Design

Identical to the pilot study, the main study implemented an alternating treatments design without a baseline (Barlow & Hayes, 1979). The order of the conditions was randomly alternated across sessions through a coin toss. However, neither condition was conducted for more than two consecutive sessions to help counterbalance the conditions. For Louis only, the study comprised of 10 sessions due to his availability. For the remaining seven participants, the study comprised of 15 sessions.

4.5.7 Data Analysis

The data analysis procedures were identical to those described in Section 3.2.7. A visual analysis of the graphic data was utilised, and the participants’ data were evaluated for variability, level, and trend within each condition. To help quantify the differences between the two conditions, a PND score was calculated for each dependent variable.

4.6. Main Study: Results

The findings for this study were mixed. Four of the participants (Daniel, Jacob, Joel, Trevor) displayed more indices of happiness during the choice condition, while four of the participants (Ryan, Louis, Seth, Jack) displayed more indices of happiness during the preference condition. This finding was similar for indices of unhappiness. Four of the participants (Daniel, Jacob, Louis, Seth) displayed more indices of unhappiness during the choice condition, while four of the participants (Ryan, Joel, Jack, Trevor) displayed more
indices of unhappiness during the preference condition. The GCARS had similar results, which helped to corroborate these findings. For on-task behaviour, the preference condition was superior to the choice condition for six of the participants (Daniel, Jacob, Joel, Louis, Seth, Trevor). The findings for each participant are outlined below.

4.6.1 Daniel

The results for Daniel are depicted in Figures 4.7–4.9. Daniel demonstrated more indices of happiness during the choice condition ($M = 66.1\%$, $SD = 23.4$) relative to the preference condition ($M = 40.7\%$, $SD = 14.3$). A visual analysis of Figure 4.7 indicates that Daniel’s indices of happiness were variable at a mostly moderate-to-high level during the choice condition. On the other hand, his indices of happiness were variable at a low-to-moderate level during the preference condition. The choice condition was superior to the preference condition in 6 of 7 sessions, yielding a PND score 85.7%.

*Figure 4.7.* Daniel’s indices of happiness.
Differential Effects of Choice vs. Preference

Daniel demonstrated more indices of unhappiness during the choice condition ($M = 5.1\%, SD = 8.6$) relative to the preference condition ($M = 4.6\%, SD = 9.6$). A visual analysis of Figure 4.8 indicates that Daniel’s indices of unhappiness were variable at a low level during both conditions. There was frequent overlap between the two conditions and the choice condition was superior to the preference condition in only 2 of 7 sessions, yielding a PND score of 28.6%.

*Figure 4.8. Daniel’s indices of unhappiness.*

Daniel demonstrated more on-task behaviour during the preference condition ($M = 80.7\%, SD = 11.1$) relative to the choice condition ($M = 69.2\%, SD = 7.7$). A visual analysis of Figure 4.9 indicates that Daniel’s on-task behaviour was stable at a mostly high level during the preference condition. During the choice condition, his on-task behaviour was also stable, but it occurred at a lower level. The preference condition was superior to the choice condition in 6 of 7 sessions, yielding a PND score of 85.7%.
Differential Effects of Choice vs. Preference

Figure 4.9. Daniel’s on-task behaviour.

![On-Task Behaviour for Daniel](chart)

### 4.6.2 Ryan

The results for Ryan are depicted in Figures 4.10–4.12. Ryan demonstrated more indices of happiness during the preference condition ($M = 44.4\%, SD = 16.2$) relative to the choice condition ($M = 40.5\%, SD = 8.7$). A visual analysis of Figure 4.10 indicates that Ryan’s indices of happiness were highly variable at a mostly moderate level during the preference condition. However, during this condition, he displayed a high level of indices of happiness during one session (Session 4). During the choice condition, his indices of happiness were stable at a mostly moderate level. There was frequent overlap between the two conditions and the preference condition was superior to the choice condition in only 4 of 7 sessions, yielding a PND score of 57.1\%.
**Figure 4.10.** Ryan’s indices of happiness.

Ryan demonstrated more indices of unhappiness during the preference condition (\(M = 5.1\%, SD = 12.6\)) relative to the choice condition (\(M = 2.5\%, SD = 5.7\)). A visual analysis of Figure 4.11 indicates that Ryan’s indices of unhappiness were variable at a low level during both conditions. Despite this, his indices of unhappiness occurred at a moderate level during one session of the preference condition. The preference condition was superior to the choice condition in only 2 of 7 sessions, yielding a PND score of 28.6%.
**Figure 4.11.** Ryan’s indices of unhappiness.

Ryan demonstrated more on-task behaviour during the choice condition ($M = 63.8\%, SD = 5.4$) relative to the preference condition ($M = 58.2\%, SD = 12.1$). A visual analysis of Figure 4.12 indicates that Ryan’s on-task behaviour occurred at moderate-to-high level during both conditions. Yet, his on-task behaviour showed more stability at a marginally higher level during the choice condition when compared with the preference condition. The choice condition was superior to the preference condition in 5 of 7 sessions, yielding a PND score of 71.4\%. 
4.6.3 Jacob

The results for Jacob are depicted in Figures 4.13-4.15. Jacob demonstrated more indices of happiness during the choice condition (\(M = 48.4\%, SD = 18.5\)) relative to the preference condition (\(M = 40.9\%, SD = 14.2\)). A visual analysis of Figure 4.13 indicates that Jacob’s indices of happiness were highly variable at a mostly moderate level during the choice condition. During the preference condition, his indices of happiness were also highly variable, but they occurred at a low-to-moderate level. There was frequent overlap between the two conditions and the choice condition was superior to the preference condition in only 4 of 7 sessions, yielding a PND score of 57.1\%.
Jacob demonstrated more indices of unhappiness during the choice condition \( (M = 4.2\%, \ SD = 6.5) \) relative to the preference condition \( (M = 2.7\%, \ SD = 4.1) \). A visual analysis of Figure 4.14 indicates that Jacob’s indices of unhappiness were variable at a low level during both conditions. There was frequent overlap between the two conditions and the choice condition was superior to the preference condition in only 3 of 7 sessions, yielding a PND score of 42.9\%. 

Figure 4.13. Jacob’s indices of happiness.
Jacob demonstrated more on-task behaviour during the preference condition ($M = 69.5\%, SD = 11.2$) relative to the choice condition ($M = 62.2\%, SD = 5.8$). A visual analysis of Figure 4.15 indicates that Jacob’s on-task behaviour was stable at a moderate-to-high level during both conditions. However, his on-task behaviour occurred at a marginally higher level during the preference condition relative to the choice condition. The preference condition was superior to the choice condition in 5 of 7 sessions, yielding a PND score of 71.4%.
Based off the results from the GCARS, Jacob’s mean composite affect score during the choice condition was 3.2 ($SD = 1.1$). His mean composite affect score during the preference condition was 2.9 ($SD = 1.4$). These scores corroborated the data from the two conditions.

### 4.6.4 Joel

The results for Joel are depicted in Figures 4.16-4.18. Joel demonstrated more indices of happiness during the choice condition ($M = 39.7\%, SD = 11.5$) relative to the preference condition ($M = 33.1\%, SD = 13.9$). A visual analysis of Figure 4.16 indicates that Joel’s indices of happiness were variable at a low-to-moderate level during both conditions. Nevertheless, his indices of happiness occurred at a marginally higher level during the choice condition. The choice condition was superior to the preference condition in 5 of 7 sessions, yielding a PND score of 71.4\%.
Figure 4.16. Joel’s indices of happiness.

Joel demonstrated more indices of unhappiness during the preference condition \( (M = 3\%, \ SD = 3.4) \) relative to the choice condition \( (M = 2.9\%, \ SD = 3.7) \). A visual analysis of Figure 4.17 indicates that Joel’s indices of unhappiness were variable at a low level during both conditions. There was frequent overlap between the two conditions and the preference condition was superior to the choice condition in only 3 of 7 sessions, yielding a PND score of 42.9\%. 
Figure 4.17. Joel’s indices of unhappiness.

Joel demonstrated more on-task behaviour during the preference condition ($M = 82.7\%, SD = 10.6$) relative to the choice condition ($M = 72.7\%, SD = 11.5$). A visual analysis of Figure 4.18 indicates that Joel’s on-task behaviour had a stable, gradually increasing trend at a high level during the preference condition. During the choice condition, his on-task behaviour was stable at a moderate-to-high level. Although there was overlap between the two conditions, the preference condition was superior to the choice condition in 7 of 7 sessions, yielding a PND score of 100%.
Figure 4.18. Joel’s on-task behaviour.

Based off the results from the GCARS, Joel’s mean composite affect score during the choice condition was 3.6 \((SD = 1.2)\). His mean composite affect score during the preference condition was also 3.6 \((SD = 0.9)\). However, the range for the preference condition was marginally lower than the range for the choice condition, so the results from the GCARS corroborated the data from the two conditions.

4.6.5 Louis

The results for Louis are depicted in Figures 4.19-4.21. Louis demonstrated more indices of happiness during the preference condition \((M = 30.8\%, SD = 21.4)\) relative to the choice condition \((M = 23.1\%, SD = 5.2)\). A visual analysis of Figure 4.19 indicates that Louis’ indices of happiness had a variable, gradually increasing trend at a low-to-moderate level during the preference condition. During the choice condition, Louis’ indices of happiness were stable at a low level. The preference condition was superior to the choice condition in 3 of 4 sessions, yielding a PND score of 75%.
Louis only demonstrated indices of unhappiness during the choice condition ($M = 1.7\%$, $SD = 1.6$). During this condition, his indices of unhappiness were variable at a low level. The choice condition was superior to the preference condition in 3 of 4 sessions, yielding a PND score of 75% (Figure 4.20).
Louis demonstrated more on-task behaviour during the preference condition ($M = 97\%, \ SD = 1.2$) relative to the choice condition ($M = 90.5\%, \ SD = 4.6$). A visual analysis of Figure 4.21 indicates that Louis’ on-task behaviour was stable at a high level during both conditions. Yet, his on-task behaviour occurred at a marginally higher level during the preference condition relative to the choice condition. The preference condition was superior to the choice condition in 4 of 4 sessions, yielding a PND score of 100%.

*Figure 4.21. Louis’ on-task behaviour.*

Based off the results from the GCARS, Louis’s mean composite affect score during the choice condition was 3.1 ($SD = 1$). His mean composite affect score during the preference condition was 4.1 ($SD = 0.6$). These scores corroborated the data from the two conditions.

4.6.6 Seth

The results for Seth are depicted in Figures 4.22–4.24. Seth demonstrated more indices of happiness during the preference condition ($M = 32.6\%, \ SD = 8.5$) relative to the choice condition ($M = 31\%, \ SD = 7.9$). A visual analysis of Figure 4.22 indicates that Seth’s indices
of happiness were variable at a low-to-moderate level during both conditions. The preference condition was superior to the choice condition in only 4 of 7 sessions, yielding a PND score of 57.1%.

*Figure 4.22.* Seth’s indices of happiness.

Seth demonstrated more indices of unhappiness during the choice condition ($M = 1.6\%, SD = 4.5$) relative to the preference condition ($M = 0.3\%, SD = 0.7$). Seth’s indices of unhappiness were rare, as they only occurred during one session in each condition. A visual analysis of Figure 4.23 indicates that his indices of unhappiness occurred at a low level during both conditions. However, his indices of unhappiness occurred at a somewhat higher level during Session 1 of the choice condition in comparison to Session 11 of the preference condition. The choice condition was superior to the preference condition in only 1 of 7 sessions, yielding a PND score of 14.3%.
**Differential Effects of Choice vs. Preference**

*Figure 4.23. Seth’s indices of unhappiness.*

Seth demonstrated more on-task behaviour during the preference condition ($M = 94.8\%$, $SD = 3.9$) relative to the choice condition ($M = 87.2\%$, $SD = 11.4$). A visual analysis of Figure 4.24 indicates that Seth’s on-task behaviour was stable at a high level during both conditions. There was frequent overlap between the two conditions and the preference condition was superior to the choice condition in only 4 of 7 sessions, yielding a PND score of 57.1\%. 
Based off the results from the GCARS, Seth’s mean composite affect score during the choice condition was 3.3 \( (SD = 0.8) \). His mean composite affect score during the preference condition was 4 \( (SD = 0.7) \). These scores corroborated the data from the two conditions.

**4.6.7 Jack**

The results for Jack are depicted in Figures 4.25-4.27. Jack engaged in more indices of happiness during the preference condition \( (M = 20\%, SD = 11.6) \) relative to the choice condition \( (M = 11.6\%, SD = 9.4) \). A visual analysis of Figure 4.25 indicates that Jack’s indices of happiness were variable at a low-to-moderate level during the preference condition. On the other hand, his indices of happiness had a variable, gradually increasing trend during the choice condition, but they occurred at a low level. The preference condition was superior to the choice condition in only 4 of 7 sessions, yielding a PND score of 57.1%.
Figure 4.25. Jack’s indices of happiness.

Jack demonstrated more indices of unhappiness during the preference condition ($M = 5.8\%, SD = 5.1\%$) relative to the choice condition ($M = 3.8\%, SD = 5.3\%$). A visual analysis of Figure 4.26 indicates that Jack’s indices of unhappiness were highly variable at a low level during both conditions. There was frequent overlap between the two conditions and the preference condition was superior to the choice condition in only 3 of 7 sessions, yielding a PND score of 42.9\%. 
Jack demonstrated more on-task behaviour during the choice condition ($M = 89.8\%$, $SD = 7$) relative to the preference condition ($M = 80.6\%$, $SD = 13.6$). A visual analysis of Figure 4.27 indicates that Jack’s on-task behaviour was stable at a high level during both conditions. Nevertheless, Jack’s on-task behaviour occurred at a moderate level during one session of the preference condition. There was frequent overlap between the two conditions and the choice condition was superior to the preference condition in 6 of 7 sessions, yielding a PND score of 85.7\%.
Based off the results from the GCARS, Jack’s mean composite affect score during the choice condition was 3.7 (SD = 1.2). His mean composite affect score during the preference condition was 3.9 (SD = 1). These scores corroborated the data from the two conditions.

4.6.8 Trevor

The results for Trevor are depicted in Figures 4.28-4.30. Trevor demonstrated more indices of happiness during the choice condition ($M = 33\%$, $SD = 22.4$) relative to the preference condition ($M = 30.5\%$, $SD = 23.8$). A visual analysis of Figure 4.28 indicates that Trevor’s indices of happiness had a highly variable, gradually decreasing trend at a low-to-moderate level during both conditions. There was frequent overlap between the two conditions, and the choice condition was superior to the preference condition in only 4 of 7 sessions, yielding a PND score of 57.1%.
Trevor engaged in more indices of unhappiness during the preference condition ($M = 8.3\%, SD = 12.3$) relative to the choice condition ($M = 6.8\%, SD = 9.1$). A visual analysis of Figure 4.29 indicates that Trevor’s indices of unhappiness had a highly variable, gradually increasing trend at a low level during both conditions. There was frequent overlap between the two conditions and the preference condition was superior to the choice condition in only 3 of 7 sessions, yielding a PND score of 42.9\%.
**Figure 4.29.** Trevor’s indices of unhappiness.

Trevor demonstrated more on-task behaviour during the preference condition ($M = 90.4\%, SD = 6.2$) relative to the choice condition ($M = 83.5\%, SD = 7.3$). A visual analysis of Figure 4.30 indicates that Trevor’s on-task behaviour was stable at a high level during both conditions. The preference condition was superior to the choice condition in 5 of 7 sessions, yielding a PND score of 71.4\%.
Based off the results from the GCARS, Trevor’s mean composite affect score during the choice condition was 3.1 ($SD = 0.8$). His mean composite affect score during the preference condition was 2.9 ($SD = 1.4$). These scores corroborated the data from the two conditions.

### 4.7 Main Study: Discussion

During the 1990s, self-determination emerged as an important construct within disability services as the result of a federally funded initiative by the United States Department of Education (Wehmeyer & Schalock, 2001). One strategy that can be used to promote the self-determination of individuals with disabilities is the implementation of choice-based interventions. Choice-based interventions improve the self-determination, and in turn, the overall QoL of individuals with disabilities (Shogren et al., 2004). In addition, choice-making has been linked to improved intervention outcomes for individuals with ASD (Reutebuch et al., 2015). The mechanism of action of these interventions is debatable, as several researchers have suggested that choice opportunities only result in a preferred outcome, and that similar
results can be obtained by either providing a choice opportunity or a highly-preferred alternative (Cole et al., 1997). Therefore, the purpose of this study was to evaluate the differential effects of choice versus preference within DTT procedures. The effects of choice and preference were evaluated through objective measures of mood and on-task behaviour. Although choice-making is related to an improved QoL, only one study has previously measured happiness as an outcome during a choice-based intervention (Moes, 1998).

The results for indices of happiness and unhappiness were mixed, as the choice condition improved the mood of some participants, while the preference condition improved the mood of others. The direct observations of participant mood were validated by the individual outcomes of the GCARS. The mean affect score for each participant was higher during the condition that demonstrated the most indices of happiness on average. However, a visual analysis of the data suggests that the difference between the two conditions was small for most participants. This was illustrated by the frequent overlap between the two conditions and the similarities in variability, level, and trend. The results for indices of happiness and unhappiness support previous research that choice and preference are equally effective at producing behaviour change in individuals with disabilities (Bambara et al., 1994; Cole et al., 1997; Killu et al., 1999; Parsons et al., 1990; Smith et al., 1995).

For improving on-task behaviour, the preference condition was superior to the choice condition for six of the participants. One explanation for this result is that the reinforcing effects of the highly-preferred items were more robust than the effects of choice in relation to task engagement (Fisher et al., 1997). In a concurrent-operants arrangement, Fisher and colleagues (1997) found that participants responded more to therapist-delivered reinforcers (i.e., no-choice condition) when the reinforcers were more preferred, but preferred to select the reinforcers themselves (i.e., choice condition) when the reinforcers in both conditions were
equated. Killu et al. (1999) had similar findings, and the researchers concluded that choice becomes unnecessary when highly-preferred items are used. In essence, access to preferred stimuli may be more important than choice when higher-preferred items are used within the preference condition.

Although providing choice was equally effective, but not more effective, than assigning a preferred alternative, it should still be considered favourable from an ontogenic perspective (Catania, 1980). Choice opportunities help to prevent reinforcer satiation and can account for changes in preference over time (Romaniuk & Miltenberger, 2001). Previous research has shown that personal preferences can change, regardless of age or disability (Hanley, Iwata, & Roscoe, 2006). This is the result of unique environmental events that the individual experiences. More specifically, the pairing history (Hanley, Iwata, Roscoe, Thompson, & Lindberg, 2003) or the availability of an item (Vollmer & Iwata, 1991) could affect an individual’s preference for that item. If a toy is repeatedly presented to a child, the child would likely become satiated, and this item could lose its effectiveness as a reinforcer. When given the choice, the child would be less likely to select that item over an item that s/he has not had recent exposure to. By including choice within DTT, children with ASD can express changes in motivation and preference in more appropriate ways (Fisher et al., 1997; Shogren et al., 2004). Consequently, choice could be considered a conditioned reinforcer, as it is correlated with increased access to preferred stimuli (Fisher et al., 1997).

In summary, choice is a useful strategy when a thorough preference assessment cannot be conducted prior to each session or when a child’s preferences frequently change (Lerman, Iwata, & Rainville, 1997). Choice-making opportunities can easily be embedded within DTT without threatening the fidelity of procedures or requiring a great deal of additional time or resources (Elliott & Dillenburger, 2016; Tiger, Toussaint, & Roath, 2010). Choosing
Differential Effects of Choice vs. Preference

Reinforcers can be used to enhance the self-determination of children with ASD and improve the efficacy of reinforcement-based strategies such as DTT (Lerman et al., 1997; Tiger et al., 2010).

4.7.1 Limitations

The findings from this study must be interpreted with caution due to several limitations. First, the experimental design used within this study had a few disadvantages. By nature, an ATD can have multiple treatment interference, where the effects of one condition influence the effects of the other condition (Barlow & Hayes, 1979). This was controlled for by counterbalancing the two conditions and by using salient discriminative stimuli (i.e., colour-coded choice/preference visuals) for each condition. A further disadvantage was that there was no baseline conducted within this study due to time constraints. Without a baseline for comparison, definitive conclusions regarding the effects of each condition cannot be made with certainty.

A second limitation was that the Indices of Happiness and Unhappiness Questionnaire did not include a question regarding the stereotypies of each participant. As noted in Section 4.5.3, the stereotypies identified for seven of the participants were also included as their indices of happiness or unhappiness, because these stereotypies shared the same topography as the mood indices. This may have resulted in an overestimation of the indices of happiness and unhappiness observed in these participants. To address this issue, the researcher should have included an additional questionnaire item that asked which, if any, of the listed behaviours were considered stereotypical in nature. Any behaviours that were also considered to be stereotypies for a participant could have been excluded from the list of indices of happiness and unhappiness to prevent any misinterpretations.
Another limitation was that the treatment fidelity of the procedures may have been compromised by the preschool tutors implementing the sessions. The classroom structure was organised in such a way that the tutors were rotated between students on a daily basis. This arrangement could not be discontinued for the purpose of this study due to the needs of other students. This resulted in inconsistency between the tutors, as some tutors may have been better skilled at implementing DTT procedures than others. The researcher attempted to control for this barrier by coaching the tutors during the sessions whenever it was deemed necessary. However, none of the sessions had to be terminated due to the incompetence of a tutor.

A final limitation was related to the preference assessment implemented by the tutors. The paired-choice preference assessment only measured the relative preferences for six total items. Due to the limited number of items used within the assessment, all items could have been considered moderately to highly-preferred. Despite this, previous research has demonstrated that there are no differential outcomes between choice and preference when the conditions included items of the same preference level (Smith et al., 1995). The preference assessment was also conducted prior to the beginning of the study, so momentary changes in preference could not be accounted for. This may have affected the outcomes for the preference condition, as the highly-preferred items may have lost their reinforcing value due to satiation. The items were not restricted to the research setting and unlimited access to these items outside of the sessions could have served as an abolishing operation for the measured behaviours. By rotating between the three highly-preferred items, the researcher attempted to avoid the effects of satiation.

4.7.2 Future Direction
Differential Effects of Choice vs. Preference

Individuals with disabilities are often given limited opportunities for real choice within their daily lives, so when a choice opportunity merely provides an option between two similar alternatives, the choice can lose its significance and meaning to the individual (Cullen, 1999). As discussed above, the items included within the preference assessment could have all been considered moderately to highly-preferred. When an individual must make a choice between two items of the same preference level, the choice opportunity may lose its strength (Lerman et al., 1997). It is hypothesised that the quality of the choice opportunity offered in this study was not meaningful enough to supersede the effects of preference. Choice making may only be beneficial when it results in a preferred item or activity among a group of non-preferred alternatives. For choice to be meaningful to a child with ASD, choice opportunities “must be available across the day, within daily activities and routines” (Brown et al., 1993, p. 320). By providing children with ASD more meaningful choices within DTT, it is hypothesised that their mood and overall QoL will improve.

