

SUPPORTING TEACHERS WHEN WORKING WITH STUDENTS WITH AUTISM
SPECTRUM DISORDER IN THE INCLUSIVE CLASSROOM

by

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ABSTRACT

Introduction: ASD symptomology can make aspects of the general inclusive classroom challenging for students with the disorder, and classroom teachers report lacking the knowledge and the skills necessary to provide adequate instruction to their students with ASD. The *Accessible Strategies Supporting Inclusion for Students by Teacher (ASSIST)* program introduces evidence-based strategies for teachers of students with neurodevelopmental disorders in an adaptable, feasible, accessible, and manageable way. This study explores the implementation, effectiveness, and satisfaction of the *ASSIST for ASD* module using the RE-AIM framework while considering the impact of the COVID-19 pandemic. **Method:** Data was collected from Canadian classroom teachers using a mixed methods approach. **Results:** After completing the program, teachers reported using many of the *ASSIST* strategies semi-regularly and continued to do so 6-months post-intervention. There was no indication of clinical effectiveness and teachers were overall satisfied with the program. However, results were likely impacted by the COVID-19 pandemic as engagement was an issue. Clinical implications and future directions were discussed.

Keywords: Autism spectrum disorder; inclusive education; online intervention, implementation

LIST OF ABBREVIATIONS

Autism Spectrum Disorder: ASD

Accessible Strategies Supporting Inclusion for Students by Teachers: ASSIST

Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition, Text Revision: DSM-5-TR

American Psychiatric Association: APA

Public Health Agency of Canada: PHAC

Pervasive Developmental Disorder Not Otherwise Specified: PDD-NOS

Intellectual Developmental Disorder: IDD

Attention-Deficit/Hyperactivity Disorder: ADHD

Centers for Disease Control and Prevention: CDC

Autism Diagnostic Interview-Revised: ADI-R

Autism Diagnostic Observation Schedule – Second Edition: ADOS-2

Adaptive Behavior Assessment System – Third Edition: ABAS-3

The Vineland Adaptive Behavior Scale – Second Edition: Vineland-II

Wechsler Intelligence Scale for Children – Fifth Edition: WISC-V

Wechsler Adult Intelligence Scale – Fourth Edition: WAIS-IV

Woodcock-Johnson Test of Cognitive Abilities – Fourth Edition: WJ-IV

Applied Behavioural Analysis: ABA

Pivotal Response Treatment: PRT

Developmental Social-Pragmatic models: DSP

Cognitive Behavioural Therapy: CBT

Canadian Survey on Disability: CSD

Individualized Program Plan: IPP

Educational Assistant: EA

Speech-Language Pathologist: SLP

Individuals with Disabilities Education Act: IDEA

Convention on the Rights of Persons with Disabilities: CRPD

Inclusive Education Canada: IEC

The National Autism Centre: NAC

Learning Disability: LD

Specific, Measurable, Attainable, Relevant, Time-Bound Goals: SMART

Behaviour Change Wheel: BCW

Capability-Opportunity-Motivation Behaviour model: COM-B

Reach, Efficacy, Adoption, Implementation, And Maintenance: RE-AIM

Lunchtime Enjoyment Activity and Play: LEAP

National Centre for Education Statistics: NCES

Canadian Teachers' Federation: CTF

Coronavirus Disease: COVID-19

Instructional and Behaviour Management Approaches Survey: IBMAS

Teacher Attitudes and Beliefs Questionnaire: TAB

Izaak Walton Killam Hospital for Children: IWK

Mount Saint Vincent University: MSVU

Research Electronic Data Capture: REDCap

IBM Statistical Package for Social Sciences: SPSS

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CHAPTER ONE

Literature Review

This chapter serves as an overview and deeper exploration of topics that are mentioned in the current study. In-depth information on the characteristics, diagnostic patterns, etiology, assessment, intervention, and impact of autism spectrum disorder (ASD) begins this chapter. This is followed by the historical progression towards inclusive education and the implications this has had on students with ASD as well as their teachers. Finally, there is an overview of the *Accessible Strategies Supporting Inclusion for Students by Teachers (ASSIST)* program that has been developed in response as a mechanism to support teachers of students with ASD. The goal of this chapter is to provide context and background knowledge on relevant themes instrumental to the implementation study of the *ASSIST for ASD* module.

