TEACHER TRAINING IN A PROACTIVE CLASSROOM MANAGEMENT APPROACH FOR STUDENTS WITH AUTISM SPECTRUM DISORDERS

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A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy
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As the prevalence of Autism Spectrum Disorders (ASD) increases, more children with ASD present for services in public school classrooms. Due to the unique social and communication difficulties that characterize this population, these children often exhibit challenging behaviours such as non-compliance, verbal and physical aggression and high levels of off-task responses. Compounding these concerns, teachers and classroom support staff are typically inadequately trained in evidence-based behavioural intervention strategies for such children, particularly those suited for class-wide intervention that are easy to implement and fit within a school setting.

The current study addressed these concerns by examining the effectiveness of Errorless Classroom Management (ECM), a proactive classroom management teacher training package, in three self-contained classrooms and a total of 7 students ranging from Grade 1 to Grade 8. In a multiple baseline across classrooms design, teachers and classroom support staff were taught a range of proactive skills that included use of moderating support strategies, reinforcement of prosocial student behaviours, and systematic fading of supports and reinforcement. Teachers and classroom support staff were also trained in how to use these classroom management strategies to build four core student skills: compliance, acquiescence, on-task behaviour, and communication skills.
After training, classroom staff showed increased use of proactive classroom management strategies and reduction in use of reactive disciplinary strategies. Results also indicated moderate improvements in student compliance, on-task skills and prosocial behaviours, as well as covariant reductions in challenging behaviours. Improvements in staff and student behaviour were maintained at the 5 month follow-up. Most staff members indicated satisfaction with the training and showed an overall moderate reduction in stress levels related to classroom management.

The outcomes of the current study are encouraging and suggest that ECM is suitable as a proactive classroom management approach for self-contained ASD special education classrooms and may fit well as a curriculum within a school wide positive behaviour support framework. The in-service training was completely non-aversive, inexpensive, and brief, making it a positive and cost-efficient approach to classroom management. Teacher training in ECM could potentially decrease the number of students with ASD who require intensive supports in the school system.
**Acknowledgements**

Many people have contributed to my development as a child psychologist and to this research. I am grateful for the “out-of-the-box thinking”, clinical acumen, humility, and guidance of my supervisor, Dr. Joseph Ducharme. He has both deepened and broadened the scope of my clinical thinking. In particular, he has taught me about the importance of creating positive, therapeutic, and calming environments for children in school settings through the power of relationships and building prosocial skills.

I would like to thank my committee members, Dr. Judy Wiener and Dr. Rosemary Tannock, for all their support and thoughtful reactions and suggestions in this research. As well, thank you to my external committee member, Dr. James Bebko, for his contributions.

This research would not have been possible without the help and support of my labmate, Nathalie Conn-Krieger, and the dedication and hard work of my eight volunteer research assistants. A special thank you to the teachers and classroom support staff who participated in this research. I was inspired by their inventiveness and dedication in running special education classrooms for diverse students with Autism Spectrum Disorders.

To my colleagues in SCCP, thank you for your company and for being there through the highs and lows of graduate school. I especially would like to acknowledge four great spirits in my life: Kim Saliba, Kim Daniel, Heidi Kiefer and Megan Brunet. I am also most grateful to Rob Levesque. His faith and support enabled me to imagine, start, and stay moving on my long journey to achieving a Ph.D. – day after day. In appreciation of my parents for all that I have learned from them and for the precious gift of freedom to pursue my passions. Finally, I thank my brothers, Duncan and Nelson Ashworth, who have always been part of my intersubjective experience over my whole life and who will always remain by my side.
Table of Contents

Abstract ................................................................................................................................................. ii
Acknowledgements ............................................................................................................................ iv
List of Tables .......................................................................................................................................... ix
List of Figures ......................................................................................................................................... x
List of Appendices ............................................................................................................................... xii

Chapter 1: Introduction .......................................................................................................................... 1

1.1 Autism Spectrum Disorders .............................................................................................................. 2
  1.1.1 The Defining Features and Prevalence of Autism Spectrum Disorders. ...................... 2
  1.1.2 Changing Diagnostic Criteria ......................................................................................... 3
  1.1.3 Challenging Behaviour, Mental Health and Learning Difficulties ............................. 4

1.2 Applied Behaviour Analysis and Function-Based Interventions: Early Years of Applied
  Behaviour Analysis ............................................................................................................................... 5
  1.2.1 Functional Assessment ................................................................................................. 6
  1.2.2 Applied Behavioural Analysis and Autism Spectrum Disorders ..................................... 9

1.3 School-Based Behavioural Interventions for Students with Autism Spectrum Disorders ... 10
  1.3.1 Classroom Placements for Students with Autism Spectrum Disorders ..................... 11

1.4 Positive Behavioural Supports in Schools .................................................................................... 13
  1.4.1 Tier I: School-Wide Interventions .............................................................................. 13
  1.4.2 Tier II: Small Group or Class-Wide Interventions ...................................................... 13
  1.4.3 Tier III: Individualized, Function-Based Interventions ............................................. 14
  1.4.4 Concerns with Functional Assessment in Schools ..................................................... 14
  1.4.5 School Wide Positive Behavioural Support and Autism Spectrum Disorders ........ 15

1.5 Teacher and Classroom Support Staff Training in Classroom Behaviour Management .... 16
  1.5.1 Reactive Classroom Management .............................................................................. 19

1.6 A Keystone Approach to Classroom Intervention ..................................................................... 19
  1.6.1 Compliance ................................................................................................................. 22
  1.6.2 Social skills .................................................................................................................. 23
    Acquiescence as a keystone social skill .............................................................................. 23
  1.6.3 On-task behavior ......................................................................................................... 24
  1.6.4 Communication skills ................................................................................................. 25

1.7 Errorless Remediation .................................................................................................................. 26
1.8 Errorless Classroom Management: A Proposed Model for Use with Students with Autism Spectrum Disorders .................................................................27
  1.8.1 Providing supports to moderate or reduce challenging behaviours.........28
    Antecedent strategies.................................................................28
    Ecological strategies .................................................................29
    Rapport strategies .......................................................................30
  1.8.2 Reinforcing keystone skills....................................................31
  1.8.3 Gradually reducing supports while increasing demand..................31
1.9 Rationale and Hypotheses for the Current Study .................................................32

Chapter 2: Method .................................................................................34
  2.1 Classroom Settings .......................................................................34
  2.2 Participants ..................................................................................35
    2.2.1 Recruitment ..........................................................................35
    2.2.2 Teachers and Classroom Support Staff.................................36
    2.2.3 Students ...............................................................................38
  2.3 Research Design ............................................................................45
  2.4 Dependent Measures ....................................................................47
    2.4.1 Observational Time Series Measures. ...................................47
    2.4.2 Classroom Staff Behaviour. ..................................................47
      Reinforcement strategies ............................................................47
      Antecedent strategies ..................................................................48
      Reactive strategies .......................................................................48
    2.4.3 Student Behaviour. ...............................................................49
      Compliance ...............................................................................49
      On-task behaviour .....................................................................50
      Challenging behaviour ...............................................................50
      Prosocial behaviour ....................................................................50
    2.4.4 Classroom Staff Report Measures. .......................................51
      2.4.4.1 Sample Description Report Measure...............................51
      2.4.4.2 Outcome Report Measures ..............................................52
      2.4.4.3 Consumer Satisfaction Report Measure ............................54
  2.4 Procedures ...................................................................................55
    2.4.1 Baseline Phase ......................................................................55
    2.4.2 Intervention Phase: Staff Training ...........................................55
Compliance Strategies ........................................................................................................ 56
On-Task Strategies ........................................................................................................... 58
Acquiescence Strategies ................................................................................................. 59
Communication Strategies .............................................................................................. 60

2.4.3 Intervention Phase: Post-Training ......................................................................... 61
2.4.4 Follow-up Sessions ................................................................................................. 62

2.5 Data Collection ......................................................................................................... 62
  2.5.1 Observer training ................................................................................................... 62
  2.5.2 Assessment of Inter-Observer Agreement (IOA) .................................................. 62
  Classroom Staff Skills ................................................................................................. 63
  Student Compliance Behaviour ...................................................................................... 64
  Student On-Task Behaviour .......................................................................................... 64
  Challenging and Prosocial Student Behaviours ............................................................ 65

2.6 Data Analysis ............................................................................................................ 65
  2.6.1 Visual Analysis ...................................................................................................... 65
  2.6.2 Statistical Analysis for Time-Series Data ............................................................... 65
  2.6.3 Statistical Analysis for the Teacher Questionnaires ............................................. 67

Chapter 3: Results .......................................................................................................... 69

3.1 Classroom Staff Data ............................................................................................... 69
  3.1.1 Observational Analysis. .................................................................................... 69
    3.1.1.1 Reinforcement strategies ........................................................................... 69
    3.1.1.2 Antecedent strategies .............................................................................. 72
    3.1.1.3 Reactive strategies .................................................................................... 74
    3.1.1.4 Subjective Units of Distress Scale (SUDS) ............................................... 77
  3.1.2 Staff Questionnaire Measure .............................................................................. 82
    3.1.2.1 Index of Teaching Stress. ....................................................................... 82

3.2 Student Data ............................................................................................................. 83
  3.2.1 Student Observational Data .............................................................................. 83
    3.2.1.1 Student Compliance ............................................................................... 84
    3.2.1.2 Student On-Task Behaviour .................................................................. 90
    3.2.1.3 Student Challenging Behaviour ............................................................... 95
    3.2.1.4 Student Prosocial Behaviour .................................................................. 100
  3.2.2 Staff Questionnaire for Student Behaviours .................................................... 105
    3.2.2.1 Behavior Assessment System for Children-II-Teacher Rating Scale... 105
3.3 Consumer Satisfaction Questionnaire ................................................................. 114

Chapter 4: Discussion ........................................................................................... 116

4.1 Staff Classroom Management Strategies .............................................................. 116
4.2 Student Behaviours .......................................................................................... 119
4.3 Teacher Report Behavioural Measure ................................................................. 122
4.4 Social Validity of ECM Training for Students with Autism Spectrum Disorders in School Settings .......................................................................................... 123
4.5 Limitations and Future Directions .................................................................... 126
4.6 Conclusions and Implications for Practice ....................................................... 132

References .............................................................................................................. 135
List of Tables

Table 1. Participant Teachers’ and Classroom Staff Characteristics ........................................38
Table 2. Summary of Student Participant Characteristics ..............................................................41
Table 3. Summary of the Participant Students’ BASC-2 T-Scores at Baseline ..............................42
Table 4. Summary of the Participant Students’ Vineland Adaptive Behavior Scale–II-TRF v-Scale and Standard Scores .................................................................43
Table 5. Mean (Range) Inter-Observer Agreement (IOA) Across Classroom Staff Behaviours and Phases ..............................................................................................64
Table 6. Effect Size Estimates of Staff Frequency of Reinforcement Strategies using Percentage of All Non-Overlapping Data for Staff in Classrooms 1, 2, and 3 ...............................72
Table 7. Effect Size Estimates of Staff Frequency of Antecedent Strategies using Percentage of All Non-Overlapping Data for Staff in Classrooms 1, 2, and 3 .................................74
Table 8. Effect Size Estimates of Staff Frequency of Reactive Strategies using Percentage of All Non-Overlapping Data for Staff in Classrooms 1, 2, and 3 ..............................................77
Table 9. Effect Size Estimates of Staff Ratings of Subjective Units of Distress using Percentage of All Non-Overlapping Data for Staff in Classrooms 1, 2, and 3 ...............................81
Table 10. Index of Teaching Stress Global and Subscale T-Scores .............................................83
Table 11. Effect Size Estimates of Student Compliance using Percentage of All Non-Overlapping Data for Classrooms 1, 2, and 3 .................................................................90
Table 12. Effect Size Estimates of Student On-Task Behaviour using Percentage of All Non-Overlapping Data for Classrooms 1, 2, and 3 .................................................................94
Table 13. Effect Size Estimates of Student Challenging Behaviour using Percentage of All Non-Overlapping Data for Classrooms 1, 2, and 3 .........................................................99
Table 14. Effect Size Estimates of Student Prosocial Behaviours using Percentage of All Non-Overlapping Data for Classrooms 1, 2, and 3 ...............................................................104
Table 15. Descriptive Statistics for the BASC-2 Teacher Rating Scale T-Scores ........................106
Table 16. Classroom Staff Mean Responses to Consumer Satisfaction Questionnaire ..........114
List of Figures

Figure 1. The keystone model for Proactive Classroom Management. 21

Figure 2. Multiple Baseline Design for Classrooms 1, 2 and 3 across baseline, post-training, and follow-up in the year 2011. 46

Figure 3. Classroom staff frequency of reinforcement per half hour across all study phases. 70

Figure 4. Mean class frequency of reinforcement strategies per half hour across baseline and post training sessions. 71

Figure 5. Classroom staff frequency of antecedent strategy use per half hour across all study phases. 73

Figure 6. Mean class frequency of antecedent strategies per half hour across baseline and post training sessions. 74

Figure 7. Classroom staff frequency of reactive strategies per half hour across all study phases. 76

Figure 8. Mean class staff frequency of reactive strategies per half hour across baseline and post training sessions. 77

Figure 9. Classroom staff ratings of Subjective Units of Distress for the general classroom across all study phases for Classroom 1. 79

Figure 10. Classroom staff ratings of Subjective Units of Distress for the general classroom across all study phases for Classroom 2. 80

Figure 11. Classroom staff ratings of Subjective Units of Distress for the general classroom across all study phases for Classroom 3. 81

Figure 12. Percentage of compliance to classroom requests during baseline, post-training and follow-up sessions for Classroom 1. 87

Figure 13. Percentage of compliance to classroom requests during baseline, post-training and follow-up sessions for Classroom 2. 87

Figure 14. Percentage of compliance to classroom staff requests during baseline, post-training and follow-up sessions for Classroom 3. 88

Figure 15. Overall mean percent compliance to classroom staff requests across baseline and post-training phases for three participating classrooms. 89

Figure 16. Percentage of on-task behaviour during baseline, post-training, and follow up for Classroom 1. 91
Figure 17. Percentage of on-task behaviour during baseline, post-training, and follow up for Classroom 2.

Figure 18. Percentage of on-task behaviour during baseline, post-training, and follow up for Classroom 3.

Figure 19. Overall mean percentage of on-task behaviour across baseline and post-training phases for the three participating classrooms.

Figure 20. Frequency of challenging behaviours per hour during baseline, post-training, and follow up for Classroom 1.

Figure 21. Frequency of challenging behaviours per hour during baseline, post-training, and follow up for Classroom 2.

Figure 22. Frequency of challenging behaviours per hour during baseline, post-training, and follow up for Classroom 3.

Figure 23. Mean frequency of challenging behaviours per hour across baseline and post-training phases for three participating classrooms.

Figure 24. Frequency of prosocial behaviours per hour during baseline, post-training, and follow up for Classroom 1.

Figure 25. Frequency of prosocial behaviours per hour during baseline, post-training, and follow up for Classroom 2.

Figure 26. Frequency of prosocial behaviours per hour during baseline, post-training, and follow up for Classroom 3.

Figure 27. Mean frequency of prosocial behaviours per hour across baseline and post-training phases for three participating classrooms.

Figure 28. T-scores for the BASC-2 Composite Scales pre and post-training for Classrooms 1, 2, and 3.

Figure 29. T-scores for the BASC-2 Maladaptive Scale Scores pre and post-training for Classrooms 1, 2, and 3.

Figure 30. T-scores for the BASC-2 Maladaptive Scale Scores pre and post-training for Classrooms 1, 2, and 3.

Figure 31. T-scores for the BASC-2 Adaptive Behaviours Scale Scores pre and post-training for Classrooms 1, 2, and 3.
List of Appendices

Appendix A. Sample Teacher and Classroom Staff Behaviour Coding Form.................................154
Appendix B. Sample Student Behaviour Coding Form...............................................................155
Appendix C. Sample Student On-Task Data Form.........................................................................156
Appendix D. Teacher/Classroom Staff Satisfaction Questionnaire...............................................157
Appendix E. Keystone Classroom Management Strategies Handout...........................................159
Appendix F. Summary of the Participant Students’ Index of Teaching Stress T-Scores...........161
Chapter 1: Introduction

A variety of challenging behaviours, such as aggression, non-compliance, destructive behaviour, self-injury, and off-task responses are often exhibited by children with Autism Spectrum Disorders (ASD). Such behaviours have a significant impact on their ability to self-regulate, learn and socialize. Children with ASD are one of the fastest growing groups of students in public schools due to the increasing prevalence rates for this condition (Lord & Bishop, 2010; Ouellette-Kuntz et al., 2012). These increased numbers have placed significant demands on educational systems, given the need to provide teachers and classroom support staff with the skills and knowledge to ensure students receive enough support to meet their curriculum needs. Unfortunately, most classroom staff are inadequately trained in evidence-based interventions for such children, placing them at higher risk for stress and burn-out. In particular, there are few empirically validated class-wide interventions for this population that are easy to implement by classroom staff.

More effective and efficient class-wide interventions for students diagnosed with ASD are necessary to assist school personnel at all levels in their ability to manage their classrooms effectively. The aim of the present study was to investigate the efficacy of Errorless Classroom Management (ECM), a proactive classroom management program designed to provide skills to teachers in supporting students. With this package, students learn keystone skills (i.e., skills that when targeted lead to broad positive behavioural effects). The specific goals of the class-wide intervention were: 1) to determine whether teacher training in ECM would result in a decrease in use of reactive disciplinary strategies and an increase in proactive classroom management strategies among classroom staff; 2) to determine whether ECM would lead to increases in student prosocial behaviour and decreases in student challenging behaviour; 3) to ascertain
whether ECM would result in reduced levels of stress in classroom staff; 4) to evaluate classroom staff acceptance of ECM in their classroom; and 5) to determine whether any student gains resulting from the intervention would persist.

This chapter begins with a review of the literature on the defining features of ASD and its comorbid conditions. This is followed by a discussion of applied behavior analysis and functional assessment and how they are commonly used to assist in management of some of the characteristic challenges associated with ASD. Next, a review of empirically supported school-based interventions for students with ASD along with a critique of school wide positive behavioural support will be provided. Concerns with carrying out functional assessment in schools and inadequate training of teachers and classroom support staff will also be discussed. Finally, the need for effective and efficient class-wide interventions is considered, leading into a rationale for the proactive classroom management approach used in the present research.

1.1 Autism Spectrum Disorders

1.1.1 The Defining Features and Prevalence of Autism Spectrum Disorders.

Autism Spectrum Disorders (ASD) are a group of neurodevelopmental disorders of child onset that share overlapping diagnostic criteria: deficits in communication, deficits in socialization, restricted interests, and repetitive behaviors (APA, 2000). ASD comprises several diagnoses, including Autistic Disorder, Asperger’s Disorder, Pervasive Developmental Disability Not Otherwise Specified (NOS), and Childhood Disintegrative Disorder. These subtypes are differentiated by age and nature of the onset, severity and comprehensiveness of symptoms, and association with language delay or cognitive impairments (DSM-IV-TR, 2000; Volker & Lopata, 2008). These disorders are believed to be the result of genetic causes although no one gene has been identified as causing ASD (Abrahams & Geschewind, 2008; Rutter, 2005).
The prevalence of the whole spectrum of ASD in Canada and the United Kingdom, as defined by the DSM-IV-TR (2000), is estimated to be about 0.6%, or 1 in 165 children (Fombonne et al., 2006). This is similar to the most recent estimate of overall prevalence rate in the United States of 0.9% or 1 in every 110 children (ADDM, 2009). Based on a recent Canadian epidemiological study, the prevalence of ASD appears to be increasing (Ouellette-Kuntz et al., 2012). This increase can be attributed to a number of factors, including the broader definition of PDD that was provided in the DSM-IV (APA, 1994), as well as improved diagnostic practices that have resulted in increased recognition of symptomology (Chakrabarti & Fombonne, 2005; Lord & Bishop, 2010; Rutter, 2005).

1.1.2 Changing Diagnostic Criteria. There have been a number of recent changes affecting the definition of ASD due to the revised fifth edition of the Diagnostic and Statistical Manual (DSM-V; APA, 2013). The revised criteria include only two symptom domains (social communication deficits and restricted, repetitive interests, behaviours and activities), collapse subtypes of ASD into a single diagnostic dimension, and describe individual differences in terms of severity of the two domains (APA, 2013). Lastly, variance with respect to non-ASD symptoms in individuals has been formally recognized with specifiers such as cognitive ability (e.g., ASD and Specific Learning Disorder or ASD and Intellectual Disability), expressive language, onset patterns, associated medical and genetic conditions (e.g., ASD with Fragile X), and comorbid psychopathology (e.g., ASD with Attention Deficit Hyperactivity Disorder) (APA, 2013). Bearing these issues and distinctions in mind, for the purposes of this paper, the term “ASD” will refer to individuals who have diagnoses of Autistic Disorder, Asperger’s Disorder, or Pervasive Developmental Disability (NOS) according to the DSM-IV-TR diagnostic system (note that the diagnosis of Childhood Disintegrative Disorder is excluded).
1.1.3 Challenging Behaviour, Mental Health and Learning Difficulties.

Individuals with ASD often have mental health and behavioural issues along with the core features of this disorder. Approximately 70% of children with ASD meet criteria for at least one additional psychiatric disorder (Leyfer et al., 2006; Simonoff, Pickles, Charman, Chandler, Loucas & Baird, 2008; Tonge, Brereton, Gray, & Einfeld, 1999). Children with ASD are more likely to develop oppositional and disruptive behaviours such as tantrums, aggression, self-injury, non-compliance, stereotypies, property destruction, elopement, and pica (Farmer & Aman, 2011; Horner, Carr, Strain, Todd, & Reed, 2002; McClintock, Hall, & Oliver, 2003). Communication and intellectual impairments among children with ASD are known to increase the probability of challenging behaviours (McClintock, Hall, & Oliver, 2003). Disorders such as anxiety, depression, attention deficit hyperactivity disorder, obsessive compulsive disorder, and oppositional defiant disorder are also commonly found in children with ASD (Gjevik, Eldevik, Fjaeran-Granum, & Sponheim, 2011). In addition to psychological disorders and behavioural problems, children with ASD with average cognitive abilities frequently exhibit significant difficulties with academic attainment, with up to 60% meeting formal criteria for a learning disability (Mayes & Calhoun, 2008). These co-morbid conditions can increase the severity of impairments for children with ASD and interfere with their ability to socialize, self-regulate, and learn (Koegel, Matos-Fredeen, Lang & Koegel, 2011; Ruble & Dalrymple, 1996). Moreover, challenging behaviour tends to persist in individuals with ASD (Matson, Mahan, Hess, Fodstad & Neal, 2010; Murphy, Beadle-Brown, Wing, Gould, Shah, & Homes, 2005), particularly when intervention is not provided (National Research Council, 2001). The incidence of these problems and the increasing occurrence of ASD have created a pressing need for effective interventions in school settings as well as in homes (Koegel et al., 2011; Simpson, Mundschenk, & Heflin, 2011).
For the remainder of this paper, challenging behaviour in students with ASD will be discussed in the context of its treatment. For the present purposes, ‘challenging behaviour’ will refer to any problem responses by a student that restrict opportunities to engage in social, recreational, and learning activities in the school. Examples of challenging behaviours include physical aggression, property destruction, tantrums, or elopement.


Applied Behaviour Analysis (ABA) is the application of interventions based upon operant principles of behaviour that emerged in the 1960s (Baer, Wolf, & Risley, 1968). The purpose of early ABA was to reduce the frequency and severity of challenging behaviours and facilitate the acquisition of adaptive behaviour (e.g., communication, daily living skills, academic skills) primarily through the manipulation of behavioural consequences (Cooper, Heron & Heward, 2007). This commonly involved provision of reinforcement for prosocial responses and use of decelerative consequences (i.e., punishment procedures such as overcorrection, physical holds, reprimands, time out) following challenging behaviours. However, more current research demonstrated that although decelerative consequences can decrease or control challenging behaviour in the short term, they have little long-term benefit and do not teach children strategies for managing difficult situations (Lerman & Vorndran, 2002). Moreover, punishment-based procedures can result in undesirable stimulus-specific treatment gains, where the desired change in behaviour is exhibited only in the presence of the punisher (Cooper, 2007; Lerman & Vorndran, 2002). Other concerns with this approach include the potential for inadvertent reinforcement of escape and avoidant behavior (e.g., placing a child in time-out when he is engaging in challenging behaviour to avoid academic work), undesirable
modeling (e.g., the adult firmly reprimands or spanks the child, increasing the odds that the child will yell at or hit others), negative emotional side effects, potential for abuse (Vollmer, 2002), and damage to the adult-child relationship (Ducharme & Shecter, 2011; Maag, 2001).

1.2.1 Functional Assessment.

Given concerns with the use of punitive and constraining procedures for managing challenging behaviour, ABA researchers developed positive behavioural support in the 1980s and 1990s as a proactive means of improving the behavioural repertoire and quality of life of persons with challenging behaviour (Carr et al., 1999; Cooper et al., 2007; Sugai et al., 2000). One of the prominent characteristics of positive behavioural support is its emphasis on considering the function or purpose of challenging behaviour when planning interventions (Cooper et al., 2007; Gresham, 2004). As with ABA, the positive behavioural support model is rooted in operant conditioning theory. An essential aspect of this theory is that most behaviours, either adaptive or maladaptive, are purposeful and maintained by environmental conditions that function to increase their likelihood of occurrence (Skinner, 1938; 1953). In other words, behaviours are functional or outcome-focused; knowledge of the outcome being sought by the individual provides key information on how to effectively increase or decrease the behaviour.