Further research is needed to determine if providing other types of choice within a teaching session will result in better intervention outcomes than a basic choice of reinforcer. Chapter 5 will investigate the effects of a choice intervention package, which includes both within- and across-activity choices, on the indices of happiness, indices of unhappiness, and on-task behaviour of young children with ASD. The effects of the choice intervention package will be compared with a baseline that only provides a choice of reinforcer. The choice opportunities will be presented as an antecedent, rather than as a consequence, because it is theorised choice will act as an establishing operation for the target behaviours. Previous research has shown that providing choices to children prior to teaching has resulted in a reduction in escape-maintained behaviour (Cannella et al., 2005; Rispoli et al., 2013; Shogren
et al., 2004). This, in turn, could improve the mood and on-task behaviour of young children with ASD.

4.7.3 Conclusion

In conclusion, this study demonstrated that providing a choice of reinforcer was equally effective, but not more effective, than assigning a preferred alternative. Although choice did not provide any additional benefits, it may still be considered more favourable from a self-determination standpoint. Choice opportunities, no matter how basic, help to improve the self-determination of children with ASD. In addition, providing a choice between reinforcers helps to prevent satiation and can prove to be beneficial when a thorough preference assessment cannot be conducted, or a child’s preferences are frequently changing. This study contributed to the literature by further investigating the differential effects of choice and preference by including an objective measure of mood.
Chapter 5:

The Impact of Combined Within- and Across-Activity Choice on the Indices of Happiness and Unhappiness of Children with ASD
5.1 Introduction

The findings presented in Chapter 4 demonstrated that practitioners can obtain similar intervention outcomes by either providing children with autism spectrum disorder (ASD) with a choice of reinforcer, or by assigning a preferred alternative. This finding corroborates previous research that choice and preference are separate, but related, variables with a similar mechanism of action (Bambara, Ager, & Koger, 1994; Cole, Davenport, Bambara, & Ager, 1997; Killu, Clare, & Im, 1999; Parsons, Reid, Reynolds, & Bumgarner, 1990; Smith, Iwata, & Shore, 1995). Together with these findings, the results from Chapter 4 would suggest that choice making is essentially an alternative way of expressing preference (Wehmeyer & Schalock, 2001). That being said, offering children with ASD the opportunity to select their reinforcer should be considered a more favourable consequence than providing a preferred alternative for two reasons. First, providing even simple choice opportunities to children with ASD can enhance their self-determination (Heller et al., 2011). Second, providing a choice of reinforcer helps to improve the efficacy of reinforcement-based interventions (Tiger, Toussaint, & Roath, 2010). By providing a choice of reinforcer, practitioners can prevent reinforcer satiation and adapt for any changes in child preference over time (Lerman, Iwata, & Rainville, 1997; Romaniuk & Miltenberger, 2001).

Although choosing a reinforcer has its therapeutic benefits, it is typically the only type of choice offered to individuals with disabilities within the teaching environment (Elliott & Dillenburger, 2016). Unfortunately, individuals with disabilities are often given limited opportunities to make meaningful choices within their daily lives (Cullen, 1999). This lack of choice can result in learned helplessness (Guess, Benson, & Siegel-Causey, 2008), which in turn, can lead to emotional disturbance and the undermining of an individual’s motivation to respond (Seligman, 1975). Furthermore, learned helplessness can negatively influence the
cognitive performance (Gacek, Smoleń, & Pilecka, 2017), attentional functioning (Utley, Hoehn, Soraci, & Baumeister, 1993), and communicative interactions (Basil, 1992). The lack of real choice opportunities provided to individuals with disabilities may be explained by the belief of most practitioners that their clients lack the necessary skills to make meaningful choices, or that their choices will be inappropriate or counterproductive to current academic goals and objectives (Brown, 1991). Despite this perception, research has shown that most individuals with disabilities are capable of making a choice response, and providing choice opportunities to these individuals, regardless of the type of choice, can result in positive intervention outcomes (Cannella, O’Reilly, & Lancioni, 2005; Lancioni, O’Reilly, & Emerson, 1996; Reutebuch, El Zein, & Roberts, 2015; Tullis et al., 2011). The self-determination of individuals with disabilities is positively correlated with the number and range of choices made available to them throughout the day (Brown, Belz, Corsi, & Wenig, 1993). For choice to be meaningful to these individuals, choice-making opportunities must be incorporated into all facets of the learning environment and throughout the school day (Shevin & Klein, 2004).

Another way in which choice-making opportunities can be incorporated into the daily routine of children with ASD is through within- and across-activity choices. A within-activity choice is providing the child with a choice of materials to use within an activity. For example, the child could choose to use Legos® or wooden blocks to build a structure. A between-activity choice is providing the child with a choice among activities. For example, the child could choose to complete a reading or handwriting academic task. Within discrete trial training (DTT), these choice opportunities are typically presented prior to teaching trials. There is research to suggest that providing a choice opportunity to a child with ASD prior to a teaching trial results in better intervention outcomes than offering a choice following a child’s
response (Peterson, Lerman, & Nissen, 2016). In other words, providing choice as an antecedent intervention (e.g., choice of activity/materials) may have advantages over providing choice as a consequence intervention (e.g., choice of reinforcer).

There are two different theories as to why choice may be more effective as an antecedent intervention. One theory is that providing choice as an antecedent may act as an abolishing operation for escape-maintained challenging behaviour. When a child with ASD is facilitated to select the tasks and materials used during a teaching session, s/he is more likely to choose the activities and items that are least aversive; consequently, s/he will be less motivated to escape or avoid that session (Rispoli et al., 2013; Romaniuk et al., 2002). Similarly, if the child is choosing preferred tasks and materials, s/he is more likely to engage in more appropriate behaviours such as task engagement. In this regard, choice can also be considered an establishing operation for on-task behaviour. Multiple studies have demonstrated the efficacy of choice as an antecedent intervention for decreasing the challenging behaviours and increasing the desired behaviours of individuals with ASD (Koegel, Singh, & Koegel, 2010; Moes, 1998; Newman, Needelman, Reinecke, & Robek, 2002; Rispoli et al., 2013; Smeltzer, Graff, Ahearn, & Libby, 2009; Ulke-Kurcuoglu & Kircaali-Iftar, 2010). Through antecedent interventions such as choice, practitioners have a proactive approach to reducing challenging behaviour. This preventative approach will save practitioners from implementing more time consuming, reactive strategies in the long run (Rispoli et al., 2013).

Another theory that can explain the success of choice as an antecedent intervention is that providing a choice prior to a teaching session allows children with ASD to exert control over their environment in a more appropriate way (Romaniuk & Miltenberger, 2001). Children with ASD who are non-verbal or have limited speech will often engage in challenging
behaviour as a form of communication (Chiang, 2008). For example, a child may hit a practitioner during a non-preferred activity to communicate his/her preference for another activity. Through choice-making opportunities, children with ASD can express their preferences in a socially acceptable manner. If making a choice response requires less of a response effort than engaging in challenging behaviour, a child with ASD is more likely to avail of choice-making opportunities to express his/her preferences (Horner & Day, 1991).

DTT is often criticised for being too teacher-driven because it relies on strictly prescribed, highly structured procedures (Elliott & Dillenburger, 2016). Through choice-making opportunities, children with ASD have an opportunity to exert control over their learning environment, and this can potentially be a higher motivational factor than the outcomes of the choice itself (Dibley & Lim, 1999).

The purpose of the current study was to evaluate the effects of a choice intervention package, which included both within- and across-activity choices, on the indices of happiness, indices of unhappiness, and on-task behaviour of young children with ASD. The choice intervention package was delivered as an antecedent during DTT sessions and it comprised of three different types of choice – choice of reinforcer, choice of activity, and choice of materials. The outcomes of the choice intervention package were compared with the results of a baseline condition that only provided a choice of reinforcer. An additional purpose of this study was to address some of the limitations discussed in Chapter 4 (Section 4.7.1).

5.2 Method

5.2.1 Participants

Due to participant attrition, only three of the eight participants included in Study 2 were available to participate in Study 3. The remaining five participants were no longer
enrolled in the special needs preschool following graduation. Joel, Jack, and Louis had previously met the inclusion criteria outlined in Section 3.2.1. At the beginning of the study, Joel was 4 years 1 month old, Jack was 3 years 11 months old, and Louis was 5 years old ($M = 4.3$, $SD = 0.6$). The additional characteristics for each participant, including their Social Communication Questionnaire (SCQ) Total Scores, can be found in Table 3.3.

5.2.2 Setting

All sessions were conducted at each participant’s work desk within a familiar classroom. Each classroom included individual desks, chairs, shelves, a large group table, and other items typically found within an early education classroom such as visual aids, toys, and books. For consistency purposes, other students and tutors were present during the study, but they were asked to not interfere with the procedures.

5.2.3 Dependent Variables

The same three dependent variables from Study 2 were measured in Study 3. The operational definitions for each participant’s indices of happiness and unhappiness can be found in Table 3.4. The indices of happiness identified for Joel were smiling, laughing, and hugging, while his indices of unhappiness were crying and flopping. The indices of happiness identified for Jack were smiling and laughing, while his indices of unhappiness were screeching and flopping. The indices of happiness identified for Louis were giggling, smiling, and positive talk, while his indices of unhappiness were crying, hitting, and negative talk. The full operational definitions for each participant’s indices of happiness and unhappiness can be found in Table 3.4. The secondary dependent variable, on-task behaviour, was operationally defined as “looking at the tutor or materials and completing the given task(s) without needing redirection, and without engaging in stereotypy or challenging behaviour”. The type of
stereotypy and/or challenging behaviour identified for each participant is operationally defined in Table 4.1.

5.2.4 Measurement

5.2.4a Data collection. The data collection procedures were identical to those described in Section 4.2.4 with the addition of an IOA assessment. An iPad was used to video record all sessions and in-vitro observation was employed by the researcher to code for all dependent variables. The researcher used 15-s partial interval recording to code for the presence or absence of the mood indicators and 15-s whole interval recording to code for the presence of on-task behaviour. Each session was 10 minutes long and consisted of 40, 15-s intervals. A percentage of intervals was calculated for each dependent variable using the following formula: Number of intervals with (dependent variable) ÷ 40 X 100.

5.2.4b Interobserver agreement (IOA). The same IOA procedures described in Section 3.5.4b were applied in this study. For each participant, a secondary observer independently observed at least 20% of all baseline sessions and at least 25% of all intervention sessions (Kennedy, 2005). IOA was calculated on an interval-by-interval basis for all three dependent variables. The mean IOA across all participants and variables was 90.6% ($SD = 9.3$), which was considered acceptable (i.e., >80%; Cooper, Heron, & Heward, 2007). Table 5.1 presents the mean IOA for each participant’s indices of happiness, indices of unhappiness, and on-task behaviour.

Table 5.1. Mean IOA for indices of happiness, indices of unhappiness, and on-task behaviour.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Indices of Happiness</th>
<th>Indices of Unhappiness</th>
<th>On-Task Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joel</td>
<td>$M = 91.5%, SD = 5.2$</td>
<td>$M = 98.5%, SD = 1.4$</td>
<td>$M = 83%, SD = 8.9$</td>
</tr>
</tbody>
</table>
Impact of Within- and Across-Activity Choice

<table>
<thead>
<tr>
<th></th>
<th>Jack</th>
<th></th>
<th>Louis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M = 85.5%, SD = 10.5$</td>
<td>$M = 100%$</td>
<td>$M = 82.5%, SD = 6.9$</td>
<td>$M = 91%, SD = 3.8$</td>
</tr>
</tbody>
</table>

**5.2.4c Cohen’s Kappa.** In addition to IOA, Cohen’s Kappa was calculated to determine the inter-rater reliability of the dependent measures. A description of this statistical measure can be found in Section 3.5.4c. The inter-rater reliability for this study was found to be $\kappa = 0.8$ ($p < 0.001$), indicating substantial agreement.

**5.2.5 Procedure**

All sessions were conducted by each participant’s tutor, while their behaviours were video recorded by the researcher. Sessions lasted 10 minutes each, and at least one session was implemented with each participant daily. If two sessions took place with a participant due to additional time, or the absence of other participants, they were separated by at least one hour to control for carryover effects. Furthermore, if a participant was informally observed to be engaging in high frequencies of happy or unhappy indicators prior to the start of a session, the session was delayed until the participant was displaying neutral behaviours for at least five minutes.

**5.2.5a Multiple stimulus without replacement (MSWO) preference assessment.** As discussed in Section 4.5.5a, a paired-choice preference assessment was conducted with each participant at five different times throughout the year. Although this assessment accurately determined a hierarchy of preference for six different items, it did not account for changes in preference over time, which was a limitation discussed in Study 2 (see Section 4.7.1). Personal preferences for an item can be fluid, depending on unique environmental events that an individual might experience with that item (Hanley, Iwata, & Roscoe, 2006). For a young
child with ASD, momentary states of deprivation or satiation can affect their preference for a stimulus. For example, if a child has been exposed to a specific activity or toy often, he may lose interest in that stimulus (i.e., satiation). On the other hand, if a child has not played with a toy for a long period of time, he may gain interest in that stimulus (i.e., deprivation). For this reason, it is imperative to assess for preferences frequently, as to account for these temporary environmental conditions (Hanley et al., 2006). This limitation was addressed by conducting a daily preference assessment with each participant.

DeLeon and Iwata (1996) developed the MSWO preference assessment, which is a variation of the multiple-stimulus preference assessment. The MSWO preference assessment has the advantage of identifying potential reinforcers for an individual in substantially less time than the paired-choice preference assessment, but with similar accuracy (DeLeon & Iwata, 1996). In a comparison of the two procedures, DeLeon and Iwata (1996) found that the time to complete a seven-item paired-choice preference assessment was more than twice as long (i.e., 53.3 minutes) than the time it took to complete a seven-item MSWO preference assessment (i.e., 21.8 minutes). As the MSWO assessment could be conducted in a shorter amount of time, the researcher was able to assess for the preferences of the participants more frequently (i.e., prior to each session). During this assessment, each participant was presented with an array of six different items. The items selected for this array were the same six items included within each child’s most recent paired-choice preference assessment (Section 4.5.5a). Once the array was shown to a participant, he was prompted to select one item. Following this selection, the participant was given 10 seconds to manipulate or play with the item, then the item was removed from the array. The remaining five items were rearranged, and the participant was prompted to make another selection. This choice opportunity was repeated
until three items were selected. These three items were included in the teaching session that followed.

**5.2.5b Baseline.** Baseline sessions were similar to the daily teaching sessions the tutors conducted with all students. Specifically, the children were given a pre-session choice of a highly-preferred item prior to the start of DTT. The tutors asked, “What would you like to work for?”, and the selected item was used as a reinforcer during the DTT session. Unlike normal teaching sessions, the participants in this study were shown the yellow choice visual (Appendix K) while making their pre-session choice. This visual had three Velcro spots where the pictures of the three items selected during the MSWO preference assessment were attached. The participants were asked to make a choice between the three items, and following this choice response, the 10-minute teaching session began. During DTT, the participants were given various academic tasks and the same teaching procedures described in Section 4.2.5b were followed by the tutor. The item selected during the pre-session choice opportunity was withheld until each participant met their specific responding requirement described below.

Each participant had a different schedule of reinforcement that was determined by the lead teacher prior to the start of the study. A schedule of reinforcement is defined as a rule that describes a contingency of reinforcement (Cooper et al., 2007). That is, a certain responding requirement had to be met before a reinforcer was delivered to each participant. All participants were on a fixed ratio (FR) or variable ratio (VR) schedule of reinforcement. This meant that the participants were required to complete a fixed number – or variable number – of responses prior to reinforcement (Cooper et al., 2007). Joel had a FR1 schedule of reinforcement; that is, for every task completed correctly, his selected preferred item was delivered. Both Jack and Louis were on a VR3 schedule of reinforcement; they had to complete three tasks, on average, prior to reinforcement. Furthermore, both Jack and Louis
used a token system, which meant that every time their VR3 requirement was met, one token was delivered. Both children earned five tokens before their preferred item was delivered. Once an item was delivered to a participant, the child had 30 seconds to play with or manipulate the item. After this time had passed, the item was removed, and another choice opportunity was presented. The choice visual was presented again and the participants selected another preferred item. During each 10-minute session, the number of choice opportunities varied depending on the reinforcement schedule for each participant.

5.2.5c Intervention. During intervention sessions, a choice intervention package was employed. This package included three different types of choice: choice of reinforcer, choice of activity (i.e., across-activity choice), and choice of materials (i.e., within-activity choice). First, the participants were given a choice of reinforcer using the same procedures described in Section 5.2.5b. In addition, the participants were given an across-activity choice, in which they selected the academic tasks they wanted to complete during DTT. Each participant had a set of academic targets that were selected by the lead teacher based on prior assessments and progress within individualised academic programmes (see Table 5.2). For each intervention session, four of these tasks were randomly selected by the researcher. Each task was represented by a 3 in. x 4 in. visual specific to that activity (Appendix L). Prior to beginning any task, the participants were presented two activity visuals. The tutor would ask a participant which of the two activities he would like to complete (e.g., “Do you want to do your sorting or matching?”). The selected activity was completed, then the unselected activity was presented again with another activity. The participants would make another selection, and this process continued until the end of the 10-minute session. During each intervention session, all four activities were completed, regardless of participant selection. If there was an activity never selected by a participant, the tutor would wait until the end of the session to complete the
activity. Therefore, all four activities were completed, but the participants had the advantage of selecting the order of completion. The number of across-activity choices presented during each session varied, depending on the cooperation of the participants.

A third type of choice offered to the participants was a within-activity choice. That is, the participants had an opportunity to select which materials they wanted to use during the completion of some academic tasks. During each session, at least one of the four activities selected by the researcher included two sets of materials to choose from. The activities which included a choice of materials (in bold print) and the options for these activities are listed in Table 5.2. When one of these activities was selected by a participant using the across-activity choice procedures described above, the tutor offered the child a choice of materials. For example, if Louis selected his handwriting activity, the tutor would ask, “Do you want to use your green or blue pencil?”, while presenting Louis his two options. The within-activity choice was repeated each time a relevant activity was selected by a participant. At least one within-activity choice was presented during each intervention session.

Table 5.2. Academic tasks and within-activity choice options for Joel, Jack, and Louis.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Academic Tasks</th>
<th>Within-Activity Choice Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joel</td>
<td>- Sorting (colours and shapes) - Matching (identical pictures) - Listener responding (action-on-command) - Listener responding (receptive identification of pictures) - Play (two-step functional play) - Imitation (gross motor movements) - Intraverbal (Nursery Rhymes)</td>
<td>- Sorting  →  choice of shape or colour to sort - Matching  →  choice of which picture to match - Play  →  choice of drum or maraca to use - Intraverbal  →  choice of Nursery Rhyme</td>
</tr>
<tr>
<td>Jack</td>
<td>- Sorting (categories) - Tacting (picture identification)</td>
<td>- Imitation  →  choice of blocks to use</td>
</tr>
</tbody>
</table>
### 5.2.5d Treatment Acceptability Questionnaire

The social validity of the choice intervention package was assessed through a non-standard questionnaire created specifically for this study. This questionnaire was modelled after the Treatment Acceptability Rating Form – Revised (TARF-R; Reimers, Wacker, & Cooper, 1991), and it comprised of 10 items for the respondents to complete using a 5-point Likert-type scale (Appendix M). Three different adults, including two tutors and one lead teacher, completed the Treatment Acceptability Questionnaire for each participant. For each respondent, the 10 items from the questionnaire were summed to form a total acceptability score. Total scores could range from 10 to 50, with a higher score indicating a higher level of acceptability for the choice intervention package.

### 5.2.6 Experimental Design
A multiple baseline across participants design was implemented to determine the effects of the choice intervention package (Kennedy, 2005). During a multiple baseline across participants design, there is a time-lagged introduction of the intervention with each participant. Consequently, baseline continued for a different number of sessions with each participant. Baseline comprised of five sessions for Joel, eight sessions for Jack, and 11 sessions for Louis. The study included 20 sessions overall; therefore, intervention was implemented for a total of 15 sessions for Joel, 12 sessions for Jack, and nine sessions for Louis.

5.2.7 Data Analysis

The same visual analysis procedures described in Section 3.2.7 were applied in this study. Specifically, the variability, level, and trend were evaluated for each dependent variable to help determine the effects of the choice intervention package.

5.2.7a Tau-U. Unlike the previous two studies, this study did not include percentage of non-overlapping data (PND) scores as an adjunct to visual analysis. Although PND is one of the most commonly used methods for estimating effect size in single-subject experimental designs (SSEDs), it presents with several limitations (Parker, Hagan-Burke, & Vannest, 2007). For multiple baseline designs, PND is often criticised because it relies on a single baseline datum point and ignores all other baseline data; therefore, PND is vulnerable to outliers (Rakap, 2015). In addition to having a ceiling and floor effect, PND cannot address trends and cannot be used for significance testing (Vannest & Ninci, 2015). Furthermore, PND is not recommended when there is variability in baseline, as this can result in lower PND scores (Scruggs & Mastropieri, 2013).
To address the limitations inherent in the use of PND for multiple baseline designs, Tau-U was employed in the current study to estimate the effect size of the intervention (Parker, Vannest, Davis, & Sauber, 2011). Tau-U can be interpreted as “the percent of data that improve over time considering both phase nonoverlap and Phase B trend, after control of Phase A trend” (Parker et al., 2011, p. 291). Tau-U is a non-parametric statistic that purports to complement visual analysis procedures. Tau-U offers multiple benefits over other nonoverlap methods, such as the following: (a) it is appropriate for small data sets; (b) it corrects for any unwanted baseline trends; (c) it accounts for positive trends during intervention; (c) it is resistive to outliers, and (d) it offers significance testing (Parker et al., 2011).

Effect size estimates were calculated for each dependent variable using a web-based calculator (http://www.singlecaseresearch.org/calculators/tau-u; Vannest, Parker, Gonen, & Adiguzel, 2016). In addition to calculating individual Tau-U scores, this web-based application can be used to identify baseline trends; if a baseline had a trend of 0.4 or higher (Parker et al., 2011), it was corrected. Another strength of this web-based application is that it can be used to analyse the data across all dependent variables so that an overall omnibus effect size can be calculated for the intervention. To calculate overall omnibus effect sizes, the Tau-U scores for each dependent variable were combined into a weighted average (Vannest et al., 2016).

Tau-U scores can range from -1.0 to 1.0. A positive Tau-U score suggested that the condition was effective for the dependent variable, while a negative score, or a score of 0.0, suggested no effect on the dependent variable. Effect sizes were interpreted by the following ranges: a Tau-U score of 0.0 to 0.2 indicated a “small effect”; a score of 0.2 to 0.6 indicated a
“moderate effect”; a score of 0.6 to 0.8 indicated a “large effect”, while a score of 0.8 to 1.0 indicated a “very large effect” (Vannest & Ninci, 2015).

5.3 Results

All three participants displayed more indices of happiness during intervention in comparison to baseline. Similarly, all three participants demonstrated less indices of unhappiness during intervention relative to baseline. The on-task behaviour improved for only two of the three participants during intervention. The results for each participant are depicted in Figures 5.1 and 5.2 below. In addition, individual Tau-U scores and overall omnibus effect sizes for the choice intervention package can be found in Table 5.3.

5.3.1 Joel

Joel demonstrated marginally more indices of happiness during intervention ($M = 29.3\%, SD = 16.8$) relative to baseline ($M = 28\%, SD = 12.9$). A visual analysis of Figure 5.1 indicates that Joel’s indices of happiness were highly variable at a low-to-moderate level during baseline. During intervention, his indices of happiness were also highly variable at a mostly low-to-moderate level, but they had a gradually increasing trend. A Tau-U score of -0.0 suggests that there was no effect on Joel’s indices of happiness.