Autism Spectrum Disorder (ASD)

ASD is a neurodevelopmental disorder that is characterized by repetitive sensory-motor behaviours and deficits in social communication (American Psychiatric Association [APA], 2022). ASD has become one of the most prevalent and widely researched neurodevelopmental disorders of childhood, with estimates that 1% of children worldwide have a diagnosis of ASD (Bishop, 2010; Scandurra et al., 2019; Wolff, 2004; Zeidan et al., 2022). In Canada, recent reports have stated that approximately 1 in 66 children and youth between the ages of 5 and 17 have a diagnosis of ASD (Public Health Agency of Canada [PHAC], 2018). The prevalence rates of ASD have steadily increased over the past few decades which has been met with much controversy (Onaolapo & Onaolapo, 2017). There have been debates on what is causing this increase, with some hypothesizing that the influx of research, funding, and advocacy, and the

refinement of identification, assessment, and diagnostic practices have increased the prevalence (Dawson, 2013; Onaolapo & Onaolapo, 2017; Fombonne, 2003; Fombonne, 2005).

Since its initial discovery, ASD has remained a disorder of great fascination and puzzlement, undergoing multiple shifts in perspective (Wolff, 2004). In the past, varying levels of impairment associated with social deficits and repetitive behaviours were differentially labelled with terms such as Asperger's syndrome, autistic disorder, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS; APA, 2000). More recently, and what is illustrated within the most current version of the *Diagnostic and Statistical Manual of Mental Disorders Fifth Edition Text Revision* (DSM-5-TR; APA, 2022), is the idea that ASD is best represented on a spectrum. The spectrum of ASD encompasses the wide range of manifestations, symptoms, skills, and levels of functioning that can occur in individuals with ASD (APA, 2022; U.S. Department of Health and Human Services, 2015). Despite the wide range of presentations, all individuals with ASD experience disruptions in two core areas of functioning: social communication and restricted behaviours (Lord et al., 2018).

Diagnostic Criteria

The *DSM-5-TR* (APA, 2022) outlines four diagnostic criteria for ASD. Criterion A refers to persistent deficits in social communication across multiple settings (APA, 2022). Some examples of these social deficits may include struggles with the development, maintenance, and navigation of social relationships, difficulty with non-verbal communication (e.g., eye contact, body language, use of gestures), and trouble participating in back-and-forth conversation with social-emotional reciprocity (e.g., expressing emotion, affect, or shared interests; APA, 2022; McCormick et al., 2015). Criterion B refers to restricted and repetitive behaviour patterns (APA,

2022). These behaviours may include fixated interests, rigidity to sameness and routines, repetitive motor movements, and sensory input sensitivities (e.g., adverse response to excessive or insufficient light, sound, smell, or textures; APA, 2022). These deficits may manifest differently depending on the developmental period, intellectual and language ability, and the extent of support in place (APA, 2022).

The social communication and repetitive behavioural symptoms associated with Criteria A and B must be present within the early developmental period, cause significant functional impairment, and not be better explained by another disorder, illustrated by Criteria C, D, and E, respectively (APA, 2022). Associated features that commonly, but do not consistently, occur in those with ASD are gross and fine motor deficits (e.g., walking on tiptoes, uncoordinated bearing, difficulty manipulating objects; APA, 2022; Ming et al., 2007) and self-injurious behaviours (e.g., hair pulling, arm biting, head banging; APA, 2022; Weiss, 2002).

Comorbid Disorders. Impairments associated with ASD can be incredibly disruptive in instances of co-occurring mental disorders, which about 70% of individuals with ASD experience (APA, 2022; Simonoff et al., 2008). ASD is frequently comorbid with intellectual developmental disorder (IDD; Matson & Shoemaker, 2009; Bertelli, 2019), structural language impairments (Boucher, 2011), anxiety disorders (Maddox & White, 2015; Zaboski & Storch, 2018), and attention-deficit/hyperactivity disorder (ADHD; Antshel et al., 2016; Jang et al., 2013). Individuals with ASD and other comorbid mental disorders may experience more severe symptoms and functional challenges than those solely diagnosed with ASD (Jang & Matson, 2015; Joshi et al., 2010).

Sex Considerations. A discrepancy in sex representation has been identified in those diagnosed with ASD, in which studies have found that males are 3-4 times more likely than

females to receive the diagnosis (APA, 2022; Halladay et al., 2015; Loomes et al., 2017).