Skinner proposed that most human behaviour is maintained by two specific functions or types of reinforcement: positive and negative reinforcement. Positive reinforcement entails the presentation of a desired stimulus (e.g., praise, access to a tangible reward) following a behavior; negative reinforcement involves the removal of an unpleasant or undesired stimulus (e.g., a challenging task) following a response. According to operant theory, individuals are more likely to engage in behaviours that lead to positive outcomes and that allow them to avoid unpleasant
outcomes (both types of reinforcement increase the future probability that the individual will repeat the behavior).

Children exhibit various forms of behavior to access positive reinforcers. Typical reinforcers include gaining attention or reactions from peers or adults, acquiring something tangible (e.g., a desired item or activity), or fulfilling a sensory need (e.g., visual, auditory, kinesthetic or neurochemical stimulation). In other circumstances, behaviors are used to access negative reinforcement, that is, to escape or avoid something aversive or undesired. For example, individuals may engage in challenging behaviors to avoid a difficult task or escape from encounters with unfamiliar peers. If the behaviors succeed in gaining access to the desired circumstance or provide relief from the undesired ones, these behaviors are more likely to occur again in the future.

Assessing the functions of challenging behaviors for treatment purposes is now considered best practice and is an essential component of most positive behavioural support plans (Gresham, 2004; Sugai & Horner, 2009; Sugai et al., 2000). Functional assessment involves gathering information from various sources such as direct manipulations, regular observations with data collection, interviews, and questionnaires to determine functional relations between variables (Gresham, 2004; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982). Within the field of ABA, a functional relationship is assumed when a specific antecedent or consequence consistently follows the behavior in question, and other antecedents or consequences occur much less frequently in association with that response. Based on the results of a functional assessment, interventions can be designed that eliminate consequences that maintain challenging behaviours, and introduce teaching and reinforcement for prosocial alternative behaviours. In addition to these functional strategies, positive behaviour support
plans commonly include antecedent techniques, that is, alteration of conditions that commonly occur before or concurrent with behaviours as a means of increasing or decreasing the probability of these responses (Cooper et al., 2007; Horner et al., 2002; Horner, Vaughn, Day & Ard, 1996; Kern & Clemens, 2007). Through use of this range of procedures, the need for decelerative consequences for managing challenging behaviour is often eliminated or substantially decreased (Carr et al., 1999; Cooper et al., 2007; National Research Council, 2001).

ABA and positive behavioural support strategies have been used with a variety of populations, including individuals with ASD, developmental disabilities, attention deficit hyperactivity disorders, and emotional or behavioural disorders. Challenging behaviours such as aggression, self-injury, and stereotypic behavior have been successfully treated; academic, social, communicative and other prosocial skills have been enhanced through these interventions (Carr et al., 2002; Cooper et al., 2007; Didden, Duker & Korzilius, 1997; Didden, Korzilius, van Oorsouw & Sturmey, 2006; Marquis et al., 2000; National Autism Center, 2009; National Research Council, 2001; Scotti, Evans, Meyer & Walker, 1991; Sugai et al., 2000). The effectiveness of ABA and positive behavioural interventions has been based mostly on single subject experimental designs though there is an increasing number of between group studies (Carr et al., 1999; Cooper et al., 2007; Didden et al, 1997; Didden et al., 2006; Horner, Carr, Strain, Todd & Reed, 2002; Lundervold & Bourland, 1988; National Research Council, 2001; Weisz, Weiss, Han, Granger, & Morton, 1995). Specifically, most group design research and recent randomized controlled trials (RCTs) have involved evaluation of comprehensive ABA curriculums for children with ASD (Dawson et al., 2010; Odom et al., 2010; Reichow and Wolery, 2009). While ABA and positive behavioural approaches have been demonstrated effective in the short-term when properly implemented, the intensity, duration and generalization
of intervention is often not documented (Carr et al., 1999; Car et al., 2002; Didden et al., 1997; 2006; National Research Council, 2001; Scotti et al., 1991). Moreover, it is unclear which behavioural interventions are more efficacious than others, as most studies compare an intervention to practice as usual (Odom et al., 2010; Kasari & Smith, 2013; Lord et al., 2005). As such, RCTs are required to help identify the most effective behavioural interventions and to produce population based evidence. It may be useful to note, however, that most behavioural intervention studies have been conducted in real-life settings and are grounded in experimentally rigorous technology (Carr et al., 2002; Horner et al., 2005), ensuring that outcomes are both clinically, and not just experimentally significant. More recently, some reviews have focused on meta-analysis of single-subject studies, a strategy that can help to pool and document the most effective behavioural interventions for specific populations and problems (Bellini, Peters, Benner, & Hopf, 2007; Campbell, 2003; Didden et al., 1997; 2006; Gresham, Sugai, & Horner, 2001; Marquis et al., 2000; Parker, Hagan-Burke & Vannest, 2007; Scotti et al., 1991).

1.2.2 Applied Behavioural Analysis and Autism Spectrum Disorders.

Many researchers have concluded that ABA is the most empirically supported intervention for children with ASD who have challenging behaviours (Harrower & Dunlap, 2001; Horner et al., 2002; Koegel et al., 2011; Machalicek, O’Reilly, Beretvas, Sigafoos & Lancioni, 2007; National Autism Center, 2009; National Research Council, 2001). In the pioneering work of Lovaas (1987), he demonstrated that ABA techniques, including discrete trials training (e.g., teaching specific skills through repeated trials and intensive reinforcement), resulted in substantial improvements in behavioural outcomes for children with ASD. Moreover, recent literature reviews have noted the benefits of combining multiple ABA techniques such as discrete trials training, incidental teaching (e.g., utilizing “teachable moments” within the child’s
environment to provide instruction based on the child’s interests and motivation) and task analysis (e.g., breaking a task down into a sequence of smaller steps or actions) into comprehensive and intensive programs for children with ASD (Odom et al., 2010; Reichow & Wolery, 2009). Consensus panels (National Research Centre, 2009; National Research Council, 2001) based primarily on single subject and group design research evidence have identified two empirically validated comprehensive programs for children with ASD that are based on ABA principles and procedures: 1) Early Intensive Behavioural Intervention (EIBI), and 2) Pivotal Response Treatment (PRT). EIBI is focused on teaching discrete skills through repeated trials with pre-school children whereas PRT provides opportunities for children to learn within natural environmental settings such as school and home settings by targeting four pivotal areas (i.e., motivation, self-management, self-initiation, and joint attention/responsiveness to multiple cues). In their meta-analysis of EIBI studies, Reichow and Wolery (2009) conclude that, for many children with ASD, EIBI has been effective for improving adaptive behaviours, expressive and receptive language, and to some extent verbal IQ scores. The findings of the moderator analysis suggest better improvements when there is a well trained supervisor, long duration and intensive hours of therapy. Similarly, PRT has been identified as an established intervention for children with ASD ranging in age from 3 to 9 years (Koegel & Koegel, 2006; National Autism Centre, 2009).

1.3 School-Based Behavioural Interventions for Students with Autism Spectrum Disorders

There are several advantages to conducting ASD treatment programs in the school, including the potential for intensity of intervention throughout the school day, availability of peers for the development of social skills and the opportunity to teach school-based skills in the natural environment, thus promoting greater generalization and spontaneous use of skills learned
(Gresham et al., 2001; 2004; Lord & Bishop, 2010). Moreover, consensus panels suggest that when communication, social skills, and behavioural deficits associated with ASD are addressed in natural environments such as the school, children gain even greater benefit from early diagnosis and treatment (National Autism Center, 2009; National Research Council, 2001). As with other interventions for this population, school-based approaches for students with ASD that have the greatest empirical support are based on ABA principles and procedures (Machalicek et al., 2007; Koegel et al., 2011; National Autism Center, 2009). The National Standards project (2009) as well as a literature review conducted by Machalicek and colleagues (2007) have identified a number of evidence based educational interventions for children with ASD. Specific interventions include antecedent strategies (e.g., prompting, priming, high probability requests), discrete trial training, functional communication training, differential reinforcement, self-management, Pivotal Response Training, video modeling, and various peer mediated interventions, among others.

1.3.1 Classroom Placements for Students with Autism Spectrum Disorders

There are contradicting views and evidence regarding whether self-contained classrooms (those focused exclusively on students with ASD) or inclusive general classrooms (those having students with ASD integrated with others) provide the best environment for effective intervention. Research conducted in the United States found that children with ASD in self-contained classrooms typically have lower cognitive scores (hereafter referred to as IQ) and greater symptom severity (e.g., communication deficits and repetitive behaviours) (White, Scahill, Klin, Koenig & Volkmar, 2007), though this may not be representative of placement patterns in all North American schools. Decisions about educational placement in North America are often based on a wide variety of factors including notions about social justice, experiential
knowledge of practitioners, as well as practical, financial and parent/caregiver preferences and values (Parsons, Guldborg, MacLeod, Jones, Prunty & Balfe, 2011; Simpson et al., 2011). Both placement alternatives offer advantages and disadvantages.

Students with ASD with greater deficits (e.g., lower IQ and more severe forms of ASD symptoms) appear to be more likely to make gains when they are educated in special education classrooms using structured teaching (Panerai et al., 2009). Self-contained classroom settings allow for smaller class size, better trained teachers, and the provision of tailored programming to address their needs (Simpson et al., 2011). However, such settings offer little interaction with typically developing peers, thereby limiting modelling of and exposure to developmentally appropriate prosocial behaviour.

In general classrooms, children with ASD have been found to be more socially involved with peers and have larger friendship networks (Harrower & Dunlap, 2001; Robertson, Chamberlain & Kasari, 2003). In contrast, other studies have shown that they are often not well-accepted in these settings (Chamberlain, Kasari, & Rotheram-Fuller, 2007; Symes & Humphrey, 2011). In fact, studies have found higher rates of bullying with students with ASD in general classrooms (Wainsoct, Naylor, Sutcliffe, Tantam & Williams, 2008; Symes & Humphrey, 2011; van Roekel, Scholte, & Didden, 2010). Moreover, there have been few studies showing differences in achievement outcome between students with ASD in self-contained versus general classrooms (Simpson et al., 2011). Overall, there is insufficient research to recommend one of these placement options over the other for students with ASD; comparison research is required. It is interesting to note, however, that a recent review of school-based intervention strategies for improving challenging behaviours in students with ASD aged 3 to 21 found that the majority of
intervention studies are implemented in self-contained or pull-out special education classrooms with additional classroom support (Machalicek et al. 2007).

1.4 Positive Behavioural Supports in Schools

School Wide Positive Behavioural Support (SWPBS) is a framework that was designed to assist school personnel in the planning and implementation of evidence based interventions focused on improving behavioural and educational outcomes for students with diverse needs (Sugai et al., 2000). SWPBS is the most empirically validated approach used in the school system for enhancing prosocial skills and addressing a wide range of learning problems and challenging behaviours of students with and without special needs (Carr et al., 1999; Iovannone, Dunlap, Huber, & Kincaid, 2003; National Research Council, 2001; Sugai et al., 2000; Turnbull et al., 2002). The developers of SWPBS propose a three-tiered systems model of intervention in the schools that arranges interventions hierarchically from least to most intensive (Gresham, 2004).

1.4.1 Tier I: School-Wide Interventions. At the Tier I level, school-wide interventions target all students and are designed to prevent challenging behaviour and reduce the number of new cases of students with such difficulties. Some examples of strategies used by school staff at this level include posting clear expectations, noticing and rewarding prosocial behaviours, having clear and consistent disciplinary procedures, and providing assistive technology for all students. This level of support is purported to be effective with 80% of students who do not have serious behavioural difficulties (Sugai & Horner, 2002).

1.4.2 Tier II: Small Group or Class-Wide Interventions. Tier II level of support offers specialized small group or class-wide evidence-based interventions for the 15% of students with challenging behaviour who do not respond to school-wide interventions and are at high risk for
more serious challenging behaviour or school failure (Sugai & Horner, 2009). These students require more structured intervention practices, more frequent behaviour feedback, and more active supervision and monitoring (Sugai & Horner, 2009). According to Anderson and Borgmeier (2010), Tier II interventions include four key features: 1) explicit instruction of prosocial skills, 2) structured prompts for appropriate behaviour, 3) opportunities for the student to practice new skills in the natural setting, and 4) frequent feedback to the student.

1.4.3 Tier III: Individualized, Function-Based Interventions. Tier III addresses high risk students (about 5%) who have not responded to Tier I and II interventions. This level provides individualized functional assessment and intervention to reduce the frequency and intensity of their challenging behaviours (Sugai et al., 2000). As previously discussed, a functional assessment is conducted to gain an understanding of the function of the challenging behaviour and the triggering antecedents, thereby providing the information needed to design a more intensive and tailored intervention (Gresham, 2004). Additional support staff may be included in the assessment and intervention process to achieve the identified intervention goals, such as other school staff, school psychologists, speech pathologists, behavioural therapists, and parents.

1.4.4 Concerns with Functional Assessment in Schools.

While functional behavioural assessment is useful for identifying contextual variables that maintain challenging behaviour and developing an effective intervention, implementing this strategy in complex settings such as schools is difficult (Ducharme & Shecter, 2011). Functional assessment may require substantial time and a high level of expertise from teachers, requiring them to devote extensive resources and attention to a small number of students with the most severe needs (Johnston & O’Neill, 2001; Matson & Minshawi, 2007). Another concern with
functional assessment is the complex and multiple contingencies maintaining some behaviours that make it difficult to isolate individual functions. Moreover, there is some preliminary evidence that functional assessment may not be essential for children with various disabilities. For example, Gresham’s (2004) comparative review of the effectiveness of interventions based on functional behaviour assessment of individuals with developmental disabilities found that such assessments made little difference on outcomes. Similarly, a review conducted by Machalicek et al. (2007) examined intervention research conducted in school settings for students with ASD and challenging behaviours. The authors determined that although 13 out of 27 studies reviewed did not include a functional assessment prior to developing interventions, most of these interventions (73%) reported equally positive findings. Notwithstanding the benefits of conducting functional assessments for implementing individualized behaviour interventions, more cost effective and efficient forms of proactive behavioural management are required in schools to meet the support needs of students with ASD.

1.4.5 School Wide Positive Behavioural Support and Autism Spectrum Disorders.

Examination of the literature indicates that the majority of school intervention research conducted with students with ASD is at the individual or Tier III level (Harrower & Dunlap, 2002; Horner et al., 2002; Koegel et al., 2011; Lord et al., 2005; Machalicek et al., 2007). In contrast, there is a paucity of research on Tier 1 and Tier II intervention with this population (Koegel, Robinson & Koegel, 2009; Doehring & Winterling, 2011; Neitzel, 2010; Odom et al., 2010; Snell, 2006; Turnbull et al., 2002). Further, some Tier 1 or Tier II intervention studies have been conducted by researchers instead of by teachers and paraprofessionals thus limiting the generalizability of the findings (Crosland & Dunlap, 2012; Machalicek et al., 2007). It should be noted that, although comprehensive classroom interventions are often required for students
with ASD, there are concerns regarding their implementation. These approaches can be complicated, time consuming and demanding, requiring significant training and investment of time and resources (Kasari & Smith, 2013; Smith et al., 2007). Moreover, the fidelity of implementation of a comprehensive intervention can be compromised due to multiple components, poor fit within the classroom, and limited acceptance and endorsement by teachers (Kasari & Smith, 2013; Smith et al., 2007).

Thus, while students with ASD could benefit from supports and interventions at all three tiers, there is currently a need for effective and efficient class-wide interventions (Koegel et al., 2011; Simpson et al., 2011). Although clinical researchers have developed several effective behavioural practices for students with ASD (National Autism Center, 2009; National Research Council; 2001; Simpson et al., 2005), there is not yet a clear best practice approach for the provision of comprehensive class-wide interventions for these students (Kasari & Smith, 2013; Koegel et al., 2011; Machalicek et al., 2007; Olley, 1999; Simpson et al., 2011; Wilczynski, Menousek, Hunter & Mudgal, 2007).

1.5 Teacher and Classroom Support Staff Training in Classroom Behaviour Management

Classroom management refers to the actions taken by the teacher to create and maintain an environment that supports and facilitates meaningful teaching and learning in the classroom (Brophy, 2006). Classroom management can include strategies for organizing the physical environment, establishing relationships and facilitating interactions, planning and conducting instruction, maintaining order, motivating students, keeping them on task, and developing rules and procedures so that students know what to do. Effective classroom management practices are critical to student outcomes, including academic learning, prosocial behaviour, and social-
emotional well-being (Brophy, 2006; Somersalo, Solantaus, & Almqvist, 2002; Machalicek et al., 2007; Webster-Stratton, Reid, & Stoolmiller, 2008).

Managing students’ challenging behaviours is one of the most difficult aspects of the job for many teachers (Hardman & Smith, 2003; Kyriacou, 2001). These classroom management difficulties are a major cause of stress, burnout, job dissatisfaction and attrition (Clunies-Ross, Little, & Kienhuis, 2008; Geving, 2007; Hastings & Bham, 2003; Kyriacou, 2001). Teacher stress can result in teachers defaulting to reactive, harsher disciplinary strategies (Clunies-Ross et al., 2008; Infantino & Little, 2005; Maag, 2001). Classroom challenging behaviour also interferes with teaching time (Little, Hudson, & Wilks, 2002). However, most teachers do not have adequate pre-service training in effective classroom management (Barrett & Davis, 1995; Wubbels, 2011).

In addition, special education preparation for teachers is often inadequate (Oliver & Reschly, 2010; Simpson et al., 2011). Special education training is often broad and typically does not include disability-specific field experience or course work (Cooley-Nichols, 2004; Leblanc, Richardson & Burns, 2009; Simpson et al., 2011). Special education teachers who work with students with ASD have reported higher levels of emotional burnout in the face of managing challenging behaviours (Hastings & Brown, 2002; Simpson, De Boer-Ott, & Smith-Myles, 2003).

Teachers often receive little formal pre-service or in-service instruction in classroom management and empirically supported intervention strategies for students with ASD (Lang et al., 2010; Leblanc et al., 2009; National Research Council, 2001; Rispoli, Neely, Lang & Ganz, 2011; Simpson et al., 2011). For the minority of teachers who do receive such training, they have been found to blend researched and non-researched behavioural strategies and/or make
significant modifications and adaptations to empirically based programs, resulting in inadequate treatments (Dillenburger, 2011; Hess, Morrier, Heflin & Ivey, 2008; Kasari & Smith, 2013; Stahmer, Collings, & Palinkas, 2005). An additional concern is that special education teachers often choose strategies based on non-scientific factors, including their values, beliefs and needs, resulting in a disconnect between best practice guidelines and current reported classroom practice (Boardman, Arguelles, Vaughn, Hughes & Klingner, 2005; Hess et al., 2008; Simpson et al., 2011).

Given the common need for teacher support in managing children with disabilities, paraprofessionals are commonly employed in the classroom. Paraprofessionals include teaching or educational assistants as well as child and youth workers and can assist teachers in the classroom in a variety of ways (Rispoli et al., 2011). Giangreco and colleagues (2001) noted the increasing reliance on paraprofessionals to support students with the most complex needs, including students with ASD in school settings. Unfortunately, paraprofessionals are often even less prepared than teachers to be effective with students in the classroom and the requirements to become one vary widely (Carter, O’Rourke, Sisco & Pelsue, 2009; Giangreco et al., 2001; Giangreco, Suter & Doyle, 2010; Hilton & Gerlach, 1997). Katsiyannis, Hodge and Lanford (2000) found that most paraprofessionals begin their jobs with little formal training in behaviour management and continue to work with limited knowledge, skill and support in this area. This is particularly problematic because paraprofessionals often assume the majority of responsibility over the instructional and behavioural management of students with disabilities, particularly in inclusive classroom settings (Giangreco & Broer, 2005; Giangreco et al., 2001). Despite these concerns, evidence suggests that well-trained paraprofessionals can have a positive impact on student functioning (Giangreco, Edelman, Broer, & Doyle, 2001; Giangreco et al., 2010; Rispoli,
Neely, Lang & Ganz, 2011; Robinson, 2011). For the remainder of this paper the term “classroom support staff” will be used to refer to paraprofessionals hired to assist teachers.

1.5.1 Reactive Classroom Management.

Without adequate training and knowledge of effective interventions, teachers and classroom support staff commonly resort to reactive approaches to classroom management that focus on immediately terminating challenging behaviour through aversive consequences (Clunies-Ross et al., 2008; Ducharme & Shecter, 2011; Maag, 2001). Teachers often use verbal reprimands, negative stares, time-outs, and response-cost (i.e., losing points or privileges) to suppress challenging behaviour (Little & Akin-Little, 2008; Reupurt & Woodcock, 2011). While these reactive strategies are easy to use and can serve to terminate the behaviour (Maag, 2001), they are associated with the same disadvantages and negative side effects of punishment procedures previously discussed. There is a critical need for training in proactive and positive classroom behaviour management practices for teachers and classroom support staff, especially those approaches that produce broad ranging effects on student functioning (Koegel et al., 2011; National Research Centre, 2009).

1.6 A Keystone Approach to Classroom Intervention

A keystone behaviour or skill is one that, once acquired, has a positive effect on other behaviours not directly targeted for intervention (Barnett, Bauer, Ehrhardt, Lentz, & Stollar, 1996). In particular, the teaching of keystone skills to children with conduct difficulties often results in substantial reduction of challenging behaviour in conjunction with other positive outcomes (Ducharme & Shecter, 2011). This change process has also been described in the behavioural literature as response covariation, a concept that denotes changes in the frequency of one behaviour that occurs in conjunction with changes in the frequency of another (Barnett et al.,
One possible explanation for response covariation is the related concept of functional equivalence; that is, when the frequency of a behaviour is altered through changes in the function or outcomes provided for that response, other behaviours that are maintained by that same function will also change in frequency (Carr, 1988; Ducharme, 2000; Ducharme & Shecter, 2011).

For example, most challenging behavioural responses serve a function for the student, such as to gain attention from a teacher or to access escape from a difficult task. When students are taught prosocial responses that serve the same function (e.g., attention or escape), the challenging responses typically decrease, as they are no longer necessary to gain access to classroom needs. In fact, functional communication training (FCT; Carr and Durand, 1985), one of the most empirically supported interventions for challenging behaviour, is based on the concepts of functional equivalence and response covariation. With this approach, children are taught communicative responses that serve the same function as challenging behaviour, thereby rendering the problem responses unnecessary. For example, a child who has learned to tantrum to obtain attention from the teacher could be taught to say “Please talk to me” or “Look what I did” to replace his challenging behaviour (Carr & Durand, 1985; Luselli, 2009).

While there are many potential keystone skills, there are some that are most relevant to school settings. Ducharme and Shecter (2011) proposed a keystone conceptualization that includes four specific keystones as a potential curriculum for proactive classroom management. Within the keystone model, a student’s success is contingent upon his or her ability to manage three points of interface with the classroom environment: 1) the teacher, 2) peers, and 3) the curriculum (See Figure 1). First, the keystone behaviour of compliance allows effective and productive interactions with the teacher. Another keystone, acquiescence (a sub-skill of social
skills), ensures that students are able to interrelate with peers in a manner that is flexible and mutually rewarding (see discussion to follow). The keystone of on-task skills allows students to take on curriculum requirements with effort and perseverance, ensuring academic achievement. Finally, keystone communication skills override all others, ensuring that students have an effective means of expressing their needs, accessing positive attention, relating their feelings, asking for help, conversing with others, and managing the three points of interface just described.

Figure 1. The keystone model for Proactive Classroom Management. From Ducharme & Shecter (2011).

The specific sub-skill of acquiescence is taught to teach a range of social skills for intervention.

Thus, teaching students the core skills of compliance, acquiescence, on-task behaviour and communication may have the potential to lead to a broad range of positive outcomes for students. A likely benefit of this approach is the reduced need for reactive or punitive strategies to decrease challenging behaviour (Conn Krieger, 2013; Cooper et al., 2007; Ducharme &
Shecter, 2011; Lerman & Vorndran, 2002), given that such problem responses are indirectly reduced through a focus on core replacement skills. Additionally, the model was designed to decrease the need for functional assessment. Although keystone strategies are informed by an understanding of behavioural functions, they do not typically require a formal assessment of the specific outcomes of challenging behaviour. Teaching keystone skills to children may provide an efficient and practical alternative approach to classroom intervention that requires less training and financial resources than other classroom intervention strategies (Ducharme & Shecter, 2011). A review of the literature shows that for each of these four keystone skills, there is at least preliminary evidence of collateral positive changes in other behaviours when they are targeted individually in children with a diagnosis of ASD.