Joel demonstrated more indices of unhappiness during baseline ($M = 11.5\%, SD = 8$) relative to intervention ($M = 1.3\%, SD = 2.5$). A visual analysis of Figure 5.1 indicates that Joel’s indices of unhappiness were highly variable at a low level during baseline. During intervention, his indices of unhappiness also occurred at a low level, but they showed more stability than during baseline. A Tau-U score of 0.8 suggests that there was a very large effect on Joel’s indices of unhappiness.
Joel demonstrated more on-task behaviour during baseline ($M = 75\%, SD = 10.2$) relative to intervention ($M = 71.8\%, SD = 15.1$). A visual analysis of Figure 5.2 indicates that Joel’s on-task behaviour was stable at a moderate-to-high level during baseline. During intervention, his on-task behaviour was more variable, but it occurred at a moderate-to-high level. A Tau-U score of -0.1 suggests that there was no effect on Joel’s on-task behaviour.

The overall omnibus effect size for the choice intervention package was Tau-U = 0.2, suggesting that there was a moderate effect on Joel’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 5.3).

### 5.3.2 Jack

Jack demonstrated more indices of happiness during intervention ($M = 26.5\%, SD = 16.6$) relative to baseline ($M = 8.8\%, SD = 8.2$). A visual analysis of Figure 5.1 indicates that Jack’s indices of happiness were highly variable at a low level during baseline. During intervention, his indices of happiness were also variable, but they occurred at a mostly low-to-moderate level and had a gradually increasing trend. A Tau-U score of 0.8 suggests that there was a large effect on Jack’s indices of happiness.

Jack demonstrated marginally more indices of unhappiness during baseline ($M = 1.3\%, SD = 1.9$) relative to intervention ($M = 1, SD = 1.7$). A visual analysis of Figure 5.1 indicates that Jack’s indices of unhappiness were variable at a low level during both baseline and intervention. A Tau-U score of 0.1 suggests that there was a small effect on Jack’s indices of unhappiness.

Jack demonstrated more on-task behaviour during intervention ($M = 81\%, SD = 9.5$) relative to baseline ($M = 73.4\%, SD = 18.7$). A visual analysis of Figure 5.2 indicates that Jack’s on-task behaviour was variable at a mostly high level during baseline. During
intervention, his on-task behaviour occurred at a moderate-to-high level, but it showed more stability than during baseline. A Tau-U score of 0.2 suggests that there was a small effect on Jack’s on-task behaviour.

The overall omnibus effect size for the choice intervention package was Tau-U = 0.3, suggesting that there was a moderate effect on Jack’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 5.3).

5.3.3 Louis

Louis demonstrated more indices of happiness during intervention ($M = 34.2\%, SD = 16.3$) relative to baseline ($M = 21.1\%, SD = 11$). A visual analysis of Figure 5.1 indicates that Louis’ indices of happiness were highly variable at a mostly low level during baseline. During intervention, his indices of happiness were also highly variable and occurred at a low-to-moderate level, but they had a gradually increasing trend. A Tau-U score of 0.4 suggests that there was a moderate effect on Louis’ indices of happiness.

Louis demonstrated more indices of unhappiness during baseline ($M = 1.8\%, SD = 3.6$) relative to intervention ($M = 0.3\%, SD = 0.8$). A visual analysis of Figure 5.1 indicates that Louis’ indices of unhappiness were variable at a low level during baseline. During intervention, Louis’ indices of unhappiness were rare, as they only occurred during one session (Session 17). During this session, his indices of unhappiness occurred at a low level. A Tau-U score of 0.2 suggests that there was a small effect on Louis’ indices of unhappiness.

Louis demonstrated more on-task behaviour during intervention ($M = 88.3\%, SD = 11.9$) relative to baseline ($M = 78.6\%, SD = 8.9$). A visual analysis of Figure 5.2 indicates that Louis’ on-task behaviour had a stable, gradually increasing trend at a mostly high level during
baseline. During intervention, Louis’ on-task behaviour was also stable at a high level. A Tau-U score of 0.2 suggests that there was a small effect on Louis’ on-task behaviour.

The overall omnibus effect size for the choice intervention package was Tau-U = 0.3, suggesting that there was a moderate effect on Louis’ indices of happiness, indices of unhappiness, and on-task behaviour (Table 5.3).
Figure 5.1. Indices of happiness and unhappiness for Joel, Jack, and Louis.
Figure 5.2. On-task behaviour for Joel, Jack, and Louis.
Table 5.3. Individual Tau-U scores and overall omnibus effect sizes for the choice intervention package.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Indices of happiness</th>
<th>Tau-U Scores</th>
<th>Indices of unhappiness</th>
<th>On-task behaviour</th>
<th>Overall Omnibus Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joel</td>
<td>Tau-U = -0.0</td>
<td>Tau-U = 0.8</td>
<td>Tau-U = -0.1</td>
<td>Tau-U = 0.2</td>
<td></td>
</tr>
<tr>
<td>Jack</td>
<td>Tau-U = 0.8</td>
<td>Tau-U = 0.1</td>
<td>Tau-U = 0.2</td>
<td>Tau-U = 0.3</td>
<td></td>
</tr>
<tr>
<td>Louis</td>
<td>Tau-U = 0.4</td>
<td>Tau-U = 0.2</td>
<td>Tau-U = 0.2</td>
<td>Tau-U = 0.3</td>
<td></td>
</tr>
</tbody>
</table>

5.3.4 Treatment Acceptability Questionnaire

The results from the treatment acceptability questionnaire suggest that the lead teachers and tutors reported the choice intervention package to be acceptable, as the total acceptability score across all nine respondents was $M = 41.3$ ($SD = 1$). Based on these findings, it can be concluded that the respondents were in favour of the choice intervention package and clearly understood the procedures. The respondents were willing to implement the intervention and believed the procedures would fit into their classroom routine. In addition to this, the respondents thought the intervention could be applied to other students within their classroom. The respondents were more neutral with their answers to Item 3. In essence, the lead teachers and tutors were undecided whether the procedures would be disruptive to their classroom. Based on written anecdotal notes collected by the researcher, there was one hypothesis for this finding. One of the lead teachers had concerns about providing the between-activity choice during certain times of the day. More specifically, she did not think this type of choice would be appropriate when the students were required to complete an activity (e.g., eat snack) and no other activity choices were available. This concern is addressed in Section 7.2.3.
With regard to the target behaviours, the lead teachers and tutors believed the choice intervention package helped to improve the on-task behaviour of the students. Similarly, the respondents generally agreed that the intervention increased the happiness of the students. The respondents were less certain that the intervention helped to reduce the indices of unhappiness and challenging behaviour of the students. However, there was a lack of undesirable behaviours observed during both baseline and intervention for two participants, so the respondents may have found no discernible difference between the two conditions. The mean scores for individual items can be found in Table 5.4 below.

*Table 5.4.* Mean treatment acceptability scores.

<table>
<thead>
<tr>
<th>Item</th>
<th>Question</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How clear is your understanding of the suggested procedures?</td>
<td>5 ( (SD = 0) )</td>
</tr>
<tr>
<td>2</td>
<td>How willing are you to implement the suggested procedures within your classroom routine?</td>
<td>4.8 ( (SD = 0.4) )</td>
</tr>
<tr>
<td>3</td>
<td>How disruptive will it be to your classroom to implement the suggested procedures?</td>
<td>3.4 ( (SD = 1) )</td>
</tr>
<tr>
<td>4</td>
<td>How well will carrying out these procedures fit into your classroom routine?</td>
<td>4 ( (SD = 0.5) )</td>
</tr>
<tr>
<td>5</td>
<td>How much do you like the proposed procedures?</td>
<td>5 ( (SD = 0) )</td>
</tr>
<tr>
<td>6</td>
<td>I believe the procedures increased the happiness of the student.</td>
<td>3.9 ( (SD = 0.6) )</td>
</tr>
<tr>
<td>7</td>
<td>I believe the procedures decreased the unhappiness and challenging behaviour of the student.</td>
<td>2.6 ( (SD = 0.9) )</td>
</tr>
<tr>
<td>8</td>
<td>I believe the procedures increased the task engagement of the student.</td>
<td>4.3 ( (SD = 0.7) )</td>
</tr>
<tr>
<td>9</td>
<td>I believe the procedures will increase the self-determination and well-being of the student.</td>
<td>3.9 ( (SD = 0.8) )</td>
</tr>
<tr>
<td>10</td>
<td>I believe the procedures can be applied to other students in the classroom.</td>
<td>4.4 ( (SD = 0.7) )</td>
</tr>
</tbody>
</table>
5.4 Discussion

Empirical research has shown that individuals with disabilities are often given limited opportunities for choice within their daily lives (Cullen, 1999). Typically, the only type of choice made available to children with ASD is a choice of reinforcer prior to the start of a teaching session (Elliott & Dillenburger, 2016). This choice opportunity is often presented in a “first-then” format, whereupon a child with ASD is asked, “What do you want to work for?” and their choice of reinforcer is displayed on a first-then visual or token board (Peterson et al., 2016). The child must then complete a task or set of tasks before receiving his/her reinforcer. Providing a choice of reinforcer has its therapeutic benefits, but it offers little in terms of choice diversity. The self-determination of individuals with disabilities increases as a function of the range of choices made available to them (Brown et al., 1993). To better improve the self-determination and overall quality of life (QoL) of children with ASD, a variety of choice opportunities should be provided, beyond the single choice of reinforcer. The purpose of this study was to determine whether a choice intervention package, which included both within- and across-activity choices, would result in better intervention outcomes than a baseline condition that only provided a choice of reinforcer.

The results for indices of happiness and unhappiness were favourable, as the choice intervention package improved the mood of all three participants. With the addition of within- and across-activity choices prior to the start of DTT, each participant demonstrated more indices of happiness and less indices of unhappiness relative to baseline. A visual analysis of Figure 5.1 indicates a gradually increasing trend in indices of happiness across all three participants with the introduction of the choice intervention package. This outcome corroborates the findings from Moes (1998), who found that the provision of within- and across-activity choices increased the affect of four children with ASD.
The choice intervention package improved the on-task behaviour of two of the three participants. A visual analysis of Figure 5.2 indicates that the participants demonstrated high levels of task engagement during both baseline and intervention. The choice intervention package appeared to improve the on-task behaviour of both Jack and Louis, but there was still considerable overlap between the two conditions. The lack of convincing evidence for on-task behaviour extends previous research findings (Bambara et al., 1994; Cole et al., 1997; Killu et al., 1999; Parsons et al., 1990; Smeltzer et al., 2009; Spevack, Martin, Hiebert, Yu, & Martin, 2004). Within their meta-analysis, Shogren and colleagues (2004) found that choice-based interventions had less of an effect on non-aggressive (e.g., off-task) behaviours than aggressive behaviours. This finding could suggest that choice-based interventions have less of an effect on on-task behaviour than other target behaviours. Further research is necessary to determine if this is the case.

Another explanation for the discrepancy in these findings is that the choice-based intervention resulted in more demands being placed on the participants by the tutors. Although the additional choice-making opportunities seemed to improve the mood of each participant (i.e., increase in indices of happiness, decrease in indices of unhappiness), the participants were being asked to perform additional tasks when making their choices. This may have inadvertently resulted in some challenging behaviour, which could have decreased the amount of time each participant was on-task. Furthermore, the participants were exposed to two novel forms of choice (e.g., within-activity, across-activity) that they did not regularly encounter in their typical teaching sessions. This may have increased their latency to respond to the new choice opportunities, which could have decreased their overall time on-task.

Finally, it has been suggested that children with ASD who have escape-maintained challenging behaviour are more likely to benefit from choice-based interventions than children...
who have challenging behaviour maintained by access to tangibles or attention (Berotti, 1996; Romaniuk et al., 2002). As discussed previously, choice as an antecedent may act as an abolishing operation for escape-maintained challenging behaviour. Children who engage in this type of behaviour are less motivated to escape during teaching sessions and are more likely to demonstrate on-task behaviour when they are provided with choice-making opportunities. It is possible that the participants in the current study had challenging behaviour that was maintained by access to tangibles or attention; therefore, the choice intervention package was not as effective for these children. However, this conclusion cannot be made with certainty because a functional behaviour assessment (FBA) was not conducted prior to the study.

Regardless of the function of their challenging behaviour, it is important that all children with disabilities are given choice-making opportunities to better improve their self-determination and overall QoL (Romaniuk et al., 2002). Although the choice intervention package did not result in a significant increase in on-task behaviour for all participants, it can still be considered socially significant because it helped to enhance their QoL (Kazdin, 1999). According to the questionnaire results, the lead teachers and tutors found the choice intervention package to be socially acceptable and were willing to implement the procedures in the future. Despite the lack of convincing evidence within the data, the respondents believed the choice intervention package improved the on-task behaviour of the participants. Based on the answers from the questionnaire, the choice intervention package can be considered a socially valid intervention for young children with ASD.

5.4.1 Limitations
This study had several limitations that must be acknowledged. The first limitation was that the researcher could not control for the skill level of the tutors conducting the sessions. As discussed in Section 4.7.1, the tutors were randomly alternated each school day, so that a single tutor never worked with the same student across two consecutive days. As a result, some tutors may have been better skilled in the DTT procedures than others. To help improve the fidelity of the choice procedures, the researcher coached the tutors during the intervention sessions when needed. However, none of the sessions had to be terminated due to the incompetence of the tutors. As this was an exploratory study, treatment fidelity measures were not collected.

A second limitation of this study was that a preference assessment for the within- and across-activity choices was not conducted. The MSWO preference assessment conducted prior to each session ensured that current preferred items were included within the choice of reinforcer opportunities. It is possible that the participants’ preferences for certain materials and/or activities may have confounded the role of choice during intervention (Dibley & Lim, 1999; Rispoli et al., 2013). Although choice is a way of expressing preference, a choice may become less meaningful if it is used to make a selection between two non-preferred items or activities. However, a preference assessment for the within- and across-activity choices would have been inappropriate due to the structure of the DTT sessions. The participants were required to work on the same tasks each day based on their current academic goals. If only highly-preferred activities were included within the DTT sessions, the participants would have missed opportunities to target other skills. The exclusion of non-preferred tasks was deemed unethical by the researcher.

Another limitation was that the participants were not trained in the choice procedures prior to the start of the choice-based intervention. The participants had the ability to choose
between two or more items (i.e., inclusion criteria) and they were familiar with the choice of reinforcer format, as this was the type of choice most often used during their typical teaching sessions. However, the participants were not as familiar with the within-activity and between-activity choice opportunities, and this may have resulted in some delays in responding.

Although the study did not include any specific training to teach these contingencies, the participants never failed to make a selection during these novel choice opportunities, and non-verbal prompting methods were not needed by the tutors.

A further limitation was that the participants were not reassessed at the beginning of the study. Study 3 began nine months after the end of Study 2, and the maturation of the participants during this time could have resulted in changes to their SCQ Total Scores and mood indices. The participants likely acquired more skills during these nine months, and this may have resulted in improvements to their SCQ Total Scores. In addition, the participants may have developed new indices of happiness and/or unhappiness during this time. Without a follow-up to the Indices of Happiness and Unhappiness Questionnaire, there is the possibility that the participants acquired additional mood indices that went undetected during the study.

The final limitation for this study was the length of the intervention phase. Due to time constraints, the study was limited to a total of 20 sessions per participant. As there was a gradually increasing trend in the indices of happiness across all participants, it is possible that this dependent variable would have continued to improve had the intervention been conducted for a longer period of time. In multiple baseline designs, it is recommended that the intervention is introduced to each subsequent tier only once a predetermined criterion has been met (Gast, Lloyd, & Ledford, 2014). A predetermined criterion was not used for any of the dependent variables as this was an exploratory study. Regardless, the intervention phase of the study still met the evidence standards proposed by the What Works Clearinghouse (WWC), as
there were at least five data points included within each condition for each participant (Kratochwill et al., 2010).

On a similar note, the limited amount of time to complete the study resulted in a multiple baseline design that lacked tight experimental control. In a multiple baseline design, it is not customary to introduce the intervention to the first tier until stability has been reached and there is no observed trend (Gast et al., 2014). Likewise, the intervention should not be introduced to a subsequent tier until stability has been reached in the previous one. Despite these guidelines, the time constraints for the study and the nature of the applied setting required the researcher to start each phase in the manner that is observed. With only four weeks to conduct the study, the researcher introduced the intervention to each participant after a set number of sessions, rather than a pre-determined criterion. Furthermore, the lead teacher had requested that Joel be the first participant to enter the intervention phase, as a new tutor was being trained with Jack then Louis, respectively. This resulted in a predetermined order of tiers.

5.4.2 Future Research

The results from this study suggest that the choice intervention package was moderately effective at improving the mood and on-task behaviour of young children with ASD. However, the question remains whether all three types of choice (e.g., choice of reinforcer, within-activity choice, across-activity choice) were necessary for the package to be successful. For a behavioural treatment to be analytic, practitioners must recognise the active components of the intervention that are responsible for behaviour change (Baer, Wolf, & Risley, 1968). Through component analyses, practitioners can identify these active components. A component analysis is defined as “any experiment designed to identify the
active elements of a treatment condition, the relative contributions of different variables in a treatment package, and/or the necessary and sufficient components of an intervention” (Cooper et al., 2007, p. 692). A component analysis improves the efficiency of an intervention package because it helps to identify unnecessary or ineffective components (Ward-Horner & Sturmey, 2010).

Chapter 6 will implement a component analysis to determine which of the three types of choice included within the choice intervention package are the most influential on intervention outcomes. During this study, the participants will be exposed to each type of choice on its own, as well as in different choice combinations (e.g., choice of reinforcer plus a choice of activity). The study will help to enlighten the current research findings, as it will reveal the relative impact each type of choice has. The component analysis will ascertain the necessity and sufficiency of each type of choice. A component is considered necessary if it is needed for the package to be effective, while a component is considered sufficient if it is as effective as the treatment package on its own. If there are any unnecessary choice components included within the choice intervention package, they can be eliminated from future research.

5.4.3 Conclusion

The current study demonstrated that different types of choice can easily be embedded into DTT programming to help improve the self-determination and mood of young children with ASD. Based on the results of this study, it can be implied that the overall QoL of these children was enhanced through the application of the choice intervention package. Although the intervention did not result in significant improvements in on-task behaviour for all participants, even small improvements in task engagement should be considered meaningful. Furthermore, any intervention that improves the QoL of individuals with ASD should be
considered advantageous. This self-determination-based intervention is consistent with the movement towards non-aversive behaviour management (Horner et al., 2005) and person-centred planning (Dibley & Lim, 1999).
Chapter 6:

Evaluating the Differential Effects of a Choice Intervention Package Using a Component Analysis
6.1 Introduction

The results from Chapter 5 suggest that the choice intervention package was moderately effective at improving the mood and on-task behaviour of three young children with autism spectrum disorder (ASD). Despite the success of the choice intervention package, this treatment could not be described as analytic. A behavioural intervention is only considered analytic once the researcher can identify the active components within the treatment that are responsible for the changes in behaviour (Baer, Wolf, & Risley, 1968). Therefore, the purpose of the current study was to further evaluate the choice intervention package to determine which individual choice components were the most effective at improving the participants’ mood and on-task behaviour.

When the efficacy of an intervention package has been demonstrated, but the active components of that package are unknown, a component analysis is appropriate (Ward-Horner & Sturmey, 2010). A component analysis is any experiment in which the effects of different independent variables (i.e., components) within an intervention package are evaluated by systematically removing or adding one or more components across phases. Component analyses are important because they can help to identify any unnecessary or ineffective components within a treatment package. By eliminating ineffective, effortful, or unnecessary components, the efficiency and social validity of an intervention package can be improved (Cameron, Luiselli, Littleton, & Ferrelli, 1996; Ward-Horner & Sturmey, 2010). Furthermore, by removing any unnecessary or effortful components from a treatment package, the fidelity and maintenance of the programme’s procedures may be enhanced, as the practitioners can be trained to implement only the key components needed for behaviour change (Ward-Horner & Sturmey, 2010).
Although component analyses are sometimes necessary in behaviour analytic research, it has been suggested that these experimental designs are not described sufficiently in the literature (Ward-Horner & Sturmey, 2010). Surprisingly, several notable sources in single-subject research methodology do not refer to component analyses at all (Johnston & Pennypacker, 2009; Kazdin, 2011; Sidman, 1960), while others only provide brief or incomplete descriptions (Cooper, Heron, & Heward, 2007; Gast & Ledford, 2014; Kennedy, 2005; Mayer, Sulzer-Azaroff, & Wallace, 2014). Cooper and colleagues (2007) defined the component analysis as, “any experiment designed to identify the active elements of a treatment condition, the relative contributions of different variables in a treatment package, and/or the necessary and sufficient components of an intervention” (p. 692). Utilising this definition, a component is considered necessary if it is required for the intervention package to be effective, while a component is considered sufficient if it is just as effective as the intervention package (Ward-Horner & Sturmey, 2010).

Ward-Horner and Sturmey (2010) provided a literature review evaluating the experimental designs of component analyses across 30 published studies. Prior to the publication of their review article, a thorough description of the procedures for conducting a component analysis had not yet been provided in the literature. Based on the findings from Ward-Horner and Sturmey (2010), two different types of component analyses were identified: 1.) a dropout component analysis, in which the intervention package is presented first, and the components are subsequently removed in a systematic manner. This type of component analysis has clinical importance because it can improve a target behaviour immediately, usually within the first or second phase (Ward-Horner & Sturmey, 2010); 2.) An add-in component analysis, in which the individual components are presented individually, or in different combinations, before being presented as an intervention package. This type of
Component Analysis

Component analysis is useful for evaluating the active components of an intervention package that has previously been shown to be effective (Ward-Horner & Sturmey, 2010). When conducting a component analysis, a multiple baseline, reversal, or alternating treatments design is typically employed. For the purpose of this study, an add-in reversal design will be used, as the choice intervention package has already been shown to be effective and this design can provide “the most powerful and complete analysis of the active components of a treatment package” (Ward-Horner & Sturmey, 2010, p. 690).

The component analysis presented in the current chapter contributes to the literature in two ways. First, although within- and across-activity choices have been proven effective as separate independent variables in previous research (Rispoli et al., 2013; Ulke-Kurkuoglu & Kircaali-Iftar, 2010), these studies did not evaluate both types of choice within a combined choice condition. Similarly, other studies have demonstrated the efficacy of a choice intervention package, but these researchers did not analyse the effects of each type of choice separately (Dibley & Lim, 1999; Dyer, Dunlap, & Winterling, 1990; Koegel, Singh, & Koegel, 2010; Moes, 1998; Newman, Needelman, Reinecke, & Robek, 2002). As a result, Rispoli et al. (2013) highlighted the need for a component analysis that can investigate the additive nature of different types of choice further. To the author’s knowledge, this is the first study to do so.