Despite rates of ASD showing higher prevalence in males, it is debated whether a diagnostic bias may exist due to the influence of socio-cultural factors, sex inequities in research, and with the use of assessment tools and diagnostic criteria that reflect the typical male presentation of ASD (Kreiser & White, 2013). Some studies propose potential sex differences in ASD manifestation, such as the pattern of females with ASD exhibiting increased functional social communication (Head et al., 2014; Lai et al., 2011) and fewer stereotyped and repetitive behaviours (Mandy et al., 2012; Zwaigenbaum et al., 2012). When females with ASD exhibit less discernible symptoms, they often receive diagnoses of depressive, anxiety, or personality disorders rather than a diagnosis of ASD (Fusar-Poli et al., 2020).

Geographical and Cultural Considerations. A geographical ASD diagnostic discrepancy has been identified, where the prevalence is somewhat lower in countries outside of North America and Europe (Zaroff & Uhm, 2011). A definitive explanation for this discrepancy is unknown, but it is suggested that this may be due to differences in diagnostic methodology (Zaroff & Uhm, 2011). Some studies have also shown that African American and Hispanic populations have been underdiagnosed or receive diagnoses much later following the initial presentation of ASD symptoms when compared to individuals of other ethnicities (Keller-Bell, 2017; Jarquin et al., 2011; Mandell et al., 2009). However, very few studies outside of the United States have explored the prevalence of ASD with respect to ethnicity (Zaroff & Uhm, 2011). Despite this, diagnostic decisions can be heavily influenced by cultural values, practices, and expectations (Norbury & Sparks, 2013). The norms for social and nonverbal communication vary across cultures, making it imperative that the assessment of ASD involve consideration of the norms within the unique cultural context (APA, 2022; Jarquin et al., 2011).

Assessment Practices

The assessment of ASD can be complex, as it relies heavily on observations and recounting of developmental history and behaviour (APA, 2022; Centers for Disease Control and Prevention [CDC], 2022a). Caregivers are often asked to reflect on their child's developmental progress, as infants who later receive a diagnosis of ASD often exhibit diminished acquisition of developmentally typical social milestones in the first 12 to 24 months of their life (Zwaigenbaum et al., 2013). Observable behaviours and social precursors that are typically recounted during ASD assessment are excessive swaying or rocking, flapping hands, fixations on objects, atypical use of gaze when observing objects, and delayed speech (Barbaro et al., 2011). Some toddlers with ASD may reach developmental milestones on time or even early but later seem to experience a loss of progress as they age (Zwaigenbaum et al., 2013).

ASD assessment includes the collection of information on developmental history (e.g., school, medical, or previous testing records), parent interviews, measures of adaptive functioning, developmental and cognitive tests, and play-based observations (Flessner & Piacentini, 2019). Common standardized tools that assess ASD are the Autism Diagnostic Interview-Revised (ADI-R; Rutter et al., 2003) and the Autism Diagnostic Observation Schedule – Second Edition (ADOS-2; Lord et al., 2012). Such assessments involve direct observations or interview questions regarding behaviour and development that touch on communication skills, social interaction, imaginative use of materials, and repetitive behaviours (Lord et al., 2012; Rutter et al., 2003). The Vineland Adaptive Behavior Scale – Second Edition (Vineland-II; Sparrow et al., 2005) and the Adaptive Behavior Assessment System – Third Edition (ABAS-3; Harrison & Oakland, 2015) are often used to assess adaptive functioning skills, such as communication, socialization, completion of daily tasks, motor skills, personal grooming, and

age-expected responsibility. Cognitive testing may also be done using measures such as the Wechsler scales (i.e., Wechsler Intelligence Scale for Children – Fifth Edition [WISC-V]; Wechsler, 2014; Wechsler Adult Intelligence Scale – Fourth Edition [WAIS-IV]; Wechsler, 2008) or the Woodcock-Johnson Test of Cognitive Abilities – Fourth Edition (WJ-IV; Schrank et al., 2014).

Etiology and Course

Very few definitive scientific conclusions have been made surrounding the biological basis of ASD (Barbaro & Dissanayake, 2009). However, twin studies have shown that genetic heritability rates of ASD are quite high, ranging from 37% to 90% (APA, 2022; Sandin et al., 2017). Some studies have explored the role of chromosomal structure (State & Šestan, 2012) and gene variations (Rylaarsdam & Guemez-Gamboa, 2019) on the development of ASD, while others discuss environmental factors such as parental age (Parner et al., 2012) and low birth weight (Lampi et al., 2012). Despite the explorations, no stand-out genetic or environmental contributor has been found to fully explain ASD manifestation (APA, 2022; Matsuzaki et al., 2012). Instead, hundreds of genes may make relatively small contributions that could be influenced or activated by various environmental factors (APA, 2022).