1.6.1 Compliance. Compliance refers to the performance of an action, or the termination of an action, at the request of authority figures, such as teachers and classroom support staff. It is an important skill because compliance with teachers or classroom staff is essential for student learning and supportive staff-student relationships. Research has shown that compliance is a keystone skill; improvements in compliance often result in a broad range of other behavioural improvements (Ducharme & Shecter, 2011). For example, in one study, Ducharme and Ng (2012) implemented a proactive intervention approach called errorless academic compliance training with the goal of improving student compliance with academic and tabletop activities among three elementary students with ASD in a classroom setting (the errorless concept will be discussed in further detail in section 1.7 on Errorless Remediation). In addition to increased compliance to academic requests, collateral improvements in on-task responding and reductions in disruptive and aggressive behaviour occurred. A similar pattern of results was demonstrated in a study in which parents implemented errorless compliance training in their homes with their
children with ASD (Ducharme & Drain, 2004). In other studies in which compliance of children and adolescents with ASD was increased through training and reinforcement, problem behaviours such as aggression and self-injury were reduced (Horner, Day, Sprague, O’Brien & Heathfield, 1991; Luiselli, 2010; Wilder, Saulnier, Beavers & Zonnevold, 2008).

1.6.2 Social skills. Social skills can be defined as a range of interactive behaviours that enable an individual to relate with others in ways that result in positive interactions (Gresham & Elliot, 1995). As noted earlier, impairment in social skills is a central feature of ASD (APA, 2000; 2013); individuals with ASD have difficulty establishing and maintaining relationships with others. A few examples of the most common social skills deficits among individuals with ASD include initiating and sustaining interactions, taking turns, perseveration on topics or activities, identifying and interpreting emotions, and taking another’s perspective (Koegel et al., 2011; Reichow & Volkmar, 2010; Welsh, Park, Widaman & O’Neil, 2001). Besides impacting opportunities to interact and learn, such social skill deficits may lead to emotional difficulties due to social isolation, teasing, and bullying (Montes & Halterman, 2007). Reviews of the literature indicate that teaching children with ASD replacement social skills can result in reductions in challenging behaviours and stereotypic responding (Bellini et al., 2007; Luiselli, 2010; Reichow & Volkmar, 2010). Moreover, focusing on social skills can lead to concomitant positive side effects in other areas, including improvements in joint attention, play skills and academic engagement for children with ASD (Bellini et al., 2007; Machalicek et al., 2007; Rao, Beidel, & Murray, 2008; Reichow & Volkmar, 2010; Williams, Koenig & Scahill, 2007).

Acquiescence as a keystone social skill. Given that most social skills training programs require extensive training and time commitment to teach the broad range of skills that students need to function effectively with peers, Ducharme and colleagues (2008) proposed that the social
skill of *acquiescence* could potentially serve as a keystone for peer social interaction. They defined *acquiescence* as “the ability to give in to or flex with the needs and wants of other children” when it is appropriate to do so to promote positive peer interactions. A student needs to learn to manage everyday peer interactions by acquiescing or flexing when a peer asks him/her to share a toy, take a turn on a computer, or when he/she needs to tolerate a minor imposition from another without demonstrations of anger or aggression. Note that this definition is not meant to include acquiescing when it is more socially appropriate to demonstrate assertion (e.g., another student asks if he can have the target child’s snack or tries to take it). In such situations, students must be taught to stand up for themselves. Initial research targeting acquiescence in children with behavioural disorders suggests that this skill can lead not only to gains in social flexibility, but also to collateral changes in untargeted areas, including increases in other prosocial behaviours and reductions in antisocial behaviours (Ducharme & Conn, 2007; Ducharme, Folino, & DeRosie, 2008). To date, no studies have examined the effects of acquiescence intervention on children with ASD. However, given that children with ASD are often characterized as cognitively inflexible, targeting the sub-skill of *acquiescence* for intervention may be particularly useful for this population (Koegel et al., 2011; Simpson, 2008). As such, acquiescence training will be the primary focus for teaching social skills to students with ASD in this study.

**1.6.3 On-task behavior.** On-task behaviour refers to the ability of a child to actively engage in academic tasks, a skill that is essential to learning and academic achievement (Ducharme & Shecter, 2011). Targeting on-task skills can lead to covariant increases in academic performance and reductions in problem behaviour (Ducharme & Shecter, 2011). With respect to ASD students, several studies have demonstrated improvements in independent
academic functioning, social skills and problem behaviour with the use of on-task and self-management interventions (Callahan & Rademacher, 1999; Ducharme, Lucas & Pontes, 1994; Lee, Simpson & Shogren, 2007; Pelios, MacDuff, Axelrod, 2003; Mancina, Tankersely, Kampaus, Kravits & Parrett, 2000). These findings are noteworthy given the difficulties with attention, concentration and behavioural regulation commonly experienced by children with ASD (Gjevik et al., 2011; Holtmann, Bolte, & Poustka, 2007; Koegel & Koegel, 2006).

1.6.4 Communication skills. Communication refers to the ability of a child to interact with others using words, gestures or other means to express wants, needs, and feelings. The majority of children with ASD have some difficulty with receptive and expressive language, as well as communicating nonverbally using hand gestures, eye contact, and facial expressions. These deficits interfere with opportunities for play, socialization with peers and classroom staff, academic achievement, and integration in the school setting (Prelock, Paul & Allen, 2011). Many children who struggle with communication, including those with ASD, may engage in challenging behaviour as a means of conveying their needs and achieving desired outcomes (Sigafoos, Arthur-Kelly, & Butterfield, 2006; Sigafoos, Arthur & O’Reilly, 2003).

A large body of evidence has shown that interventions focused on improving communication skills in children with and without ASD are effective in decreasing challenging behaviours (e.g., Carr & Durand, 1985; Charlop-Christy, Carpeneter, LeBlanc & Kellet, 2002; Mancil, Conroy, Nakao & Alter, 2006; Prelock et al., 2011). Additional collateral effects for children with ASD include gains in joint attention, eye contact, and positive affect (Prelock et al., 2011; Whalen, Schreibman & Ingersoll, 2006). It is noteworthy that the National Autism Center (2009) has endorsed functional communication training (FCT) as an established intervention and the Picture Exchange Communication System (PECS; communicate a need by exchanging a card
with a picture on it) as an emerging established intervention for individuals with ASD. Given the prevalence of communication deficits in children with ASD, several researchers have recommended that school-based interventions incorporate communication skills as part of their general intervention approaches (Koegel et al., 2011; Machalicek et al., 2007; Simpson et al., 2011).

1.7 Errorless Remediation

Errorless remediation is a proactive intervention approach designed to improve prosocial behaviours and reduce challenging behaviours (Ducharme, 2008). The approach is based on the same principles as those used in errorless discrimination learning, a teaching strategy that is designed to reduce substantially the number of errors an individual makes when learning (Terrace, 1963). In errorless learning, individuals are initially provided with prompts that ensure correct discriminations. Over time, prompts are faded at a slow enough rate that errors do not occur, until eventually the correct response is made without prompt support (Ducharme, 2008; Terrace, 1963). With errorless remediation, which bears a conceptual similarity to errorless discrimination procedures, various support strategies (e.g., prompting, priming, high probability requests) are used in the beginning of intervention to help the individual manage difficult situations that commonly lead to challenging behaviours. These support strategies are systematically reduced over time as the individual gradually builds tolerance to the demands of the environment (Ducharme, 2008). This process typically leads to a substantial reduction of challenging behaviour.

There is evidence that errorless remediation strategies are an effective approach for reducing challenging behaviours of children with ASD (e.g., Ducharme & Drain, 2004; Ducharme, Lucas, & Pontes, 1994; Ducharme, Sanjuan, & Drain, 2007; Green, 2001; National
Research Center, 2009; National Research Council, 2001) as well as with children with developmental disabilities (e.g., Ducharme, Di Padova, & Ashworth, 2010; Ducharme & DiAdamo, 2005; Ducharme, Harris, Milligan, & Pontes, 2003) and behavioural disorders (e.g., Ducharme, Folino, & DeRosie, 2008; Ducharme & Harris, 2005; Folino, Ducharme, & Conn, 2008). There is also preliminary evidence that errorless techniques can be effective for individualized treatment in special education and day treatment classrooms for students diagnosed with Autism Spectrum Disorders, Down Syndrome, Attention Deficit Hyperactivity Disorder, and Oppositional Defiant Disorder from Junior Kindergarten to Grade 4 (e.g., Ducharme & DiAdamo, 2005; Ducharme & Harris, 2005; Ducharme & Ng, 2012; Folino et al., 2008).

1.8 Errorless Classroom Management: A Proposed Model for Use with Students with Autism Spectrum Disorders

Errorless strategies have recently been adapted for use in school settings at a class-wide level in both general and special education classrooms (Grades 1 to 8) (Conn Krieger, 2013; Ducharme, 2007; Ducharme & Shecter, 2011; De Sa Maini & Ducharme, 2014). Ducharme (2007) developed Errorless Classroom Management (ECM) as a proactive behaviour management model for classroom intervention. The approach involves teacher emphasis on teaching keystone skills (i.e., compliance, acquiescence, on-task behaviour, and communication skills) in an errorless manner (i.e., with intensive supports that are gradually faded as the skill is learned). ECM can be classified as a Tier II intervention because it adheres to the four essential features of this level of intervention (explicit instruction of prosocial skills, structured prompts for appropriate behaviour, opportunities to practice new skills, and frequent feedback to the student) (Anderson & Borgmeier, 2010). Further, it includes essential strategies for fading
antecedent support and reinforcement as students gain new skills. Preliminary findings for ECM on student and classroom staff outcomes are encouraging (Conn Krieger, 2013; De Sa Maini & Ducharme, 2014). For example, the De Sa Maini and Ducharme (2014) study found substantial increases in teacher use of proactive classroom management strategies following ECM. Both the De Sa Maini and Ducharme (2014) and Conn Krieger (2013) studies found reductions in teacher use of reactive strategies following ECM. Additionally, decreases in student challenging behaviours (e.g., verbal and physical aggression, disruptive behaviour, and off-task behaviour) were demonstrated in each study. However, it is important to note that, although errorless approaches have been used effectively with children with ASD (Drain, 2011; Ducharme & Drain, 2004; Ducharme & Ng, 2012; Ducharme, Sanjuan & Drain, 2007), ECM has not yet been evaluated with this population. With the ECM approach, teachers and classroom support staff are trained to use a conceptual framework comprised of three categories of procedures: 1) providing supports to moderate or reduce challenging behaviour, 2) reinforcing keystone skills, and 3) gradually reducing supports while increasing demand (Ducharme, 2007).

1.8.1 Providing supports to moderate or reduce challenging behaviours. To reduce challenging behaviours, teachers and classroom staff can deliver moderating strategies to students. Moderating strategies are supportive techniques that teachers and classroom staff use in the beginning stages of ECM to allow students to achieve success in managing aversive or difficult classroom circumstances. Classroom staff can use three categories of moderating strategies: 1) antecedent strategies, 2) ecological strategies, and 3) rapport building strategies (Ducharme, 2007).

Antecedent strategies. Most challenging behaviour in the classroom occurs in the presence of specific events, such as teacher requests, academic demands, transitions, or
termination of desirable activities (Ducharme, 2007; 2008; Kern & Clemens, 2007). As noted earlier, this challenging behaviour may reflect an attempt to escape or avoid difficult situations (e.g., working on an academic task) or to gain access to more pleasant circumstances (e.g., access to computer time, or attention from a favourite classroom staff). One strategy for improving student conduct is to alter antecedent conditions that typically lead to challenging behaviours, typically through the use of antecedent supports that allow students to successfully manage classroom challenges. These include curriculum modifications (e.g., embedding preferred topics or items into academic instructions and activities, reducing task demand or duration, using assistive technology), environmental modifications (e.g., creating quiet or calming areas, minimizing visual and auditory distractions), priming (providing preparatory information about upcoming circumstances or transitions), prompting (providing verbal and visual cues), issuing high probability requests (asking a student to perform something easy such as “get a snack” to create cooperative momentum), and offering choices (Ducharme, 2007; Renshaw & Kuriakose, 2011).

**Ecological strategies.** Ecological factors include emotional and biological conditions that affect challenging behavior (Carter & Driscoll, 2007; Ducharme, 2008). They are commonly distal to the problem response and therefore less observable to classroom staff. In the emotional domain, factors outside of the classroom such as abuse, family conflict, parental divorce, bullying, a move, a family death, and poverty can have a substantial impact on student behaviour. In the biological domain, hunger, fatigue, allergies, medication side effects, sensory impairments, psychiatric conditions, and pain or medical conditions can have a similar negative effect on a child’s behaviour. Moreover, children with ASD may be particularly sensitive to certain environmental stimuli such as noise, overcrowding, lighting, and temperature (Simpson,
These ecological factors can make typical demands in the classroom more difficult for students to manage, rendering them more likely to use challenging behaviour to escape unpleasant classroom conditions (Ducharme, 2007; Horner, Vaughn, Day & Ard, 1996).

Simple ecological strategies can often be used to minimize the effects of many of these biological and emotional factors on the behavioural repertoire of students (e.g., provide a hungry student with a snack or headphones to a student who is bothered by the noise levels). Classroom staff can also use previously mentioned moderating strategies to decrease student stress levels. For instance, the provision of extra assistance or reduction of task demands when a student is tired or not feeling well can help reduce distress and challenging behaviour.

Moreover, children with ASD may be unable to communicate their distress related to ecological factors to classroom staff due to impairments in communication and self-awareness. This makes it important for classroom staff to have ongoing communication with caregivers to gather information about ecological factors potentially contributing to challenging behaviours (Ducharme, 2007; Kasari & Smith, 2013; Koegel et al., 2011). For example, a poor night’s sleep could result in more frequent escape motivated non-compliance to academic tasks, given that demanding tasks are often more aversive when the child is fatigued (O’Reilly, 1995); a teacher with knowledge of this can make required classroom modifications.

**Rapport strategies.** Building a warm, fun, and caring relationship with students is often the most critical strategy classroom staff can implement to change student behaviours in the classroom (Ducharme, 2007; 2008; Pianta, 1999; Pianta, 2006). The beneficial effects of positive teacher-student interactions are myriad and include establishing the classroom staff as a potent source of reinforcement, thereby increasing the likelihood that students will cooperate and work harder on academic tasks (Levine & Ducharme, 2013). When students have warm relationships
with their teachers, they are more likely to share their difficulties, obtain support, and build effective social skills, which are particularly important for children with ASD (Abidin, Greene & Konold, 2004; Ducharme, 2007; Levine & Ducharme, 2013). Classroom staff can develop rapport with their students by providing warm and personal daily greetings (Allday & Pakurar, 2007), engaging in pleasant conversation, making positive remarks, collaborating in a shared activity, and making empathic statements when students show signs of distress (Ducharme, 2008).

**1.8.2 Reinforcing keystone skills.** Teachers and classroom staff can encourage and increase students’ prosocial responding by noticing and consistently reinforcing keystone skills throughout the school day. For students with ASD, careful selection of reinforcers is important, given that they may be unresponsive to more traditional social rewards such as praise and attention from others (Williams, Johnson & Sukhodolsky, 2005). Classroom staff may need to make use of more tangible rewards and activities related to the student’s interests and may find that point or token systems can assist in ensuring that prosocial behaviours are consistently reinforced.

**1.8.3 Gradually reducing supports while increasing demand.** Once students are consistently demonstrating success in their use of some or all of the keystone skills, classroom staff need to gradually reduce moderating and reinforcement strategies in the classroom at a slow enough rate that challenging behaviours do not return. Fading of these support procedures is essential to the ECM approach as a means of ensuring that students learn to effectively manage and tolerate difficult classroom circumstances without the support of others (Ducharme, 2007).
1.9 Rationale and Hypotheses for the Current Study

The number of students with ASD in the public school system has increased over the past 20 years (Lord & Bishop, 2010; Maenner & Durkin, 2010; Simpson et al., 2011); these students present a unique challenge to the educational system. Research is needed to identify effective, efficient and socially valid Tier II interventions for use by teachers and classroom support staff to improve the quality of life of students with ASD (Koegel et al., 2011; Lang et al., 2010; Machalicek et al., 2007). Errorless classroom management with a focus on keystone skills may be a suitable curriculum to guide teachers and classroom support staff in class-wide intervention for students with ASD. The purpose of the present study was to determine the efficacy and feasibility of ECM in three specialized classrooms for students with ASD in public schools. In this paper, the term ‘efficacy’ refers to establishing whether functional relationships between our intervention and student and classroom staff outcomes exist (Horner et al., 2005). We used a single-subject experimental design to evaluate the intervention and systematically measured specific therapeutic effects with a small number of students with ASD and challenging behaviour. Teachers and classroom support staff were taught ECM strategies that involved noticing, supporting, and reinforcing the keystones of compliance, on-task skills, acquiescence, and communication skills. As previously noted, these particular keystone skills were deemed most relevant for classroom intervention given evidence of broad positive covariant effects when targeted for training (Ducharme & Shecter, 2011). Moreover, students with ASD typically display deficits in these same keystone areas (Koegel at al., 2011; Machalicek et al., 2007; Odom et al., 2010). A multiple baseline across classrooms design using time series observational measurement throughout the phases of intervention was used to examine the impact of ECM
intervention on classroom staff and student behaviour in three classrooms. Additionally, teacher report measures were used to examine intervention effects.

The specific research questions addressed by this study were:

1) Will ECM intervention result in a decrease in use of reactive classroom management strategies by classroom staff and an increase in their use of proactive classroom management strategies?

2) Will ECM intervention result in a decrease in the levels of stress of classroom staff?

3) a. Will ECM intervention result in reductions in student challenging behaviour?
   b. Will ECM intervention result in increases in prosocial student behaviour, including compliance and on-task skills?

4) Will ECM intervention result in maintenance of gains (4 or 5 months) beyond the intervention period in the subsequent school year?

5) Will ECM intervention lead to high satisfaction and acceptability ratings by participating classroom staff?
Chapter 2: Method

The purpose of this study was to examine the efficacy and impact of ECM intervention on both student and classroom staff outcomes. The intervention was implemented across three classrooms using a multiple baseline across classrooms design. Data were collected through classroom observations of classroom staff skill implementation (3 teachers and 2 classroom support staff) and student behaviour (7 target students). Pre and post standardized teacher measures were used as supplemental measures to evaluate the intervention. This chapter provides a description of the methodology used for the current study and includes an overview of the classroom settings, participants, research design, dependent measures (observational and standardized measures), the ECM training workshop, data collection procedures, inter-observer agreement, and analyses.

2.1 Classroom Settings

This study was conducted in two schools in the Toronto District School Board (TDSB). Ethics approval for this project was granted by the Office of Research Ethics of the University of Toronto as well as the External Research Review Committee of the TDSB. A total of three self-contained special education classrooms designed for students with Autism Spectrum Disorders (ASD) and classified as Autism Intensive Support Programs (A-ISP) participated in the study. Classroom admission criteria for the A-ISP program are as follows: 1) the student is assessed as having average thinking and reasoning abilities, 2) the student has been diagnosed with ASD based on the DSM-IV-TR criteria by a qualified professional (See Table 2 for diagnoses specific to each student participant), 3) the student shows evidence of social, communication and behavioural difficulties, and 4) the student has been previously identified with a “Communications/Autism” exceptionality by an Identification Placement and Review
Committee at the TDSB. It is notable that these ASD self-contained classroom criteria differ markedly from those described earlier in White et al. (2007) in which they indicated that students in such classrooms typically have lower IQ.

At School 1, two special education classrooms specifically designed for students with ASD participated. The first classroom to receive ECM in our study design was composed of six students from Grades 3 to 5 (e.g., ages 7 to 11), one special education teacher, three child and youth workers, and one special education assistant. The second classroom was composed of five students in Grades 1 to 3 (e.g., ages 6 to 8), one special education teacher, one child and youth worker and one special education assistant. The third ASD classroom was located at School 2; it was composed of seven students in Grades 6 to 8 (e.g., ages 11 to 14) with ASD along with one special education teacher, two child and youth workers, and one special education assistant. In the first two elementary classrooms, students spent the majority of their day in the self-contained classrooms, although they joined the other students for recess. In the senior elementary classroom, most students integrated for about half of their day for non-academic subjects (e.g., gym, art, music, lunch).

2.2 Participants

2.2.1 Recruitment.

This study was developed in response to requests for training in proactive classroom management from two teachers in the ASD classrooms at School 1, one of whom had prior involvement in a classroom management study by the professor supervising this research. A third teacher who teaches students with ASD at the middle school level learned about the study from a classroom staff at School 1 and requested involvement in the training.
After receiving ethical approval from both the University of Toronto and the TDSB, an information meeting was held for the principal and teachers at both schools to describe the staff training study in greater detail, including responsibilities and time commitments required to participate in the study (i.e., student recruitment, in-service training, and completion of pre-post and weekly measures in relation to each target student). Each teacher and classroom support staff was provided with an information letter and consent form. Following classroom staff consent, all students in each of the three classrooms were recruited for participation. Information letters and parent consent forms were sent home to every student in each classroom. Parents/guardians were encouraged to contact the research team if they had any questions about their child’s participation in the study. Parents were informed that although all students are eligible to participate, we would limit our observational focus to a subset of students for whom we received parent or guardian consent to participate. Parents interested in participation after reviewing the project description were asked to submit their signed consent form to their child’s teacher. Once consent was obtained from parents, the author met individually with the target students to obtain their assent for participation in the study. All parents provided consent for their children to participate and be monitored in the classroom for the study.

2.2.2 Teachers and Classroom Support Staff. A total of three teachers participated in the study as well as nine classroom support staff (six child and youth workers and three special education assistants, EAs). It is important to note that only two of the nine classroom support staff were monitored for progress because they were consistently present in the classrooms. The other classroom support staff were frequently withdrawn to help students in other classrooms and/or to assist students with partial integration into mainstream classes. Characteristics of all the classroom staff are presented in Table 1.
With respect to previous training in evidence based practices for students with ASD, Teachers 1 and 2 had participated in a few professional development workshops that were didactic in nature and covered topics such as the diagnosis of ASD, applied behavioural analysis strategies, including prompting, and reinforcement, and visual support strategies (e.g., visual schedules, social stories). Additionally, Teacher 1 had learned errorless compliance techniques from participating in a different study overseen by the supervisor for this study. Although Teacher 3 was in her first year of teaching, she had 1½ years of previous experience implementing applied behavioural analysis techniques (i.e., positive reinforcement) with two children with ASD. Overall, each teacher implemented a variety of disparate strategies in their classroom before training. This practice is consistent with ASD classroom research that indicates that teachers commonly use an eclectic approach to classroom management that is not informed by a theory or model and is typically based on limited research evidence (Kasari & Smith, 2013; Hess et al., 2008).

However, with their piecemeal knowledge of isolated ABA techniques, they were likely already implementing some strategies that were serving to prevent and decrease challenging behaviour even before the initiation of ECM training. With regard to the nine classroom support staff, most had little exposure to behavioural approaches to prevent or manage student problem behaviour, although most had received training in crisis management strategies focused on maintaining control of classroom conditions when behavioural episodes occurred. Throughout baseline, these staff appeared to seek direction or model the teacher’s classroom management behaviour when potential problems occurred.
Table 1. Participant Teachers’ and Classroom Staff Characteristics

<table>
<thead>
<tr>
<th>Group</th>
<th>Staff Role</th>
<th>Sex</th>
<th>Total number of years teaching/assisting</th>
<th>Number of years teaching/assisting special education</th>
<th>Number of years teaching/assisting general education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Teacher*</td>
<td>F</td>
<td>10</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Educational Assistant*</td>
<td>F</td>
<td>12</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Child and Youth Worker</td>
<td>F</td>
<td>2.5</td>
<td>2.5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Child and Youth Worker</td>
<td>F</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Child and Youth Worker</td>
<td>F</td>
<td>5</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Class 2</td>
<td>Teacher*</td>
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<td>4</td>
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<td>0</td>
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<tr>
<td></td>
<td>Educational Assistant*</td>
<td>F</td>
<td>25</td>
<td>22</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Child and Youth Worker</td>
<td>F</td>
<td>22</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>Class 3</td>
<td>Teacher*</td>
<td>F</td>
<td>0.5</td>
<td>0.5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Child and Youth Worker</td>
<td>F</td>
<td>5</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Child and Youth Worker</td>
<td>F</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Educational Assistant</td>
<td>F</td>
<td>7</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Note. * indicates staff who were observed for progress monitoring

2.2.3 Students. Although each teacher implemented the intervention with all of their students, two to three students in each classroom were chosen for progress monitoring due to their more severe challenging behaviours (this decision was based on interviews with teachers and classroom observations conducted by the author). The seven target children (six males and one female) often exhibited aggression, non-compliance, disruptive behaviour and off-task behaviour. All student participants had been previously independently diagnosed with a specific subtype of Autism Spectrum Disorder (ASD) using the DSM-IV-TR diagnostic criteria (APA, 2000) by professionals (e.g., paediatricians, psychologists, psychiatrists). They ranged in age from 6 years, 4 months to 12 years, 4 months. Although the language ability of each student was not formally tested, each student was categorized as using primarily verbal or non-verbal means of communication based on informal observations and results from the Vineland Adaptive Behavior Scales-II-Teacher Rating Form (TRF). Baseline demographic characteristics of the seven student participants are summarized in Table 2.

Teacher pre-baseline ratings on the hyperactivity, aggression, conduct problems or attention subscales of the Behavior Assessment System for Children-Second Edition (BASC-2)
indicated that the target students’ behaviour was viewed as being at the clinically at-risk range (i.e., $T$ score $\geq 60$) for all participant students. See Table 3 for a summary of each student’s emotional and behavioural profile.