Second, this study contributes to the literature in that it provides a complete component analysis of the choice intervention package. To perform a complete component analysis, the effects of each component and all component combinations must be independently evaluated within the experimental design (Ward-Horner & Sturmey, 2010). Ward-Horner and Sturmey (2010) identified 30 published studies employing component analyses within their literature review, but none of these studies had conducted a complete component analysis. This author
completed a more recent search of the literature across two databases (e.g., PsycINFO, PubMed) using the same search terms as Ward-Horner and Sturmey (2010). This search identified 10 additional component analyses that have been conducted since 2010, but only one of these studies had employed a complete component analysis (Armstrong, Madaus Knapp, & McAdam, 2014). Based on these findings, the current study can be considered one of only two complete component analyses in current behaviour analytic literature. Furthermore, the component analysis implemented by Armstrong et al. (2014) only investigated two separate intervention components and the combination of these two components. As the current component analysis evaluated three separate choice components and all their various combinations, this study can also be considered one of the most extensive component analyses in the behaviour analytic literature to date.

6.2 Method

6.2.1 Participants

Due to the extensive number of sessions ($n = 70$) needed for the component analysis, only two participants were recruited for this study. Both Joel and Jack had participated in the previous three studies and were available for the current study. Louis was not selected for participation due to behavioural concerns. At the time of the study, Louis was engaging in tantrum-like behaviour throughout his teaching sessions which prevented him from engaging in his work. The researcher spoke with his lead teacher and determined that Joel and Jack would be more suitable candidates. At the beginning of the study, Joel was 4 years 4 months old and Jack was 4 years 2 months old ($M = 4.3$, $SD = 1.4$). Both participants had previously met the inclusion criteria described in Chapter 3 (Section 3.2.1). The participant characteristics
and the Social Communication Questionnaire (SCQ) Total Scores for Joel and Jack can be found in Table 3.3.

6.2.2 Setting

All sessions were conducted at each participant’s work desk within a familiar classroom. Each classroom included individual desks, chairs, shelves, a large group table, and other items typically found within an early education classroom such as visual aids, toys, and books. For consistency purposes, other students and tutors were present during the study, but they were asked not to interfere with the procedures.

6.2.3 Dependent Variables

The same three dependent variables from Studies 2 and 3 were measured in the current study. Joel’s indices of happiness were identified as smiling, laughing, and hugging, while his indices of unhappiness were identified as crying and flopping. Jack’s indices of happiness were identified as smiling and laughing, while his indices of unhappiness were identified as screeching and flopping. The full operational definitions for each participant’s indices of happiness and unhappiness can be found in Table 3.4. The third dependent variable, on-task behaviour, was operationally defined as “looking at the tutor or materials and completing the given task(s) without needing redirection, and without engaging in stereotypy or challenging behaviour”. The stereotypy and/or challenging behaviour identified for each participant is operationally defined in Table 4.1.

6.2.4 Measurement

6.2.4a Data collection. The data collection procedures were identical to those described in Section 4.2.4 with the addition of an IOA assessment. All sessions were video recorded with an iPad and in-vitro observation was utilised by the researcher to code for all
dependent variables. The researcher employed 15-s partial interval recording to code for the presence or absence of the mood indicators and 15-s whole interval recording to code for the presence of on-task behaviour. Each session was 10 minutes long and consisted of 40, 15-sec intervals. A percentage of intervals was calculated for each dependent variable using the following formula: Number of intervals with (dependent variable) ÷ 40 X 100.

6.2.4b Interobserver agreement (IOA). The same IOA procedures described in Section 3.5.4b were applied in this study. A secondary observer independently observed 20% of all sessions for each participant and IOA was calculated on an interval-by-interval basis for all three dependent variables (Kennedy, 2005). The initial mean IOA across both participants and all variables was 88.8%, which was considered acceptable (i.e., >80%; Cooper et al., 2007). However, due to observer drift, the co-rater was retrained in the data collection procedures following the same procedures described in Section 4.5.4c. After this follow-up training, the mean IOA increased to 89.9% (SD = 9.6). Table 6.1 presents the mean IOA for both participants.

Table 6.1. Mean IOA for indices of happiness, indices of unhappiness, and on-task behaviour.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Indices of Happiness</th>
<th>Indices of Unhappiness</th>
<th>On-Task Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joel</td>
<td>M = 86.4%, SD = 7.1</td>
<td>M = 97%, SD = 5</td>
<td>M = 85.9%, SD = 6.3</td>
</tr>
<tr>
<td>Jack</td>
<td>M = 87%, SD = 10.6</td>
<td>M = 99.3%, SD = 2.1</td>
<td>M = 83.8%, SD = 11.1</td>
</tr>
</tbody>
</table>

6.2.4c Cohen’s Kappa. In addition to IOA, Cohen’s Kappa was calculated to determine the inter-rater reliability of the dependent measures. A description of this statistical measure can be found in Section 3.5.4c. The inter-rater reliability for this study was found to be κ = 0.8 (p < 0.001), indicating substantial agreement.
6.2.5 Procedure

All sessions were implemented by each participant’s tutor, while their behaviours were video recorded by the researcher. At least one 10-minute session was conducted with each participant daily. If two sessions took place with a participant due to additional time, or the absence of the other participant, they were separated by at least one hour to control for carryover effects. If a participant was informally observed to be engaging in high frequencies of happy or unhappy indicators prior to the start of a session, the session was delayed until the participant was displaying neutral behaviours for at least five minutes. During each experimental condition, a single choice component, or a combination of components, was presented to each participant. If a condition included a combination of components, the procedures for each component were implemented in tandem. The procedures for each choice component are outlined below.

6.2.5a Multiple stimulus without replacement (MSWO) preference assessment.

Prior to each session, a MSWO preference assessment was conducted with each participant following the same procedures described in Section 5.2.5a. During this assessment, each participant was shown an array of six items that had previously been identified through a paired-stimulus preference assessment (Section 4.5.5a). The participants were prompted to select an item and following their selection, the item was removed from the array. Depending on the condition to follow, this choice opportunity was presented again, or it was not. For sessions that included a choice of reinforcer, this process was repeated until three items were selected. For all other sessions, this choice opportunity was presented once and only a single item was selected by the participants.
6.2.5b Baseline. Baseline sessions were similar to those described in Section 5.2.5b, but without a pre-session choice of reinforcer. Rather, the tutors said, “It’s time for work, you are working for (item)” and the item selected during the MSWO preference assessment was placed on the work desk. During the 10-minute teaching sessions, the participants were given various academic tasks and the same discrete trial training (DTT) procedures described in Section 4.2.5b were implemented by the tutors. The participants were reinforced according to their unique reinforcement schedules. The same item selected by each participant during the MSWO preference assessment was used for each reinforcement opportunity. Joel had a fixed ratio (FR) 1 schedule of reinforcement, so for every task he completed correctly, his selected item was delivered. Jack had a variable ratio (VR) 3 schedule of reinforcement and used a token system; consequently, he had to complete three tasks, on average, before a token was delivered. Jack had to receive five tokens before his selected item was delivered. The number of reinforcement opportunities presented to each participant varied, depending on their cooperation and reinforcement schedule. During baseline, no choice opportunities were presented to the participants.

6.2.5c Choice of reinforcer (CR). During this component, procedures were identical to baseline, except that the participants were able to choose their reinforcer. Prior to the start of the session, the tutors first presented the participants with the choice visual (Appendix K) and asked, “What would you like to work for?”. The three items displayed on the choice visual were the same three items selected during the MSWO preference assessment. The participants selected an item, and following this choice response, the 10-minute teaching session began. During the session, the participants were reinforced according to the reinforcement schedules described in baseline. Following each reinforcement opportunity, the participants were presented with the choice visual again and were prompted to make another choice. The
number of choice opportunities presented to each participant varied, depending on their cooperation and reinforcement schedule. Within this choice component, only a choice of reinforcer was presented to the participants.

6.2.5d Choice of activity (CA). During this component, procedures were identical to baseline, except that the participants were able to select which activities to complete during the teaching session (i.e., across-activity choice). Prior to each session, the researcher randomly selected four tasks for each participant that were current academic targets. Each task was represented by a 3 in. x 4 in. visual specific to that activity (Appendix L). Before starting a task, the tutors would present two activity visuals and ask the participants which of the two activities they wanted to complete (e.g., “Do you want to do your sorting or matching?”). The selected activity was completed, then the unselected activity was presented again with another activity. This process continued until the end of the 10-minute teaching session. Regardless of participant selection, all four activities were completed during the session. If an activity was never selected by a participant, the tutor waited until the end of the 10 minutes to complete the activity. Thus, all four activities were completed, but the participants had the advantage of selecting the order of completion. The number of activity choices presented to each participant varied depending on their cooperation. Within this choice component, only a choice of activity was presented to the participants.

6.2.5e Choice of materials (CM). During this component, procedures were identical to baseline, except that the participants were able to select the materials to use during the completion of some tasks (i.e., within-activity choice). At least one of the four activities selected by the researcher had two sets of materials to choose from. Before starting this activity, the tutors would present a choice of materials to the participants (e.g., “Would you like to use your green pencil or blue pencil?”). Some examples of the within-activity choice
options for certain academic tasks can be reviewed in Table 5.2. This choice of materials was repeated each time a relevant activity was presented to a participant by the tutor. At least one within-activity choice was presented during these teaching sessions. Within this choice component, only a choice of materials was presented to the participants.

**6.2.5f Open-ended social validity questionnaire.** During Study 3, the researcher collected written anecdotal notes from the teachers regarding the acceptability of the choice intervention package. Although the information gathered from these notes was valuable, this was not a formal way of assessing the social validity of the intervention. Therefore, an open-ended social validity questionnaire was included within the current study to gather more information about the acceptability of the procedures. Although rating scales provide data that are easily quantifiable, the amount of information provided by these scales can be limited (Finn & Sladecek, 2001; Gresham & Lopez, 1996). The opinions of teachers and tutors can be better conceptualised with the use of an open-ended questionnaire. The questionnaire included within this study was modelled after the sample semi-structured interview included in Gresham and Lopez (1996). Seven respondents, including three lead teachers and four tutors, completed the social validity questionnaire. The questionnaire included six open-ended questions and the respondents were asked to respond freely to each item (Appendix N).

**6.2.6 Experimental Design**

An add-in reversal design provides the most thorough analysis of the active components within an intervention package; therefore, a reversal design was implemented for the current component analysis (Baer, Wolf, & Risley, 1968). A notation system similar to the one proposed by Ward-Horner and Sturmey (2010) was applied in this study to help clarify the order of conditions. Each type of choice (i.e., component) was identified using the following
letters: [CR] for choice of reinforcer, [CA] for choice of activity, and [CM] for choice of materials. The letters [BL] were used to note baseline. Each experimental condition included a single component, or a combination of components, and brackets were used to separate the individual conditions.


6.2.7 Data Analysis

The same visual analysis procedures described in Section 3.2.7 were applied in this study. Specifically, the variability, level, and trend were examined for each dependent variable to help determine the effects of the choice components. To compliment these visual analysis procedures, and further ascertain the effects of each component, Tau-U scores were calculated following the procedures described in Section 5.2.7a. During these statistical analysis procedures, each experimental condition was evaluated in relation to its preceding baseline condition. Conclusions regarding the efficacy of each component were made based on the individual Tau-U scores for each dependent variable and the overall omnibus effect size for each condition.

6.3 Results
Component Analysis

Based on the Tau-U scores, the most effective condition for Joel was the choice intervention package (Tau-U = 0.4). The next most effective condition for Joel was the CA + CR condition (Tau-U = 0.4). For Jack, the most effective condition was the CA condition (Tau-U = 0.6). The next most effective condition for Jack was the choice intervention package (Tau-U = 0.4). However, these findings are only tentative, as there was a lack of experimental control within the conditions and conflicting evidence was found within the visual inspection of the data. The findings for each participant are outlined below. Individual Tau-U scores and overall omnibus effect sizes for each condition can be found in Table 6.2.

6.3.1 Joel

6.3.1a CA. Joel demonstrated similar levels of indices of happiness during both baseline \((M = 26.5, SD = 8.9)\) and the CA condition \((M = 27, SD = 11.9)\). During baseline, Joel’s indices of happiness had a variable, gradually decreasing trend. On the other hand, during the CA condition, his indices of happiness had a stable, gradually increasing trend (Figure 6.1). The CA condition had a small effect on Joel’s indices of happiness (Tau-U = 0.1).

Joel demonstrated more indices of unhappiness during baseline \((M = 4.5, SD = 8.7)\) relative to the CA condition \((M = 2.5, SD = 3.1)\). Joel’s indices of unhappiness were variable at a low level during both conditions. However, during the CA condition, his indices of unhappiness had a gradually decreasing trend (Figure 6.1). The CA condition was considered ineffective for Joel’s indices of unhappiness (Tau-U = -0.1).

Joel demonstrated more on-task behaviour during baseline \((M = 61.5, SD = 8)\) relative to the CA condition \((M = 58, SD = 23.1)\). During baseline, Joel’s on-task behaviour was stable at a moderate-to-high level. During the CA condition, his on-task behaviour also occurred at
Component Analysis

moderate-to-high level, but it had a variable, rapidly decreasing trend (Figure 6.2). The CA condition was considered ineffective for Joel’s on-task behaviour (Tau-U = -0.3).

The overall omnibus effect size for the CA condition was Tau-U = -0.1, suggesting there was no effect on Joel’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).

6.3.1b CA + CR. Joel demonstrated more indices of happiness during the CA + CR condition (M = 49.5, SD = 16) relative to baseline (M = 39.5, SD = 17.4). Joel’s indices of happiness occurred at a mostly moderate level during both conditions. During baseline, his indices of happiness had a highly variable, gradually decreasing trend. Meanwhile, his indices of happiness had a stable, rapidly decreasing trend during the CA + CR condition (Figure 6.1). The CA + CR condition had a moderate effect on Joel’s indices of happiness (Tau-U = 0.4).

Joel demonstrated more indices of unhappiness during baseline (M = 7, SD = 6) relative to the CA + CR condition (M = 1, SD = 2.2). Joel’s indices of unhappiness occurred at a low level during both conditions. During baseline, his indices of unhappiness had a highly variable, rapidly decreasing trend. Alternatively, his indices of unhappiness had a stable, gradually decreasing trend during the CA + CR condition (Figure 6.1). The CA + CR condition had a moderate effect on Joel’s indices of unhappiness (Tau-U = 0.4).

Joel demonstrated more on-task behaviour during the CA + CR condition (M = 61.5, SD = 14.6) relative to baseline (M = 52, SD = 10.2). During baseline, Joel’s on-task behaviour had a stable, gradually increasing trend at a mostly moderate level. During the CA + CR condition, his on-task behaviour had a variable, gradually increasing trend at a moderate-to-high level (Figure 6.2). The CA + CR condition had a small effect on Joel’s on-task behaviour (Tau-U = 0.2).
The overall omnibus effect size for the CA + CR condition was $\text{Tau-U} = 0.4$, suggesting there was a moderate effect on Joel’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).

**6.3.1c CM.** Joel demonstrated more indices of happiness during baseline ($M = 50, SD = 24.9$) relative to the CM condition ($M = 39, SD = 13.8$). Joel’s indices of happiness were variable at a mostly moderate level during both conditions. Yet, during baseline, his indices of happiness had a gradually decreasing trend (Figure 6.1). The CM condition was considered ineffective for Joel’s indices of happiness ($\text{Tau-U} = -0.4$).

Joel demonstrated more indices of unhappiness during baseline ($M = 5.5, SD = 9.8$) relative to the CM condition ($M = 4, SD = 6.5$). Joel’s indices of unhappiness were variable at a low level during both conditions. During baseline, his indices of unhappiness had a rapidly increasing trend. On the other hand, during the CM condition, his indices of unhappiness had a gradually increasing trend (Figure 6.1). The CM condition was considered ineffective for Joel’s indices of unhappiness ($\text{Tau-U} = 0.0$).

Joel demonstrated similar levels of on-task behaviour during both baseline ($M = 50.5, SD = 11.1$) and the CM condition ($M = 50.5, SD = 14.8$). Joel’s on-task behaviour occurred at a mostly moderate level during both conditions. However, during baseline, his on-task behaviour showed more stability than during the CM condition (Figure 6.2). The CM condition had a small effect on Joel’s on-task behaviour ($\text{Tau-U} = 0.1$).

The overall omnibus effect size for the CM condition was $\text{Tau-U} = -0.1$, suggesting there was no effect on Joel’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).
6.3.1d CM + CR. Joel demonstrated more indices of happiness during baseline ($M = 32.5, SD = 9.4$) relative to the CM + CR condition ($M = 16, SD = 10.8$). During baseline, Joel’s indices of happiness had a variable, gradually decreasing trend at a low-to-moderate level. During the CM + CR condition, his indices of happiness had a highly variable, gradually increasing trend at a low level (Figure 6.1). The CM + CR condition was considered ineffective for Joel’s indices of happiness (Tau-U = -0.8).

Joel demonstrated similar levels of indices of unhappiness during both baseline ($M = 3.5, SD = 1.4$) and the CM + CR condition ($M = 3.5, SD = 4.2$). Joel’s indices of unhappiness were variable at a low level during both conditions. Nevertheless, his indices of unhappiness had a gradually decreasing trend during the CM + CR condition (Figure 6.1). The CM + CR condition had a small effect on Joel’s indices of unhappiness (Tau-U = 0.2).

Joel demonstrated more on-task behaviour during the CM + CR condition ($M = 78, SD = 9.3$) relative to baseline ($M = 50.5, SD = 17.5$). During baseline, Joel’s on-task behaviour had a variable, rapidly increasing trend at a mostly moderate level. During the CM + CR condition, his on-task behaviour had a stable, gradually increasing trend at a high level (Figure 6.2). The CM + CR condition had a large effect on Joel’s on-task behaviour (Tau-U = 0.7).

The overall omnibus effect size for the CM + CR condition was Tau-U = 0.0, suggesting there was no effect on Joel’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).

6.3.1e CR. Joel demonstrated more indices of happiness during the CR condition ($M = 21, SD = 22.3$) relative to baseline ($M = 15, SD = 10.6$). During baseline, Joel’s indices of happiness had a variable, gradually decreasing trend at a low level. During the CR condition, his indices of happiness had a highly variable, rapidly increasing trend at a mostly low level.
Component Analysis

(Figure 6.1). The CR condition was considered ineffective for Joel’s indices of happiness (Tau-U = -0.0).

Joel demonstrated more indices of unhappiness during the CR condition ($M = 1.5$, $SD = 1.4$) relative to baseline ($M = 0.5$, $SD = 1.1$). Joel’s indices of unhappiness occurred at a low level during both conditions. However, during baseline, his indices of unhappiness showed more stability than during the CR condition (Figure 6.1). The CR condition was considered ineffective for Joel’s indices of unhappiness (Tau-U = -0.4).

Joel demonstrated more on-task behaviour during the CR condition ($M = 73$, $SD = 13.9$) relative to baseline ($M = 71.5$, $SD = 11.8$). During baseline, Joel’s on-task behaviour had a stable, gradually increasing trend at a mostly high level. During the CR condition, his on-task behaviour was variable at a moderate-to-high level (Figure 6.2). The CR condition was considered ineffective for Joel’s on-task behaviour (Tau-U = 0.0).

The overall omnibus effect size for the CR condition was Tau-U = -0.1, suggesting there was no effect on Joel’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).

6.3. If CA + CM. Joel demonstrated more indices of happiness during the CA + CM condition ($M = 23$, $SD = 5.7$) relative to baseline ($M = 12$, $SD = 11.9$). Joel’s indices of happiness had a gradually increasing trend at a low level during both conditions. Nevertheless, his indices of happiness showed more stability during the CA + CM condition than during baseline (Figure 6.1). The CA + CM condition had a large effect on Joel’s indices of happiness (Tau-U = 0.6).

Joel demonstrated more indices of unhappiness during the CA + CM condition ($M = 4.5$, $SD = 7.4$) relative to baseline ($M = 3$, $SD = 4.5$). Joel’s indices of unhappiness occurred at
a low level during both conditions. During baseline, his indices of unhappiness had a variable, gradually increasing trend. Alternatively, his indices of unhappiness had a highly variable, gradually decreasing trend during the CA + CM condition (Figure 6.1). The CA + CM condition was considered ineffective for Joel’s indices of unhappiness (Tau-U = -0.1).

Joel demonstrated more on-task behaviour during baseline ($M = 77, SD = 2.7$) relative to the CA + CM condition ($M = 56.5, SD = 9.6$). During baseline, Joel’s on-task behaviour was stable at a high level. During the CA + CM condition, his on-task behaviour had a stable, rapidly decreasing trend at a mostly moderate level (Figure 6.2). The CA + CM condition was considered ineffective for Joel’s on-task behaviour (Tau-U = -1.0).

The overall omnibus effect size for the CA + CM condition was Tau-U = -0.2, suggesting there was no effect on Joel’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).

6.3.1g CA + CM + CR (choice intervention package). Joel demonstrated more indices of happiness during the choice intervention package ($M = 24.5, SD = 13.9$) relative to baseline ($M = 21.5, SD = 16.6$). Joel’s indices of happiness were highly variable at a mostly low level during both conditions. Yet, during baseline, his indices of happiness had a rapidly decreasing trend (Figure 6.1). The choice intervention package had a moderate effect on Joel’s indices of happiness (Tau-U = 0.3).

Joel only demonstrated indices of unhappiness during baseline ($M = 2, SD = 3.3$). During baseline, his indices of unhappiness had a variable, gradually increasing trend at low level (Figure 6.1). The choice intervention package had a moderate effect on Joel’s indices of unhappiness (Tau-U = 0.4).
Joel demonstrated more on-task behaviour during the choice intervention package ($M = 80.5, SD = 13.5$) relative to baseline ($M = 67, SD = 6.2$). During baseline, Joel’s on-task behaviour had a stable, gradually increasing trend at a moderate-to-high level. During the choice intervention package, Joel’s on-task behaviour had a stable, rapidly increasing trend at a mostly high level (Figure 6.2). The choice intervention package had a moderate effect on Joel’s on-task behaviour (Tau-U = 0.4).

The overall omnibus effect size for the choice intervention package was Tau-U = 0.4, suggesting there was a moderate effect on Joel’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).
Figure 6.1. Joel’s indices of happiness and unhappiness during the complete component analysis.
Figure 6.2. Joel’s on-task behaviour during the complete component analysis.
6.3.2 Jack

6.3.2a CR. Jack demonstrated more indices of happiness during the CR condition ($M = 27, SD = 12.7$) relative to baseline ($M = 26, SD = 10.4$). Jack’s indices of happiness occurred at a low-to-moderate level during both conditions. During baseline, his indices of happiness had a highly variable, gradually increasing trend. Alternatively, his indices of happiness had a variable, gradually decreasing trend during the CR condition (Figure 6.3). The CR condition was considered ineffective for Jack’s indices of happiness ($\text{Tau-U} = 0.0$).

Jack demonstrated similar levels of indices of unhappiness during both baseline ($M = 1, SD = 2.2$) and the CR condition ($M = 1, SD = 2.2$). During both conditions, Jack’s indices of unhappiness had a stable, gradually increasing trend at a low level (Figure 6.3). The CR condition was considered ineffective for Jack’s indices of unhappiness ($\text{Tau-U} = 0.0$).

Jack demonstrated more on-task behaviour during baseline ($M = 86, SD = 5.5$) relative to the CR condition ($M = 73, SD = 15.9$). Jack’s on-task behaviour had a stable, gradually increasing trend during both conditions. However, during baseline, his on-task behaviour occurred at a higher level than during the CR condition (Figure 6.4). The CR condition was considered ineffective for Jack’s on-task behaviour ($\text{Tau-U} = -0.5$).