ASD symptoms typically first arise between 12 and 24 months of age (APA, 2022). The first symptoms usually involve the absence of or delayed speech development, lack of social interest, atypical communication patterns (e.g., lack of response when their name is called), developmentally inappropriate play behaviours (e.g., carrying around a toy without playing with it), or lack of social exchanges (e.g., lack of response to caregivers' smiles or facial expressions; APA, 2022; Barbaro et al., 2011; Hogan et al., 2020). Marked behavioural patterns such as preferring repetition and routines (e.g., lining up toys, eating the same foods) and stereotyped

behaviours (e.g., flapping or twirling hands, swaying) typically become more apparent and severe at the age of two (APA, 2022; Hogan et al., 2020). ASD is primarily recognized as a lifelong disorder (Matson & Kozlowski, 2011). Few studies have explored the lifespan trajectory of ASD presentation, but some short-term studies have shown that about 10-20% of children tend to show improvements in symptomology (Fountain et al., 2012; Szatmari et al., 2015). However, the trajectory and development of ASD symptoms can differ significantly among individuals (Fountain et al., 2012).

Evidence-Based Interventions

There are various interventions that are commonly used to reduce symptoms and facilitate skill building for those with ASD (CDC, 2022b). However, only a select few of these interventions have been recognized as evidence-based (Smith & Iadarola, 2015). Evidence-based refers to the practical applications of the most current and supported available research (American Psychological Association, 2022). One of the most widely recognized interventions for ASD in young children is Applied Behavioural Analysis (ABA) therapy (Smith & Iadarola, 2015). ABA therapy has been recognized as a well-established evidence-based intervention for children and youth with ASD, meaning extensive research has demonstrated ABA therapy as efficacious within this population (Chambless et al., 1998; Smith & Iadarola, 2015). ABA therapy is a form of therapy based on the principles of behaviour modification (e.g., positive reinforcement, modelling, prompting, antecedents, consequences) that are applied systematically to improve social behaviour and facilitate helpful behaviour change (Dillenburger et al., 2009). An example of the application of these principles in ABA therapy would be providing a reward (e.g., toy, snack, access to a game) following a desired behaviour (e.g., responding to social interaction, using speech technology to communicate needs; Kearney, 2015). Comprehensive

ABA often involves individualized programs with specialized target behaviours, desired rewards, and overarching goals across multiple domains that best address the needs of the individual receiving the ABA therapy (Kearney, 2015). Focused ABA targets a small number of skills typically within the same domain, which can be delivered by teachers and other support professionals (Smith & Iadarola, 2015). Most ABA programs involve observing and adjusting antecedents (i.e., what occurs directly before a target behaviour), behaviours themselves (i.e., the response to the antecedent), and consequences (i.e., what directly follows the behaviour; Kearney, 2015).

Following the development and widespread use of ABA, Pivotal Response Treatment (PRT) was developed with a similar behavioural perspective (Kim et al., 2019). PRT acknowledged that the principles of ABA facilitate many symptom improvements, but that the environment can be distressing, repetitive, and unenjoyable for the child, as well as tedious because it often requires many trials. PRT emphasizes the role of motivation in learning and occurs within the natural day-to-day environment surrounding interactions with family, peers, teachers, and other professionals. The term pivotal within its name is synonymous with core, targeting core areas of symptomology for individuals with ASD. PRT helps in the development of motivation, self-management, self-initiation, and responsivity to multiple cues that are then generalized to core areas of functioning (Park, 2021). An example interaction within PRT would be a family member, peer, or support professional is playing with a child, the child then makes a meaningful attempt to ask for the toy the other is playing with and is then rewarded for their communication by being given the toy. A systematic review conducted by Verschuur et al. (2014) illustrated the positive impacts of PRT and its ability to increase communication, language, play skills, and self-initiations as well as decrease maladaptive behaviour.