Five participant students received psychotropic medication during the study. Student 1 began receiving a daily dose of Adderall halfway through the intervention phase. Student 5 began receiving Strattera halfway through baseline and continued taking this medication throughout intervention (all medication changes are noted on graphs in the results section). The remaining three students (Students 2, 3 and 6) had no changes in their medication throughout the study.

Information on the cognitive levels of each participant were unavailable due to resource limitations for cognitive testing. However, the TDSB admission criteria for the three specialized ASD classrooms required that the student did not meet criteria for programming in a developmental disability classroom ($1^{st}$ percentile or below) or a mild intellectual disability classroom ($2^{nd}$ - $9^{th}$ percentile). In line with these criteria, students were required to have, at minimum, low-average cognitive abilities or higher ($9^{th}$ percentile or above). To provide us with information on student daily functioning, teachers were asked to complete the Vineland Adaptive Behavior Scales-II-TRF. A summary of the v-scale scores of students and standard scores for the subdomains and domains of the Vineland-II TRF is provided in Table 4. All student participants scored the lowest in the socialization domain at approximately two standard deviations below the mean in a typical population reference group (standard score around 70 or below). Several of the students evidenced significant deficits in other areas as well. Student 4 presented differently in comparison with the other students; she was not only severely socially withdrawn (as shown in
her low social skills scores on the Vineland-II-TRF), but also appeared to be engaging in sensory stimulation seeking behaviours in the classroom. For example, she frequently rocked her body.
Table 2. Summary of Student Participant Characteristics

<table>
<thead>
<tr>
<th>Student</th>
<th>Class</th>
<th>Grade</th>
<th>Sex</th>
<th>Age (in years and months at recruitment)</th>
<th>Ethnicity</th>
<th>Language ability</th>
<th>Diagnoses</th>
<th>Psychotropic Medication and Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>4</td>
<td>Male</td>
<td>9:10</td>
<td>Caucasian</td>
<td>Verbal</td>
<td>PDD ADHD Learning Disability Oppositional Defiant Disorder</td>
<td>Adderall daily (dose unknown)</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>5</td>
<td>Male</td>
<td>10:4</td>
<td>Caucasian</td>
<td>Verbal</td>
<td>ASD</td>
<td>40mg Biphentin daily</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Male</td>
<td>6:4</td>
<td>Middle Eastern</td>
<td>Verbal</td>
<td>ASD ADHD</td>
<td>40mg Biphentin daily</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>1</td>
<td>Female</td>
<td>6:3</td>
<td>Asian</td>
<td>Verbal, but significant expressive weakness</td>
<td>ASD</td>
<td>None</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>2</td>
<td>Male</td>
<td>8:5</td>
<td>Caucasian</td>
<td>Verbal</td>
<td>ASD</td>
<td>25/40mg Strattera daily</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>6</td>
<td>Male</td>
<td>11:11</td>
<td>Caucasian</td>
<td>Verbal</td>
<td>Asperger’s Disorder ADHD Learning Disability</td>
<td>40mg Strattera daily 25mg Zoloft twice daily .25ml Risperidol twice daily .025mg Clonidine twice daily</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>7</td>
<td>Male</td>
<td>12:4</td>
<td>Caucasian</td>
<td>Non-verbal</td>
<td>PDD</td>
<td>None</td>
</tr>
</tbody>
</table>

Note. ASD = Autism Spectrum Disorder; PDD-NOS = Pervasive Developmental Disorder-Not Otherwise Specified; ADHD = Attention Deficit Hyperactivity Disorder

a Language ability was categorized based on informal observations and results from Vineland Adaptive Behavior Scales-II-TRF

b All diagnoses are based on DSM-IV-TR (APA, 2000) diagnostic criteria
# Table 3. Summary of the Participant Students’ BASC-2 T-Scores at Baseline

<table>
<thead>
<tr>
<th></th>
<th>Student 1</th>
<th>Student 2</th>
<th>Student 3</th>
<th>Student 4</th>
<th>Student 5</th>
<th>Student 6</th>
<th>Student 7</th>
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<tbody>
<tr>
<td>Maladaptive Scales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Hyperactivity</td>
<td>91**</td>
<td>74**</td>
<td>73**</td>
<td>64*</td>
<td>81**</td>
<td>82**</td>
<td>76**</td>
</tr>
<tr>
<td>Aggression</td>
<td>100**</td>
<td>94**</td>
<td>106**</td>
<td>52</td>
<td>81**</td>
<td>84**</td>
<td>65*</td>
</tr>
<tr>
<td>Conduct Problems</td>
<td>78**</td>
<td>66*</td>
<td>68*</td>
<td>53</td>
<td>81**</td>
<td>82**</td>
<td>60*</td>
</tr>
<tr>
<td>Externalizing Problems Total Score</td>
<td>92**</td>
<td>80**</td>
<td>85**</td>
<td>57</td>
<td>83**</td>
<td>85**</td>
<td>68*</td>
</tr>
<tr>
<td>Anxiety</td>
<td>76**</td>
<td>65*</td>
<td>89**</td>
<td>43</td>
<td>65*</td>
<td>66*</td>
<td>46</td>
</tr>
<tr>
<td>Depression</td>
<td>106**</td>
<td>79**</td>
<td>102**</td>
<td>47</td>
<td>55</td>
<td>84**</td>
<td>59</td>
</tr>
<tr>
<td>Somatization</td>
<td>81**</td>
<td>73**</td>
<td>54</td>
<td>57</td>
<td>54</td>
<td>43</td>
<td>47</td>
</tr>
<tr>
<td>Internalizing Problems Total Score</td>
<td>97**</td>
<td>78**</td>
<td>91**</td>
<td>49</td>
<td>60*</td>
<td>67*</td>
<td>51</td>
</tr>
<tr>
<td>Attention Problems</td>
<td>72**</td>
<td>66*</td>
<td>65*</td>
<td>67*</td>
<td>70**</td>
<td>76**</td>
<td>78**</td>
</tr>
<tr>
<td>Learning Problems</td>
<td>66</td>
<td>72**</td>
<td>58</td>
<td>44</td>
<td>74**</td>
<td>59</td>
<td>59</td>
</tr>
<tr>
<td>School Problems Total Score</td>
<td>71**</td>
<td>71**</td>
<td>63*</td>
<td>56</td>
<td>74**</td>
<td>69*</td>
<td>70**</td>
</tr>
<tr>
<td>Atypicality</td>
<td>118**</td>
<td>82**</td>
<td>59</td>
<td>69*</td>
<td>85**</td>
<td>65*</td>
<td>82**</td>
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<tr>
<td>Withdrawal</td>
<td>74**</td>
<td>82**</td>
<td>86**</td>
<td>81**</td>
<td>84**</td>
<td>63*</td>
<td>89**</td>
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<tr>
<td>Behavioural Symptoms Index</td>
<td>105**</td>
<td>87**</td>
<td>90**</td>
<td>67*</td>
<td>83**</td>
<td>81**</td>
<td>80**</td>
</tr>
</tbody>
</table>

*Note. T-score of 60-69 is considered At-Risk; **T-scores 70 or higher are considered Clinically Significant.*
Table 4. Summary of the Participant Students’ Vineland Adaptive Behavior Scale–II-TRF
\(v\)-Scale and Standard Scores

<table>
<thead>
<tr>
<th>Subdomain</th>
<th>Student</th>
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<th>Student</th>
<th>Student</th>
<th>Student</th>
<th>Student</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive</td>
<td>10*</td>
<td>14</td>
<td>13</td>
<td>10*</td>
<td>11*</td>
<td>10*</td>
<td>8*</td>
</tr>
<tr>
<td>Expressive</td>
<td>10*</td>
<td>11*</td>
<td>13</td>
<td>8*</td>
<td>9*</td>
<td>14</td>
<td>9*</td>
</tr>
<tr>
<td>Written</td>
<td>9*</td>
<td>13</td>
<td>12*</td>
<td>13</td>
<td>10*</td>
<td>13</td>
<td>11*</td>
</tr>
<tr>
<td>Daily Living Skills</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Personal</td>
<td>7*</td>
<td>11*</td>
<td>11*</td>
<td>9*</td>
<td>9*</td>
<td>15</td>
<td>8*</td>
</tr>
<tr>
<td>Domestic</td>
<td>10*</td>
<td>10*</td>
<td>12*</td>
<td>11*</td>
<td>11*</td>
<td>16</td>
<td>9*</td>
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<td>Community</td>
<td>3*</td>
<td>9*</td>
<td>11*</td>
<td>9*</td>
<td>8*</td>
<td>8*</td>
<td>8*</td>
</tr>
<tr>
<td>Socialization</td>
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<td></td>
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<td>Gross Motor</td>
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<td>-</td>
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<td>81*</td>
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<td>77*</td>
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Note. * = Low or moderately low functioning
\(^a\)\(v\)-Scale Scores 1-9 are Low; 10-12 are Moderately Low; 13-18 are Adequate; 19-21 are Moderately High; 22-24 are High
\(^b\)Motor Skill scores are only appropriate and available for students aged 6 and younger
\(^c\)Standard Scores 20-69 are Low; 70-85 are Moderately Low; 86-115 are Adequate; 116-130 are Moderately High; 131+ are High
Finally, we excluded the data for one participating student (Classroom 1) from our analyses for two reasons. First, during his most severe tantrums, we were not permitted to observe and collect data on him because of safety concerns and to avoid inadvertent attentional reinforcement. For this reason, observed data for this student were highly distorted; they reflected only those days when staff were reasonably able to manage his behaviours in the classroom without the need to evacuate the other students. This led to the inaccurate appearance that the intervention was highly effective for this student. Second, independent of our intervention, staff initiated more intrusive measures to stop and contain his behaviours, including time-outs, seclusion in an empty room, and sometimes physical arm restraints. Given that the behavioural data no longer served as an evaluation of ECM, we terminated data collection for this student in mid April.

This student was 9 years old, verbal, and had a previous diagnosis of ASD. He displayed one of the highest rates of challenging behaviour at baseline compared to the other participating students. His extreme tantrums at times included running around and trying to leave the school, destruction of the classroom, and stripping. When demonstrating these behaviours, he required multiple staff to ensure his and other’s safety. His teacher’s pre-baseline ratings on the Behavior Assessment System for Children (BASC-2) indicated he had one of the highest clinically significant levels (T-score > 70) for his hyperactivity and anxiety symptoms. In the area of atypical symptoms, he had the most elevated rating, suggesting a tendency to behave in ways that are considered odd or strange (e.g., seems unaware of others, seems out of touch with reality, says things that do not make sense). Further, he often displayed rapid fluctuations in mood, behaviour, and energy levels, as well as racing thoughts, pressured speech, agitation and
explosiveness which were difficult for staff to manage. This student had a child and youth worker assigned to him because of his intensive needs. Due to his negative impact on his classmates and accumulating staff injuries, school administrators decided to remove him from the classroom in April and have him supervised in isolation in an empty resource room.

2.3 Research Design

To evaluate the efficacy of ECM, a multiple baseline across classrooms design was used, in which live classroom observations were conducted throughout baseline and intervention in a time-series manner (Barlow & Hersen, 1984). In this design, the baseline phase was initiated simultaneously for all students in the three classrooms. Initiation of the intervention was time-lagged sequentially across classrooms, with Classroom 1 receiving the intervention three weeks before Classroom 2, and Classroom 3 receiving the intervention two weeks after Classroom 2 (See Figure 2 for an illustration of the study design). Thus, each classroom served as a form of wait-list control for the previous classroom and its students. In addition to the multiple baseline across classroom design, questionnaire measures (i.e., Index of Teaching Stress and Behavior Assessment System for Children) were administered before and after intervention to provide additional evidence of intervention effects.
Figure 2. Multiple Baseline Design for Classrooms 1, 2 and 3 across baseline, post-training, and follow-up in the year 2011. Post-training consisted initially of 2 weeks of in-class performance feedback to classroom staff from the author.
2.4 Dependent Measures

2.4.1 Observational Time Series Measures.

Participant students were observed in their classrooms regularly for all observational periods (i.e., baseline, intervention and follow-up). Typically, each student was observed two times per week (2-3 hours per week) while engaging in classroom routines and activities. Observations were not conducted if the student was in gym or having free time in the computer lab. Event recording was used to code all behaviours listed below with the exception of student on-task behaviour which was measured using a partial interval coding procedure. In terms of classroom staff behaviour, approximately two staff from each class were observed for 30 minutes per week while engaging in their regular job duties in the classroom. Follow-up observations were conducted at four and five month follow-up, but for only four of the seven students, due to consent issues and practical reasons. Specifically, we were unable to obtain consents for monitoring Students 6 and 7 (Classroom 3), and Student 1 (Classroom 1) changed schools in the subsequent school year.

2.4.2 Classroom Staff Behaviour.

Observations of classroom staff use of behaviour management strategies in the classroom were conducted using an event coding system (See Appendix A) that involved recording the frequency of occurrence of three classroom behaviour management strategies: 1) reinforcement strategies, 2) antecedent strategies, and 3) reactive strategies. Each target behaviour was observed for its occurrence during a thirty minute session approximately twice per week for each teacher and, where permitted, a second classroom support staff.

Reinforcement strategies. Reinforcement strategies were defined as all positive teacher/classroom support staff responses following prosocial student behaviours and included
both praise statements and tangible reinforcers. Praise was defined as non-tangible verbal or non-verbal recognition of a students’ prosocial behaviour (e.g., “good job!”, “nice listening”, giving a high five, etc.). Tangible reinforcers were defined as the offering of tangible items or privileges contingent on student prosocial behaviour (e.g., providing tokens or check-marks, treats, access to a favourite activity, etc.).

**Antecedent strategies.** Antecedent strategies were defined as all teacher/classroom support staff responses directed at supporting students in demonstrating prosocial behaviour. Antecedent strategies included 1) prompting (providing cues to help guide the student’s behaviour toward a successful outcome), 2) priming (providing a verbal or non-verbal warning about upcoming circumstances or transitions), 3) providing choices (giving the student choices with respect to order of task completion, materials used, how to spend their free time, etc.), 4) building rapport (e.g., engaging with a student through conversation or shared activity or making empathic statements towards the student), and 5) modelling and role playing (demonstrating and practicing desired behaviour in the classroom).

**Reactive strategies.** Reactive strategies were defined as all teacher/classroom support staff behaviours that followed student challenging behaviour and were focused on immediate termination of such responses. Reactive strategies comprised 1) verbal reprimands (responding to student behaviour with a negative or disapproving verbal statement), 2) non-verbal reprimands (responding with a negative facial expression such as a frown, glare/stare, or rolling of the eyes at the student), 3) threats (threatening students with negative consequences), 4) withdrawal of privileges (removing tangible rewards or privileges), 5) time-outs (sending a student to a solitary location in or outside of the classroom, with the goal of removing the student
from the ongoing activity of the class), and 6) physical force or restraints (restricting the voluntary movement of a student’s body or any access to any part of the body).

2.4.3 Student Behaviour.

Two observation coding procedures were used to measure student behaviour. The first was event recording in which each student was observed for 60 minutes once or twice per week for the occurrence of three categories of behaviour, including compliance, challenging behaviours, and prosocial behaviours (See Appendix B for the comprehensive data sheet used). An interval coding system was used as the second procedure to measure student on-task behaviour. Students were observed during approximately 10 minute sessions of academic activities (desk-top activities, group lessons) using a 10-second partial interval coding system. For each 10-second interval, an observer coded whether the student spent at least 50 percent of the interval on-task, off-task, or engaged in a neutral activity (See Appendix C). See detailed definitions below.

Compliance. A student was considered compliant if the appropriate motor response to the classroom staff request was initiated within 10 seconds of the request and the student followed through on completion in a reasonable period of time. A student was considered non-compliant when any of the following situations occurred in response to a teacher/classroom staff request: 1) it took longer than 10 seconds for the student to begin the appropriate response, and 2) the student began, but did not finish the task they were asked to complete. The percentage of compliance to teacher or classroom staff requests for each session was calculated by totalling the number of requests yielding compliance, dividing by the total number of requests, and multiplying by 100.
**On-task behaviour.** A student was recorded as on-task when he was observed to follow task instructions (i.e., writing, reading, or doing their math work), comply with classroom staff instructions, or attend to classroom teacher/staff when appropriate for at least 50 percent of the interval. A student was recorded as off-task whenever he was observed not following classroom staff instructions, not complying with teacher requests, or not attending to classroom staff or to a task (e.g., talking to a classmate) for more than 50 percent of the interval. Neutral was coded if the student’s behaviour was ambiguous (i.e., looking at his worksheet without any output) or if the student was waiting for classroom staff instruction or assistance for more than 50 percent of the interval. On-task, off-task and neutral represent mutually exclusive categories. The percentage of on-task behaviour was calculated by dividing the number of on-task intervals by the total number of intervals, and multiplying by 100.

**Challenging behaviour.** Challenging behaviour was defined as any actions or verbal statements that were antisocial, aggressive, or disruptive in nature. This category included negative verbal behaviour (e.g., threatening, teasing, insulting, or swearing), negative physical behaviour (e.g., hitting, kicking, spitting, biting, throwing objects, destroying property, or making faces at someone), and disruptive behaviour (e.g., calling out, interrupting others, getting out of one’s seat without permission, or crying or whining).

**Prosocial behaviour.** Prosocial behaviours included all verbal and physical self-initiated behaviours that promote prosocial interactions with others. Examples of prosocial verbal behaviours included (but are not limited to): praising or complimenting, apologizing, thanking, using appropriate greetings, asking nicely rather than just doing or taking things, using the word ‘please’, inviting a peer to play a game or activity, and appropriately defending or standing up for a peer. Prosocial physical behaviours refer to any self-initiated cooperative action directed
towards a peer or classroom staff. These behaviours include helping a peer with a task (e.g., putting away toys, getting a chair for a peer), giving or sharing items, raising a hand in class to ask a question, and waving hello or goodbye to someone.

2.4.4 Classroom Staff Report Measures.

Three types of staff report measures were used for the present study including sample description, outcome and consumer satisfaction measures. A description of each measure follows.

2.4.4.1 Sample Description Report Measure

Vineland Adaptive Behavior Scales – Second Edition-Teacher Rating Form. The Vineland Adaptive Behavior Scales – Second Edition – Teacher Rating Form (Vineland-II-TRF) (Sparrow, Cichetti & Balla, 2006) was completed by teachers at baseline only (January 2011) to obtain a more detailed description of the functioning level of each student. It is a norm-referenced assessment of personal and social skills, for students from 3 to 21 years of age in a school, preschool, or structured day care setting. The Vineland-II-TRF provides an estimate of an individual’s daily living skills, given the typical demands placed on individuals of the same age. Skills are assessed across four domains and eleven subdomains: Communication (i.e., receptive, expressive, and written), Daily Living Skills (i.e., personal, academic, school community), Socialization (i.e., interpersonal relationships, play and leisure, coping skills), and Motor Skills (i.e., gross motor skills, fine motor skills). An overall Adaptive Behaviour Composite score is calculated using the scores of the four individual domains for children 6 years and younger; for students aged 7 and older, the motor skills composite is not included in the overall composite. Each school specific observable adaptive behaviour is rated independently by the teacher as “usually”, “sometimes or partially” or “never”. The psychometric properties of the Vineland-II-
TRF are well established though inter-rater reliabilities for the domains are modest (Sparrow et al., 2006).

2.4.4.2 Outcome Report Measures

Three outcome measures were used to further evaluate the effect of ECM intervention: 1) the Behavior Assessment System for Children Teacher Rating Scale (BASC-2-TRS), 2) the Index of Teaching Stress (ITS), and 3) the Subjective Units of Distress Scale (SUDs). Teachers were asked to complete the BASC-2-TRS and the ITS before (in January 2011) and after training (end of the school year in June 2011). The stress levels of all participating classroom staff using the SUDs was measured at the end of each observation day through each phase of the intervention.

Behavior Assessment System for Children – Second Edition – Teacher Rating Scale. The Behavior Assessment System for Children – Second Edition – Teacher Rating Scale (BASC-2-TRS; Reynolds & Kamphaus, 2004), child (ages 6-11) and adolescent (ages 12-21) forms, were used to evaluate teacher perception of student behaviour in the school setting. The BASC-2-TRS consists of 139-items describing positive and negative behaviours. It is a teacher-report questionnaire that assesses teacher perceptions of student problem behaviour, academic competence, and social functioning. The BASC-2-TRS includes five composite scales (Externalizing Problems, Internalizing Problems, Behavioral Symptoms Index, School Problems, and Adaptive Skills), and sixteen clinical scales (Activities of Daily Living, Adaptability, Aggression, Anxiety, Attention Problems, Conduct Problems, Depression, Functional Communication, Hyperactivity, Leadership, Learning Problems, Social Skills, Somatization, Study Skills, and Withdrawal). The teacher indicates how often the student displays each behaviour, choosing “Never”, “Sometimes”, “Often” or “Almost Always.” Students’ raw scores
are converted to T-Scores. For the clinical scales, the “at-risk” range corresponds to the 60-69 T-Score, and scores greater than 70 T-Score are considered “clinically significant”. Comparable interpretations apply to the low adaptive clinical scale scores: “at-risk,” 31-40 T-Score; “clinically significant,” ≤ 30 T-Score. Overall, the psychometric integrity of the BASC-II-TRS scales are strong to moderate in terms of test-retest reliability, inter-rater reliability, internal consistency of scales, and construct validity.

*Index of Teaching Stress.* The Index of Teaching Stress (ITS; Abidin, Greene, & Konold, 2004) was used to evaluate the teachers’ subjective level of stress in relation to a specific child in his or her class. The ITS focuses on the teacher’s perceptions and transactions in relation to a given student, rather than on more global aspects of teacher stress. The ITS is comprised of 90 items and generates a Total Stress Score and three domain scores, consisting of ADHD, Student Characteristics and Teacher Characteristics. The ADHD domain measures the teacher’s stress level in relation to the student’s behaviours that are commonly associated with ADHD (e.g., this student squirms and fidgets a great deal). The Student Characteristics domain measures the teacher’s stress associated with the student’s behaviour and temperament. The Teacher Characteristics domain measures the teacher’s stress in relation to their self-perceptions of the impact of the student upon the teacher and teaching process, their sense of efficacy and satisfaction in working with the student, and the nature of their interactions with other adults involved with the student (e.g., the student’s parents). The Total Stress score is a sum of the three domain scores. The Student Characteristics domain consists of four subscales related to the teacher’s response to student behaviour, including the student’s: 1) emotional lability/low adaptability, 2) anxiety/withdrawal, 3) low ability/learning disability, and, 4) aggression/conduct disorder. The Teacher Characteristics domain is further subdivided into four subscales including
the teacher’s 1) sense of competence/need for support, 2) loss of satisfaction from teaching, 3) disruption of the teaching process, and 4) frustration working with parents. The items are rated on a 6-point Likert scale from 1 (strongly disagree) to 6 (strongly agree). The ITS possesses adequate psychometric properties in terms of internal consistency (range from 0.71 to 0.98), test-retest reliability (range from 0.57 to 0.70), and discriminant and concurrent validity (Abdin et al., 2004).

**Subjective Units of Distress Scale (SUDS).** The Subjective Units of Distress Scale (SUDS; Wolpe, 1973) was used to track and evaluate, in a time series manner, the level of subjective stress classroom staff were experiencing. SUDs is a widely used single item subjective measure of fear and anxiety intensity that was adapted for use in this study to measure stress intensity because it can be quickly and easily administered. For the purpose of this study, classroom staff were asked to rate their level of stress (i.e., how stressed do you feel in the general classroom today?) on a scale from 0 to 10, where 10 reflects the highest level of stress and 0 the lowest level. Staff were asked to complete the SUDS at the end of each observation day.

**2.4.4.3 Consumer Satisfaction Report Measure**

Teachers and classroom staff completed a consumer satisfaction questionnaire at the conclusion of data collection to determine their level of satisfaction with the classroom training (June 2011). A similar form has been used in previous studies (Ducharme & Drain, 2004; Ducharme, Atkinson, & Poulton, 2001) to measure parent satisfaction with intervention efforts. For this study, it was adapted for classroom staff. The satisfaction questionnaire comprised six
items rated on a 5-point Likert scale and two open-ended questions to obtain anecdotal feedback (See Appendix D).

2.4 Procedures

2.4.1 Baseline Phase.

Baseline observations were conducted to evaluate teacher/classroom support staff and student behaviour before intervention (January 2011). The teacher, classroom support staff and students went through their typical daily routines in the classroom and observers collected observational data on student and classroom staff behaviours, as described in the dependent measures section.

2.4.2 Intervention Phase: Staff Training.

At the initiation of this phase, staff attended a 4.5 hour workshop across two to three days (1.5 to 2 hours per training session). The training workshop was implemented on February 28th and March 2nd 2011 for Classroom 1, March 23rd and 24th 2011 for Classroom 2, and March 30th, 31st, and April 4th 2011 for Classroom 3. All staff-training workshops took place either in the classroom or in another room in the school. The workshop included a variety of instructional methods including a Powerpoint presentation, case discussions, role plays, and handouts. The sessions were conducted by a psychologist (the thesis supervisor) who developed the classroom management approach being evaluated.