The overall omnibus effect size for the CR condition was $\text{Tau-U} = -0.2$, suggesting there was no effect on Jack’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).

6.3.2b CM. Jack demonstrated similar levels of indices of happiness during both baseline ($M = 18, SD = 8.9$) and the CM condition ($M = 17.5, SD = 16.5$). During baseline, Jack’s indices of happiness had a highly variable, gradually increasing trend at a low level. On the other hand, his indices of happiness had a highly variable, gradually decreasing trend at a
mostly low level during the CM condition (Figure 6.3). The CM condition was considered ineffective for Jack’s indices of happiness (Tau-U = -0.1).

Jack did not engage in any indices of unhappiness during either baseline or the CM condition (Figure 6.3). Therefore, the CM condition was considered ineffective for Jack’s indices of unhappiness (Tau-U = 0.0).

Jack demonstrated similar levels of on-task behaviour during both baseline ($M = 74$, $SD = 12.3$) and the CM condition ($M = 73.5$, $SD = 11.1$). During baseline, Jack’s on-task behaviour had a stable, rapidly decreasing trend at a moderate-to-high level. Meanwhile, during the CM condition, his on-task behaviour had a stable, gradually decreasing trend at a mostly high level (Figure 6.4). The CM condition was considered ineffective for Jack’s on-task behaviour (Tau-U = -0.2).

The overall omnibus effect size for the CM condition was Tau-U = -0.1, suggesting there was no effect on Jack’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).

**6.3.2c CM + CR.** Jack demonstrated more indices of happiness during baseline ($M = 24$, $SD = 17.3$) relative to the CM + CR condition ($M = 21$, $SD = 13.3$). Jack’s indices of happiness were highly variable at a mostly low level during both conditions. Yet, during the CM + CR condition, Jack’s indices of happiness had a gradually increasing trend (Figure 6.3). The CM + CR condition was considered ineffective for Jack’s indices of happiness (Tau-U = -0.2).

Jack demonstrated similar levels of indices of unhappiness during both baseline ($M = 0.5$, $SD = 1.1$) and the CM + CR condition ($M = 0.5$, $SD = 1.1$). During both conditions, Jack’s
indices of unhappiness were stable at a low level (Figure 6.3). The CM + CR condition was considered ineffective for Jack’s indices of unhappiness (Tau-U = 0.0).

Jack demonstrated more on-task behaviour during baseline ($M = 80, SD = 6.4$) relative to the CM + CR condition ($M = 75.5, SD = 8.2$). Jack’s on-task behaviour had a stable, gradually decreasing trend during both conditions. Nevertheless, his on-task behaviour occurred at a marginally higher level during baseline (Figure 6.4). The CM + CR condition was considered ineffective for Jack’s on-task behaviour (Tau-U = -0.4).

The overall omnibus effect size for the CM + CR condition was Tau-U = -0.2, suggesting there was no effect on Jack’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).

6.3.2d CA. Jack demonstrated more indices of happiness during the CA condition ($M = 33.5, SD = 9.3$) relative to baseline ($M = 11.5, SD = 5.8$). During baseline, Jack’s indices of happiness had a highly variable, gradually decreasing trend at a low level. Meanwhile, during the CA condition, his indices of happiness had a variable, gradually decreasing trend at a low-to-moderate level (Figure 6.3). The CA condition had a very large effect on Jack’s indices of happiness (Tau-U = 1.0).

Jack only demonstrated indices of unhappiness during baseline ($M = 1.5, SD = 2.2$). During baseline, Jack’s indices of unhappiness had variable, gradually decreasing trend at a low level (Figure 6.3). The CA condition had a moderate effect on Jack’s indices of unhappiness (Tau-U = 0.4).

Jack demonstrated more on-task behaviour during the CA condition ($M = 77.5, SD = 5.9$) relative to baseline ($M = 66, SD = 17.6$). During baseline, Jack’s on-task behaviour had a highly variable, rapidly increasing trend at a moderate-to-high level. During the CA condition,
his on-task behaviour was stable at a high level (Figure 6.4). The CA condition had a moderate effect on Jack’s on-task behaviour (Tau-U = 0.4).

The overall omnibus effect size for the CA condition was Tau-U = 0.6, suggesting there was a moderate effect on Jack’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).

6.3.2e CA + CR. Jack demonstrated more indices of happiness during baseline ($M = 32, SD = 12.9$) relative to the CA + CR condition ($M = 29.5, SD = 9.8$). During baseline, Jack’s indices of happiness had a highly variable, gradually increasing trend at a low-to-moderate level. During the CA + CR condition, his indices of happiness were variable at a mostly low level (Figure 6.3). The CA + CR condition was considered ineffective for Jack’s indices of happiness (Tau-U = -0.1).

Jack demonstrated more indices of unhappiness during the CA + CR condition ($M = 2, SD = 2.1$) relative to baseline ($M = 0.5, SD = 1.1$). Jack’s indices of unhappiness occurred at a low level during both conditions. During baseline, his indices of unhappiness were stable. On the other hand, his indices of unhappiness had a highly variable, gradually increasing trend during the CA + CR condition (Figure 6.3). The CA + CR condition was considered ineffective for Jack’s on-task behaviour (Tau-U = -0.4).

Jack demonstrated more on-task behaviour during baseline ($M = 75, SD = 9.8$) relative to the CA + CR condition ($M = 71.5, SD = 17$). During baseline, Jack’s on-task behaviour had a stable, gradually decreasing trend at a mostly high level. During the CA + CR condition, his on-task behaviour had a highly variable, rapidly decreasing trend at a moderate-to-high level (Figure 6.4). The CA + CR condition was considered ineffective for Jack’s on-task behaviour (Tau-U = -0.1).
Component Analysis

The overall omnibus effect size for the CA + CR condition was Tau-U = -0.2, suggesting there was no effect on Jack’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).

6.3.2f CA + CM. Jack demonstrated similar levels of indices of happiness during both baseline ($M = 22, SD = 5.7$) and the CA + CM condition ($M = 21.5, SD = 15$). During baseline, Jack’s indices of happiness had a stable, gradually increasing trend at a low level. During the CA + CM condition, his indices of happiness had a highly variable, rapidly increasing trend at a mostly low level (Figure 6.3). The CA + CM condition was considered ineffective for Jack’s indices of happiness (Tau-U = -0.5).

Jack demonstrated similar levels of indices of unhappiness during both baseline ($M = 1.5, SD = 1.4$) and the CA + CM condition ($M = 1, SD = 1.4$). During both conditions, Jack’s indices of unhappiness were variable at a low level (Figure 6.3). The CA + CM condition had a moderate effect on Jack’s indices of unhappiness (Tau-U = 0.2).

Jack demonstrated more on-task behaviour during baseline ($M = 74, SD = 12.6$) relative to the CA + CM condition ($M = 72.5, SD = 14.5$). Jack’s on-task behaviour was stable at a moderate-to-high level during both conditions. While his on-task behaviour had a rapidly increasing trend during baseline, it had a rapidly decreasing trend during the CA + CM condition (Figure 6.4). The CA + CM condition was considered ineffective for Jack’s on-task behaviour (Tau-U = -0.3).

The overall omnibus effect size for the CA + CM condition was Tau-U = -0.3, suggesting there was no effect on Jack’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).
6.3.2g CA + CM + CR (choice intervention package). Jack demonstrated more indices of happiness during the choice intervention package ($M = 24, SD = 12.8$) relative to baseline ($M = 20, SD = 10.2$). During baseline, Jack’s indices of happiness had a highly variable, gradually increasing trend at a low level. During the choice intervention package, his indices of happiness had a highly variable, gradually decreasing trend at a mostly low level (Figure 6.3). The choice intervention package was considered ineffective for Jack’s indices of happiness (Tau-U = 0.0).

Jack demonstrated more indices of unhappiness during baseline ($M = 7.5, SD = 7.5$) relative to the choice intervention package ($M = 1, SD = 1.4$). Jack’s indices of unhappiness occurred at a low level during both conditions. Yet, during the choice intervention package, his indices of unhappiness showed more stability (Figure 6.3). The choice intervention package had a moderate effect on Jack’s indices of unhappiness (Tau-U = 0.4).

Jack demonstrated more on-task behaviour during the choice intervention package ($M = 89.5, SD = 9.9$) relative to baseline ($M = 79.5, SD = 8.9$). Jack’s on-task behaviour had a stable, gradually increasing trend at a high level during both conditions. Nevertheless, his on-task behaviour occurred at a marginally higher level during the choice intervention package (Figure 6.4). The choice intervention package had a moderate effect on Jack’s on-task behaviour (Tau-U = 0.6).

The overall omnibus effect size for the choice intervention package was Tau-U = 0.4, suggesting there was a moderate effect on Jack’s indices of happiness, indices of unhappiness, and on-task behaviour (Table 6.2).
Figure 6.3. Jack’s indices of happiness and unhappiness during the complete component analysis.
Figure 6.4. Jack’s on-task behaviour during the complete component analysis.
Table 6.2. Individual Tau-U scores and overall omnibus effect sizes for each condition.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Condition</th>
<th>Indices of happiness</th>
<th>Tau-U Scores Indices of unhappiness</th>
<th>On-task behaviour</th>
<th>Overall Omnibus Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joel</td>
<td>CA</td>
<td>Tau-U = 0.1</td>
<td>Tau-U = -0.1</td>
<td>Tau-U = -0.3</td>
<td>Tau-U = -0.1</td>
</tr>
<tr>
<td></td>
<td>CA + CR</td>
<td>Tau-U = 0.4</td>
<td>Tau-U = 0.4</td>
<td>Tau-U = 0.2</td>
<td>Tau-U = 0.4</td>
</tr>
<tr>
<td></td>
<td>CM</td>
<td>Tau-U = -0.4</td>
<td>Tau-U = 0.0</td>
<td>Tau-U = 0.1</td>
<td>Tau-U = -0.1</td>
</tr>
<tr>
<td></td>
<td>CM + CR</td>
<td>Tau-U = -0.8</td>
<td>Tau-U = 0.2</td>
<td>Tau-U = 0.7</td>
<td>Tau-U = 0.0</td>
</tr>
<tr>
<td></td>
<td>CR</td>
<td>Tau-U = -0.0</td>
<td>Tau-U = -0.4</td>
<td>Tau-U = 0.0</td>
<td>Tau-U = -0.1</td>
</tr>
<tr>
<td></td>
<td>CA + CM</td>
<td>Tau-U = 0.6</td>
<td>Tau-U = -0.1</td>
<td>Tau-U = -1.0</td>
<td>Tau-U = -0.2</td>
</tr>
<tr>
<td></td>
<td>CA + CM + CR</td>
<td>Tau-U = 0.3</td>
<td>Tau-U = 0.4</td>
<td>Tau-U = 0.4</td>
<td>Tau-U = 0.4</td>
</tr>
<tr>
<td>Jack</td>
<td>CR</td>
<td>Tau-U = 0.0</td>
<td>Tau-U = 0.0</td>
<td>Tau-U = -0.5</td>
<td>Tau-U = -0.2</td>
</tr>
<tr>
<td></td>
<td>CM</td>
<td>Tau-U = -0.1</td>
<td>Tau-U = 0.0</td>
<td>Tau-U = -0.2</td>
<td>Tau-U = -0.1</td>
</tr>
<tr>
<td></td>
<td>CM + CR</td>
<td>Tau-U = -0.2</td>
<td>Tau-U = 0.0</td>
<td>Tau-U = -0.4</td>
<td>Tau-U = -0.2</td>
</tr>
<tr>
<td></td>
<td>CA</td>
<td>Tau-U = 1.0</td>
<td>Tau-U = 0.4</td>
<td>Tau-U = 0.4</td>
<td>Tau-U = 0.6</td>
</tr>
<tr>
<td></td>
<td>CA + CR</td>
<td>Tau-U = -0.1</td>
<td>Tau-U = -0.4</td>
<td>Tau-U = -0.1</td>
<td>Tau-U = -0.2</td>
</tr>
<tr>
<td></td>
<td>CA + CM</td>
<td>Tau-U = -0.5</td>
<td>Tau-U = 0.2</td>
<td>Tau-U = -0.3</td>
<td>Tau-U = -0.3</td>
</tr>
<tr>
<td></td>
<td>CA + CM + CR</td>
<td>Tau-U = 0.0</td>
<td>Tau-U = 0.4</td>
<td>Tau-U = 0.6</td>
<td>Tau-U = 0.4</td>
</tr>
<tr>
<td>(choice intervention package)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.3.3 Open-Ended Social Validity Questionnaire

The responses to the open-ended social validity questionnaire suggest that the lead teachers and tutors approved of the choice intervention package. The questionnaire produced 41 different comments. These responses were analysed by the researcher, then categorised as either a strength or weakness of the choice intervention package. Benefits of the choice intervention package included the following: it promoted independence; it allowed for communication of likes/dislikes; it improved the mood and on-task behaviour of the participants; it gave the participants a sense of control; academic tasks were completed faster, and there were no negative side effects. Weaknesses of the choice intervention package included the following: it may be difficult for new staff members to implement without a checklist or training protocol; the choices slowed down the pace of the DTT sessions; the lead teachers did not have time to make the activity visuals necessary for non-verbal students; the CR component was not informative to the teachers because participants were already given a choice of reinforcer as a good teaching practice, and the participants were unable to request other reinforcers during baseline or conditions without the CR component, so manding opportunities were deferred. Table 6.2 presents 16 open-ended responses selected by the researcher, arranged by the two categories mentioned above.

Table 6.3. Selected responses to open-ended social validity questionnaire.

<table>
<thead>
<tr>
<th>Benefits of Choice Intervention Package</th>
<th>Weaknesses of Choice Intervention Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>• “I feel this is a positive way of promoting independence and allowing the children to communicate to us their likes and dislikes.”</td>
<td>• “We already give the child a choice of reinforcers in our school. I feel it wasn’t as informative to us.”</td>
</tr>
<tr>
<td>• “I think the child had more task engagement. This was especially true for the tasks he enjoyed doing, but I”</td>
<td>• “I would not have the time as a teacher to make the visual aids necessary to provide a choice of tasks to non-verbal students.”</td>
</tr>
</tbody>
</table>
think as he began to see that he was getting choices he didn’t mind doing the less preferred tasks either.”

- “We don’t provide a choice of work task or work materials. Therefore, I really enjoyed this new choice aspect as it seemed to motivate the students.”
- “I don’t think the intervention had any negative side effects because it encourages control and independent learning from a young age.”
- “I thought having three choices of reinforcers worked well as the child often changed his mind about what he chose to work for.”
- “I feel it worked well as the students seemed to work a lot better and faster because they had the choice of materials and activities.”
- “I thought it was great for the children. I think it gave them a sense of control over the activity they did, which I think was definitely beneficial.”
- “I found it very insightful to see the pattern of choices the child made. I had an idea myself, previous to this, which tasks I thought the child enjoyed but it was exciting to see that I was correct with some tasks and not so much with others.”

- “Although it did work well, I felt giving the child the choice of what work to do sometimes slowed down the session.”
- “The choice of reinforcement in every activity slowed down the work a little bit.”
- “Manding sessions were often deferred, resulting in him becoming somewhat demotivated to use an appropriate form of communication (e.g., PECS and Grace app) to mand for what he wants presently.”
- “When the child chose a reinforcer, they had to stick with that one for the session, and couldn’t switch to something else.”
- “As there are several visual aids required I think it may be difficult for newly trained staff to keep track of what they have and have not provided as a work choice to students. They may need a checklist themselves to keep on track of this.”
- “It is also important that everyone understanding how to run the choice intervention so a short protocol for teachers/tutors to follow might be good.”

### 6.4 Discussion

A component analysis is an experimental design that systematically removes different components of an intervention package across phases to determine which components are the most effective for the target behaviour(s). A complete component analysis was applied in the current study to determine which of the choice components included within the choice intervention package were the most influential on the mood and on-task behaviour of two
young children with ASD. The results for this component analysis were confounding, as a visual inspection of the data suggests that little experimental control was obtained for either participant. There was frequent overlap among the various conditions, and on occasion, reversals to baseline seemed to improve intervention outcomes. However, a few tentative conclusions were made based on the visual analysis of the graphs.

For improving Joel’s mood, the CA + CR, CA + CM, and choice intervention package conditions were potentially more effective. During these three conditions, his indices of happiness occurred at higher levels in relation to their previous baselines, and his indices of unhappiness occurred less often. For improving Joel’s on-task behaviour, the CA + CR, CM + CR, and choice intervention package conditions were potentially more effective. During these three conditions, his on-task behaviour had an increasing trend at comparably higher levels than in the previous baselines.

For improving Jack’s mood, the CA and choice intervention package conditions were potentially more effective. During these two conditions, his indices of happiness occurred at higher levels in relation to their previous baselines, and his indices of unhappiness occurred less often. For improving Jack’s on-task behaviour, the CA and choice intervention package conditions were potentially more effective. During these two conditions, his on-task behaviour occurred at comparably higher levels than in the previous baselines. Furthermore, his on-task behaviour had a gradually increasing trend during the choice intervention package.

Another purpose of the component analysis was to evaluate the necessity and sufficiency of each choice component in relation to the choice intervention package overall. However, frequent overlap and similarities among the various conditions made this analysis more difficult when relying on visual inspection alone. By evaluating the individual Tau-U
scores, the researcher had a quantitative way of determining the necessity and sufficiency of each choice component. The findings for the Tau-U analysis are described below.

For improving Joel’s indices of happiness, none of the choice components were sufficient. During their independent conditions, only the CA component was shown to have a small effect, while the CM and CR components had no effect at all. During an analysis of the choice combinations, it was determined that the CA + CR and CA + CM conditions had a moderate and large effect, respectively. Meanwhile, the CM + CR condition had no effect. Although the choice intervention package had a moderate effect on Joel’s indices of happiness, the CA + CM condition was found to be the most effective overall (Tau-U = 0.6). As the CA component was included in all the effective conditions, it could be considered a necessary choice component for improving Joel’s indices of happiness. This was supported by the finding that the CA component was the only choice component to have a small, but independent, effect.

For improving Jack’s indices of happiness, the CR and CM components were not sufficient, as they were not effective as independent conditions. On the other hand, the CA component was considered sufficient, as it was the most effective condition overall (Tau-U = 1.0). None of the choice combinations, or the choice intervention package, were found to be effective. Together, these findings propose that the CA component was sufficient for Jack’s indices of happiness, and necessary for Joel’s indices of happiness. Therefore, it is recommended that practitioners provide children with ASD with opportunities to select their tasks and/or order of tasks when appropriate. By providing children with ASD with opportunities to choose their activities across the day, their happiness and overall quality of life (QoL) may be improved. This assumption is supported by the findings of the open-ended social validity questionnaire. Several of the respondents believed that providing the children
with opportunities to choose their activity gave the children a sense of control, which in turn, improved their mood and motivation.

For reducing Joel’s indices of unhappiness, none of the choice components were considered sufficient, as they were not effective as individual conditions. During an analysis of the choice combinations, the CA + CR condition was found to have a moderate effect, while the CM + CR condition had a small effect. The CA + CM condition had no effect on Joel’s indices of unhappiness. This finding could suggest that the CR component had an additive effect when combined with the other choice components. Although the choice intervention package had a moderate effect on Joel’s indices of unhappiness, the CA + CR condition was found to be the most effective overall (Tau-U = 0.4). As the CR component was included in all the effective conditions, it could be considered a necessary choice component for reducing Joel’s indices of unhappiness.

For reducing Jack’s indices of unhappiness, none of the choice components were sufficient. During their independent conditions, only the CA component was shown to have a moderate effect, while the CM and CR components had no effect at all. During an analysis of the choice combinations, the CA + CM condition was found to have a moderate effect, while the CM + CR and CA + CR conditions had no effect. The choice intervention package was the most effective condition for reducing Jack’s indices of unhappiness (Tau-U = 0.4). As the CA component was included in both the CA + CM condition and choice intervention package, it could be considered a necessary choice component for reducing Jack’s indices of unhappiness. This is supported by the finding that the CA component was the only choice component to have a moderate, independent effect.
For improving Joel’s on-task behaviour, none of the choice components were sufficient. During their independent conditions, only the CM component was shown to have a small effect, while the CA and CR components had no effect at all. During an analysis of the choice combinations, it was determined that the CA + CR and CM + CR conditions had a small and large effect, respectively. On the other hand, the CA + CM condition had no effect. Based on this finding, it can be concluded that the CR component had an additive effect when combined with the other choice components. Although the choice intervention package had a moderate effect on Joel’s on-task behaviour, the CM + CR condition was found to be the most effective overall (Tau-U = 0.7). As the CR component was included in all the effective conditions, it could be considered a necessary choice component for improving Joel’s on-task behaviour. However, the CM component was included in both the CM + CR condition and the choice intervention package, so it could be considered another necessary choice component for Joel’s on-task behaviour. This is supported by the finding that the CM component was the only choice component to have a small, but independent, effect.

For improving Jack’s on-task behaviour, none of the choice components were sufficient. During their independent conditions, only the CA component was shown to have a moderate effect, while the CM and CR components had no effect at all. Furthermore, none of the choice combinations were found to be effective for this participant. The choice intervention package was the most effective condition for improving Jack’s on-task behaviour (Tau-U = 0.6).

With regard to overall omnibus effect sizes, the CA + CR condition had a moderate effect on Joel’s mood and on-task behaviour (Tau-U = 0.3), while the CA condition had a moderate effect on Jack’s mood and on-task behaviour (Tau-U = 0.6). The choice intervention package had a moderate effect on both Joel’s (Tau-U = 0.4) and Jack’s (Tau-U = 0.4) mood.
and on-task behaviour. None of the other independent choice components, or choice combinations, had an overall effect on the participants’ mood or on-task behaviour.

In summary, the lack of experimental control found within the component analysis limited the findings for this study. Based on visual analysis and the overall omnibus effect sizes, a tentative conclusion for these results is that the choice intervention package was the favourable condition for both participants. For both Joel and Jack, the choice intervention package resulted in slightly higher levels of indices of happiness and less frequent indices of unhappiness in comparison to the previous baseline. Furthermore, the choice intervention package resulted in a rapidly increasing trend for Joel’s on-task behaviour, and a gradually increasing trend for Jack’s on-task behaviour. This conclusion is substantiated by the overall omnibus effect sizes, which found the choice intervention package to be moderately effective for both participants. This finding replicates the results of Study 3, so it could be argued that the external validity of the choice intervention package was further demonstrated. In addition, the social validity of the choice intervention package was supported by the responses to the open-ended questionnaire. In general, the respondents believed that the delivery of different types of choice helped to improve the mood, independence, and task engagement of the participants.

6.4.1 Limitations

The most salient limitation was the lack of experimental control within the component analysis. This is likely contributable to the time constraints of the study. Due to a strict research schedule, the allotted time to complete the component analysis was limited, and only five sessions were included within each phase. Experimental control may have been further demonstrated if each condition had continued until stable responding had been achieved.
within each phase. Furthermore, if each phase had been conducted for longer, more information regarding the effects of each choice component may have been revealed.