Additional interventions that have been recognized as possibly efficacious for youth with ASD are the Developmental Social-Pragmatic (DSP) models of therapy and Cognitive Behavioural Therapy (CBT; Smith & Iadarola, 2015). The DSP model supports the development of language while emphasizing social communication, engagement, and intent rather than the content and form of language (Binns & Cardy, 2019). Principles involved in DSP therapy are similar to that of ABA, as it makes use of encouragement, rewards, and adjustment of responses, which typically follow all communication attempts and interactions (Ingersoll et al., 2005). Cognitive-behavioural approaches to therapy emphasize the connection between thoughts, feelings, and actions and often involve a professional guiding an individual through adaptations and techniques to alleviate distress caused by cognitions and behaviours (CDC, 2022b; Fenn & Byrne, 2013). Applications of CBT for those with ASD often involve strategies to improve social cognition and responses to dysfunctional automatic thoughts and to address comorbid disorders such as anxiety and depression (Gaus, 2011).

Many families and individuals with ASD also wish to consider medications to improve symptoms. However, there are no medications that have been approved by Health Canada for the treatment of ASD (PHAC, 2022). Despite this, medications are used by some individuals with ASD to treat irritability, aggression, and maladaptive behaviours (LeClerc & Easley, 2015). Frequently, the medications used to treat these symptoms are risperidone and aripiprazole (LeClerc & Easley, 2015). Very few studies have illustrated support regarding psychotropic medications for ASD, yet as many as 64% of individuals with ASD have been prescribed at least one psychotropic drug to lessen symptoms (Spencer et al., 2013). However, it has been hypothesized that comorbid disorders such as anxiety and ADHD may also influence the use of psychotropic medications in those with ASD (Flessner & Piacentini, 2019).

Impact of ASD

Family Life. Many families who have a child or children with ASD often report that the challenges associated with the disorder impact various aspects of family life (Cassidy et al., 2008). Learning about a family member's ASD diagnosis may elicit strong emotions (Banach et al., 2010). Many caregivers report experiencing feelings of guilt, disappointment, and failure when learning of their child's ASD diagnosis, while others report feelings of relief (Altiere & von Kluge, 2009; Wachtel & Carter, 2008). Some families report experiencing increased stress associated with potential life changes, lack of assurance in their ability to provide adequate care, and potential barriers to accessing required services (Banach et al., 2010). The cost of services, financial strain, impacts on co-parenting and social relationships, and the often-extensive processes involved in gaining support (e.g., respite care, funding) can present additional barriers and areas of stress to caregivers and families with ASD (Cooke et al., 2020; Karst and Van Hecke, 2012; Nealy et al., 2012; Sim et al., 2017).

Caregivers of children with ASD have been found to experience higher cortisol levels (i.e., stress hormone) than caregivers of neurotypical children (Seltzer et al., 2009). Stress levels may be influenced by the child's age, level of cognitive and adaptive functioning abilities, and severity of symptoms (Rivard et al., 2014). Family stress has been found to negatively impact intervention outcomes and externalizing behaviours in those with ASD (Clauser et al., 2020; Shine & Perry, 2010). However, studies have shown that stress levels can dissipate over time in response to achieved understanding, acceptance, and successfully implemented adaptations and daily routines (Bonis, 2016).

Siblings of individuals with ASD can also experience family stress, which has been seen through reported concerns for the future, additional responsibilities (e.g., aiding in sibling's care,

protecting them from bullying), routine adjustments, and overlooked needs (Leedham et al., 2020; Watson et al., 2021). Despite this, many siblings have reported experiencing positive emotions in response to being a sibling to an individual with ASD, such as resilience, compassion, empathy, and pride (Leedham et al., 2020; Ward et al., 2016). Despite the potential for negative impacts, many individuals diagnosed with ASD have reported that their families are excellent sources of support and offer understanding, affection, and opportunities to socialize with less scrutiny (DePape & Lindsay, 2015).