The training began with a discussion of the advantages and disadvantages of traditional classroom management techniques, followed by an introduction to a more proactive and success-based approach called Errorless Classroom Management (ECM, Ducharme, 2008) and its potential advantages over traditional strategies. Staff learned about the theoretical framework underlying ECM and how to implement the model in three skill clusters: 1) moderating the
environment to encourage prosocial behaviour in students, 2) reinforcing positive student behaviour, and 3) gradually increasing demand. Staff were also taught the concept of a “keystone skill” (Ducharme & Shecter, 2011) and the importance of promoting four keystone skills in their students (compliance, on-task skills, communication skills, and acquiescence). The latter half of the training consisted of teaching and modelling ECM strategies for building each of these four keystone skills. Within each keystone area, the application of the three skill clusters was taught. A description of the strategies taught for each keystone follows (See also Appendix E for a one page laminated ECM strategies handout).

**Compliance Strategies.** Classroom staff were taught the following six procedures to facilitate compliance in students:

1) Providing effective requests to students to help them understand and follow instructions. Effective request delivery comprised: a) capturing the students attention and making eye contact before issuing a request, b) using a polite but firm tone, c) using the imperative instead of the interrogative (e.g., “Read the book” versus “Can you read your book”), d) using single component rather than multi-component requests, e) issuing the request once, f) providing time for the student to respond, and g) avoiding prompts or engagement in a discussion about the task following a request.

2) Providing high probability requests that are likely to yield compliant responses in students (typically requests to complete easy and enjoyable tasks). This strategy is used to build behavioural momentum (Mace et al., 1988) to increase the probability of compliance to more challenging requests. A compliance probability checklist was provided to teachers to complete for each student to assist them in determining which requests to use early in intervention (higher probability of compliance) and which ones to introduce over time.
3) Delivering priming statements that prepared students for an upcoming challenging task (i.e., a low probability request). For example, when the teacher wanted the student to terminate computer time or a favourite activity, she could say “Thomas, you’re doing a great job at keeping your cool today - I’m going to ask you to stop working on the computer and go on to something else in 5 minutes.”

4) Praising or providing other types of reinforcement to the student immediately and enthusiastically after each compliant response. Classroom staff were taught to provide a labelled praise statement to ensure the student was aware of the behaviour being reinforced (e.g., “You did a good job listening to my instructions”). For group requests, classroom staff were instructed to notice and praise students who were complying with the request, rather than reprimanding or scolding those who were not complying.

5) Avoiding the provision of negative attention following noncompliance. This procedure was used to ensure that negative classroom staff reactions did not serve to reinforce the noncompliant response or compromise classroom staff-student rapport. Thus, classroom staff were taught to avoid scolding, reprimanding, making threats, or making other negative statements or facial reactions.

6) Gradually fading or decreasing supports over time. As students began to experience consistent success with their compliance to adult requests, classroom staff were asked to gradually fade supports. This could be done by: a) reducing the number of high probability requests, b) fading out supports for easy requests, c) gradually increasing the frequency of more demanding requests, and d) continuing to praise compliance for more demanding requests.
**On-Task Strategies.** To improve each student’s level of independent work, classroom staff were trained to use the following four on-task strategies (see Ducharme & Harris, 2005):

1) Providing moderating strategies to help the student get started on an assignment. Classroom staff were trained to use three moderating strategies to increase student on-task responding: a) making friendly and motivational statements to get the student started, b) providing prompts to ensure success, and c) incorporating student interests and preferred activities into materials.

2) Informing the student that he should work independently for a short period. Classroom staff were asked to tell the student that they would leave him to work by himself, for example, “That was great work! Now, can you show me how well you can keep going without my help? I’ll be back in a few minutes to see how you’re doing.” Classroom staff were taught to leave the student for a short duration of time, only as long as he or she could stay engaged in the activity without disruption.

3) Praising the student at the end of an independent work interval for effort made. Classroom staff were taught to return to the student after a brief period of time and provide praise for any work completed (e.g., “Wow, you kept working the whole time I was away! You should be proud of yourself!”).

4) Increasing duration of independent work. Classroom staff were taught to attempt to increase the duration of independent work by a short amount (30 to 60 seconds) each day. Thus, adult support for work was faded over time as students became increasingly independent of supports and worked for longer durations. However, the schedule was modified to accommodate students’ needs. For example, if a student was having a difficult day or feeling tired, the duration of independent work was shortened. To help
with monitoring of each student’s progress and maintain continuity of the strategy among classroom staff, teachers were asked to use a data sheet for each student indicating duration of on-task activity for each session.

**Acquiescence Strategies.** Classroom staff were taught to deliver skill training sessions on acquiescence and promote the skill in their classrooms using four main strategies:

1) Delivering seven skill training sessions (approximately 20 minutes in length) with their students over a period of seven weeks. Each session consisted of instruction on a specific skill that involved a form of acquiescence and a play activity to practice each skill. As part of each skill training session, teachers reminded students of the concept of “flexing” and discussed each skill using this term, then asked students for examples. Following this discussion, teachers modelled and role played the incorrect and correct use of the skill and each student then practiced the skill with their peers. Students received praise for demonstrating correct skill use and corrective feedback when necessary. Following the instructional component, students were typically engaged in a short play period (about 10 minutes) to practice the skill (e.g., building something or playing a board game with a peer). The seven instruction sessions consisted of: a) introducing the word “flex” and “flexing” by telling students what it is (i.e., sometimes letting others have their way and keeping cool) and reminding them of the concept at the beginning of each day, b) helping and sharing, c) playing by the rules, taking turns, and letting others win, d) listening and going along with someone else’s ideas, e) keeping your cool when things are not going your way, f) approaching and inviting others to join in, and g) complimenting and thanking others.
2) Providing moderating strategies to help students to learn to flex in real-life situations with peers each day in both skill training sessions and in the classroom through prompting, performance feedback, and support.

3) Praising students for acquiescence and cooperation with peers during training/play sessions and regular daily activities.

4) Gradually reducing praise for acquiescence and other forms of peer cooperation once students began to consistently demonstrate these skills.

**Communication Strategies.** Classroom staff were provided with information about many of the most common circumstances in which students use various challenging behaviours to communicate their wants and needs (e.g., to escape something unpleasant or avoid someone, to seek attention, to elicit help, to obtain a desired item or gain access to an activity, or to be by themselves). To improve each student’s communication skills, classroom staff were taught to use three strategies:

1) Maintaining awareness of and being responsive to strategies the student uses to communicate (e.g., non-verbal behaviours). They were trained to prompt students to ask for attention, help, or a break at times when they appeared overwhelmed or frustrated.

2) Responding immediately to a student’s attempt to communicate and praising them for the attempt (e.g., “good asking”, “I like how you used your words to tell me you were feeling upset”).

3) Gradually fading prompts and reinforcement as students begin to consistently communicate their needs in a prosocial manner.
To further promote correct implementation of skills, classroom staff were given a one page laminated ECM strategies handout to help them remember and implement their newly acquired practical skills (See Appendix E) as well as a booklet of the training presentation slides. After the training was completed, the classroom staff were encouraged to review the training booklet and laminated ECM skills handout(s) in order to help them consolidate and refresh their skills.

2.4.3 Intervention Phase: Post-Training.

Observations of student and staff behaviours to evaluate the intervention occurred exactly as in baseline. Following the training workshop, the author observed each staff in the classroom four times over a two week period (A total of about 3-4 hours of observation each) and provided in-vivo performance feedback to staff in the classroom (See Figure 2 for illustration of study phases and timelines). These procedural checks (using the single page procedures handout as a guideline - see Appendix E) were conducted independent of the observations used to evaluate the training. The author prompted and modelled ECM proactive strategies, prepared staff for how they could respond to possible upcoming challenging situations by applying ECM strategies, and provided praise and constructive feedback on ECM skill use. The author met individually with each staff as needed during this two week period to provide tailored performance feedback.

Two months after the group training workshop (May 2011), the author met again with staff from each classroom for two hours to provide refresher training for the four keystone skills. This session also provided an opportunity to discuss how things were going in the classroom and to problem solve specific classroom issues.
2.4.4 Follow-up Sessions.

Follow-up sessions were conducted the following school year at four and five months after staff training to evaluate maintenance of intervention effects. The author was present for all follow-up sessions to record data simultaneously with one research assistant. Due to logistical reasons and consent issues, follow-up observations were conducted only for students 1, 3, 4, 5, Teachers 1, 2, and EA 1 and 2.

2.5 Data Collection

The primary data collectors consisted of seven volunteer research assistants who were either undergraduate students in psychology (n = 5) or recent graduates of an undergraduate program in psychology (n = 2). In most cases, the author acted as the secondary observer (92% and 71% of baseline and intervention sessions, respectively).

2.5.1 Observer training. All observers were trained by the author in coding procedures. Training consisted of 1) reviewing a coding manual containing a detailed description of coding procedures and observational measures, 2) applying coding procedures to hypothetical situations, and 3) practicing observing and coding in the classroom context with this author for one to two observation days until he/she was able to demonstrate 80% agreement. Additionally, weekly meetings were held with the observers to review coding procedures and address any problems or questions with the author.

2.5.2 Assessment of Inter-Observer Agreement (IOA). Inter-observer agreement (IOA) was calculated for all observational measures throughout baseline, intervention, and follow-up for both students and classroom staff. The Cohen’s kappa coefficient was used to calculate IOA for the categorical measure of student compliance and on-task behaviour. This
A statistical measure of inter-rater reliability provides the proportion of inter-observer agreement after change agreement between two observers is taken into account, with values ranging from -1.00 to 1.00. (Cohen, 1960; Watkins & Pacheco, 2000). Landis and Koch (1977) have proposed the following as standards for evaluating the strength of agreement for the kappa statistic: < 0.00 = poor agreement, 0.00 to 0.20 = slight agreement, 0.21 to 0.40 = fair agreement, 0.41 to 0.60 = moderate agreement, 0.61 to 0.80 = substantial agreement, and 0.81 to 1.00 = almost perfect agreement. For the remaining non-categorical measures pertaining to the frequency counts of classroom staff behaviour (use of reinforcement, antecedent and reactive strategies) and student behaviour (i.e., challenging behaviour and prosocial behaviour), percentage of agreement was used. Percentage of agreement was obtained by dividing the number of agreements by the total number of agreements plus disagreements and multiplying by 100.

**Classroom Staff Skills.** IOA between observers was evaluated during 19.2% of baseline sessions, 27.6% of post-training sessions, and 37.5% of follow-up sessions. Percentage of agreement for classroom staff skills was obtained by comparing the two observers’ frequency counts for each of the 3 types of classroom staff behaviour. An agreement required that both observers reported the occurrence of the same classroom staff behaviour. The overall mean IOA for classroom skill implementation was 92.0% (range = 77.5% to 98.6%) for baseline sessions, 91.9% (range = 59.3% to 100.0%) for post-training sessions, and 85.3% (range = 76.6% to 94.5%) for follow-up sessions. The mean agreement rates for each staff skill across the study phases met minimum standards (i.e., above 80.0%), with the exception of antecedent strategies at follow-up (Horner et al., 2005). The range of agreement was in some cases very broad due to the fact that occasionally a particular classroom staff behaviour occurred only once or twice during a
single observation period. Thus, any disagreement between observers in this situation resulted in a low overall agreement rate. Table 5 shows data for IOA agreement on the occurrence and non-occurrence of each category of staff behavior for each phase of the study.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Reinforcement Strategies</th>
<th>Antecedent Strategies</th>
<th>Reactive Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>96.1 (83.3 – 100.0)</td>
<td>86.6 (52.3 – 100.0)</td>
<td>96.9 (78.2 – 100.0)</td>
</tr>
<tr>
<td>Post-Training</td>
<td>92.1 (66.7 – 100.0)</td>
<td>86.8 (46.9 – 100.0)</td>
<td>95.2 (50.0 – 100.0)</td>
</tr>
<tr>
<td>Follow-Up</td>
<td>89.0 (80.0 – 96.6)</td>
<td>68.5 (60.7 – 83.3)</td>
<td>86.9 (60.7 – 100.0)</td>
</tr>
</tbody>
</table>

**Student Compliance Behaviour.** For student compliance, IOA was calculated for 26.0% of the baseline sessions and 28.0% of the intervention sessions. No follow-up IOA sessions were conducted for this particular student behaviour due to logistical and time constraints. The average kappa coefficient was 0.90 (range = 0.55 to 1.00) for baseline sessions and 0.96 (range = 0.57 to 1.00) for intervention sessions. The average kappa coefficient for student compliance across each phase of the study reflected very high agreement.

**Student On-Task Behaviour.** IOA agreement was collected on 23.0% of baseline on-task sessions, 22.0% of intervention sessions, and 22.0% of follow-up sessions. The average kappa coefficients obtained for student on-task behaviour was 0.88 (range = 0.46 to 1.00) for baseline sessions, 0.91 (range = 0.20 to 1.00) for intervention sessions, and 0.87 (0.74 to 1.00) for follow-up sessions. For the majority of IOA sessions, the kappa values indicate at least a moderate level of agreement. The overall average kappa values for each phase of the study, however, are considered to be in very high agreement.
**Challenging and Prosocial Student Behaviours.** IOA was calculated for observational student data on 26.0% of the baseline sessions and 28.0% of the intervention sessions; no follow-up IOA sessions were conducted for these particular student behaviours for the same reasons previously mentioned. Average IOA for challenging behaviour was 84.3% for baseline sessions (range = 0% to 100%; 5.3% of IOA ratings had 0% agreement) and 84.7% for intervention sessions (range = 0% to 100%; 4.9% of IOA ratings had 0% agreement). Lastly, IOA scores for prosocial behaviours was 79.9% for baseline sessions (range = 0% to 100%; 6% of IOA ratings had 0% agreement) and 89.9% for intervention sessions (range = 0% to 100%; 2.4% of ratings had 0% agreement).

### 2.6 Data Analysis

#### 2.6.1 Visual Analysis.

Visual analysis of graphical displays was used to examine patterns of within- and between phase data patterns. In particular, visual analysis of: 1) level, 2) trend, 3) variability, 4) overlap, 5) immediacy of effect, and 6) consistency of data patterns across similar phases was used to assess whether changes in data across phases are related to manipulation of the independent variable (i.e., classroom staff training intervention). In addition, effect size measurements were used to supplement the visual interpretation of single-case data.

#### 2.6.2 Statistical Analysis for Time-Series Data.

A recent innovation in single subject designs involves effect size analysis for small sample studies to help supplement, synthesize and integrate findings. Effect size is a reference-free statistic that reflects the degree of change from a null (baseline) state, or the strength of the intervention. The Percentage of All Non-Overlapping Data (PAND) (Parker, Hagan-Burke & Vannest, 2007) which compares all data points in phase B (intervention) with every value in
phase A (baseline) is becoming a common analytic technique to describe the strength of the intervention. Where there is perfect non-overlap between conditions (i.e., phase B data are distinctly different from phase A), PAND equals 100%. For chance levels of non-overlap with random data, PAND equals 50%. The PAND method was chosen over other methods of calculating effect sizes for single subject designs because it takes into account all data points and counts the minimum number of data points that need to be removed in order to obtain a series with no overlap (Parker et al., 2007). Additionally, it is particularly suited for longer data set series (minimum of 25 total data points across all study participants in a data series design), including multiple baseline designs (Parker et al., 2007). For the present study, the average class data series for student outcomes comprised 73 data points (range of 46 to 85 data points). For classroom staff outcomes, the average class design comprised 49 data points in total (range of 31 to 67 data points).

An additional advantage of PAND is that it can be transformed into widely recognized effect sizes, specifically Pearson’s Phi, which allows for more conservative estimates of effect sizes and an ability to make comparisons on different variables in this study and across the three classrooms. PAND and Pearson’s Phi was calculated using a data spreadsheet for each outcome in each of the three classrooms, and the results were also averaged for a total score for each outcome. It should be noted that confidence intervals, which provide a method for estimating population values from sample statistics, were not calculated, as PAND and Phi coefficients lack a known population sampling distribution for single subject designs. Further, the sample of observations from our multiple baseline design study is too small to make any meaningful population inferences. As such, confidence intervals were deemed inappropriate for the present study. While effect sizes in single subject research are useful for providing an overall summary
of the strength of the intervention, it is recommended that they be used as a “rough estimate” and, as such, interpreted with caution (Kratochwill et al., 2010; Schneider, Goldstein, & Parker, 2008).

A caveat of the PAND method is that it does not correct for trend or ceiling effects. The \( \Phi \) coefficient is limited because an accumulating number of single subject studies have shown inflated \( \Phi \) coefficients (Schneider et al., 2008). All in all, the field continues to grapple with establishing the validity and application of effect size metrics for single subject designs. Due to the finding that effect sizes are known to be inflated for single subject designs, we chose to use more conservative guidelines that have been proposed in the literature. A set of conservative guidelines developed by Burns, Coddin, Boice, and Lukito (2010) were used for interpretations of both PAND and the \( \Phi \) coefficient effect size results. They suggest that PAND scores \( \geq .80\% \) are considered indicative of an effective intervention, whereas PAND scores \( \leq .79\% \) were considered questionable in their efficacy. In the case of the Pearson’s \( \Phi \) coefficient, they suggest that a negligible, small, medium, and large effect size for Pearson’s \( \Phi \) to be \( \leq .29 \), 0.30-0.49, 0.50-.69, and \( \geq .70 \), respectively.

2.6.3 Statistical Analysis for the Teacher Questionnaires.

Given the relatively small sample size of the current study, the effect of serial dependency inherent in the data, and the lack of assumptions about the distribution of the behaviours of interest, parametric statistical analyses were ruled out. Instead, the Wilcoxon Signed Rank Test, a non-parametric statistical test, was used to analyze differences in overall mean pre-training and mean post-training scores for both teacher questionnaires (Norman &
Streiner, 2000). All analyses were performed on SPSS for PC version 15.0. The level of significance was set at $p < 0.05$, and all tests were two-tailed.
Chapter 3: Results

Results are organized by classroom staff and student outcomes. Within each participant category, observational analysis is presented first, followed by the results of supplemental standardized measures. The final section presents classroom staff feedback on the ECM intervention.

3.1 Classroom Staff Data

3.1.1 Observational Analysis.

Staff observational data are presented below according to each of the three classroom strategies: reinforcement, antecedent, and reactive strategies. Data for each strategy are examined at the individual staff and classroom level.

3.1.1.1 Reinforcement strategies.

Figure 3 presents the frequency of reinforcement for each classroom staff for all baseline, post-training, and follow-up sessions. Although there is considerable variability within and between classroom staff, there appears to be a general increase in the frequency of reinforcement strategies following training for most classroom staff. Visual analysis of the follow-up data indicates that increases in reinforcement strategies appear to be maintained at four months and five months follow-up for three of the four classroom staff who were monitored at follow-up.

Figure 4 presents the averaged class data for frequency of staff use of reinforcement strategies across baseline and post-training sessions. The overall mean during baseline was 5, 8, and 5 times per half hour for classrooms 1, 2, and 3, respectively. Mean frequencies of staff usage of reinforcement strategies following staff training were 8, 12, and 10 times per half hour for classrooms 1, 2, and 3, respectively, an increase of 3, 4, and 5 strategies per half hour, respectively.
Figure 3. Classroom staff frequency of reinforcement per half hour across all study phases. Follow-up data represent 4 and 5 months after intervention. The dotted horizontal line represents the mean frequency of reinforcement strategies during each phase.
Intervention effects of staff strategy use were examined by using the percentage of all non-overlapping data (PAND) index. PAND and $\Phi$ coefficients were calculated individually for the three classroom management strategies in each of the three classrooms. Additionally, an overall effect estimate across the three classrooms was calculated for each strategy. The results depicted in Table 6 indicate a medium aggregate effect for reinforcement strategy use. The effect size was medium for Classrooms 1 and 3 whereas it was small for Classroom 2.
Table 6. Effect Size Estimates of Staff Frequency of Reinforcement Strategies using Percentage of All Non-Overlapping Data for Staff in Classrooms 1, 2, and 3

<table>
<thead>
<tr>
<th></th>
<th>PAND</th>
<th>Phi (Φ)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>84%</td>
<td>0.62</td>
<td>medium</td>
</tr>
<tr>
<td>Class 2</td>
<td>73%</td>
<td>0.45</td>
<td>small</td>
</tr>
<tr>
<td>Class 3</td>
<td>87%</td>
<td>0.66</td>
<td>medium</td>
</tr>
<tr>
<td>Overall</td>
<td>81%</td>
<td>0.57</td>
<td>medium</td>
</tr>
</tbody>
</table>

3.1.1.2 Antecedent strategies.

The frequency of antecedent strategy use for each classroom staff, for all baseline, post-training, and follow-up sessions, are presented in Figure 5. Despite variability within and between classroom staff, there appears to be a gradual increase in the frequency of antecedent strategy use following staff training for three of the five classroom staff monitored (Teacher 1, Teacher 2, and Teacher 3). Visual analysis suggests that intervention gains were maintained at four and five months following the termination of training for all classroom staff.

Figure 6 presents the averaged classroom data for staff frequency of antecedent strategies during the baseline and intervention phases. Before participating in the ECM training program, classroom staff were observed to engage in proactive antecedent strategies an average of 6, 11, and 6 times per half hour for classrooms 1, 2 and 3, respectively. After the training, staff were engaged in using antecedent strategies an average of 21, 26, and 15 times per half hour for classrooms 1, 2, and 3, respectively. ECM training was associated with a mean increase of 15, 15, and 9 antecedent strategies per half hour, respectively.
Figure 5. Classroom staff frequency of antecedent strategy use per half hour across all study phases. Follow-up data represent 4 and 5 months after intervention. The dotted horizontal line represents the mean frequency of antecedent strategies during each phase.
As shown in Table 7, effect size estimates were medium for Classrooms 1 and 3 and small for Classroom 2. The aggregate effect size was medium.

Table 7. Effect Size Estimates of Staff Frequency of Antecedent Strategies using Percentage of All Non-Overlapping Data for Staff in Classrooms 1, 2, and 3

<table>
<thead>
<tr>
<th></th>
<th>PAND</th>
<th>( \Phi ) (Φ)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>84%</td>
<td>0.62</td>
<td>medium</td>
</tr>
<tr>
<td>Class 2</td>
<td>71%</td>
<td>0.41</td>
<td>small</td>
</tr>
<tr>
<td>Class 3</td>
<td>84%</td>
<td>0.58</td>
<td>medium</td>
</tr>
<tr>
<td>Overall</td>
<td>79%</td>
<td>0.54</td>
<td>medium</td>
</tr>
</tbody>
</table>

3.1.1.3 Reactive strategies.

Figure 7 depicts data for reactive strategy use for all baseline, post-training, and follow-up sessions. After ECM training, there was an overall general decrease in the frequency of reactive responses from baseline levels. Most classroom staff demonstrated an immediate
decrease in their reactive responses following the training; Teacher 1, EA 1, and Teacher 3 decreased their reactive responding to near-zero levels following training. As can be seen in Figure 7, three of the four classroom staff who were observed during follow-up maintained the low levels of reactive strategies at four and five months after termination of the intervention.

Overall mean frequencies of reactive strategy use at the class level across baseline and post-training sessions is depicted in Figure 8. During baseline, the mean frequencies were 4, 8, and 4 times per half hour for classrooms 1, 2, and 3, respectively. After training, these mean frequencies were 1, 3, and 1 times per half hour for classrooms 1, 2, and 3, a decrease of 3, 5, and 3 reactive strategies, respectively.

As shown in Table 8, there was a medium effect for reduction in reactive strategy use for each of the three classrooms. The aggregate effect size for reactive strategy use was also medium.
Figure 7. Classroom staff frequency of reactive strategies per half hour across all study phases. Follow-up data represent 4 and 5 months after intervention. The dotted horizontal line represents the mean frequency of reactive strategies during each phase.
Figure 8. Mean class staff frequency of reactive strategies per half hour across baseline and post training sessions.

Table 8. Effect Size Estimates of Staff Frequency of Reactive Strategies using Percentage of All Non-Overlapping Data for Staff in Classrooms 1, 2, and 3

<table>
<thead>
<tr>
<th></th>
<th>PAND</th>
<th>Phi (Φ)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>87%</td>
<td>0.60</td>
<td>medium</td>
</tr>
<tr>
<td>Class 2</td>
<td>79%</td>
<td>0.57</td>
<td>medium</td>
</tr>
<tr>
<td>Class 3</td>
<td>84%</td>
<td>0.58</td>
<td>medium</td>
</tr>
<tr>
<td>Overall</td>
<td>85%</td>
<td>0.66</td>
<td>medium</td>
</tr>
</tbody>
</table>

3.1.1.4 Subjective Units of Distress Scale (SUDS).

Classroom staff ratings of stress at the end of each school observation day on the SUDS are presented in Figures 9, 10, 11. Scores reflect the level of stress that classroom staff perceived themselves to be under during all observational sessions in baseline, post-training, and follow-up.
sessions, where higher scores reflect greater levels of perceived stress. There is considerable variability within and between classroom staff ratings of stress levels. Visual inspection of the individual graphs reveals a general trend toward either higher or consistent levels of perceived stress for staff in Classroom 2 following ECM training, whereas staff members in Classrooms 1 and 3 show decreased stress levels following ECM training. Stress levels were low at four and five months follow-up for staff members in Classroom 2 and decreases in stress levels appear to be maintained during follow-up for staff in Classroom 1. No follow-up data was collected for the Teacher in Classroom 3.