Another limitation of this study was that it only included two participants. A small number of participants is common within single-subject research methodology, but it is typically recommended to have at least three participants (Horner et al., 2005). Due to the time constraints, it was impossible to include more than two participants and still conduct the complete component analysis in a timely manner. This study required a complex experimental design that included 70 sessions across 14 phases with each participant. To the author’s knowledge, this component analysis is one of the most extensive component analyses reported within the behaviour analytic literature to date, despite the limited number of participants.

Finally, as noted in earlier studies, this research was limited by the skill level of the tutors (Section 4.7.1). The researcher attempted to control for this barrier by coaching the tutors during sessions when it was necessary. No sessions during this study were terminated based on the incompetence of the tutors. As this was an exploratory study, treatment fidelity measures were not collected.

6.4.2 Future Research

As this was an exploratory study, a treatment protocol was not developed for the tutors conducting the sessions. Based on the responses to the social validity questionnaire, the teachers believed the tutors could benefit from having a protocol to follow so that the choice opportunities could be appropriately delivered throughout the school day. By creating a teaching protocol, the tutors will have guidelines for implementing choice within the classroom and more choice opportunities will be made available to children with ASD. Furthermore, by having a teaching protocol, the fidelity of the procedures can be measured in
the future. Chapter 7 will provide a teaching protocol for practitioners who work with students in the special needs classroom. This protocol will provide background information on choice and explain why choice is important for individuals with disabilities. Then, the protocol will outline what it means for a student to make a choice and how choice-making skills can be taught. The protocol will describe how mood indicators can be used as an outcome measure for choice-based interventions. Finally, the protocol will explain how choice opportunities can be incorporated throughout the day and practitioners can complete a Model for Choice Diversity Table (Brown, Belz, Corsi, & Wenig, 1993) to help structure their provision of choice opportunities.

6.4.3 Conclusion

The results for the current study provided further evidence of the choice intervention package’s efficacy for young children with ASD. As the choice intervention package was beneficial for both participants, it is recommended that all three types of choice are provided to children with ASD. Nevertheless, it may have been the additive nature of the choices, rather than the types of choice themselves, that had a positive effect on the participants. Therefore, by providing a number and variety of choices throughout the day, practitioners can ensure the happiness and self-determination of young children with ASD. This, in turn, may help to improve their overall QoL. These recommendations must be considered with caution due to the limited amount of experimental control found within the component analysis.
Chapter 7:

Improving the Self-Determination of Students with Disabilities through Choice: A Teaching Protocol
Teaching Protocol

7.1 Background

Self-determination is considered a fundamental human right and is defined as “acting as the primary causal agent in one’s life and making choices and decisions regarding one’s quality of life free from undue external influence or interference” (Wehmeyer, 1996, p. 24). By providing choice opportunities to individuals with disabilities, practitioners can improve their self-determination and overall quality of life (Shogren, Faggella-Luby, Bae, & Wehmeyer, 2004; Wehmeyer & Schwartz, 1998). Individuals with disabilities are often given limited opportunities to make real choices within their daily lives (Cullen, 1999). This can lead to learned helplessness and overdependence (Guess, Benson, & Siegel-Causey, 2008).

Research has shown that intervention outcomes can be improved through choice-making opportunities (Reutebuch, El Zein, & Roberts, 2015). Choice must be included across the day, in all facets of learning, before it becomes meaningful to students with disabilities (Brown, Belz, Corsi, & Wenig, 1993). Choice can easily be introduced into educational programming at little to no additional cost in terms of time and resources (Tiger, Toussaint, & Roath, 2010). By selecting preferred tasks, preferred materials, and/or preferred settings, students with disabilities are more motivated to participate in activities (Rispoli et al., 2013). Providing choice acts as a preventative, antecedent intervention that will save practitioners from time consuming, reactive strategies in the long run. Based on the findings outlined within the current body of research, this teaching protocol was developed to aid practitioners in implementing a choice-based intervention within the special education classroom.

7.2 Steps to Implementation

Before choice can be implemented in the classroom, the following steps should be taken by the practitioner: (a) students should be taught how to make a choice (if applicable);
(b) individualised mood indicators should be identified, and (c) the Model of Choice Diversity table should be completed. Once these steps have been completed, the choice intervention can begin. For this protocol, choice will be defined as:

- **Choice** – *an individual selecting a preferred alternative from among familiar options. Choice may be represented by moving towards an item, picking up an item, touching an item, looking at an item, facial expressions, and/or verbally asking for an item.*

### 7.2.1 Step One: Teach Choice-Making Skills

Not all students with disabilities will know how to make a choice or possess good choice-making skills. If a student is unable to make a choice appropriately, the choice intervention will be unsuccessful. The following procedures should be used to teach choice-making skills (Stafford, 2005):

1. Identify an array of items that the student likes and dislikes. Items can be identified through observation, interviewing staff members, or interviewing caregivers. Ensure that you have a sufficient number of items to be classified as preferred, neutral, and disliked.

2. Allow your student to sample all items. Note their idiosyncratic responses to accepting or rejecting items.

3. Present each item to the student 10 times. If the student accepts the item, allow him/her to do so and mark an acceptance. If the student does not accept the item within 5 seconds, provide physical assistance so that the student may sample the item. If the student still rejects the item after physical assistance, mark a rejection.
4. Classify the items as *preferred* (accepted at least 80% of presentations), *neutral* (accepted 40-60% of presentations), or *disliked* (accepted 0-20% of presentations). Omit all items that do not fall in these categories.

4. Teach choice by presenting the student with the following sequence of pairings: (a) preferred-disliked, (b) preferred-neutral, and (c) preferred-preferred.

- Select 10 pairs of items, with each pair consisting of a preferred item and disliked item. Be sure to include a variety of items.
- With each trial, present the following verbal cue – “(Student), I have (first item) and (second item). Do you want the (first item) or (second item)?” and allow the student to make a choice. Be sure to vary the order in which you present the items (i.e., preferred/disliked, disliked/preferred).
- Select a prompt strategy appropriate for the student. If the student does not make a choice within 5 seconds after the verbal cue, use this prompt to initiate the choice. A prompted selection does not count towards criterion.
- Continue this process until an established criterion is met (i.e., 80% for three consecutive sessions) before moving on to the next pairing (i.e., preferred-neutral). Continue until all three pairings have met criterion.

### 7.2.2 Step Two: Identify Mood Indicators

Choice helps to increase the self-determination and overall quality of life of students with disabilities. Therefore, a quality of life indicator such as mood should be included as an outcome measure. Indices of happiness and unhappiness are defined as any overt behaviours a student engages in when he/she is deemed to be happy or unhappy. Examples include smiling, laughing, crying, or frowning. The following steps can be used to identify these behaviours:
1. Interview all caregivers and staff members who are familiar with the student. Ask these individuals to identify any behaviours the student will engage in when he/she is feeling happy and when he/she is feeling unhappy. If at least two individuals agree on a behaviour, write that behaviour down as either a happy or unhappy indicator.

2. Ask the interviewees to identify a type of situation likely to evoke the happy and unhappy indicators, respectively. Any identified situations that are agreed upon by at least two interviewees can be temporarily contrived. The practitioner should observe the student during these contrived situations to confirm the presence or absence of the identified mood indicators.

3. If the mood indicators are present during these situations, the practitioner must then operationally define these behaviours. If the mood indicators are not present, the practitioner can informally observe the student throughout the day to identify any other potential situations likely to evoke these behaviours and then repeat Step 2.

Once these indices of happiness and unhappiness have been operationally defined, a measurement system should be selected by the practitioner. Depending on the resources available within the classroom, some measurement systems will be preferable to others. Types of measurement systems include:

1. *Frequency recording* – count the number of times the student engages in indices of happiness and/or unhappiness during a specific amount of time

2. *Duration recording* – record the duration of time the student engages in indices of happiness and/or unhappiness during a specific amount of time
3. **Partial interval recording** – record whether indices of happiness and/or unhappiness are present or absent during predetermined intervals.

4. **Momentary time sampling** – record whether indices of happiness and/or unhappiness are present or absent at the end of a predetermined interval.

4. **Mood Scale** – complete a Likert-type scale based on the indices of happiness and unhappiness you observed during a specific time of day. This scale is less time consuming than the methods described above, but it is more subjective and less accurate (Figure 7.1). This mood scale was taken from the General Child Affect Rating Scale (GCARS) developed by Dunlap and Koegel (1980). It will need to be adapted to reflect the specific behaviours of the student.

*Figure 7.1. Mood scale (Dunlap & Koegel, 1980).*

**Mood Scale**

Directions: At the end of your activity, please rate the mood of the student by circling a score of 0-5. Please use the descriptions below to help make your decision.

<table>
<thead>
<tr>
<th>Unhappy (0-1)</th>
<th>Neutral (2-3)</th>
<th>Happy (4-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cries, frowns, screams, tantrums, aggression (Score of 0-1, depending on extent of unhappiness)</td>
<td>Does not appear to be decidedly happy or unhappy. May smile or frown occasionally but overall, seems rather neutral. (Score of 2-3, depending on extent of happiness)</td>
<td>Smiles, laughs, claps, shows affection (Score of 4-5, depending on extent of happiness)</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>
7.2.3 Step Three: Complete the Model of Choice Diversity Table

For choice to be meaningful to students with disabilities, choice must be provided at every opportunity throughout the day, within and across activities. A student’s self-determination improves as more choice opportunities are provided to the student, so the practitioner should aim to provide as many opportunities for choice as possible. There are seven basic types of choice identified within the Model of Choice Diversity (Brown et al., 1993). These choices can easily be provided to all students, regardless of disability. The categories of choice are as follows:

1. *Within activities* – choice of materials to use within an activity (e.g., crisps or popcorn during snack time)
2. *Between activities* – opportunities to choose among different activities (e.g., read a book or eat snack)
3. *Refusal* – choice to refuse participation in an activity (e.g., refusing a snack)
4. *Who* – choice of person(s) to be included/excluded in an activity (e.g., eating your snack with Joe or Sally)
5. *Where* – choice of location of an activity (e.g., eat snack in kitchen or in living room)
6. *When* – at what time the activity should occur (e.g., eat snack now or later)
7. *Terminate* – choice to end a particular activity (e.g., finishing your snack after only two handfuls)

For each student, the Model of Choice Diversity table (Figure 7.2) should be completed. In the first column, all activities throughout the day should be noted. Next to each activity, the types of choice that can be provided within the activity should be listed. Not all
choice types will be available for each activity, especially within a classroom where certain activities must occur at certain times of the day. However, the best approach is to assume that all choices are available within each activity, and a clear justification should be provided for any choice that is limited (Brown et al., 1993).

*Figure 7.2. Model of Choice Diversity table (Brown et al., 1993).*

<table>
<thead>
<tr>
<th>Instructor:</th>
<th>Learner:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date of Review:</th>
<th>Setting:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Instructions:** Indicate the form(s) of choice that could occur in each box. Leave box blank if choice is not relevant.

**CHOICE DIVERSITY**

<table>
<thead>
<tr>
<th>ROUTINE</th>
<th>W/IN</th>
<th>BETW</th>
<th>REF</th>
<th>WHO</th>
<th>WHR</th>
<th>WHN</th>
<th>TRM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:**
7.2.4 Step Four: Implement the Choice Intervention

Once the previous three steps have been completed, the choice intervention can be implemented. The practitioner should use the Model of Choice Diversity table to guide choice opportunities throughout the school day. The practitioner should collect data on the students’ indices of happiness and unhappiness during the activities where choice is provided. If the students are responding well to the choice intervention, it should not be discontinued. This intervention is best under circumstances where choice opportunities can continuously be provided. Please refer to Figure 7.3 for a flowchart outlining the steps of the choice intervention. To check that the procedures are implemented with fidelity, this flowchart may also be used as a fidelity checklist (Figure 7.3).
Figure 7.3. Flowchart/fidelity checklist.

Flowchart for Choice Intervention/Fidelity Checklist

Can the student independently make a choice?

YES

NO

Identify Mood Indicators:
1. Interview caregivers and staff.
   Ask about:
   o Happy behaviours
   o Unhappy behaviours
   o Happy situations
   o Unhappy situations
2. Identify happy/unhappy mood indicators agreed upon by at least two respondents.
3. Identify happy/unhappy situations agreed upon by at least two respondents.
4. Contrive the happy and unhappy situations, respectively. Confirm the presence/absence of mood indicators identified in #2.
5. If mood indicators are present in their respective situations, operationally define these behaviours.
   o If not, informally observe participant to identify other likely situations and repeat Step #4.
6. Select a measurement system appropriate for the mood indicators (e.g., frequency, duration, interval recording, time sampling, mood scale).

Teach Choice-Making:
1. Identify an array of items the student likes/dislikes.
2. Allow the student to sample all items.
3. Present each item 10 times. Mark each item as either:
   o Preferred (accepted at least 80% of trials)
   o Neutral (accepted 40-60% of trials)
   o Disliked (accepted 0-20% of trials)
   o Omit all others
4. Teach choice using the following order of pairings:
   o Preferred – Disliked
   o Preferred – Neutral
   o Preferred – Preferred
5. Use a set criterion before moving on to next pairing. Continue until all pairings have met criterion.
Complete Model of Choice Diversity Table

During each planned activity for the day, identify the types of choice that may be offered:

- Within-activity
- Between-activity
- Refusal
- Who
- Where
- When
- Terminate

Implement Choice Intervention

- Refer to Model of Choice Diversity Table as a guide.
- Measure mood indicators as outcomes to intervention.
Chapter 8:

General Discussion
8.1 Overview of Research Aims

Autism spectrum disorder (ASD) is a lifelong neurodevelopmental disorder that is characterised by deficits in social communication and interaction, as well as restricted and repetitive behaviours (American Psychiatric Association [APA], 2013). Individuals with ASD are thought to experience a lower quality of life (QoL) than the general population across the lifespan (van Heijst & Geurts, 2015). However, there is a limited amount of research that has focused on the QoL of individuals with ASD due to difficulties in its measurement. QoL is typically assessed through QoL instruments that collect both subjective and objective measures, using either self- or proxy-reports (Verdugo, Schalock, Keith, & Stancliffe, 2005). Although generic QoL instruments have previously been used with individuals with ASD, the diagnostic characteristics inherent to this condition can create issues for these individuals when completing these assessments. Therefore, the validity of generic QoL instruments for individuals with ASD can be compromised. More recently, a condition-specific QoL measure was developed for adults with ASD (ASQoL; McConachie et al., 2018), but this add-on “module” was first published in May 2018 and the validity of this assessment will need to be explored further across additional samples.

QoL is a multidimensional construct that includes the following eight domains: emotional well-being, physical well-being, material well-being, social inclusion, interpersonal relationships, self-determination, rights, and personal development (Schalock & Verdugo, 2002). Not only is emotional well-being (i.e., happiness) considered one of the core domains, but most practitioners would agree that individual happiness is the most important aspect of QoL (Carr, 2007). Consequently, the evaluation of happiness as a determinant of QoL has become more common in the literature and various corresponding measures have been developed (Wallander & Koot, 2016). Similar to generic QoL instruments, the emotional well-
being of an individual is typically assessed through self- or proxy-reports, but there are two issues that can arise when applying these types of measures with individuals with ASD. First, emotional well-being scales that rely on self-report will often necessitate individuals with ASD to have more advanced language skills (Felce & Perry, 1995). Second, the use of proxy-reports can lead to inaccuracies, as parents will typically report lower QoL scores than what the individuals with ASD would report themselves (Egilson, Ólafsdóttir, Leósdóttir, & Saemundsen, 2017). Proxy-reports are also considered more subjective and less meaningful than objective measures (Brown, 2017). With the growing emphasis on QoL and emotional well-being in the field of disability services, the need for an objective measure of happiness has become more apparent. In fact, the use of objective measures of happiness can be crucial when evaluating the QoL of individuals with limited communication, such as individuals with ASD (Dillon & Carr, 2007).

In behavioural terms, happiness is considered a private event that cannot be directly observed (Green & Reid, 1996). Although direct measures of happiness are not readily measurable, there are overt behaviours theorised to be associated with happiness that can be observed instead. These public indicators of mood are sometimes called indices of happiness (or unhappiness), and research has shown that they can be operationally defined and systematically manipulated through environmental events (Dillon & Carr, 2007; Green & Reid, 1996; Parsons, Reid, Bentley, Inman, & Lattimore, 2012a). Individuals with disabilities are thought to engage in similar indices of happiness and unhappiness as those without disabilities (Reid & Green, 2006). Yet, individuals with ASD have a tendency to demonstrate idiosyncratic behaviours that differ from their neurotypical peers (Donnellan, Hill, & Leary, 2013). Therefore, it is imperative that these overt mood indicators are individualised for these individuals (Dillon & Carr, 2007). By objectively measuring the individualised indices of
happiness and unhappiness of an individual with ASD, the efficacy of an intervention
designed to improve their QoL can be assessed (Parsons et al., 2012a).

One type of intervention that is thought to improve the QoL of individuals with ASD is
the provision of choice. When individuals with ASD are given choice-making opportunities,
they act as causal agents within their lives, which in turn, enhances their self-determination
and overall QoL (Wehmeyer & Schalock, 2001). Self-determination is considered one of the
eight core domains of QoL, and individuals who demonstrate self-determination skills are
thought to have a better QoL than those who lack these skills (Lachapelle et al., 2005;
Wehmeyer & Schwartz, 1998). Self-determination is defined as “acting as the primary causal
agent in one’s life and making choices and decisions regarding one’s quality of life free from
undue external influence or interference” (Wehmeyer, 1996, p. 24). Self-determination skills
are necessary for both the academic success and adult outcomes of individuals with
disabilities. Despite this, individuals with disabilities often lack opportunities for self-
determination within their daily lives (Brotherson, Cook, Cunconan-Lahr, & Wehmeyer,
1995). By embedding choice into the learning environment, practitioners can promote the self-
determination of individuals with disabilities (Heller et al., 2011; Wehmeyer, 1996). Previous
research has demonstrated that providing choice to individuals with ASD is an effective
treatment, as choice-making opportunities have been linked to improved intervention
outcomes for this population, regardless of the type of choice offered (Reutebuch, El Zein, &
Roberts, 2015).

This research was founded on the theory that choice, self-determination, happiness,
and QoL are all interrelated concepts. The main purpose of this thesis was to objectively
measure the emotional well-being (i.e., happiness) of young children with ASD as the result of
a self-determination-based intervention. More specifically, this research embedded choice-
making opportunities within an established evidence-based intervention (i.e., discrete trial training [DTT]) to determine how the provision of choice would affect the mood and task engagement of young children with ASD. It was hypothesised that the additional choice-making opportunities would improve the self-determination and happiness of these young children, which in turn, would benefit their overall QoL.

Prior to implementing the choice-based intervention, a systematic review was conducted to summarise the current state of literature including mood as a dependent variable within behavioural interventions designed for individuals with ASD. Next, this research examined whether individualised indices of happiness and unhappiness could be operationally defined and reliably measured in young children with ASD. Following this experimentation, the differential effects of choice versus preference were evaluated to determine how these two conditions would influence the mood and on-task behaviour of young children with ASD. Next, a choice intervention package, which included both within- and across-activity choices, was implemented and the impact of this intervention on the mood and on-task behaviour of young children with ASD was examined. Finally, a component analysis of this choice intervention package was conducted to determine which choice components were most effective. Together, these findings were assembled to create a teaching protocol for practitioners who work with students with special needs. This protocol provided recommendations for the implementation of choice-based interventions within the classroom.

8.2 Summary of Findings

In Chapter 2, a systematic review summarised the current state of literature involving mood as a dependent variable in interventions designed for individuals with ASD. The findings of this review suggest that objective indicators of mood can be reliably measured in
individuals with ASD, and that behavioural interventions can be implemented with these individuals to systematically increase or decrease these mood indicators. This review highlighted several limitations within the current research, such as: (a) the lack of methodological rigour; (b) the use of mood as an ancillary measure rather than as a primary dependent variable; (c) the overuse of Likert-type scales and mentalistic language within included studies, and (d) the lack of individualised operational definitions for the overt mood indicators. The findings of this systematic literature review were utilised to help guide the methodologies of studies to follow.

Chapter 3 established that there is a systematic process that can be used to identify and define individualised indices of happiness and unhappiness in young children with ASD. Using more rigorous experimental procedures, this study demonstrated that these overt mood indicators can be systematically increased or decreased through environmental arrangements. This study also confirmed that individualised, overt indicators of mood can be reliably measured in young children with ASD. However, the results of the modified self-report (i.e., mood scale) did not corroborate the findings of this study, as the participants rarely responded to the mood scale. This finding proposed that emotional self-awareness needs to be taught to children with ASD at a young age. In conclusion, this study suggested that individualised indices of happiness and unhappiness can be reliably measured as QoL indicators during intervention.

Chapter 4 evaluated the differential effects of a choice-based teaching condition and a preference-based teaching condition on the indices of happiness, indices of unhappiness, and on-task behaviour of young children with ASD. During the choice condition, the participants were given a choice between three low-preferred items as a consequence during DTT. On the other hand, the participants were given a teacher-delivered, highly-preferred item as a
consequence during the preference condition. The findings for indices of happiness and unhappiness were mixed, as the choice condition improved the mood of some participants, while the preference condition improved the mood of others. The mixed findings for participant mood were corroborated by the individual outcomes of the General Child Affect Rating Scale (GCARS). For on-task behaviour, the preference condition was superior for most of the participants. One explanation for this finding was that access to highly-preferred stimuli was more important than choice when it related to task engagement. In summary, this study suggests that providing choice as a reinforcer is equally effective, but not more effective, than assigning a preferred alternative. Although choice did not provide any additional benefits over preference, it was still considered more favourable from an ontogenic perspective, as choice-making opportunities help to prevent reinforcer satiation. This, in turn, improves the efficacy of DTT procedures. The provision of choice, no matter how basic, is thought to improve the self-determination of young children with ASD.

During Chapter 5, the researcher evaluated the effects of a choice-based intervention, which included both within- and across-activity choices, on the indices of happiness, indices of unhappiness, and on-task behaviour of young children with ASD. During baseline, a choice of reinforcer was the only choice opportunity presented to the participants. During intervention, the participants were given three different types of choice – choice of reinforcer, choice of activity, and choice of materials. The results for indices of happiness and unhappiness were favourable, as the choice intervention package seemed to improve the mood of all three participants. Meanwhile, the choice intervention package only improved the on-task behaviour of two participants. The lack of convincing evidence for on-task behaviour suggests that choice-based interventions do not affect task engagement to the same degree as other target behaviours. Although the choice intervention package did not provide convincing
General Discussion

evidence for on-task behaviour, the intervention was considered socially significant because it helped to enhance the self-determination and QoL of these children. This conclusion was supported by the findings of the treatment acceptability questionnaire completed by the lead teachers and tutors. More specifically, the respondents were in favour of the choice intervention package and believed the provision of choice improved the on-task behaviour and happiness of the participants. In conclusion, this study demonstrated that choice can easily be embedded within DTT procedures to help promote the self-determination and happiness of young children with ASD.