Peer Relationships. Individuals with ASD frequently struggle to create and maintain positive peer relationships compared to their neurotypical peers (Crompton et al., 2020; Estes & Rodda, 2018). When positive connections are developed, the practicalities of relationship building and communication tend to be troublesome for those with ASD (Estes & Rodda, 2018; Orsmond et al., 2004). Parents and teachers report that school-aged children with ASD often have playmates and friends with whom they share similar interests but may have difficulty defining what a friend is, reading social signals (e.g., proximity and a smile indicating friendliness), and navigating conflict (Estes & Rodda, 2018). Children and youth with ASD are more likely to have smaller networks of friends, have less satisfaction with their friendships, and report feelings of loneliness compared to neurotypical children (Bauminger & Kasari, 2000). Some studies have shown that children with ASD are at a much higher risk of being bullied with one study illustrating that bullying experiences among children with ASD are four times more likely than that of neurotypical children (Cappadocia et al., 2011; Little, 2002). Sex has been shown to influence experiences with peer relationships in children with ASD, as males with ASD have been shown to experience more social exclusion than females with ASD (Dean et al., 2014). The extent and nature of peer relationships for children with ASD may be influenced by

the severity of social deficits and the presence of comorbid mental disorders, such as anxiety and IDD (Bauminger & Kasari, 2000; Chang et al., 2012).

Adolescents with ASD can experience similar troubles with peer relationships, such as difficulty making friends, feeling lonely, and being bullied (Carter et al., 2013). Adolescents with ASD often report desiring friendships and connections but have trouble reciprocating what is believed necessary to develop friendships (Lock et al., 2010). A qualitative study conducted by O'Hagan and Hebron (2016) examined the reported experiences and perceptions of friendships of adolescents with ASD. The results indicated that difficulties with social conventions, peer rejection, and problematic internalizing behaviours (e.g., heightened anxiety) were among the challenges faced in developing and maintaining friendships. These difficulties can persist into adulthood, as adults with ASD tend to have fewer interpersonal connections and report less importance and closeness in these relationships than neurotypical adults (Tobin et al., 2014). Despite the challenges individuals with ASD may face navigating peer relationships, a systematic review conducted by Chang and Dean (2022) discussed a variety of friendship interventions that presented great benefits in peer relationship development when using targeted friendship-building strategies with children and youth with ASD.

Self-Perception. Self-perception and identity can also be heavily influenced by challenges associated with ASD. Children and youth with ASD commonly have lower self-esteem and self-worth than neurotypical children, as shown through self-reports and reports from caregivers (McCauley et al., 2017; van der Crujisen & Boyer, 2020). Young children with ASD have reported feeling rejected and misunderstood by others due to the challenges associated with ASD (Cooper et al., 2020). Individuals with ASD are at increased risk of suicidal ideation and suicidal death (Croen et al., 2015; Hirvikoskiet al., 2020; Kõlves et al., 2021). Characteristics of

ASD, such as difficulty expressing feelings and emotions, can make identifying suicidal thoughts and ideation challenging (Richa et al., 2014).

Education and Employment. Various factors common to a school setting can cause considerable distress in students with ASD, such as noisy or disordered environments, unexpected changes in schedule, numerous social situations, and strict behavioural expectations. Such environmental factors and distress can negatively impact a student's academic success and progression through school (Ashburner et al., 2008). Students with ASD can experience difficulties across multiple academic skills, such as reading comprehension and math problem-solving (Bae et al., 2015; Nation et al., 2006; Westerveld et al., 2016). However, specific academic outcomes and overall academic success vary considerably among students with ASD, with very few clear patterns (Westerveld et al., 2016). A few factors that have been shown to influence academic achievement in students with ASD are the extent of social communication deficits and intellectual abilities (Estes et al., 2010).

The 2017 Canadian Survey on Disability (CSD; PHAC, 2020) found that only 33% of individuals with ASD between the ages of 20 and 64 years old were employed compared to 79% of neurotypical individuals. Communication challenges in exchanges with coworkers and supervisors tend to serve as obstacles in sustaining employment for adults with ASD. This could include adequately understanding directions, reading facial expressions, and tone of voice (Hendricks, 2010). Adjustments to job routines, changes in the work setting, stereotyped behaviours, and heightened anxiety and stress can also present challenges in achieving and sustaining employment for individuals with ASD (Hendricks, 2010; Hurlbutt & Chalmers, 2004). Despite these challenges, a study conducted by Cope and Remington (2022) found various workplace-related strengths that adults with ASD reported experiencing. These strengths were

above average memory, creativity, efficacy, and honesty (Cope & Remington, 2022). Employers are encouraged to appropriately recognize, value, and adapt to the unique characteristics of their employees with ASD (Cope & Remington, 2022).