Statistical analysis suggests a medium and negligible effect for Classrooms 1 and 2, respectively (See Table 9). Given we were able to monitor the stress ratings of only one staff in Classroom 3, the aggregated PAND analysis could not be calculated. However, visual analysis from Figure 11 clearly illustrates reduced stress for Teacher 3 post-training. In particular, Teacher 3’s mean SUDS score was 4.8 at baseline and decreased to 2.5 post-training. The aggregate effect size was medium across all three classrooms.
Figure 9. Classroom staff ratings of Subjective Units of Distress for the general classroom across all study phases for Classroom 1. Follow-up data represent 4 and 5 months after intervention. The dotted horizontal line represents the mean stress level rating during that phase.
Figure 10. Classroom staff ratings of Subjective Units of Distress for the general classroom across all study phases for Classroom 2. Follow-up data represent 4 and 5 months after intervention. The dotted horizontal line represents the mean stress level rating during that phase.
Table 9. Effect Size Estimates of Staff Ratings of Subjective Units of Distress using Percentage of All Non-Overlapping Data for Staff in Classrooms 1, 2, and 3

<table>
<thead>
<tr>
<th></th>
<th>PAND</th>
<th>(\Phi)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>87%</td>
<td>0.69</td>
<td>medium</td>
</tr>
<tr>
<td>Class 2</td>
<td>65%</td>
<td>0.29</td>
<td>negligible</td>
</tr>
<tr>
<td>Class 3(^a)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Overall</td>
<td>78%</td>
<td>0.52</td>
<td>medium</td>
</tr>
</tbody>
</table>

\(^a\) PAND analysis could not be calculated for Classroom 3 as it requires more than one participant to calculate an aggregate effect size.

Figure 11. Classroom staff ratings of Subjective Units of Distress for the general classroom across all study phases for Classroom 3. No follow-up data were collected for Classroom 3. The dotted horizontal line represents the mean stress level rating during that phase.
3.1.2 Staff Questionnaire Measure

3.1.2.1 Index of Teaching Stress.

The descriptive statistics (means, standard deviations) for the pre- and post-classroom staff training Index of Teaching Stress (ITS) questionnaire T-score data and the results of the Wilcoxon Signed Rank Test are summarized in Table 10 (see Appendix F for the ITS scores for individual students). Due to the exploratory nature of this study and the small sample size, bonferroni correction procedures for multiple statistical comparisons were not used. Of the five student subscales, two fell in the At-Risk clinical range at baseline (stress related to student ADHD behaviours, e.g., distractibility, impulsivity, restlessness, short attention span; stress related to students’ unpredictable emotionality and/or inability to adjust to changes in the classroom). In contrast, the teachers reported no clinically elevated scores related to their own effectiveness in their role as a teacher across all four teacher subscales.

With regard to the teacher evaluation of the effectiveness of the classroom training from baseline to post-training, there were significant differences in teachers’ ratings across all three total scale T-scores, four of the five student subscales and two of the four teacher subscales. Of most relevance to the present study is the finding that teachers no longer rated students as falling within the “At-Risk” clinical range for both ADHD behaviours and emotional lability and/or difficulties adjusting to routines from baseline to post-classroom staff training. Of equal relevance was the finding that teachers’ loss of satisfaction from teaching decreased significantly. In other words, teachers reported more enjoyment and interaction with their students post-training.
Table 10. Index of Teaching Stress Global and Subscale T-Scores

<table>
<thead>
<tr>
<th>Scales</th>
<th>Baseline</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Test Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Range</td>
<td>Mean</td>
<td>SD</td>
<td>Range</td>
</tr>
<tr>
<td>Total Stress Score</td>
<td>57.9</td>
<td>8.5</td>
<td>48-69</td>
<td>47.3</td>
<td>6.0</td>
<td>40-56</td>
</tr>
<tr>
<td>Student Characteristics (Part A)</td>
<td>59.4</td>
<td>4.5</td>
<td>56-69</td>
<td>48.0</td>
<td>4.5</td>
<td>41-54</td>
</tr>
<tr>
<td>Teacher Characteristics (Part B)</td>
<td>53.4</td>
<td>11.0</td>
<td>42-66</td>
<td>46.4</td>
<td>6.2</td>
<td>39-56</td>
</tr>
<tr>
<td>Student Subscales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADHD</td>
<td>60.7*</td>
<td>8.7</td>
<td>48-71</td>
<td>50.0</td>
<td>5.4</td>
<td>43-58</td>
</tr>
<tr>
<td>Emotional Lability/Adaptability</td>
<td>61.3*</td>
<td>5.1</td>
<td>51-66</td>
<td>51.4</td>
<td>5.2</td>
<td>43-57</td>
</tr>
<tr>
<td>Anxiety/Withdrawal</td>
<td>54.9</td>
<td>8.8</td>
<td>44-71</td>
<td>46.1</td>
<td>3.3</td>
<td>41-52</td>
</tr>
<tr>
<td>Low Ability/Learning Disabled</td>
<td>57.7</td>
<td>11.9</td>
<td>44-79</td>
<td>45.4</td>
<td>4.2</td>
<td>42-53</td>
</tr>
<tr>
<td>Aggressive/Conduct Disorder</td>
<td>55.6</td>
<td>5.3</td>
<td>48-61</td>
<td>47.3</td>
<td>5.5</td>
<td>42-53</td>
</tr>
<tr>
<td>Teacher Subscales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-doubt/Needs Support</td>
<td>54.3</td>
<td>10.6</td>
<td>42-66</td>
<td>47.9</td>
<td>6.8</td>
<td>42-57</td>
</tr>
<tr>
<td>Loss of Satisfaction from Teaching</td>
<td>52.3</td>
<td>11.3</td>
<td>42-71</td>
<td>45.6</td>
<td>8.1</td>
<td>39-60</td>
</tr>
<tr>
<td>Disrupts teaching</td>
<td>56.9</td>
<td>14.9</td>
<td>40-76</td>
<td>45.0</td>
<td>9.7</td>
<td>35-61</td>
</tr>
<tr>
<td>Frustration Working with Parents</td>
<td>48.3</td>
<td>6.4</td>
<td>42-58</td>
<td>42.3</td>
<td>3.4</td>
<td>36-46</td>
</tr>
</tbody>
</table>

Note: Z = Wilcoxon Signed Rank Test. *T-score of 60-69 is considered At-Risk; **T-scores 70 or higher are considered clinically significant.

3.2 Student Data

3.2.1 Student Observational Data

Student observational data are presented according to the four categories of behaviour, including compliance, on-task behaviour, challenging behaviour, and prosocial behaviour. Data for student outcomes are presented at both the individual student and classroom level.

Due to the severe behavioural reactions to academic tasks of Student 7, Teacher 3 was instructed by school administrators to withdraw all demands part-way through baseline to produce short-term improvements in his behaviour. Accordingly, staff required him to complete only high-preference activities during that period until they received training in ECM strategies. For this reason, baseline data for this student is partitioned into two phases: 1) initial baseline
with typical demands and routines in the classroom and 2) subsequent baseline with demands removed and only preferred activities required. The initial baseline with typical classroom routines is the most relevant data set for comparison with post-training data, as demand levels were returned to normal after staff received ECM training.

### 3.2.1.1 Student Compliance.

Figures 12, 13, and 14 show compliance to classroom staff requests across baseline, post-training and follow-up phases for all seven students. Observational sessions that contained less than three staff requests were omitted from the individualized student compliance graphs to prevent misrepresentation of data trends. This resulted in the omission of five session data points (all for Student 2). However, these data are included in the classroom level graphs. Note also that Student 4 was included in the time series graphs but not included in the aggregate and statistical analyses because her compliance was non-problematic and above 80% in baseline, which is well within the normative range (Whiting & Edwards, 1988). Inclusion of her data in aggregate level analyses would have resulted in greater data overlap and attenuation of intervention effect size estimates for compliance.

As expected, students demonstrated increased mean levels of compliance after training. It should be noted, however, that some of the students showed an increasing trend in baseline, making it more difficult to discern whether the improvement in compliance could be attributed to training or to other extraneous variables. As noted earlier for Student 7, the most relevant comparison is between compliance data in the initial baseline phase and those in the post-training phase (for both of these phases, demand levels were similar). This comparison shows that Student 7 made substantial compliance gains.
The overall mean increase in compliance from baseline to post-training ranged from 19% to 37% for students who were not taking any medications throughout the study. With regard to the two students who took medication during the course of the study, Student 1 demonstrated a 13% mean increase in compliance with training that was further enhanced by the medication that was initiated post training (8% additional mean increase). Student 5 began the medication in baseline and showed a mean improvement in compliance of 13% before training; the intervention produced little further benefit (4% additional mean increase). Of the four students who were monitored in follow-up sessions the following year, compliance improvements were maintained.

Mean compliance levels for the three classrooms across baseline and post training sessions are depicted in Figure 15. Before training, students demonstrated mean compliance levels of 53%, 73%, and 61% to classroom staff requests for Classrooms 1, 2, and 3, respectively. After staff training, the mean compliance levels were 73%, 86%, and 83%, an improvement of 20, 13, and 22 percentage points for Classrooms 1, 2, and 3, respectively.
Figure 12. Percentage of compliance to classroom requests during baseline, post-training and follow-up sessions for Classroom 1. Follow-up data represent 4 and 5 months after post-training. The dotted horizontal line represents the mean percentage of compliance during each phase.
Figure 13. Percentage of compliance to classroom requests during baseline, post-training and follow-up sessions for Classroom 2. Follow-up data represent 4 and 5 months after post-training. The dotted horizontal line represents the mean frequency of compliance during each phase.
Figure 14. Percentage of compliance to classroom staff requests during baseline, post-training and follow-up sessions for Classroom 3. No follow-up data were collected for Classroom 3. The dotted horizontal line represents the mean percentage of compliance during each phase. Note. PA = Baseline with Preferred Activities.
Figure 15. Overall mean percent compliance to classroom staff requests across baseline and post training phases for the three participating classrooms.

To obtain an overall estimate of the effect size of staff ECM strategies for students’ compliance behaviour, the percentage of all non-overlapping data index (PAND) was used. To ensure the most accurate representation of intervention effects for Student 5, only data from baseline and intervention phases in which he was taking medication were included in the analysis. Likewise, for Student 1, data comparisons were made only between phases during which he was not taking medications. Finally, the baseline data with the typical classroom demands was used for Student 7; the preferred activity baseline data was excluded from the analysis. Table 11 presents the PAND and Phi (Φ) coefficient value for each class as well as an overall effect estimate across the three participating classrooms. As can be seen in this table, the effect size for Classrooms 3 was large whereas the effect size was small and medium for Classrooms 1 and 2, respectively. The aggregate effect size was medium.
Table 11. *Effect Size Estimates of Student Compliance using Percentage of All Non-Overlapping Data for Classrooms 1, 2, and 3*

<table>
<thead>
<tr>
<th></th>
<th>PAND</th>
<th>Phi (Φ)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>76%</td>
<td>0.47</td>
<td>small</td>
</tr>
<tr>
<td>Class 2</td>
<td>80%</td>
<td>0.59</td>
<td>medium</td>
</tr>
<tr>
<td>Class 3</td>
<td>91%</td>
<td>0.77</td>
<td>large</td>
</tr>
<tr>
<td>Overall</td>
<td>82%</td>
<td>0.63</td>
<td>medium</td>
</tr>
</tbody>
</table>

### 3.2.1.2 Student On-Task Behaviour.

Figures 16, 17, and 18 depict the percentage of on-task intervals for each observation session during baseline, post-training, and follow-up for each student. Note that Student 3 was included in the time-series graphs but not the aggregate or statistical analysis because his baseline data was already above 80% and at a normal level (Lee, Kelly & Nyre, 1999).

As can be seen from the graphs, all students demonstrated improvement over baseline in mean levels of on-task responding. Student 7 demonstrated increased on-task behaviour when a comparison is made between the initial baseline and post-training. For four students (Student 1, 2, 4 and 6) there was evidence of an upward trend in the baseline phase, making it difficult to make conclusive statements about intervention effects on on-task behaviour for those students. Follow-up data were collected on Students 1, 3, 4 and 5. All of these students showed follow-up on-task levels that were comparable to post-training levels. The mean level increase in on-task behaviour ranged from 17% to 89% across students from baseline to post-training phases.
Figure 16. Percentage of on-task behaviour during baseline, post-training, and follow up for Classroom 1. Follow-up data represent 4 and 5 months after post-training. The dotted horizontal line represents the mean percentage of on-task behaviour during each phase.
Figure 17. Percentage of on-task behaviour during baseline, post-training, and follow up for Classroom 2. Follow-up data represent 4 and 5 months after post-training. The dotted horizontal line represents the mean percentage of on-task behaviour during each phase.
Figure 18. Percentage of on-task behaviour during baseline, post-training, and follow up for Classroom 3. No follow-up data were collected for Classroom 3. The dotted horizontal line represents the mean percentage of on-task behaviour during each phase.

Note. PA = Baseline with Preferred Activities.

Figure 19 presents mean percentage of on-task behaviour for each class across baseline and post-training sessions. The overall mean percentage of on-task during baseline for students in Classrooms 1, 2 and 3 was 65%, 66%, and 50%, respectively. On-task levels following staff
ECM training were 89%, 92%, and 88%, an improvement of 24, 26 and 38 percentage points over baseline, respectively.

![Figure 19](image_url)

*Figure 19.* Overall mean percentage of on-task behaviour across baseline and post-training phases for the three participating classrooms.

As shown in Table 12, the effect size for each classroom, as well as the aggregate effect size for on-task behaviour, was medium.

<table>
<thead>
<tr>
<th>Class</th>
<th>PAND</th>
<th>(\Phi)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>79%</td>
<td>0.54</td>
<td>medium</td>
</tr>
<tr>
<td>Class 2</td>
<td>84%</td>
<td>0.64</td>
<td>medium</td>
</tr>
<tr>
<td>Class 3</td>
<td>82%</td>
<td>0.60</td>
<td>medium</td>
</tr>
<tr>
<td>Overall</td>
<td>84%</td>
<td>0.67</td>
<td>medium</td>
</tr>
</tbody>
</table>

Table 12. *Effect Size Estimates of Student On-Task Behaviour using Percentage of All Non-Overlapping Data for Classrooms 1, 2, and 3*
3.2.1.3 Student Challenging Behaviour.

Figures 20, 21, and 22 depict the total number of challenging behaviours per one hour session across baseline, post-training, and follow-up sessions for each student. In comparison to the high frequencies of challenging behaviour in baseline for most participants, all students appeared to demonstrate a reduction in these responses post-training. For Student 1, ECM training was associated with a decrease in frequency of these behaviours; further reduction did not occur with the introduction of medication during the intervention phase. In the case of Student 5, the introduction of medication in baseline was associated with a reduction in mean frequency of behaviours from 29.9 to 13.5 behaviours per hour, and classroom intervention appeared to further reduce his behaviours to 5.6 behaviours per hour. It is important to note that some students (Students 1, 4, 5 and 6) showed a descending trend in baseline, making it difficult to determine whether the improvement in challenging behaviour could be attributed to the training or other factors.

Examination of data trends for Student 7 reveals that in comparison to the initial baseline, he showed a reduction in challenging behaviour in the post-training phase. Of the four students for whom follow-up sessions were conducted in the following school year, the decrease in challenging behaviours was maintained for Students 1, 3, and 4.

The mean frequency of challenging behaviours for each classroom across baseline and training is presented in Figure 23. The mean frequency of challenging behaviours during baseline was 34.4, 15.2, and 15.9 behaviours per hour for Classrooms 1, 2, and 3, respectively. Mean frequencies of challenging behaviours following staff training were 11.9, 6.6, and 6.6 per hour for Classrooms 1, 2, and 3. Thus, although challenging behaviour continued to occur in the classroom, it was reduced by more than half across all three classrooms post-training.
Figure 20. Frequency of challenging behaviours per hour during baseline, post-training, and follow up for Classroom 1. Follow-up data represent 4 and 5 months after post-training. The dotted horizontal line represents the mean frequency of challenging behaviour during each phase.
Figure 21. Frequency of challenging behaviours per hour during baseline, post-training, and follow up for Classroom 2. Follow-up data represent 4 and 5 months after post-training. The dotted horizontal line represents the mean frequency of challenging behaviour during each phase.
Figure 22. Frequency of challenging behaviours per hour during baseline, post-training, and follow up for Classroom 3. No follow-up data were collected for Classroom 3. The dotted horizontal line represents the mean frequency of challenging behaviour during each phase. Note. PA = Baseline with Preferred Activities.
Figure 23. Mean frequency of challenging behaviours per hour across baseline and post training phases for the three participating classrooms.

The effect size results for student challenging behaviour are depicted in Table 13. Results indicate an effect size of medium for each classroom as well as at the aggregate level.

Table 13. Effect Size Estimates of Student Challenging Behaviour using Percentage of All Non-Overlapping Data for Classrooms 1, 2, and 3

<table>
<thead>
<tr>
<th></th>
<th>PAND</th>
<th>Phi (Φ)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>81%</td>
<td>0.58</td>
<td>medium</td>
</tr>
<tr>
<td>Class 2</td>
<td>80%</td>
<td>0.59</td>
<td>medium</td>
</tr>
<tr>
<td>Class 3</td>
<td>83%</td>
<td>0.55</td>
<td>medium</td>
</tr>
<tr>
<td>Overall</td>
<td>85%</td>
<td>0.66</td>
<td>medium</td>
</tr>
</tbody>
</table>
3.2.1.4 Student Prosocial Behaviour.

Figures 24, 25, and 26 represent the frequency of prosocial behaviours per hour across all baseline, post-training and follow-up sessions for each student. As can be seen in the figures, the occurrence of prosocial behaviours was extremely low during baseline for all students across classrooms. After staff training, all students engaged in a higher mean level of prosocial behaviours per hour. For students involved in follow-up (Students 1, 3, 4, and 5), the frequency of prosocial responses at 4 and 5 months follow-up remained at levels achieved during the post-training phase, with the exception of Student 4, who demonstrated a decrease in prosocial behaviour. There is evidence of an increasing trend in baseline for some students (Students 3 and 6), making it difficult to meaningfully interpret the training effect.

Figure 27 depicts the overall mean frequency of prosocial behaviours across baseline and post-training sessions. During baseline, students engaged in an average of 3.4, 1.7, and 2.8 prosocial behaviours per hour in Classrooms 1, 2, and 3, respectively. After staff training, students engaged in an average of 7.8, 6.5, and 6.1 prosocial behaviours per hour for Classrooms 1, 2, and 3, a mean increase of 4.4, 4.8, and 3.3 prosocial behaviours per hour, respectively.
Figure 24. Frequency of prosocial behaviours per hour during baseline, post-training, and follow-up for Classroom 1. Follow-up data represent 4 and 5 months after post-training. The dotted horizontal line represents the mean frequency of prosocial behaviour during each phase.
Figure 25. Frequency of prosocial behaviours per hour during baseline, post-training, and follow up for Classroom 2. Follow-up data represent 4 and 5 months after post-training. The dotted horizontal line represents the mean frequency of prosocial behaviour during each phase.
Figure 26. Frequency of prosocial behaviours per hour during baseline, post-training, and follow up for Classroom 3. No follow-up data were collected for Classroom 3. The dotted horizontal line represents the mean percentage of frequency of prosocial behaviour during each phase. Note. PA = Baseline with Preferred Activities.
Figure 27. Mean frequency of prosocial behaviours per hour across baseline and post training phases for the three participating classrooms

A summary of the effect size results for students’ prosocial behaviours is shown in Table 14. The effect size was large for Classroom 2 and medium for Classrooms 1 and 3. The aggregate effect size was medium.

Table 14. Effect Size Estimates of Student Prosocial Behaviours using Percentage of All Non-Overlapping Data for Classrooms 1, 2, and 3

<table>
<thead>
<tr>
<th></th>
<th>PAND</th>
<th>Phi (Φ)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>79%</td>
<td>0.54</td>
<td>medium</td>
</tr>
<tr>
<td>Class 2</td>
<td>87%</td>
<td>0.74</td>
<td>large</td>
</tr>
<tr>
<td>Class 3</td>
<td>85%</td>
<td>0.61</td>
<td>medium</td>
</tr>
<tr>
<td>Overall</td>
<td>85%</td>
<td>0.67</td>
<td>medium</td>
</tr>
</tbody>
</table>
3.2.2 Staff Questionnaire for Student Behaviours

3.2.2.1 Behavior Assessment System for Children, Second Edition-Teacher Rating Scale.

*Composite scale T-Scores.*

The descriptive statistics for the BASC-2-TRS at baseline and post-training and the results of the Wilcoxon Signed Rank Test using the full study sample of seven students are reported in Table 15. On the total scale T-scores, the sample of students fell in the clinically significant range for externalizing problems, internalizing problems, and the behavioral symptoms index before intervention. For the maladaptive behavior subscales, students were rated as clinically significant at baseline for all subscales with the exception of somatization, learning problems, anxiety and conduct problem subscales. For the adaptive behavior subscales, none of the subscales were rated as clinically significant for the students at baseline by their teachers.

Following post-training, statistically significant improvements occurred for all the total scale T-scores; students were no longer rated as falling within the clinically significant range for both externalizing and internalizing problems. There were significant improvements from baseline to post-training scores for eight of the ten maladaptive subscales (the mean scores did not change for anxiety and somatization). Within the adaptive domain, two of the five subscales (adaptability and functional communication) showed significant improvement (there was no significant change for social, leadership skills and study skills).
Table 15. Descriptive Statistics for the BASC-2 Teacher Rating Scale T-Scores

<table>
<thead>
<tr>
<th>Scales</th>
<th>Baseline</th>
<th></th>
<th></th>
<th>Post-Intervention</th>
<th></th>
<th></th>
<th>Test Statistic</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Range</td>
<td>Mean</td>
<td>SD</td>
<td>Range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Scale Scores</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Externalizing Problems</td>
<td>78.6</td>
<td>11.9</td>
<td>57-92</td>
<td>64.3</td>
<td>6.8</td>
<td>53-75</td>
<td>-2.366</td>
<td>.018</td>
</tr>
<tr>
<td>Internalizing Problems</td>
<td>70.4</td>
<td>18.9</td>
<td>49-97</td>
<td>58.9</td>
<td>12.9</td>
<td>42-82</td>
<td>2.117</td>
<td>.034</td>
</tr>
<tr>
<td>Behavioural Symptoms Index</td>
<td>84.7</td>
<td>11.5</td>
<td>67-105</td>
<td>69.4</td>
<td>5.5</td>
<td>63-77</td>
<td>-2.366</td>
<td>.018</td>
</tr>
<tr>
<td>School Problems</td>
<td>67.7</td>
<td>6.2</td>
<td>56-74</td>
<td>60.9</td>
<td>6.1</td>
<td>51-67</td>
<td>-2.375</td>
<td>.018</td>
</tr>
<tr>
<td>Adaptive Skills</td>
<td>31.6</td>
<td>3.5</td>
<td>27-36</td>
<td>36.7</td>
<td>5.5</td>
<td>30-47</td>
<td>1.992</td>
<td>.046</td>
</tr>
<tr>
<td>Maladaptive Behaviour Subscales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyperactivity</td>
<td>77.3</td>
<td>8.4</td>
<td>64-91</td>
<td>66.1</td>
<td>5.1</td>
<td>56-77</td>
<td>-2.410</td>
<td>.016</td>
</tr>
<tr>
<td>Aggression</td>
<td>83.1</td>
<td>19.3</td>
<td>52-106</td>
<td>65.4</td>
<td>8.9</td>
<td>52-78</td>
<td>-2.201</td>
<td>.028</td>
</tr>
<tr>
<td>Conduct Problems</td>
<td>69.7</td>
<td>11.1</td>
<td>53-82</td>
<td>59.1</td>
<td>6.9</td>
<td>51-73</td>
<td>-2.366</td>
<td>.018</td>
</tr>
<tr>
<td>Anxiety</td>
<td>64.3</td>
<td>16.0</td>
<td>43-89</td>
<td>58.1</td>
<td>11.3</td>
<td>39-72</td>
<td>-.943</td>
<td>.345</td>
</tr>
<tr>
<td>Depression</td>
<td>76.0</td>
<td>23.2</td>
<td>47-106</td>
<td>61.9</td>
<td>11.3</td>
<td>47-77</td>
<td>-2.023</td>
<td>.043</td>
</tr>
<tr>
<td>Somatization</td>
<td>58.4</td>
<td>13.7</td>
<td>43-81</td>
<td>51.4</td>
<td>14.9</td>
<td>43-84</td>
<td>-1.753</td>
<td>.080</td>
</tr>
<tr>
<td>Attention Problems</td>
<td>70.6</td>
<td>5.0</td>
<td>65-78</td>
<td>63.7</td>
<td>5.2</td>
<td>54-70</td>
<td>-2.371</td>
<td>.018</td>
</tr>
<tr>
<td>Learning Problems</td>
<td>61.7</td>
<td>10.1</td>
<td>44-74</td>
<td>56.6</td>
<td>10.0</td>
<td>42-70</td>
<td>-2.047</td>
<td>.041</td>
</tr>
<tr>
<td>Atypicality</td>
<td>80.0</td>
<td>19.4</td>
<td>59-118</td>
<td>67.3</td>
<td>15.9</td>
<td>49-89</td>
<td>-1.997</td>
<td>.046</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>79.9</td>
<td>8.7</td>
<td>63-89</td>
<td>69.3</td>
<td>9.3</td>
<td>55-83</td>
<td>-2.201</td>
<td>.028</td>
</tr>
<tr>
<td>Adaptive Behaviour Subscales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adaptability</td>
<td>30.9</td>
<td>8.8</td>
<td>25-49</td>
<td>36.9</td>
<td>6.3</td>
<td>29-47</td>
<td>2.217</td>
<td>.027</td>
</tr>
<tr>
<td>Social Skills</td>
<td>36.6</td>
<td>6.0</td>
<td>28-45</td>
<td>40.0</td>
<td>9.6</td>
<td>28-56</td>
<td>.813</td>
<td>.416</td>
</tr>
<tr>
<td>Leadership</td>
<td>36.4</td>
<td>2.5</td>
<td>32-39</td>
<td>40.6</td>
<td>5.2</td>
<td>34-47</td>
<td>1.577</td>
<td>.115</td>
</tr>
<tr>
<td>Study Skills</td>
<td>33.1</td>
<td>4.8</td>
<td>27-42</td>
<td>36.7</td>
<td>4.7</td>
<td>33-46</td>
<td>1.897</td>
<td>.058</td>
</tr>
<tr>
<td>Functional Communication</td>
<td>30.7</td>
<td>6.6</td>
<td>24-41</td>
<td>37.6</td>
<td>7.8</td>
<td>27-52</td>
<td>2.375</td>
<td>.018</td>
</tr>
</tbody>
</table>

Note. BASC-2 = Behavior Assessment System for Children, Second Edition; Z = Wilcoxon Signed Rank Test. For the maladaptive scales, T scores higher than 70 are considered clinically significant. The adaptive behavior scales are reverse coded to denote the presence of “adaptive skills problems”. For the adaptive scales, T scores lower than 30 are considered to be clinically significant.