Chapter 6 implemented a complete component analysis to determine which of the three types of choice included within the choice intervention package were the most influential on the mood and on-task behaviour of two young children with ASD. During the component analysis, the effects of each type of choice, and all choice combinations, were independently evaluated, and the sufficiency and necessity of each type of choice was determined. Based on Tau-U scores, the choice of activity [CA] component was considered necessary and sufficient for both Joel and Jack, respectively, but it was the combination of all three types of choice (i.e., choice intervention package) that was found to be moderately effective for both participants. However, the general lack of experimental control and the conflicting observations found within the visual analysis provided little support to these findings. The tentative conclusion for this study was that the choice intervention package was a more effective condition for the participants because of the additive nature of the choices. This conclusion is supported by the findings of Study 3 (Chapter 5) and the findings of the open-ended social validity questionnaire completed by the lead teachers and tutors. The respondents believed the choice intervention package was effective at improving the children’s overall mood and motivation. In summary, it was recommended that practitioners provide a variety of
choices across the day to better improve the self-determination, happiness, and overall QoL of children with ASD.

Chapter 7 provided practitioners with a teaching protocol that outlined the procedures for incorporating choice within the special needs classroom. The protocol described choice and how to teach choice-making skills to students with disabilities. The protocol also explained how to use overt indicators of mood as an outcome measure during choice-based interventions. Finally, the protocol presented the Model for Choice Diversity Table (Brown, Belz, Corsi, & Wenig, 1993), which can be completed by practitioners to help guide them in planning for choice-making opportunities across the school day. This chapter also included a flowchart that can be used by practitioners as a teaching tool or fidelity checklist.

8.3 Theoretical Implications

As the result of this research, a few theoretical implications can be made regarding the use of choice to improve the self-determination, happiness, and overall QoL of young children with ASD.

8.3.1 Use of Mood as an Intervention Outcome

One of the most significant findings of this research was that individualised overt indicators of mood can be systematically identified and reliably measured in young children with ASD. The findings of the systematic literature review suggest that overt indicators of mood can be reliably observed in individuals with ASD, but only eight of the 29 included studies utilised more rigorous direct measurement procedures such as frequency or interval recording (Arbogast & Fryling, 2015; Geiger et al., 2012; Lattimore, Parsons, & Reid, 2009; Parsons et al., 2012a; Spector & Charlop, 2017; Stasolla, Perilli, & Damiani, 2014a; Stasolla et al., 2014b; Vernon, Koegel, Dauterman, & Stolen, 2012). Of these eight studies, only two
studies evaluated the mood of preschool-aged children with ASD (Geiger et al., 2012; Vernon et al., 2012). However, neither of these studies included individualised definitions of mood. Based on this finding, it can be concluded that individualised indices of happiness and unhappiness had not yet been investigated in preschool-aged children with ASD prior to this research.

The need for a direct measure of mood for individuals with ASD has become more essential as QoL has developed as a key objective in disability services. Happiness is considered one of the most important aspects of QoL, and the degree to which an individual experiences happiness is directly related to their overall QoL (Felce & Perry, 1995). With the growing emphasis on improving the happiness of individuals with disabilities, there is a question as to how to measure this construct efficiently (Pietro, Silvia, & Giuseppe, 2014). Generic QoL instruments and emotional well-being scales have previously been used to evaluate the happiness and overall QoL of other populations, but the diagnostic characteristics intrinsic to ASD can create issues when applying these assessments (Tavernor, Barron, Rodgers, & McConachie, 2013). Furthermore, the measures employed by QoL instruments can be considered more subjective than more direct measures (Brown, 2017; Ikeda, Hinckson, & Krägeloh, 2014).

By observing overt indicators of mood, such as indices of happiness and unhappiness, practitioners have a more objective approach to assessing the QoL of individuals with ASD. The use of this technology is crucial when evaluating the QoL of individuals who might have difficulties in expressing emotions in conventional ways, such as children with ASD (Dillon & Carr, 2007). Behaviour analysts and related practitioners often rely on challenging behaviour as an indicator of a child’s mood, but this can result in incorrect assumptions regarding the happiness and overall QoL of a child with ASD. For instance, it is possible for a child with
ASD to feel unhappy but not engage in any noticeable challenging behaviour (e.g., aggression, tantrums, self-injurious behaviour). On the other hand, a child may demonstrate some forms of challenging behaviour (e.g., stereotypy) when they are feeling happy. Until individualised indices of happiness and unhappiness are operationally defined and directly measured in children with ASD, any conclusions regarding the overall happiness of these children must be made with caution. The current research supported the use of objective measures of mood to assess the happiness of young children with ASD. In theory, these measurements can be applied when evaluating the overall QoL of these children.

As QoL indicators, practitioners can use indices of happiness and unhappiness to help judge the efficacy of interventions intended to improve the QoL of children with ASD. For example, if an intervention increases the indices of happiness of a child with ASD, it could be considered more socially acceptable (Toole, Bowman, Thomason, Hagopian, & Rush, 2003) and the practitioner may want to continue that intervention in the future. Meanwhile, if an intervention results in increases in indices of unhappiness, it could be modified or eliminated from the behaviour intervention plan (Lattimore et al., 2009). By evaluating overt indicators of mood as an outcome measure during treatment, practitioners can make changes to procedures on an ad hoc basis. The use of this technology can be considered one of the few methods available to objectively validate the programming for children with ASD (Ivancic, Barrett, Simonow, & Kimberly, 1997).

**8.3.2 Applying Choice-Based Interventions in the Classroom**

Even though individuals with disabilities are capable of making a choice response, these individuals are often given limited opportunities to make meaningful choices within their daily lives (Brotherson et al., 1995; Cullen, 1999). Yet, research has shown that choice-
making opportunities can improve the intervention outcomes of these individuals (Cannella, O’Reilly, & Lancioni, 2005; Lancioni, O’Reilly, & Emerson, 1996; Reutebuch et al., 2015; Tullis et al., 2011). For children with ASD, choice usually comes in the form of a preference assessment, in which the children select highly-preferred items to be used as reinforcers during DTT procedures. Beyond this preference assessment, no other types of choice are typically provided to children with ASD during teaching procedures (Elliott & Dillenburger, 2016). Practitioners will sometimes provide children with ASD with a choice of reinforcer during DTT, but children are often limited to one or two different items (Mechling, Gast, & Cronin, 2006). Providing children with a choice of reinforcer has its therapeutic benefits, but it does not offer much in terms of choice diversity.

For choice to be meaningful to children with ASD, choice opportunities should be presented within all aspects of the learning environment and across the school day (Shevin & Klein, 2004). The current research demonstrated the benefits of providing a variety of choice opportunities to children with ASD. This research corroborates previous studies that have established choice as an effective intervention for individuals with ASD (see Section 1.4.1 for an overview of this research). However, the findings of this research added to the literature in two different and important ways. First, the tentative findings for Studies 3 and 4 suggest that as more choice opportunities are provided to children with ASD, the better the observed intervention outcomes. Previous studies that have focused on choice for individuals with ASD have typically included only one or two different types of choice, but the current research included three choice opportunities within the choice intervention package. The additive nature of the three types of choice was proven to be more effective than the implementation of a single choice alone. The current research also added to the literature by demonstrating that choice-based interventions can improve the happiness of young children with ASD. Prior to
this research, only one other study had evaluated participant mood as an outcome during a choice-based intervention (Moes, 1998). However, this earlier study employed a less-rigorous Likert-type scale to measure the mood of the participants, and the participants were older children with ASD (Moes, 1998).

Brown and colleagues (1993) recommend that a range of choices should be provided to children with ASD throughout the day, within and across all activities within the learning environment. In fact, the researchers outlined seven different types of choice that can be addressed using the Model of Choice Diversity (Brown et al., 1993). Along with this recommendation, practitioners should take into consideration the findings of this body of research when scheduling the daily activities of children with ASD. Choice can easily be embedded into the programming of children with ASD without compromising any classroom activities or the fidelity of these procedures (Dibley & Lim, 1999; Elliott & Dillenburger, 2016). Choice is a simple intervention that does not require much time or resources (Tiger, Toussaint, & Roath, 2010). Furthermore, choice is considered a socially valid intervention, based on the results of the two measures presented in the current research. The practitioners reported the choice intervention package to be a socially acceptable and effective for improving the happiness and self-determination of young children with ASD.

8.3.3 Improving the Self-Determination and QoL of Young Children with ASD

Individuals with ASD are thought to experience a lower QoL than the general population across the lifespan (van Heijst & Geurts, 2015). This would suggest that individuals with ASD also lack self-determination skills, but there remains a lack of research in this area (Chou, Wehmeyer, Palmer, & Lee, 2017a). With themes such as self-determination and QoL becoming more common within disability services, more studies have been dedicated
to this area. However, the focus of this research to date has typically been on adolescents and adults with disabilities and not young children. Self-determination begins to develop at a young age; therefore, self-determination skills need to be taught in the early education classroom (Heller et al., 2011; Malian & Nevin, 2002). Surprisingly, only one study prior to the current research has focused on teaching self-determination skills to children with disabilities under five years old (Algozzine, Browder, Karvonen, Test, & Wood, 2001).

The most notable finding of this research was that the implementation of a choice-based intervention can help to increase the self-determination and happiness of young children with ASD. This demonstrates that self-determination skills can be encouraged among this younger population. Teaching self-determination to children with ASD requires a bidirectional approach. Not only must these children be taught self-determination skills, they must also have opportunities to practice these skills in real-world situations (Chou et al., 2017a; Wood, Fowler, Uphold, & Test, 2005). Through choice-based interventions, practitioners can facilitate age-appropriate opportunities for young children with ASD to practice and refine their self-determination skills (Abery & Zajac, 1996; Jones et al., 2018). The self-determination of a child with ASD continues to improve as the result of more choices being made available to him/her. This body of research corroborates this theory, as it was demonstrated that more choice opportunities increased the self-determination and happiness of young children with ASD. As a result, the QoL of these children will theoretically be improved.

8.4 Limitations of Research

In spite of the positive findings and theoretical implications outlined above, the current research had a number of notable limitations that must be addressed when interpreting its
findings. Some of these limitations are common within single-subject research methodology (e.g., limited participants, applied setting), while other limitations were unique to this research alone. The implications of these limitations are discussed in the following sections.

**8.4.1 Number of Participants**

Each of the studies included within this body of research had a limited number of participants. Although a small number of participants is a common characteristic of single-subject experimental designs (SSEDs), this feature can limit the external validity of the findings, and any conclusions regarding the generalisation of the results to larger sample sizes cannot be made with certainty. Nevertheless, the external validity of this research was improved by the direct replication of the procedures across several participants, and the number of participants included in Study 1 \((n = 9)\) and Study 2 \((n = 8)\) was greater than what is typically reported in related behaviour analytic literature. For instance, in a review of the effects of choice on the academic outcomes of students with ASD, the average number of participants across all studies was \(M = 3.3\) (Reutebuch et al., 2015).

With that said, the limited number of participants included within this body of research could be considered advantageous, as it permitted the use of SSEDs. SSEDs allow for intrasubject replication, which arguably provides a more convincing demonstration of functional relations (Cooper, Heron, & Heward, 2007). Furthermore, SSEDs allow for the individualisation of behavioural interventions. This is ideal within the educational setting, where the unit of concern is each individual student (Horner et al., 2005). Through the SSEDs employed within the studies, the researcher was better equipped to evaluate the outcomes of choice on an individual basis.

**8.4.2 Applied Setting**
Another limitation of this research was the applied nature of the procedures. All sessions were conducted in the natural environment, either inside an early education classroom or a common area located within the special needs preschool. As can be expected from an early education classroom, there were distractions from other students that could not be avoided. Physical interruptions by other children and tutors were kept to a minimum, but auditory and visual distractions may have impacted the findings. During Studies 2-4, the researcher attempted to control for any distractions by seating the participants at their work desk, facing away from the other students. The researcher also removed any unnecessary visual stimuli that could have been distracting to the participants.

The inability to control for other events inside the classroom is a common barrier found within SSEDs. Despite this, an applied setting was used across the four studies, so all participants and conditions were equally affected. Furthermore, it could be argued that the applied nature of the procedures helped with the generalisation of the findings to the classroom. As the results of this research were achieved in a natural setting, rather than an experimental setting, the implications of these findings have more relevance to practitioners working in the special needs classroom. Theoretically, a practitioner could apply these same procedures within a similar, but different, classroom and achieve comparable results.

8.4.3 Skill Level of the Tutors

As discussed in Section 4.7.1, the researcher could not control for which tutors were available during Studies 2-4, as the tutors were rotated on a daily basis throughout each study. This arrangement was already part of the classroom structure and it could not be discontinued due to the needs of other students. As a result, there was inconsistency between the tutors, as some tutors may have been better skilled at implementing the DTT procedures than others.
The researcher attempted to control for this limitation, and improve procedural fidelity, by coaching the tutors whenever it was needed. Despite this limitation, the researcher rarely had to intervene during the sessions and none of the sessions had to be terminated due to poor implementation of the procedures. However, any conclusions regarding the fidelity of the procedures must be made with caution as fidelity measures were not collected in any of the studies. As this body of research was exploratory in nature, measures of procedural fidelity were not collected.

**8.4.4 Length of Intervention**

Studies 3 and 4 were limited by time constraints within the research schedule which prevented the researcher from implementing the experimental conditions for longer periods of time. This resulted in a lack of tight experimental control within both studies. During Study 3 (Chapter 5), there was a gradually increasing trend in indices of happiness across all three participants with the implementation of the choice intervention package, but the study had to be terminated after each participant had reached their 20\(^{th}\) session. There is the possibility that the mood of each participant would have continued to improve had the intervention been continued for longer.

During Study 4 (Chapter 6), the researcher had to limit the length of each phase due to the complex and extensive nature of the complete component analysis. This component analysis required 14 different phases to be implemented with each participant within the allotted time frame. Due to a strict research schedule, the researcher limited each phase to five sessions. If each experimental phase had been continued until stable responding had been achieved, the experimental control for this study may have been further demonstrated.
longer experimental phases, more information regarding the effects of each choice component could have been revealed.

Regardless of these time constraints, all studies included within this body of research met the evidence standards proposed by the What Works Clearinghouse (WWC). That is, all conditions within each study included at least five data points for each participant (Kratochwill et al., 2010). In addition, it could be argued that the limited duration of each experimental phase controlled for maturation effects (Gast, 2014).

8.4.5 Risk of Bias

There was a risk of observer bias across all the studies included within this body of research. More specifically, the data for each study was coded by the researcher using in-vitro observation and blind observers were not obtained. Funding was necessary to recruit additional observers for this research because the coding process was a time-consuming endeavour (i.e., >170 hours). The lack of additional funding for this project meant that the use of blind observers was an impossibility.

The researcher attempted to control for observer bias in two ways. First, tightly prescribed procedures were utilized in Study 1 to systematically identify and operationally define the indices of happiness and unhappiness for each participant. Furthermore, clear operational definitions were used for all the dependent variables. Second, the researcher trained the secondary observers before inter-rater reliability was calculated, and interobserver agreement was found to be acceptable across all studies (i.e., >80%; Cooper et al., 2007). In addition to this, the Kappa values for each study suggested substantial to almost perfect agreement (i.e., 0.61-1.00; Landis & Koch, 1977).

8.4.6 Results for On-Task Behaviour
During Study 3 (Chapter 5), there was a lack of convincing data that the choice intervention package affected the participants’ on-task behaviour. Although the on-task behaviour of two participants increased during the intervention, this finding was not seen in Joel. Furthermore, there was considerable data overlap between baseline and intervention across all three participants. Based on individual Tau-U scores, the choice intervention package only had a small effect on two participants’ on-task behaviour, while it had no effect on the third. Study 4 (Chapter 6) provided more convincing evidence that the choice intervention package was beneficial for the participants’ on-task behaviour. During this study, the choice intervention package had a moderate effect on Joel and Jack’s on-task behaviour. A visual analysis of the data supported this finding, as there was a higher level of responding and an increasing trend in both participants’ data within the choice intervention package condition.

The lack of convincing evidence for Study 3 may be explained by several theories. One theory is that choice-based interventions may have less of an effect on non-aggressive (e.g., off-task) behaviours than aggressive behaviours (Shogren, Faggella-Luby, Bae, & Wehmeyer, 2004). That is to say, choice-based interventions do not affect on-task behaviour to the same degree as other dependent variables. Another theory is that children with ASD who demonstrate escape-maintained challenging behaviour are more likely to benefit from choice-based interventions (Berotti, 1996; Romaniuk et al., 2002), but the participants in the current research had challenging behaviour maintained by access to attention or tangibles. Furthermore, it is possible that the choice-based intervention resulted in more demands being placed on the participants, which may have inadvertently resulted in some challenging behaviour, and in turn, more off-task behaviour. Finally, the novelty of the within- and across-activity choice opportunities presented to the participants may have resulted in some latency to respond. This too would have decreased the overall time spent on-task.
One interesting finding for on-task behaviour was that the data often showed that the participants would be less engaged when demonstrating more indices of happiness. It is theorised that being off-task was more enjoyable and rewarding for the participants (a likely escape function), and this resulted in more frequent indices of happiness. This could suggest that there is a possible negative correlation between indices of happiness and on-task behaviour, but more research is necessary to determine if this is the case. Despite the lack of convincing evidence for on-task behaviour, these results should still be considered meaningful. Effect sizes must be interpreted in relation to client needs, the behaviour targeted for change, and the context for which that change is expected (Vannest & Ninci, 2015). For a dependent variable such as on-task behaviour or expressive language, even small improvements could be considered a significant outcome.

8.4.7 Lack of Additional Assessment

This body of research was limited by the lack of additional assessment. More specifically, the Social Communication Questionnaire (SCQ) and the Indices of Happiness and Unhappiness Questionnaire were only completed in Study 1, and the participants were not reassessed in later studies. Study 3 began nine months after the end of Study 2, and the participants likely acquired more skills during this time. It is unknown whether or not their SCQ Total Scores improved as a result of this maturation. Likewise, it is possible that the participants developed new indices of happiness or unhappiness during these nine months. Without a follow-up to the Indices of Happiness and Unhappiness Questionnaire, this is unknown. There may have been some unidentified mood indicators demonstrated by the participants in later studies.

This research also failed to assess the skill level of the participants. In general, the participants were functioning on similar levels; they demonstrated moderate to severe symptoms and required substantial support. However, the skill level of the participants varied slightly, which
can be noted by the type of academic tasks targeted for instruction. It would have been interesting to see how the choice-based procedures affected participants of different skill levels, but this data was never collected.

Finally, self-determination measures were never collected in this body of research because a disorder-specific self-determination assessment has not yet been developed for this population. Standardised measures have been previously used with adolescents and youth with ASD, but these instruments would have been inappropriate for the participants of this study. With an appropriate self-determination measure, it would have been more informative to see how the self-determination of the participants changed as they progressed through the studies. This is discussed in more detail in Section 8.5.4 below.

8.5 Future Research

8.5.1 Treatment Fidelity and Maintenance Measures

As this research included several exploratory studies, treatment fidelity and maintenance measures were not collected. Future research should investigate the treatment integrity of the choice intervention package by collecting data on the implementation of its procedures. The first step for collecting fidelity data would be to teach new practitioners the steps for executing the choice intervention package using behaviour skills training (BST; Parsons, Rollyson, & Reid, 2012b). This training would include the following steps: (a) instructions on how to implement the choice intervention package; (b) modelling the procedures; (c) rehearsal of the procedures, and (d) corrective feedback (Parsons et al., 2012b). Following this training, the researcher would create a checklist that includes each procedural step of the choice intervention package. Then, using this checklist, the researcher
would observe the practitioners implementing the choice intervention package and calculate procedural fidelity.

Once the practitioners have been trained how to implement the choice intervention package, and the integrity of the procedures has been demonstrated, the researcher could collect maintenance data. By collecting maintenance data, the researcher can determine if the practitioners will continue to implement the choice intervention package with fidelity, even after training has been terminated. The maintenance of treatment is necessary to ensure that children with ASD will continue to improve their self-determination in the future. To collect maintenance data, the researcher will conduct a random observation of the practitioners at three different times (e.g., three months, six months, one year) after the training has been completed. The same checklist used during treatment integrity procedures will be applied during these maintenance checks.

8.5.2 Differences in DTT Procedures

Another potential area for future research is to evaluate how differences in DTT would affect the outcomes of the choice-based procedures. There are two different types of DTT – constant task instruction and mixed and varied instruction. DTT with constant task instruction involves massed practice of the same skill, while DTT with mixed and varied instruction randomly rotates between different skills. Future studies should evaluate whether these different teaching methods have an effect on the mood and on-task behaviour of children with ASD while choice opportunities are being provided. Additional studies could investigate other factors as well, such as the number of trials, the length of teaching sessions, and the type of skills being taught during DTT.

8.5.3 Social-Emotional Curriculum
Based on the results of the self-report measure (i.e., mood scale) in Study 1, a potential area for future research would be the use of a comprehensive social-emotional curriculum to teach emotions to young children with ASD. An ideal programme would include a combination of teaching methods such as receptive and expressive labelling of static stimuli (e.g., photographs), video modelling, Social Stories (Gray, 1994), incidental teaching, and digital-based learning platforms. Preferably, the children with ASD would serve as their own models (i.e., self-modelling) for both the static stimuli and the videos. Video self-modelling (VSM) has shown to be successful in teaching a variety of skills to children with ASD (Mason, Davis, Ayres, Davis, & Mason, 2016). VSM is considered effective for children with ASD because of the visual nature of the medium and the similarity between the model and the viewer (Buggey & Rogers, 2018).

To the researcher’s knowledge, a comprehensive social-emotional curriculum has not yet been developed to teach emotions to young children with ASD. A comprehensive curriculum should be developed and implemented with this population to teach mood recognition and emotional self-awareness. With such a program, young children with ASD would be better equipped to identify and label their own emotions, which could potentially help to prevent challenging behaviour. Furthermore, practitioners could use the emotional self-awareness of children with ASD during interventions intended to improve their overall QoL. By assessing how the children felt during intervention procedures using an appropriate self-report measure, the practitioners would have an additional measure of mood to corroborate their objective observations. Hypothetically, if an intervention increased the indices of happiness observed in a child with ASD, and the child self-identified as “happy” following intervention sessions, the practitioner’s observations would be validated. Furthermore, an
intervention that improves the self-reported happiness of a child with ASD might be considered more socially acceptable to relevant stakeholders.

8.5.4 Self-Determination-Based Curriculum and Self-Determination Measures

As children with ASD experience a lower QoL, it is hypothesised that they also lack self-determination skills, based on the correlation between these two concepts. However, this claim cannot be made with certainty, as more research in the area of self-determination and ASD is needed. Self-determination is comprised of nine different component elements (see Section 1.3), yet choice-making is the most common skill taught to individuals with disabilities (Algozzine et al., 2001). For individuals with disabilities to be fully self-determined, they must be able to demonstrate these eight other skills. Without mastery of all the component elements, self-determination becomes no more than a “professional buzzword” (Algozzine et al., 2001, p. 269).

To teach these more complex skills (e.g., decision making, goal attainment, self-advocacy), a self-determination-based curriculum should be developed for children and adolescents with ASD. The Self-Determined Learning Model of Instruction is a model of teaching to promote self-determination in students with disabilities, but this instructional model has only been validated with individuals with learning and intellectual disabilities (Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000). The social and communication deficits inherent to ASD suggest that these individuals may benefit from a self-determination-based curriculum that has been developed for their unique needs (Chou et al., 2017a). Based on the recommendations by Wehmeyer and colleagues (2010), a potential area for future research is the development of such a protocol. This curriculum would include the employment of evidence-based strategies that are effective for individuals with ASD (e.g.,
task analysis, self-monitoring, discrete trial training, social skills training) to teach the eight component elements of self-determination (Wehmeyer et al., 2010).