ASD in School

As discussed briefly in the preceding section, an educational environment can often be challenging for those with ASD to navigate. Certain aspects of school are not well adapted to the core and associated characteristics of ASD which can be especially troublesome and impactful for students with the disorder. Perhaps one of the most notable obstacles students with ASD face within the school environment relates to challenges with social communication. Social communication deficits can make interpersonal connections between peers difficult for students with ASD, which can be troubling when classroom expectations or assignments involve group work or collaboration (Adams, 2005). Oral and written aspects of the curriculum can also present barriers for students with social communication deficits which may influence their ability to understand directions or follow along with classroom discussions (Adams, 2005). Students with ASD often process things more concretely than their typically developing peers and consequently may also have more difficulty with interpretation, abstraction, and complex multi-step sequences (Hobson, 2012).

Some behaviours commonly exhibited by students with ASD (e.g., aggression, non-compliance, repetitive movements) could potentially be disruptive to a learning environment (Machalicek et al., 2007). Deficits in emotional regulation abilities (e.g., tantrums, destructive physical behaviours, overexcitement impeding focus) can also negatively impact a student's ability to continue participating in classroom activities (Berkovits et al., 2016). A study conducted by Ashburner et al. (2010) found that teachers identified that their students with ASD

exhibited behavioural and emotional regulation difficulties at significantly higher rates than their typically developing peers.

A common associated characteristic of ASD that can be experienced negatively in an educational setting is sensory dysfunction (Hazen et al., 2014). A study conducted by Sanz-Cervera et al. (2017) found that children with ASD experienced higher levels of sensory processing disruptions and dysregulation than their neurotypical peers. Certain sensory stimuli familiar to a school setting, such as the recess bell, lockers opening and closing, fluorescent lights, public announcements, and echoing gymnasiums, may be overwhelming and stress-inducing for students with ASD who have sensory hypersensitivity (Case-Smith et al., 2015). The opposite can also be true where students with ASD may have sensory hyposensitivity leading to sensory-seeking behaviours (e.g., using fidget toys, making loud noises, clapping; Case-Smith et al., 2015). Such sensory difficulties can have negative implications for academic skill development since some studies have found a relationship between sensory processing difficulties and academic underachievement in children with ASD (Ashburner et al., 2008).

Children with ASD may also experience challenges with executive functions such as inhibitory control, attention, working memory, planning, monitoring, task-switching, and concept formation (Ellis Weismer et al., 2018; Margari et al., 2016). Such deficits can make certain aspects of school more demanding, such as classroom participation, activity performance, and organization (Zingerevich & LaVesser, 2009). Students with ASD may also exhibit more perseverance and persistence when completing tasks which can continue even when strategies do not produce successful results (Klin et al., 2007). Due to this perseverance, students with ASD are often good at tasks that include rote repetition (e.g., copying the alphabet and numbers; Klin et al., 2007).

Fine and gross motor deficits may also present problems in the classroom for students with ASD. Various classroom activities require students to use fine motor skills (e.g., holding a pencil, manipulating small objects) and gross motor skills (e.g., body awareness, using balance). Students with ASD are more likely to experience fine and gross motor deficits than their neurotypical peers and thus may be more likely to struggle with such tasks (McPhillips et al., 2014). Due to the characteristics of ASD and the challenges they can present within a classroom environment, many students with ASD with moderate to severe deficits can be placed on an Individualized Program Plan (IPP) or may receive additional support from an educational assistant (EA), school psychologist, or speech-language pathologist (SLP; Philofsky, 2008; Sharma et al., 2019).

Historical Perspectives

Over the past few decades, practitioners, clinicians, and researchers have explored various ways to adapt to the unique characteristics and challenges of students with ASD. The attempts to address these differences from 1700 to 1900 reflect a very dark and discriminatory past, in which most approaches involved exclusion, institutionalization, and control rather than education (Anthony et al., 2011; Brown & Andrews, 2014; Martin et al., 1996). The Eugenics movement of the early 20th century emphasized the use of intelligence testing, which prevented many students with disabilities from being able to access any aspect of the general education system (Brown & Andrews, 2014). By the late 20th century, habilitative and educational services became more normalized for those with neurodevelopmental disorders, but these primarily took place outside the general classroom (Bunch, 1994). The 1950s and 1960s were when families and caregivers began to strongly advocate for their children and family members with disabilities

which spearheaded social change in society's perceptions (Individuals with Disabilities Education Act [IDEA], 2022).