Figures 28, 29, and 30 depict the teacher ratings from the composite scale T-scores and the maladaptive behaviour and adaptive behaviour subscales on the BASC for each student. The teacher’s responses are displayed as T-scores in the graphs. For the composite scale scores and the maladaptive behaviour subscales, T-scores between 60 and 69 are considered in the at-risk range, while scores 70 or higher represent clinically significant symptom levels. T-Scores below 65 fall within the non-clinical range and are not considered to be problematic when compared to students of the same age group. For the adaptive scales, scores between 31 and 40 represent the
at-risk range, and scores 30 or below are considered to be clinically significant. The areas between the two dotted lines on the individual scale graphs denote the at-risk range.

As can be seen in Figure 28 for the composite scale T-scores, six of the seven students were rated by their teachers before training as exhibiting clinically elevated ratings on the Externalizing Problems scale and one student fell in the at-risk range. Following training, all these students were reported as exhibiting fewer externalizing problems, with three students (Students 2, 3 and 4) no longer falling in the clinically significant range post-training. Similarly, six of the seven students were reported by their teachers in baseline as displaying clinically significant symptoms on the behavioural index, while one fell in the at-risk range. For two of the six students, teacher ratings showed considerable reductions in their behavioural index symptoms after training (Student 3 and 5). With regard to internalizing problems, three students were reported as displaying clinically significant levels (Student 1, 2, and 3) while two students were in the at-risk range before training (Student 5 and 6). Two of the four students (Student 2 and 3) were no longer rated in the clinically significant range following training whereas Student 5 was no longer rated in the at-risk range. Clinically significant levels of school problems were rated as a concern for four students (Student 1, 2, 5 and 7) and two students were rated in the at-risk range before training (Student 3 and 6). Reductions in school problems were reported following training for all of these students except Student 6. Adaptive skills were rated as being a clinically significant concern (scores 30 or below) for two students (Student 5 and 7) and five students fell in the at-risk range before training (Student 1, 2, 3, 4, and 6); both students in the clinical range were reported to show improvement in these positive behaviours after training and were no longer in the clinically significant range.
Maladaptive Behaviour Subscales.

Figures 29 and 30 present a summary of the changes in the students’ T-scores for the ten maladaptive scale scores from pre and post training based on teacher reports. As can be seen in Figure 29, four of the seven students who were rated by their teachers as exhibiting clinical levels of hyperactivity before training were no longer rated in this range post-training (Student 2, 3, 5, and 7). Three of the five students (Student 1, 3 and 5) were no longer rated as falling in the clinical range for aggression post-training. Prior to training, three students were reported as displaying clinical levels of conduct problems, with two students (Student 1 and 5) exhibiting significantly lower and age appropriate levels of behaviour following training. In terms of attention difficulties, three of the four students (Student 1, 5, and 7) rated to have clinical levels prior to training displayed non-clinical levels of these symptoms post-training. Teacher ratings on the learning problems scale indicated that one of the two students (Student 5) who fell in the clinically significant range at baseline demonstrated significant reductions in this domain post-training. Teachers reported clinical levels of anxiety at baseline for two students (Student 1 and 3) but post-training ratings indicated they displayed non-clinical levels. Four students were reported by their teachers prior to training as displaying clinically significant symptoms of depression, with two of the four (Student 2 and 3) showing considerable reductions after training. One of the two students (Student 2) who were initially rated by their teachers as having somatic complaints as a clinical concern no longer did post-training. Two of the six students (Student 1 and 3) described as exhibiting clinically significant withdrawal problems prior to training improved after training. Finally, one of the four students (Student 5) rated by their teachers in baseline as displaying clinically significant unusual behaviour on the atypicality subscale showed substantial reductions after training.
Adaptive Behaviour Subscales.

Figure 31 depicts the changes in the students’ scores for the five adaptive scale T-scores from pre to post training. Teacher adaptability ratings were no longer in the clinical range for three of the four students (Students 2, 3, and 6) after training. Three of the four students (Students 1, 5 and 7) rated as exhibiting clinically elevated functional communication problems at baseline showed low to non-clinical levels post-training. Student 5 was the only student who was rated as having significant study skill problems at baseline; he showed significant improvement in his study skills after training. There was no reported improvement for the one student (Student 7) who was rated as showing clinically significant social skill deficits at baseline. One of the four students (Student 5) who were rated as having at-risk levels of social skill deficits showed improvements after training. Lastly, there were no students who were rated by their teachers as having clinically significant deficits in leadership skills at baseline.
Figure 28. T-scores for the BASC-2 Composite Scales pre and post-training for Classrooms 1 (C1), 2 (C2) and 3(C3).
Figure 29. T-scores for the BASC-2 Maladaptive Scale Scores pre and post-training for Classrooms 1 (C1), 2 (C2) and 3(C3).
Figure 30. T-scores for the BASC-2 Maladaptive Scale Scores pre and post-training for Classroom 1(C1), 2(C2) and 3(C3)
Figure 31. T-scores for the BASC-2 Adaptive Behaviours Scale Scores pre and post-training for Classrooms 1 (C1), 2 (C2) and 3 (C3).
3.3 Consumer Satisfaction Questionnaire

All three teachers and five of the nine classroom support staff returned the Teacher/Classroom Support Staff Satisfaction Questionnaire. Results of the questionnaire are presented in Table 16.

Table 16. Classroom Staff Mean Responses to Consumer Satisfaction Questionnaire

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am satisfied with the quality of the classroom management strategies I was provided with.</td>
<td>4.6 (0.5)</td>
</tr>
<tr>
<td>My classroom management needs were met by the teacher training program.</td>
<td>4.5 (0.5)</td>
</tr>
<tr>
<td>I would recommend this teacher training program to other teachers/classroom staff</td>
<td>4.9 (0.4)</td>
</tr>
<tr>
<td>I am now able to prevent behaviour problems more effectively in my classroom</td>
<td>4.6 (0.5)</td>
</tr>
<tr>
<td>I am now able to manage problem behaviours more effectively in the classroom</td>
<td>4.5 (0.5)</td>
</tr>
<tr>
<td>How much did the teacher/classroom staff training intervention help with specific problems that led you to take part in this intervention?</td>
<td>4.6 (0.5)</td>
</tr>
</tbody>
</table>

Note. SD = Standard Deviation

Based on the results from the Satisfaction Questionnaire, the teacher and support staff were satisfied with the intervention and the support they received, with mean scores of 4.5 or higher out of 5 for all items. When asked what they liked most about the training program, six of the eight staff indicated the training was straightforward and clear, as it did not rely on complicated theories, materials or instructions and provided practical skills immediately. All eight staff mentioned that they appreciated having performance feedback or reminders after the training in the classroom to help them deal with specific scenarios and understand how the interventions could help with behaviours. Two staff indicated the training helped them reframe their thinking about student problem behaviour and focus on the positive aspects of the students. Further, all staff mentioned that they liked the positive, proactive, and non-coercive approach to managing challenging behaviour. Three of the five staff who worked with the older children in Classrooms 2 and 3 mentioned that the word “flex” became part of the students’ vocabulary and
that students were spontaneously reminding each other to “flex”. When asked for areas of improvement, about half of the staff suggested that the training could have been longer with more sessions. These same staff wished they had had more opportunities to meet to discuss implementation difficulties with specific students/staff and to share their experiences and strategies with other teachers and support staff. Two staff working with the youngest group of students in Classroom 1 indicated that it was difficult to implement the concept of acquiescence or “flexing” because the concept was too abstract for the younger students to grasp, particularly those with more severe ASD symptoms and communication impairments. All three teachers indicated that visual components (e.g., social stories, cartoons, videos) were needed to make the social skill lessons more understandable and engaging for the students. Lastly, the majority of staff suggested that the training start at the beginning of the school year so that all of the classroom staff could be on the same page and using the same approach. They noted that starting training early would allow teachers to set up consistent expectations for the students and provide them with more time to learn and practice their new skills.
Chapter 4: Discussion

Given that the number of children diagnosed with ASD is rising (ADDM, 2009; Lord & Bishop, 2010; Ouellette-Kuntz et al., 2012), research on practical school-based intervention strategies for children with ASD is urgently needed. The current study addressed this need by examining the implementation of a theoretically informed proactive classroom management teacher training package in three self-contained classrooms for students with ASD. Using time-series observations and staff-report questionnaires, the classroom management skills of staff and the behaviour of students were observed before and after the in-service training.

The findings indicated that classroom staff showed significant gains in their use of reinforcement and antecedent classroom management strategies. Though classroom staff demonstrated a low level of reactive strategies prior to training, these responses decreased to near-zero levels following training. Results also indicated moderate improvements in student compliance, on-task, challenging and prosocial behaviour. Improvements in classroom staff and student behaviour were maintained at the 5 month follow-up, suggesting that ECM may produce durable changes in classroom responding. Most classroom staff indicated satisfaction with the training and showed an overall moderate reduction in stress levels related to classroom management.

4.1 Staff Classroom Management Strategies

The use of reinforcement and antecedent strategies increased for most classroom staff following ECM, and were generally maintained for classroom staff that were monitored at follow-up. However, EA 2 in Classroom 2 showed little improvements in her use of these strategies. It is noteworthy that EA 2 was the most experienced classroom support staff in our study, as she had been assisting in classrooms for 25 years. A possible explanation for her
minimal adoption of proactive strategies is their poor fit with her longstanding beliefs and experiences of managing student behaviours (i.e., based on consumer satisfaction comments, she believed that children behaved better when adults imposed their authority over them and used reactive measures); she was therefore reluctant to devote energy and time to implementing a new program (Boardman, Arguelles, Vaughn & Klingner, 2005). Moreover, she appeared to be overburdened in her wide-ranging duties by the inconsistencies in the level of support in the classroom on any given day. Due to resource limitations in the school, another classroom support staff assigned to Classroom 2 (a non-participant in this study) was frequently withdrawn to help students in other classrooms. For this reason, EA 2 may have found it challenging to focus on use of newly learned ECM strategies and defaulted to her more familiar repertoire (Clunies-Ross et al., 2008; Maag, 2001). This explanation is supported by her daily stress ratings, as they remained moderately high and unchanged post-training. However, it is interesting to note that there was a higher mean level of proactive strategy use by staff in Classroom 2 across study phases. This classroom is comprised of the youngest age group of students (Grades 1-3) in our study. Due to their relative youth, they were likely more dependent on staff support for self-regulation.

In baseline, most classroom staff showed low levels of reactive strategies (likely reflective of their acknowledged previous training in some simple behavioural strategies), but following training, use of reactive strategies decreased substantially for all three classrooms and to near-zero levels in Classrooms 1 and 3. Moreover, low levels of reactive strategies were maintained by those staff monitored at 4 and 5 month follow-ups.

Although reactive responding decreased substantially from baseline levels for both staff in Classroom 2 (i.e., a mean decrease from 8 to 3 reactive responses per half hour), staff
continued to use these strategies at a higher rate compared to staff in the other two classrooms. Within this particular classroom, we observed that there were fewer classroom support staff to assist students and impaired working relationships between the teacher and classroom support staff that may have contributed to staff emotional exhaustion (i.e., higher self-reported stress ratings for Teacher 2 and EA 2). Under these conditions, staff may have continued to use reactive disciplinary strategies to quickly curb challenging behaviour (Clunies-Ross et al., 2008; Infantino & Little, 2005; Maag, 2001). These observations suggest that interventions are complicated to deliver in school settings due to disparities in support staff resources and poor quality working relationships among staff (Kasari & Smith). Future studies need to address these issues to ensure the successful implementation of the ECM approach.

The increase in proactive strategies following intervention is commensurate with a previous evaluation of ECM in general classrooms (De Sa Maini & Ducharme, 2014). Additionally, decreases in reactive strategies following ECM training are consistent with De Sa Maini and Ducharme (2014) and another study conducted in a behavioural classroom (Conn Krieger, 2013).

Notwithstanding the extensive evidence that individualized ABA interventions can be effectively employed by classroom staff to improve outcomes for individual students with ASD (Koegel et al., 2011; Lerman et al., 2004; Lopata et al., 2012; Machalicek et al., 2007; Rispoli et al., 2011; Robinson, 2011), there are very few systematic evaluations of class-wide ABA interventions for this population (Harrower & Dunlap, 2001; Odom et al., 2010). The current ECM study addresses this research gap by demonstrating that classroom staff can be successfully trained to increase use of proactive classroom management techniques and decrease reactive techniques (Giangreco et al., 2001; Giangreco et al., 2010; Rispoli et al., 2011).
4.2 Student Behaviours

Four categories of student behaviours were assessed in the present study, including compliance, on-task skills, challenging behaviour, and prosocial behaviour. Group mean scores and overall effect sizes for these behaviours indicated moderate improvements following ECM.

Although the compliance effect size for the senior elementary students (Classroom 3) was larger than the other classrooms, this was likely influenced by the extremely low levels of compliance demonstrated by Student 7 in baseline that increased substantially post-training. There was significant overlap in data points across study phases for compliance behaviours among the students in Classroom 1, resulting in a small intervention effect for this classroom. Moreover, a visual analysis of student data suggests that improvements in compliance and on-task skills are not as clear-cut as the statistical analyses indicate. In particular, there were some increasing and variable baseline trends for some students in compliance and on-task behaviour (e.g., Students 2, 3, 4, 6, and 7), making an attribution of post-training changes to the intervention less definitive. Given these trends, external factors including maturation, naturally occurring fluctuations in behaviour, and events in the school day or home-based interventions unknown to school staff cannot be ruled out as potential influences. Therefore, results for these two outcomes must be interpreted with caution.

The aggregate intervention effect size for student challenging behaviour was also moderate. Classroom 1 exhibited the highest mean level of challenging behaviour in baseline followed by Classrooms 2 and 3. Despite the varying baseline levels of challenging behaviour among students, a mean reduction of more than half the number of instances of this behaviour occurred across all three classrooms post-training.
For prosocial behaviours, results indicated substantial increases after ECM training, with the largest gains made by the younger junior elementary students in Classroom 2 who demonstrated few prosocial behaviours in baseline (about 1 or 2 per hour). As can be seen from the staff outcome data, staff in Classroom 2 (Grades 1 to 3) provided a higher mean level of proactive strategies across baseline and intervention phases to support and reinforce student prosocial responding. These differential effects across classrooms and age groups is consistent with research that shows that very young children with ASD are more dependent on adult mediators in their environment instead of their peers to help them communicate and act prosocially (Koegel et al., 2000). Additionally, research from early intensive behavioural intervention studies suggests that younger children with ASD tend to be more responsive to interventions (Koegel et al., 2000; National Research Institute, 2001). This is likely due to the plasticity of brain neural systems during that time that can be affected by direct skill instruction to improve core domains of attention, imitation, language and social interaction (Faja & Dawson, 2005).

Improvements in classroom behaviour in the present study are in line with recent ECM research with students in public school settings without ASD (Conn Krieger, 2013; De Sa Maini & Ducharme, 2014). Further, in examinations of errorless interventions that focused on single keystone skills, including on-task skills (Ducharme & Harris, 2005) and acquiescence (Ducharme et al., 2008), improvements in on-task skills, prosocial skills, and challenging behaviours were found. Additionally, in a classroom of children with ASD, Ducharme and Ng (2012) found similar improvements in an examination of errorless academic compliance training, an intervention focused on the single keystone skill of classroom compliance.
It is important to note that some students demonstrated variable improvements following ECM. In particular, Student 4 did not produce the broad positive gains we hoped for with our class-wide intervention. Although she made improvements in other areas, she displayed few prosocial responses in baseline and made no improvements after training. Based on informal observations of her behaviour it appeared that her impaired social responding was affected by an overriding need to access sensory reinforcement. For example, she engaged in frequent body rocking that resulted in her social isolation. When she did seek interactions with others, it appeared to be for tactile experiences (e.g., to obtain a hug, to touch someone’s hair or clothing, or to sit on a staff’s lap). She was resistant to support strategies that encouraged her to interact with others in alternative prosocial ways.

Additionally, the student who was excluded from our analyses also seemed to have more complex functions for his problem responding. He continued to display unpredictable mood swings and severe behavioural episodes despite our intervention efforts. He often put inedible objects in his mouth and displayed sensitivity to noise level and fluorescent lights resulting in off task behaviour, fleeing his work area or classroom, and fighting with classroom staff. Further, he had a compulsive need to follow his own internal dialogue or plan of action; when prevented from following through with his ideas or obsessions he reacted with oppositional and aggressive responses. His challenging behaviours often appeared “out of the blue” and the result of distressing emotional states, occurring independent of classroom conditions (Hayes, Wilson, Gifford, Follette & Strosahl, 1996). In fact, his classroom teacher felt strongly that he required medication to manage his mood fluctuations and severe levels of anxiety. Given the myriad difficulties of supporting this child with classroom management strategies, he was clearly a candidate for more individualized and intensive Tier 3 interventions.
Students with such behaviours may require additional intervention components that are not included in ECM, such as sensory-based strategies (e.g., sugarless gum to replace chewing/consumption of in-edibles, access to sensory objects or toys to compete with repetitive behaviour) (Rapp & Vollmer, 2005; Twatchman-Reilly, Amaral, & Zebrowski, 2008; Williams & McAdam, 2012). Classroom staff may also need to seek the support of mental health professionals to rule out underlying medical and mental health conditions that may be contributing to a student’s challenging behaviour.

4.3 Teacher Report Behavioural Measure

Analyses of the teacher ratings on the BASC-2-TRS revealed significant reductions in students’ externalizing and internalizing behaviours following training, indicating positive changes in their perceptions of student conduct. Clinically significant improvements were also noted in specific adaptive areas including students’ adaptability, functional communication and study skills. Although the observational data indicated an overall moderate improvement in frequency of student prosocial skills, there was no clinically significant improvement found for teachers’ ratings of this behaviour. Given the severity of social skill problems in the participating students with ASD, it is possible that standardized measures were insensitive to changes that occurred, whereas observational behavioural measures (tapping discrete functional skills being taught) were more precise. An alternative possibility is that the increase in prosocial skills did not impact the teacher’s perceptions because the changes were insubstantial; notwithstanding improvements, the social skills of participating students with ASD remained impaired post-training based on informal observations. Although firm conclusions cannot be made from the pre and post questionnaires due to the non-experimental nature of these measures, they provide some
converging evidence that ECM produced broad clinical change in externalizing and internalizing symptoms and also in some adaptive skills of the students.

4.4 Social Validity of ECM Training for Students with Autism Spectrum Disorders in School Settings

Social validity was assessed through measures of satisfaction with the training program and staff stress levels. Results from the staff satisfaction survey revealed that all teachers and most classroom support staff perceived ECM as a good fit with their prior attitudes, beliefs, and limited training on how to deal with challenging behaviour. Previous research has shown that teachers in special education are more likely to adopt and continue using interventions that fit with their own beliefs in the context of their classroom (Boardman et al., 2005). Some of the staff stated that ECM helped consolidate management strategies that they were already using into a clear and simple conceptual framework. Further, most reported that ECM training engendered much-needed consistency across staff members in each classroom by providing a common approach and language for dealing with student behaviour problems. These staff responses are encouraging, given that improved consistency across treatment providers is key to enhancing the potency of intervention effects (Gresham, 2004; Horner, 2002; Koegel et al., 2010; Volkmar, Reichow & Doehring, 2011).

The majority of staff mentioned that performance feedback on their skills in the classroom setting during the first two weeks of program implementation was particularly useful. About half of the staff noted a desire for more ongoing and intensive support, especially discussion and problem-solving around longstanding student behaviour issues. LeBlanc and colleagues (2005) have suggested that ongoing support for teachers and classroom support staff is necessary for maintenance of skills in public school settings, particularly because students with
ASD often have intensive needs. Future applications of ECM in ASD settings should include strategies for promoting ongoing collaboration among staff members in and across classrooms for mutual support and troubleshooting of specific behavioural issues. Such a support system might help teachers and classroom support staff sustain the effects of ECM training after trainers have departed.

Most classroom staff members suggested that they would like the social skills component of the intervention to be more focused on the needs of students with ASD by including more dynamic teaching components (such as social stories, video modeling, etc.) to help students with ASD grasp the acquiescence concept and related social skills. Most social skill training packages for ASD include visual aids and media to enhance learning (National Research Council, 2001; Reichow & Volkmar, 2010) and use of such supports have been shown to help students with ASD learn, given their difficulties in abstract thinking, social cognition, and attention (Gjevik et al., 2011; Joseph, Tager-Flusberg & Lord, 2002; Meyer & Minshew, 2002; National Research Council, 2001). The incorporation of visual aids in future applications of ECM with students with ASD may help to promote the acquisition of social skills.

Finally, all staff requested that ECM be implemented at the beginning of the school year to establish a consistent approach and expectations for each student. The delay in implementing the staff training in the present study until the month of March meant that negative interactions between staff and students in the first half of the school year may have resulted in a well-established history of challenging student behaviours that were more difficult to treat. The late training also resulted in reduced intervention hours for students. Overall, staff satisfaction feedback indicated that ECM was viewed as relevant to the needs of those responsible for the education of students with ASD. These staff perceptions of the program are promising because
perceived acceptability of a school-based intervention model is key to implementation and effectiveness (Kasari & Smith, 2013; Machalicek et al., 2007; Simpson et al., 2011).

With regard to measurement of classroom management stress, staff members in Classrooms 1 and 3 reported reductions in stress levels following ECM, whereas the teacher in Classroom 2 noted an increase and the EA reported no change. This differential finding across classrooms could be due to extraneous factors unrelated to intervention. As previously noted, there were impaired working relationships between the teacher and the two classroom support staff as well as inconsistencies in staffing in Classroom 2. Classroom staff may have felt an added burden of learning to implement ECM strategies while trying to manage staffing shortages, possibly leading to higher levels of stress levels following ECM. It is noteworthy that the majority of staff members’ stress ratings reduced dramatically in the month of June when the academic year was wrapping up, possibly due to anticipated reduction of work stress.

In contrast with the mixed findings related to classroom management stress, findings from the ITS questionnaire completed by the teachers indicated statistically significant reductions in total stress as well as stress related to student and teacher characteristics. In particular, teachers reported clinically significant reductions in their stress levels related to students’ ADHD behaviours (i.e., distractibility, impulsivity, restlessness, and short attention span), emotionality, and inability to adjust to changes in the classroom. Such results are understandable given the increased student cooperative and on-task behavior as well as decreased challenging behaviour. Equally important is the finding that teachers reported statistically significant reductions in their loss of satisfaction from teaching. The relevance of job satisfaction is related to outcomes in teachers such as motivation, job commitment, perceptions of self-efficacy, instructional practices, and burnout (Adera & Bullock, 2010). Teacher’s
increased enjoyment of teaching and interacting with their students may have been mediated through the use of proactive effective classroom discipline strategies. That is, they may have felt more capable and successful at handling difficult student behaviour leading to higher job satisfaction ratings (Yoon, 2002). Improvements in teacher’s confidence may have also led to increases in their efforts to confront difficult situations and persist at helping their students (Ashton & Webb, 1986; Yoon, 2002). Overall, the ECM program may have provided a framework for staff that organized and streamlined classroom management strategies and increased their confidence in bringing about positive behavioural change.