Furthermore, there is a need for a disorder-specific self-determination assessment for individuals with ASD. To date, there has been a lack of research focused on the self-determination of individuals with ASD (Chou et al., 2017a; Wehmeyer, Shogren, Zager, Smith, & Simpson, 2010), and more research in this area is still needed. This paucity of research is likely due to the lack of a condition-specific measure, and only a few studies have evaluated the use of standardised measures (e.g., ARC’s Self-Determination Scale [SDS], American Institutes for Research Self-Determination Scale [AIR]) with this population (see Chou et al., 2017a; Chou, Wehmeyer, Shogren, Palmer, & Lee, 2017b). Chou et al. (2017b) demonstrated that the SDS and AIR were both reliable and valid for 95 youth with ASD. However, the students in this study ranged in age from 13 to 21 years old, and more research is needed to determine the reliability and validity of these assessments with children with ASD. It is hypothesised that these instruments would be inappropriate for children with ASD, as they are based on self-report measures. Children with ASD can demonstrate a limited capacity for self-reflection and social-communicative impairments, which make it difficult for them to respond to such measures (Tavernor et al., 2013). Therefore, a disorder-specific self-determination instrument that can account for all levels of functioning is needed. This assessment could hypothetically be used by practitioners during self-determination-based interventions to evaluate student outcomes. In the current body of research, it would have been more enlightening to have assessed the self-determination of the participants as they progressed through the studies. This is a potential area for future research.

8.5.5 Physiological Measures
It must be emphasised that the indices of happiness and unhappiness observed in this research can only provide indirect evidence of mood, as mood is considered a private event that cannot be directly observed (Parsons et al., 2012a). These indices are only presumed to correlate with the emotions of an individual, and any definitive conclusions regarding the person’s mood must be made with caution (Green & Reid, 1996, 1999). For example, individuals with ASD will often engage in laughter as a form of vocal stereotypy (Ahearn, Clark, & MacDonald, 2007), but this behaviour is not always indicative of their internal state of well-being. On the other hand, an individual with ASD could feel content, but may not engage in any overt indicators of happiness (Dillon & Carr, 2007). Future research on mood should include a physiological measure to further validate the link between overt indicators of mood and internal states of emotion (Lancioni, Singh, O’Reilly, Oliva, & Basili, 2005). The use of a smartwatch such as the Empatica E4 wristband (Empatica Inc., 2018) may be considered for future research to measure the physiological reactivity of participants in tandem with the overt measures of mood. This wearable device provides real-time physiological data on heart rate and electrodermal activity and it has previously been used for a number of different research applications (Empatica Inc., 2018). To the researcher’s knowledge, the use of the E4 wristband to measure mood would be the first application of the device for this purpose.

8.6 Conclusion

The current thesis investigated the interrelationship between choice, self-determination, happiness, and QoL. Based on the findings from this research, the following conclusions can be made. First, this research confirmed that overt indicators of mood can be reliably measured in young children with ASD as an outcome measure during intervention. Second, this research demonstrated that the provision of choice is an effective intervention for
improving the happiness of young children with ASD. Third, this research suggested that providing more choice-making opportunities to children with ASD can result in better intervention outcomes. Finally, this body of research concluded that the self-determination of young children with ASD can be fostered through choice-based interventions. Together, these findings would suggest that the overall QoL of young children with ASD can be improved through the implementation of choice-based interventions.
References


References

*Education and Training in Mental Retardation and Developmental Disabilities, 30*, 3-14.


References


300


Lang, R., Machalicek, W., Rispoli, M., O’Reilly, M., Sigafos, J., Lancioni, G., ... Didden, R. (2014). Play skills taught via behavioral intervention generalize, maintain, and persist


References


References


# Appendix A

## Social Communication Questionnaire (SCQ)

Michael Rutter M. D., F.R.S., Anthony Bailey, M. D., Sibel Kazak Berument, Ph.D., Catherine Lord, Ph. D., and Andrew Pickles, Ph. D.

Name of subject_________________________ D.O.B. ___________ Date of interview_____________

Age______ Gender ___F     ___M

Name of respondent______________________ Relation to subject_____________

Directions: Thank you for taking the time to complete this questionnaire. Please answer each question by circling yes or no. A few questions ask about several related types of behavior: please circle yes if any of these behaviors have ever been present. Although you may be uncertain about whether some behaviours were ever present or not, please answer yes or no to every question on the basis of what you think.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is she/he now able to talk using short phrases or sentences?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If no, skip to question 8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Can you have a to and fro “conversation” with her/him that involves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>taking turns or building on what you have said?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Has she/he ever used odd phrases or said the same thing over and over</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in almost exactly the same way (either phrases that she/he has heard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>other people use or ones that she/he has made up)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Has she/he ever used socially inappropriate questions or statements?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For example, has she/he ever regularly asked personal questions or made</td>
<td></td>
<td></td>
</tr>
<tr>
<td>personal comments at awkward times?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Has she/he ever got his/her pronouns mixed up (e.g., saying you or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>she/he for I)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Has she/he ever used words that she/he seemed to have invented or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>made up her/himself; put things in odd, indirect ways; or used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>metaphorical ways of saying things (e.g., saying hot rain for steam)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Has she/he ever said the same thing over and over in exactly the same</td>
<td></td>
<td></td>
</tr>
<tr>
<td>way or insisted that you say the same thing over and over again?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Has she/he ever had things that she/he seemed to have to do in a very</td>
<td></td>
<td></td>
</tr>
<tr>
<td>particular way or order or rituals that she/he insisted that you go</td>
<td></td>
<td></td>
</tr>
<tr>
<td>through?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Has her/his facial expressions usually seemed appropriate to the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>particular situation, as far as you could tell?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Has she/he ever used your hand like a tool or as if it were part of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>her/his own body (e.g., pointing with your finger, putting your hand on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a doorknob to get you to open the door)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Has she/he ever had any interests that preoccupy her/him and might</td>
<td></td>
<td></td>
</tr>
<tr>
<td>seem odd to other people (e.g., traffic lights, drainpipes, or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>timetables)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Has she/he ever seemed to be more interested in parts of a toy or an</td>
<td></td>
<td></td>
</tr>
<tr>
<td>object (e.g., spinning the wheels of a car), rather than using the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>object as it was intended?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Has she/he ever had any special interests that were unusual in their</td>
<td></td>
<td></td>
</tr>
<tr>
<td>intensity but otherwise appropriate for her/his age and peer group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g., trains, dinosaurs)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Has she/he ever seemed to be unusually interested in the sight,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>feel, sound, taste, or smell of things or people?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Has she/he ever had any mannerisms or odd ways of moving her/his</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hands or fingers, such as flapping or moving her/his fingers in front</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of her/his eyes?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Has she/he ever had any complicated movements of her/his whole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>body, such as spinning or repeatedly bouncing up and down?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td>Yes</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>17.</td>
<td>Has she/he ever injured her/himself deliberately, such as by biting her/his arm or banging her/his head?</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Has she/he ever had any objects (other than a soft toy or comfort blanket) that she/he had to carry around?</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Does she/he have any particular friends or a best friend?</td>
<td></td>
</tr>
</tbody>
</table>

For the following behaviors, please focus on the time period between the child’s fourth and fifth birthdays. You may find it easier to remember how things were at that time by focusing on key events, such as starting school, moving house, Christmas time, or other specific events that are particularly memorable for you as a family. If your child is not yet 4 years old, please consider her or his behavior in the past 12 months.

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.</td>
<td>When she/he was 4 to 5, did she/he ever talk with you just to be friendly (rather than to get something)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>When she/he was 4 to 5, did she/he ever spontaneously copy you (or other people) or what you were doing (such as vacuuming, gardening, or mending things)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>When she/he was 4 to 5, did she/he ever spontaneously point at things around her/him just to show you things (not because she/he wanted them)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>When she/he was 4 to 5, did she/he ever use gestures, other than pointing or pulling your hand, to let you know what she/he wanted?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>When she/he was 4 to 5, did she/he not her/his head to mean yes?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>When she/he was 4 to 5, did she/he shake her/his head to mean no?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>When she/he was 4 to 5, did she/he usually look at you directly in the face when doing things with you or talking with you?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>When she/he was 4 to 5, did she/he smile back if someone smiled at her/him?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>When she/he was 4 to 5, did she/he ever show you things that interested her/him to engage your attention?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>When she/he was 4 to 5, did she/he ever offer to share things other than food with you?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>When she/he was 4 to 5, did she/he ever seem to want you to join in her/his enjoyment of something?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td>When she/he was 4 to 5, did she/he ever try to comfort you if you were sad or hurt?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td>When she/he was 4 to 5, when she/he wanted something or wanted help, did she/he look at you and use gestures with sounds or words to get your attention?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td>When she/he was 4 to 5, did she/he show a normal range of facial expressions?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>When she/he was 4 to 5, did she/he ever spontaneously join in and try to copy the actions in social games, such as The Mulberry Bush or London Bridge is Falling Down?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>When she/he was 4 to 5, did she/he play any pretend or make-believe games?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>When she/he was 4 to 5, did she/he seem interested in other children of approximately the same age whom she/he did not know?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>When she/he was 4 to 5, did she/he respond positively when another child approached her/him?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.</td>
<td>When she/he was 4 to 5, if you came into a room and started talking to her/him without calling her/his name, did she/he usually look up and pay attention to you?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39.</td>
<td>When she/he was 4 to 5, did she/he ever play imaginative games with another child in such a way that you could tell that they each understood what the other was pretending?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40.</td>
<td>When she/he was 4 to 5, did she/he play cooperatively in games that required joining in with a group of other children, such as hide-and-seek or ball games?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix B

Indices of Happiness and Unhappiness Questionnaire

**Instructions:** Please answer the following questions to the best of your knowledge. Provide as much detail regarding your child’s behaviours as you can. If more space is needed, please continue on the back of this page.

1. What specific behaviours does your child engage in when he/she is feeling **happy**?

2. What specific behaviours does your child engage in when he/she is feeling **unhappy**?

3. In what situation(s)/setting(s) is your child most likely to feel **happy**?

4. In what situation(s)/setting(s) is your child most likely to feel **unhappy**?
Appendices

Appendix C
Indices of Happiness and Unhappiness Questionnaire:
FOLLOW-UP FOR AMY

Instructions: Please answer the following questions to the best of your knowledge. Circle either YES, NO, or SOMETIMES.

1. When your child is in an unhappy situation, will she engage in the following behaviour?

   Vocalizations – defined as: a loud “ahh” sound above conversational level that lasts 1-3 seconds long.

   YES                                                     NO                                         SOMETIMES

2. When denied access to an item, or when a preferred item is removed abruptly, does your child engage in indices of unhappiness (e.g., crying)? This may occur when a peer has an item that she cannot have.

   YES                                                     NO                                         SOMETIMES
Appendices

Appendix D

Indices of Happiness and Unhappiness Questionnaire:

FOLLOW-UP FOR RICHARD

Instructions: Please answer the following questions to the best of your knowledge. Circle either YES, NO, or SOMETIMES.

1. When denied access to an item, or when a preferred item is removed abruptly, does your child engage in the following behaviour?

   Covers ears – defined as: covering his ears with the palms of his hands, or by pushing against the tragus of his ear with one or two fingers. This may also include covering his ears by leaning his head against his shoulder.

   YES  NO  SOMETIMES

2. When denied access to an item, or when a preferred item is removed abruptly, does your child engage in the following behaviour?

   Pinching – defined as: using two fingers to pull at skin anywhere on his body.

   YES  NO  SOMETIMES
Appendices

Appendix E

Mood Scale

How do you feel?

HAPPY

OKAY

SAD
Appendix F

Indices of Happiness and Unhappiness Questionnaire:

FOLLOW-UP FOR LOUIS

Instructions: Please answer the following question to the best of your knowledge. Circle either YES, NO, or SOMETIMES.

1. When your child is in a happy situation, will he engage in the following behaviour?

*Smiling* – defined as: upward curvature of the mouth (i.e., grinning) with or without showing teeth.

YES                                           NO                                          SOMETIMES
Appendix G
PREFERENCE ASSESSMENT – DUAL PRESENTATION DATA FORM

Student: ______________________________   Date Range : _____________________ to ____________________________
Age: __________________________________ Instructor: ______________________________________________________

<table>
<thead>
<tr>
<th>Item Numbers</th>
<th>Preference Results Graph</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>9</td>
</tr>
<tr>
<td>2.</td>
<td>8</td>
</tr>
<tr>
<td>3.</td>
<td>7</td>
</tr>
<tr>
<td>4.</td>
<td>6</td>
</tr>
<tr>
<td>5.</td>
<td>5</td>
</tr>
<tr>
<td>6.</td>
<td>4</td>
</tr>
<tr>
<td>7.</td>
<td>3</td>
</tr>
<tr>
<td>8.</td>
<td>2</td>
</tr>
<tr>
<td>9.</td>
<td>1</td>
</tr>
<tr>
<td>10.</td>
<td></td>
</tr>
</tbody>
</table>

Number of Times Chosen
1. 2. 3. 4. 5. 6. 7. 8. 9. 10.
<table>
<thead>
<tr>
<th>Item</th>
<th>Session 1</th>
<th>Session 2</th>
<th>Sessions 3</th>
<th>Sessions 4</th>
<th>Session 5</th>
<th>Total</th>
<th>Percent</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>___/2</td>
<td>___/2</td>
<td>___/2</td>
<td>___/1</td>
<td>___/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>___/2</td>
<td>___/2</td>
<td>___/2</td>
<td>___/2</td>
<td>___/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>___/2</td>
<td>___/2</td>
<td>___/2</td>
<td>___/1</td>
<td>___/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>___/2</td>
<td>___/1</td>
<td>___/2</td>
<td>___/2</td>
<td>___/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>___/2</td>
<td>___/2</td>
<td>___/1</td>
<td>___/2</td>
<td>___/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>___/2</td>
<td>___/2</td>
<td>___/2</td>
<td>___/1</td>
<td>___/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>___/2</td>
<td>___/1</td>
<td>___/2</td>
<td>___/2</td>
<td>___/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>___/1</td>
<td>___/2</td>
<td>___/2</td>
<td>___/2</td>
<td>___/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>___/1</td>
<td>___/2</td>
<td>___/2</td>
<td>___/3</td>
<td>___/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>___/2</td>
<td>___/2</td>
<td>___/1</td>
<td>___/2</td>
<td>___/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial</td>
<td>Item 1</td>
<td>Selected?</td>
<td>Item 2</td>
<td>Selected?</td>
<td>Comment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>-----------</td>
<td>--------</td>
<td>-----------</td>
<td>---------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1.</td>
<td></td>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3.</td>
<td></td>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>5.</td>
<td></td>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>7.</td>
<td></td>
<td>8.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>9.</td>
<td></td>
<td>10.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1.</td>
<td></td>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2.</td>
<td></td>
<td>10.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>6.</td>
<td></td>
<td>7.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>4.</td>
<td></td>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
<table>
<thead>
<tr>
<th>Trial</th>
<th>Item 1</th>
<th>Selected?</th>
<th>Item 2</th>
<th>Selected?</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>2.</td>
<td></td>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>6.</td>
<td></td>
<td>8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>3.</td>
<td></td>
<td>5.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>1.</td>
<td></td>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>5.</td>
<td></td>
<td>9.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>7.</td>
<td></td>
<td>10.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>2.</td>
<td></td>
<td>9.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>1.</td>
<td></td>
<td>6.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>10.</td>
<td></td>
<td>8.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
<table>
<thead>
<tr>
<th>Trial</th>
<th>Item 1</th>
<th>Selected?</th>
<th>Item 2</th>
<th>Selected?</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>2.</td>
<td></td>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>3.</td>
<td></td>
<td>6.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>4.</td>
<td></td>
<td>7.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>1.</td>
<td></td>
<td>10.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>8.</td>
<td></td>
<td>9.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>3.</td>
<td></td>
<td>7.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>2.</td>
<td></td>
<td>8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>6.</td>
<td></td>
<td>9.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>1.</td>
<td></td>
<td>5.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
<table>
<thead>
<tr>
<th>Trial</th>
<th>Item 1</th>
<th>Selected?</th>
<th>Item 2</th>
<th>Selected?</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>4.</td>
<td></td>
<td>8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>7.</td>
<td></td>
<td>9.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>2.</td>
<td></td>
<td>5.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>6.</td>
<td></td>
<td>10.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>4.</td>
<td></td>
<td>9.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>3.</td>
<td></td>
<td>8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>1.</td>
<td></td>
<td>9.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>5.</td>
<td></td>
<td>10.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>2.</td>
<td></td>
<td>7.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
<table>
<thead>
<tr>
<th>Trial</th>
<th>Item 1</th>
<th>Selected?</th>
<th>Item 2</th>
<th>Selected?</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>2.</td>
<td></td>
<td>6.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>5.</td>
<td></td>
<td>8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>1.</td>
<td></td>
<td>7.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>4.</td>
<td></td>
<td>6.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>3.</td>
<td></td>
<td>10.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>5.</td>
<td></td>
<td>7.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>3.</td>
<td></td>
<td>9.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>1.</td>
<td></td>
<td>8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>4.</td>
<td></td>
<td>10.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
Appendices

Appendix H
General Child Affect Rating Scale (GCARS)

Directions: At the end of your teaching session, please rate the interest and happiness of the student by circling a score of 0-5 for each category. Please use the descriptions below to help make your decision.

<table>
<thead>
<tr>
<th>Interest</th>
<th>Disinterested (0-1)</th>
<th>Neutral Interest (2-3)</th>
<th>Interested (4-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Child looks bored, uninvolved, not curious or eager to continue activity. May yawn or try to avoid the situation. Spends much time looking around and not attending to task. If child does respond, there may be a long response latency. (Score 0-1, depending on extent of disinterest)</td>
<td>Neither particularly interested nor disinterested. Child seems to passively accept situation. Does not rebel but is not eager to continue. (Score 2-3, depending on extent of interest)</td>
<td>Attends readily to task. Responses readily and willingly. Child is alert and involved in activity. (Score 4-5, depending on level of alertness and involvement)</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Happiness</th>
<th>Unhappy (0-1)</th>
<th>Neutral (2-3)</th>
<th>Happy (4-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cries, pouts, tantrums; appears to be sad, angry, or frustrated. Child seems not to be enjoying self (Score of 0-1, depending on extent of unhappiness)</td>
<td>Does not appear to be decidedly happy or particularly unhappy. May smile or frown occasionally but overall, seems rather neutral in this situation. (Score 2-3, depending on extent of happiness)</td>
<td>Smiles, laughs appropriately, seems to be enjoying self. (Score 4-5, depending on extent of enjoyment)</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

336
# Appendix I

## Paired-Choice Preference Assessment

Date: 
Student Name: 
Teacher: 

Items to be assessed

<table>
<thead>
<tr>
<th>#</th>
<th>ITEM</th>
<th>#</th>
<th>ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Instructions:
1. Be sure the student has tasted or played with all items before assessing them.
2. Present both numbered items simultaneously. Place the first item on your left, the second on your right.
3. If the student doesn’t select one, say, ’Take one’.
4. Record as a selection any touch to an item. Circle the selected items.
5. If the item is an edible, allow the student to consume it before going on.
6. If the item is an activity, let the student play with it for 30 seconds.
7. Block any attempts to touch both items simultaneously.
8. If no response is made in 10 seconds, record ‘NR’ and move to the next trial.
9. Calculating the percentage of the trials that each item was selected. Those items selected 80% or more of opportunities are most probably going to function as positive reinforcers.

<table>
<thead>
<tr>
<th>TRIAL</th>
<th>LEFT</th>
<th>RIGHT</th>
<th>TRIAL</th>
<th>LEFT</th>
<th>RIGHT</th>
<th>TRIAL</th>
<th>LEFT</th>
<th>RIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>11</td>
<td>5</td>
<td>2</td>
<td>21</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>2</td>
<td>12</td>
<td>4</td>
<td>3</td>
<td>22</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>6</td>
<td>13</td>
<td>1</td>
<td>5</td>
<td>23</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>3</td>
<td>14</td>
<td>5</td>
<td>3</td>
<td>24</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>5</td>
<td>15</td>
<td>4</td>
<td>1</td>
<td>25</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>6</td>
<td>16</td>
<td>2</td>
<td>5</td>
<td>26</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>3</td>
<td>17</td>
<td>4</td>
<td>2</td>
<td>27</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>1</td>
<td>18</td>
<td>5</td>
<td>4</td>
<td>28</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>6</td>
<td>19</td>
<td>6</td>
<td>1</td>
<td>29</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>6</td>
<td>20</td>
<td>3</td>
<td>4</td>
<td>30</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

**SUMMARY**

ITEM 1 SELECTED OUT OF 10 OR ___% OF OPPORTUNITIES
ITEM 2 SELECTED OUT OF 10 OR ___% OF OPPORTUNITIES
ITEM 3 SELECTED OUT OF 10 OR ___% OF OPPORTUNITIES
ITEM 4 SELECTED OUT OF 10 OR ___% OF OPPORTUNITIES
ITEM 5 SELECTED OUT OF 10 OR ___% OF OPPORTUNITIES
ITEM 6 SELECTED OUT OF 10 OR ___% OF OPPORTUNITIES

337
Appendix J

Visual for Preference Condition
Appendix K

Visual for Choice Condition
Appendices

Appendix L

Examples of Activity Visuals

3-step sequencing

Handwriting

Receptive Identification

Imitation
Appendix M

Treatment Acceptability Questionnaire

1. How clear is your understanding of the suggested procedures?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all clear</td>
<td>Neutral</td>
<td>Very clear</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. How willing are you to implement the suggested procedures within your classroom routine?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all willing</td>
<td>Neutral</td>
<td>Very willing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. How disruptive will it be to your classroom to implement the suggested procedures?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very disruptive</td>
<td>Neutral</td>
<td>Not at all disruptive</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. How well will carrying out these procedures fit into your classroom routine?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all well</td>
<td>Neutral</td>
<td>Very well</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. How much do you like the proposed procedures?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do not like at all</td>
<td>Neutral</td>
<td>Like them very much</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. I believe the procedures increased the happiness of the student.

1 2 3 4 5
Strongly disagree Undecided Strongly agree

7. I believe the procedures decreased the unhappiness and challenging behaviour of the student.

1 2 3 4 5
Strongly disagree Undecided Strongly agree

8. I believe the procedures increased the task engagement of the student.

1 2 3 4 5
Strongly disagree Undecided Strongly agree

9. I believe the procedures will increase the self-determination and well-being of the student.

1 2 3 4 5
Strongly disagree Undecided Strongly agree

10. I believe the procedures can be applied to other students in the classroom.

1 2 3 4 5
Strongly disagree Undecided Strongly agree
Appendix N
Open-Ended Social Validity Questionnaire

1. How do you feel about allowing students to choose their reinforcers, activities, and materials during worktime?

2. Which aspects of the choice intervention did you like the most? Why?

3. Which aspects of the choice intervention did you like the least? Why?

4. How could we change the choice intervention to make it better or easier to implement?

5. Do you think the choice intervention was effective in improving the student’s mood and task engagement?

6. Do you think the choice intervention has any negative side effects for the student or his peers?