4.5 Limitations and Future Directions

One limitation of the present study involves inconsistency in the evaluation of maintenance effects. One of the reasons for difficulties in collecting complete follow-up data on study participants was the late commencement of the study mid-way through the school year, rendering follow-ups in the current school year unfeasible. Moreover, given that we were unable to obtain consents for monitoring Classroom 3 (Grade 6 to 8 students) in the subsequent school year, we could not conduct follow-up evaluations for students in this classroom. Further, Student 2 from Classroom 1 changed schools before the follow-up took place. For these reasons, we cannot draw firm conclusions about maintenance, although the data that were collected suggested enduring intervention gains for most students and staff in the primary elementary classrooms. These data were particularly encouraging given that follow-ups were conducted in the subsequent school year, approximately five months after our last post-training feedback sessions. In future studies, initiation of training at the beginning of the school year would allow evaluation of maintenance within the same school year as well as in subsequent years.
A notable strength of the present study is that the student participants were diverse, including various ages/grade levels, ASD diagnoses, ethnicities, and comorbid conditions (e.g., learning disabilities, ADHD, anxiety). However, participating students were of average cognitive ability and results may not extend to students who are more cognitively limited, non-verbal, and have more severe symptoms of ASD. Further, issues related to gender could not be considered as only one female student with ASD was included in the present study. Studies with larger sample sizes and inclusion of students with more diverse characteristics would help deal with these concerns.

This study was conducted in self-contained special education classrooms with low staff to student ratios. Such intensive resources may have influenced the efficacy of the training, because staff may have had the time to plan and apply strategies across all of their students and maintain their strategy use over time. Studies conducted in other classroom settings where students with ASD are commonly placed, such as inclusive and mixed classrooms with less intensive staff support, would be informative.

With respect to staff participants, all three teachers were keen to learn new strategies to improve their classroom management when they volunteered to participate; such enthusiastic individuals may not be representative of most special education teachers and classroom support staff in public schools. Moreover, it is possible that classroom support staff had less enthusiasm or commitment to the intervention than teachers, as the two who were monitored appeared to show less improvement in their usage of proactive classroom management strategies compared to the teachers. The previous perceptions and experiences of staff could potentially have contributed to the integrity with which ECM procedures were implemented (Boardman et al., 2005; Hess et al., 2008). It would be useful to explore how the background knowledge and
commitment of teachers and classroom support staff influences implementation of ECM and other proactive management approaches.

Furthermore, we were unable to draw firm conclusions regarding the systematic relationship between classroom staff and student behaviour in the present study, as they were each measured independently. To remedy this situation, future studies could use an interactive coding system that allows the observer to more directly measure the impact of classroom staff behaviour (e.g., antecedent strategies) on student behaviour. Such coding would provide more precise evidence of the effect of particular ECM strategies on target student behaviour.

Additionally, we were unable to measure generalization of intervention effects in other environments, including in other school settings (e.g., during recess, gym, integration classes, after-school programs), at home, or in the community. Measurement in these settings would provide evidence of the persistence of behavioural change in environments other than the classroom. Moreover, the potency of ECM could potentially be further improved by initiating concurrent intervention with parents in the home setting. There is accumulating evidence that interventions occurring within multiple settings (e.g., school and home) and provided by multiple interventionists (e.g., teacher, classroom support staff, psychologist, parent) are likely to be more effective in helping students with ASD make broad behavioural gains (Koegel & Koegel, 2006; Lord & Bishop, 2010).

The multicomponent nature of the ECM training program may lead to implementation concerns, given that staff are required to learn how to build student skills in four keystone areas; in home-based studies examining errorless treatment strategies, the focus was always on only one skill set. (e.g., Ducharme et al., 2010; Ducharme et al., 2008; Ducharme & Harris, 2005; Ducharme & Ng, 2012). The ECM curriculum appeared to be too complex for some of the staff.
to master in a short period of time. It is possible that focusing on the training of one keystone skill at a time in a staggered fashion could make the learning process simpler for staff and improve skill acquisition. This training strategy may be particularly useful for classroom support staff who typically have less education and professional training to be effective at classroom management compared to teachers. Given that we trained staff to focus on all four keystone skills, it is not possible to ascertain the necessity of individual keystones. Component analyses should be conducted to determine the extent to which each of the keystone skills contribute to the overall effectiveness of the intervention. Considering that research demonstrates positive covariant effects for each keystone, it may be that inclusion of all four such skills is unnecessary and redundant. Once the ECM approach has been further refined studies directly comparing the effects of ECM relative to other class-wide interventions are warranted to gain more information regarding its potency.

With respect to post-training staff skill levels, it is unclear whether staff acquired all of the classroom management skills necessary to produce optimal student behaviour change. In future applications of ECM, participant staff should be assessed after training to ensure they can demonstrate mastery of all ECM procedures prior to classroom implementation (Gresham, 2004). Given the relatively smaller improvements that the two classroom support staff demonstrated in their classroom management skills compared to teachers, it may also be necessary to provide this subgroup with a more intensive level of training and performance feedback in the classroom in future studies. Although we used extensive performance feedback and training materials in the present study to improve staff skills (Gresham, 2004; Odom et al., 2010), the use of mastery criteria might have ensured even greater intervention integrity.
The ECM training program was designed as a practical and cost-efficient classroom management approach for general application with all students and therefore does not deal with all of the core deficits of individuals with ASD that could lead to challenging behaviour. For example, ECM does not specifically include strategies for managing behaviours that have sensory functions. In fact, repetitive behaviour (e.g., hand flapping, body rocking, spinning objects, sniffing, pica, some forms of self-injury) is one of the defining features of ASD (APA, 2000; 2013) and can interfere directly with learning (Cunningham & Schreibman, 2008). A substantial body of research suggests that such responses are maintained by sensory reinforcement rather than external stimuli (Rapp & Vollmer, 2005). It is important that teachers and classroom support staff employing ECM approaches make use of other more focal treatments that specifically target sensory based behaviours if a student is not responsive to contextually-based interventions.

For the continued evolution of ECM as an intervention for students with ASD, a few other issues require consideration. Given that impairments in social interactions are intrinsic to ASD (APA, 2013) and that students in our study made limited skill gains in this area, a greater emphasis on social skills may be warranted for these students. For instance, more sessions comprising demonstration and practice of the initiation of social interactions (e.g., initiating conversation or play, inviting others to join in) could assist in reducing social withdrawal. Due to the fact that the social skills training is verbally loaded and the acquiescence concept is abstract to grasp, modifications are likely also required to make it more accessible for students with ASD with lower cognitive and verbal ability. Modifications could include the use of concrete visual aids as the primary method of treatment delivery, more play activities, decreased verbal demands, increased repetition, greater intensity of intervention, incorporation of child
special interests, and parent involvement. In some cases, class-wide intervention with the addition of individualized modifications, may be necessary to facilitate skill acquisition.

Additionally, peer-mediated social skills sessions could enhance the acquisition and generalization of social skills with these students (e.g., the inclusion of peer buddies without ASD in cooperative activities in the classroom) (Chan, Lang, Rispoli, O'Reilly, Sigafoos, & Cole, 2009; Reichow & Volkmar, 2010).

Another social deficit associated with ASD is difficulty in identifying and managing social conflicts of various kinds, yet ECM in its present form does not target this problem directly. Hence, children with ASD often exhibit a lack of problem solving abilities, selecting the wrong strategy in a scenario or failing to switch from one strategy to another (Goddard, Howlin, Dritschel & Patel, 2007). For example, a child with ASD may not know when it is appropriate to acquiesce or be assertive and therefore may be prone to follow negative peer influence and be bullied. Thus, social skills sessions may also need to incorporate teaching the sub-skill of problem solving to enhance social comprehension in older students with ASD.

Notwithstanding these challenges, it is important to reiterate that the goal of the ECM intervention package was to promote the broadest possible behaviour changes with the smallest number of active intervention components. In its current form, ECM did appear to promote fairly broad behavioural change, even though training was comparatively brief. Although it may be useful to discuss possibly beneficial program additions, these additional procedures could potentially result in a cumbersome and impractical intervention that could substantially reduce the motivation of classroom staff and the integrity of program implementation.

Although the present study included several diverse measures to capture the impact of ECM on both staff and student behaviours, the inclusion of additional measures in future
research might provide a more thorough picture of intervention effects. Specifically, ECM included communication as one of the keystone training components, but it was not directly measured in the present study. As communication is a core deficit in students with ASD, examination of potential change in this student skill area would provide useful information on the relevance of ECM for this population.

Teachers were not blind to the purpose of the present study (i.e., to improve challenging behaviours in their students) and this knowledge may have influenced their responses to standardized measures. It is possible that teachers developed more positive perceptions of students or inflated their improvement ratings after, for example, gaining a better understanding of the origins of challenging behaviour. Although the observational data in the classroom provided a potent measure of student behaviour change, the inclusion of a parent rating scale would be a useful additional measure to provide independent evaluation of ECM on the breadth of changes in student behaviour.

Another source of evaluation that was absent from this investigation was a measure of classroom staff use of ecological approaches. Although these approaches are sometimes difficult to measure because of their ongoing nature (use of home-school communication books, environmental modifications), future studies could document the daily implementation of certain ecological strategies (e.g., separating or pairing up certain students, giving headphones to a student who is bothered by noise, giving a snack to a hungry student) before and after ECM intervention.

4.6 Conclusions and Implications for Practice

Given current prevalence and diagnostic trends, there are increasing numbers of students with ASD in school settings who have complex needs and require a range of positive behavioural
This study was the first to investigate ECM staff training, a multi-component proactive classroom management intervention, with students with ASD in a public school setting. Findings from the current research provided initial evidence that ECM improves student and staff behavior. Both teachers and classroom support staff benefitted from the in-service ECM training as they showed increased usage of proactive classroom management strategies and reduction in usage of reactive disciplinary strategies. Improvements in student responding, including compliance, on-tasks skills and prosocial behaviours, as well as covariant reductions in challenging behaviours were found. ECM was also perceived by staff as a socially acceptable form of class-wide intervention that addressed some of the needs of students with ASD and the daily challenges they face. In addition, staff voiced a desire to have more dynamic and visual supports incorporated into the acquiescence component of ECM to enhance student learning.

In conclusion, ECM offers a conceptual and scientifically informed curriculum for class-wide intervention for students with ASD (referred to as a Tier II intervention in SWPBS). The in-service training is inexpensive, brief and focuses on a circumscribed skill set. An advantage of the approach is that the direct training of keystone skills as replacements for challenging supports (Volker & Lopata, 2008; Simpson et al., 2011). However, most teachers and classroom support staff receive little, if any, formal instruction in evidence-based interventions for such students (Giangreco et al., 2001; Koegel et al., 2011; National Autism Center, 2009; Rispoli et al., 2011). In the absence of training on effective behaviour management strategies, teachers and classroom support staff in special education settings often struggle to cope and are at higher risk for burn-out (Hastings & Brown, 2002; Jennett et al., 2003). As a consequence, there is an urgent call to develop and test interventions that are most appropriate for students with ASD in “real life” classroom settings.

In conclusion, ECM offers a conceptual and scientifically informed curriculum for class-wide intervention for students with ASD (referred to as a Tier II intervention in SWPBS). The in-service training is inexpensive, brief and focuses on a circumscribed skill set. An advantage of the approach is that the direct training of keystone skills as replacements for challenging
behaviours renders functional assessment of maintaining variables for these problem responses unnecessary. Use of ECM could potentially decrease the number of students with ASD who require more intensive supports in the school system (e.g., Tier III interventions) (Gresham, 2004). Although additional research is required, the current study is encouraging and suggests that ECM is suitable as a proactive classroom management approach for self-contained ASD special education classrooms.
References


139


## Appendix A: Sample Teacher and Classroom Staff Behaviour Coding Form

Date of observation (MM/DD/YY): ________________   ID of staff being observed: _____
Study Phase: Baseline:___  Treatment:___  Follow Up:___  Coder’s Name:_____________
Classroom Activity Observed:______________   Start Time: _______ End Time: ______  □ IOR Session

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<th>REACTIVE RESPONSES</th>
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<td>Reward (unexpected)</td>
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Appendix B: Sample Student Behaviour Coding Form

Date of observation (MM/DD/YY): _______________  ID of student being observed: _______________

Study Phase: Baseline:___  Treatment:___  Follow Up:___  Coder’s Name:_____________________________  IOR □

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<th>Prosocial Behaviours</th>
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<td>Ci   Cg  NCi  NCg</td>
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<td>Ci   Cg  NCi  NCg</td>
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<td>Ci   Cg  NCi  NCg</td>
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<td>Ci   Cg  NCi  NCg</td>
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<td>Ci   Cg  NCi  NCg</td>
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<td>Ci   Cg  NCi  NCg</td>
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<td>Ci   Cg  NCi  NCg</td>
<td>-V  -P  D  F</td>
<td>+V  + P</td>
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<td>Ci   Cg  NCi  NCg</td>
<td>-V  -P  D  F</td>
<td>+V  + P</td>
</tr>
</tbody>
</table>
Appendix C: Sample Student On-Task Data Sheet

Student's ID __________________ Date__________________ Completed by____________________

1:1 Support____ Independent_____

Partial Interval Recording: (10 secs intervals) circle ON if on-task for 5 secs or more during interval; OFF if off-task for 5 secs or more during interval; N if neutral for 5 secs or more or more during interval; AGG if disruptive/aggressive at any time during the interval when the student is on or off task (not mutually exclusive)

<table>
<thead>
<tr>
<th>Code</th>
<th>Notes</th>
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</thead>
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<td>OFF</td>
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</tbody>
</table>
Appendix D: Teacher/Classroom Staff Satisfaction Questionnaire

Participant #________
Date: _____________

Teacher/Classroom Support Staff Demographics Satisfaction Scale

**Instructions:** Please circle the number that best describes your opinion:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I am satisfied with the quality of the classroom management strategies I was provided with.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>My classroom management needs were met by the teacher training program.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>I would recommend this teacher training program to other teachers.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>I am now able to prevent behaviour problems more effectively in the classroom.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>I am now able to manage problem behaviours more effectively in the classroom.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

6. How much did the teacher training intervention help with the specific problems that led you take part in this intervention?
7. Tell us what you liked most about the teacher training program.

8. Tell us what you liked least about the teacher training program.
<table>
<thead>
<tr>
<th>COMPLIANCE</th>
<th>SOCIAL SKILLS</th>
<th>ON-TASK SKILLS</th>
<th>COMMUNICATION SKILLS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use Proper Request Delivery</strong></td>
<td><strong>Incorporate the word &quot;flex&quot; and &quot;flexing&quot; into your classroom</strong></td>
<td><strong>Engage in rapport-building &amp; provide prompts that allow the student to start their work and experience success</strong></td>
<td></td>
</tr>
<tr>
<td>• Get student’s attention</td>
<td><strong>Help students navigate peer interactions through prompting and support</strong></td>
<td>a) Help the student complete the first few questions of their work</td>
<td></td>
</tr>
<tr>
<td>• Explain task requirements before you make a request</td>
<td>• Prompt student to invite a peer to play, to wait a turn, to share, etc.</td>
<td>b) Leave the student to work independently for a short duration of time (1 or 2 minutes)</td>
<td></td>
</tr>
<tr>
<td>• Use polite but firm tone</td>
<td>• During negative peer interactions, focus your attention on the victim and NOT the aggressor</td>
<td>c) When the independent interval is over, return to the student and provide praise for the effort made, e.g., &quot;Wow! You kept working the whole time I was away! You should be proud of yourself!&quot;</td>
<td></td>
</tr>
<tr>
<td>• Issue requests as a command</td>
<td><strong>Reinforce Peer Cooperation</strong></td>
<td>d) The next day, try to increase the duration of the independent interval by a short amount (30 to 60 seconds)</td>
<td></td>
</tr>
<tr>
<td>• Use short and simple requests</td>
<td>• Praise students for cooperating with their peers and praise victims of peer provocation for staying calm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Give only one request at a time</td>
<td><strong>Role-Playing</strong></td>
<td><strong>Reinforce On-Task Efforts</strong></td>
<td></td>
</tr>
<tr>
<td>• Provide time for the student to respond (10 seconds)</td>
<td>Choose a ‘skill of the day’ and introduce it to your students at a specified time (e.g., at circle). Demonstrate appropriate uses of the skill and have students practice role-playing appropriate skill use. Skill areas include:</td>
<td>Say &quot;You’re doing a great job focussing on your assignment. Keep up the good work!&quot;</td>
<td></td>
</tr>
<tr>
<td>• Do not do the task for the student but provide assistance if necessary</td>
<td>1. Helping &amp; sharing</td>
<td><strong>Anticipate situations in which problem behaviour is likely to occur</strong></td>
<td></td>
</tr>
<tr>
<td>• After the request, DO NOT engage in discussion about the task with the student</td>
<td>2. Playing by rules, taking turns, letting others win</td>
<td>• Prompt student to ask for help or a break if they appear overwhelmed or frustrated</td>
<td></td>
</tr>
<tr>
<td><strong>Give Easy or Enjoyable Requests</strong></td>
<td>3. Listening and going along with someone else’s ideas</td>
<td><strong>Prompt student to raise their hand or use their words to let you know what they want or need</strong></td>
<td></td>
</tr>
<tr>
<td>• Deliver a high proportion of “easy” requests daily</td>
<td>4. Keeping your cool when things aren’t going your way</td>
<td>• Say, &quot;Would you like to raise your hand? I’d be happy to come over and talk to you”</td>
<td></td>
</tr>
<tr>
<td>• Intersperse “easy” requests among regular classroom requests that you routinely deliver</td>
<td>5. Approaching and inviting others to join in</td>
<td><strong>Be aware of and responsive to all the strategies that a student uses to communicate</strong> (non-verbal behaviours)</td>
<td></td>
</tr>
<tr>
<td><strong>Give Priming Statements Before Delivering A Difficult Request</strong></td>
<td>6. Complimenting and thanking others</td>
<td><strong>Respond immediately to a student’s attempt to communicate</strong></td>
<td></td>
</tr>
<tr>
<td>• Provide a detailed statement to explain the upcoming challenge</td>
<td><strong>Reinforce Compliance Immediately</strong></td>
<td>If you can’t help the student immediately, let them know you will be there in a few minutes or ask another staff to respond</td>
<td></td>
</tr>
<tr>
<td>• Let the student know you have confidence that they can handle the request/situation</td>
<td><strong>Ignore Non-Compliance and minor negative behaviours</strong></td>
<td><strong>Reinforce Communicative Attempts</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Ignore Non-Compliance and minor negative behaviours</strong></td>
<td>• Wait about 20 seconds and deliver the request again, this time provide extra supports to increase compliance.</td>
<td>Say, &quot;Good Asking&quot; or &quot;I like how you used your words to express that you were feeling upset.&quot;</td>
<td></td>
</tr>
<tr>
<td>• Wait about 20 seconds and deliver the request again, this time provide extra supports to increase compliance.</td>
<td><strong>Engage in rapport-building &amp; provide prompts that allow the student to start their work and experience success</strong></td>
<td><strong>Ensure that the student’s request leads to the desired outcome (e.g., a break, attention from you)</strong></td>
<td></td>
</tr>
</tbody>
</table>
Appendix E: KEYSTONE CLASSROOM MANAGEMENT STRATEGIES HANDOUT

Reinforce Student Success

1. **Notice when a student does something right.**
   Let them know that rule following will be noticed.

2. **Reward the student immediately following prosocial or cooperative behaviour.**

3. **Be enthusiastic when praising a student’s success.**

4. **Label the behaviour you are rewarding so it is salient to the student.**
   For example, after John has put away his book in response to your request, say "John, you put away our book after I asked you to. That’s FANTASTIC! You did a great job following my instructions."

5. **Use a variety of praise statements or rewards.**

6. **Be consistent.**
   Try to be consistent in rewarding every instance of student prosocial behaviour. If you do, the student will learn that prosocial behaviour is a reliable way to gain positive attention from you.

7. **Use effective rewards. Rewards must be potent enough to strengthen behaviour – review reinforcer potency regularly.**
   Usually praise and physical contact are effective rewards. However, with some students, other types of rewards (e.g., points, tokens or stickers that can be exchanged for toys, desired activities, foods or privileges) will be necessary to strengthen prosocial behaviour repertoires. For example, you could say "Enzo, that was fantastic the way you helped me clean up the table – here’s a hockey card!"
Appendix F:
Summary of the Participant Students’ Index of Teaching Stress T-Scores

Classroom 1 (Grades 3-5)

<table>
<thead>
<tr>
<th>Pre/Post</th>
<th>Student Behaviours</th>
<th>Teacher Behaviours</th>
<th>Total Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADHD</td>
<td>ELLA</td>
<td>ANXW</td>
</tr>
<tr>
<td>Student 1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>58</td>
<td>66</td>
<td>44</td>
</tr>
<tr>
<td>Post</td>
<td>50</td>
<td>57</td>
<td>45</td>
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<td>Student 2</td>
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<td></td>
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</tr>
<tr>
<td>Pre</td>
<td>48</td>
<td>60</td>
<td>54</td>
</tr>
<tr>
<td>Post</td>
<td>49</td>
<td>51</td>
<td>46</td>
</tr>
<tr>
<td>Mean Overall Class</td>
<td></td>
<td>53.0</td>
<td>63.0</td>
</tr>
<tr>
<td>Post</td>
<td>49.5</td>
<td>54.0</td>
<td>45.5</td>
</tr>
</tbody>
</table>

Note.
1. ADHD = Attention Deficit/Hyperactivity Disorder; ELLA = Emotional Lability/Low Adaptability; ANXW = Anxiety/Withdrawal, LALD = Low Ability/Learning Disability; AGCD = Aggressiveness/Conduct Disorder; STU CHAR = Student Characteristics Domain; SCNS = Sense of Competence/Need for Support (SCNS); LSFT = Loss of Satisfaction From Teaching; DTP = Disruption of the Teaching Process; FWP = Frustration Working With Parents; TEACH CHAR = Teaching Characteristics Domain; Total Stress = Total Stress Score
2. T score of 60-69 is considered At-Risk; T-scores 70 or higher are considered clinically significant.
# Classroom 2 (Grades 1-3)

<table>
<thead>
<tr>
<th>Pre/Post</th>
<th>Student Behaviours</th>
<th>Teacher Behaviours</th>
<th>Total Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADHD</td>
<td>ELLA</td>
<td>ANXW</td>
</tr>
<tr>
<td>Student 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
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<td>65</td>
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<tr>
<td>Post</td>
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<td>49</td>
<td>48</td>
</tr>
<tr>
<td>Student 4</td>
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<td></td>
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</tr>
<tr>
<td>Pre</td>
<td>55</td>
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<td>60</td>
</tr>
<tr>
<td>Post</td>
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<td>Pre</td>
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<td>71</td>
</tr>
<tr>
<td>Post</td>
<td>43</td>
<td>43</td>
<td>41</td>
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<tr>
<td>Mean Overall Class</td>
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<tr>
<td>Pre</td>
<td>60.7</td>
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<tr>
<td>Post</td>
<td>45.7</td>
<td>46.7</td>
<td>45.0</td>
</tr>
</tbody>
</table>

Note.

1. ADHD = Attention Deficit/Hyperactivity Disorder; ELLA = Emotional Lability/Low Adaptability; ANXW = Anxiety/Withdrawal, LALD = Low Ability/Learning Disability; AGCD = Aggressiveness/Conduct Disorder; STU CHAR = Student Characteristics Domain; SCNS = Sense of Competence/Need for Support (SCNS); LSFT = Loss of Satisfaction From Teaching; DTP = Disruption of the Teaching Process; FWP = Frustration Working With Parents; TEACH CHAR = Teaching Characteristics Domain; Total Stress = Total Stress Score

2. T score of 60-69 is considered At-Risk; T-scores 70 or higher are considered clinically significant.
### Classroom 3 (Grades 6-8)

<table>
<thead>
<tr>
<th>Pre/Post</th>
<th>Student Behaviours</th>
<th>Teacher Behaviours</th>
<th>Total Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADHD</td>
<td>ELLA</td>
<td>ANXW</td>
</tr>
<tr>
<td>Student 6</td>
<td>Pre</td>
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<td>65</td>
</tr>
<tr>
<td></td>
<td>Post</td>
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<td>56</td>
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<tr>
<td>Student 7</td>
<td>Pre</td>
<td>67</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>Post</td>
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<td>56</td>
</tr>
<tr>
<td>Mean Overall Class</td>
<td>68.5</td>
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<td>49.5</td>
</tr>
<tr>
<td>Mean Overall Class</td>
<td>57.0</td>
<td>56.0</td>
<td>48.5</td>
</tr>
</tbody>
</table>

**Note.**

1. ADHD = Attention Deficit/Hyperactivity Disorder; ELLA = Emotional Lability/Low Adaptability; ANXW = Anxiety/Withdrawal, LALD = Low Ability/Learning Disability; AGCD = Aggressiveness/Conduct Disorder; STU CHAR = Student Characteristics Domain; SCNS = Sense of Competence/Need for Support (SCNS); LSFT = Loss of Satisfaction From Teaching; DTP = Disruption of the Teaching Process; FWP = Frustration Working With Parents; TEACH CHAR = Teaching Characteristics Domain; Total Stress = Total Stress Score

2. T score of 60-69 is considered At-Risk; T-scores 70 or higher are considered clinically significant.