As society's views began to shift, legislation surrounding the treatment of individuals with disabilities also began to shift (Grynova & Kalinichenko, 2018). In 1975, the United States Congress passed the Education for All Handicapped Children Act to ensure the needs were being adequately met for youth with disabilities and their families. This included providing accessible and high-quality regular education (IDEA, 2022; Grynova & Kalinichenko, 2018). In 1990, the name of this act was changed to the Individuals with Disabilities Education Act (IDEA, 2022). Similar legislative progressions took place in Canada, which began in 1985 with the addition of physical and mental disabilities to the Canadian Human Rights Act, which prohibited discrimination against those populations (Rogow, 2002). Various other court cases that focused explicitly on the inclusion of students with disabilities in the general educational setting occurred between the 1980s and 2000s and further encouraged the idea that all children should be educated in the least restrictive environment possible (Anthony et al., 2011). Although significant gains were made during these earlier periods, the approaches to inclusion still mostly involved segregation where students with disabilities were brought to the back of the classroom or a different room with a special education teacher to receive different instruction (Mcleskey & Waldron, 2007). The following steps involved supporting the idea of mainstreaming by offering individualized and supportive services that would allow students with disabilities to progress through their education alongside their peers (Anthony et al., 2011). In 2006 the United Nations General Assembly created the Convention on the Rights of Persons with Disabilities (CRPD), which Canada ratified in 2010, that contains an article that specifically mandates the right to

inclusive education and prohibits discrimination against children with disabilities (Inclusive Education Canada [IEC], 2020).

Inclusive Education

In Canada, the right to education is represented through the provincial and territorial education acts (IEC, 2020). All Canadian provinces and territories have adopted and implemented an inclusive education framework, although these specific frameworks' practical and educational applications differ from province to province (McCrimmon, 2014). In summary, these provincial acts work towards ensuring every student receives quality, equitable, respectful, and culturally appropriate education in which they can participate and develop to their full potential (Government of New Brunswick, 2022; Government of Nova Scotia, 2021). Such policies strive to allow students to feel safe, accepted, and accommodated within the general inclusive classroom regardless of ethnicity, gender, socio-economic status, or abilities (Government of Nova Scotia, 2021). Most provinces have funding allocated towards maintaining and developing inclusive learning, which may go towards additional support professionals, services, and professional development opportunities.

School-Based Interventions and Evidence-Based Practices for Students with ASD

Due to the rise of inclusive education and inclusion policies, specific evidence-based interventions for students with ASD for school settings have been identified (The National Autism Center [NAC], 2015). These interventions are used to address maladaptive behaviour and facilitate skill building for youth with ASD. As was mentioned previously, the term evidence-based signifies a practice or intervention that represents the most current and supported available empirical research that has been translated to practical settings successfully (APA, 2022). This distinction is important to make because although these practices are noted in the research as

being efficacious, they are not always the most commonly used strategies in educational settings for students with ASD. The implications of this pattern will be examined in more depth in the following section.

Of the established evidence-based educational practices for students with ASD, behavioural interventions have the most evidence and support (NAC, 2015). Similar to the principles of ABA therapy, school-based behavioural approaches use the principles of behavioural science by adjusting antecedents and consequences to reduce problem behaviour and encourage alternative constructive behaviours (NAC, 2015; Virués-Ortega, 2010). Various school-based behavioural approaches target a wide range of behaviours and use multiple strategies (NAC, 2015). One example of a behavioural intervention that have been successfully implemented in classrooms are joint attention interventions. These interventions contain behavioural strategies such as environmental changes, prompting, modelling, and imitation, to encourage a child with ASD to exhibit joint attention (Lawton & Kasari, 2012). A study by Lawton and Kasari (2012) found that teachers in a public preschool setting successfully implemented behavioural strategies that targeted joint attention in their students with ASD, which led to improvements in joint attention and supported engagement.

Additionally, function-based interventions use behavioural strategies and typically target maladaptive behaviours by closely observing and adjusting their functions (Vance, 2019). A function-based approach may involve observing what reinforces a maladaptive or unwanted behaviour (e.g., attention) and providing that reinforcer in response to an adaptive and functionally equivalent behaviour (Vance, 2019). Teacher-administered function-based interventions have been found to reduce challenging behaviours and increase adaptive behaviours among students with ASD (Walker et al., 2017).

The behavioural strategy known as token economy can often be a part of school-based behavioural interventions for students with ASD (Houston-Wilson & Lieberman, 2003). A token economy typically involves rewarding a student in response to positive and adaptive behaviour, which sometimes compiles towards a larger reward (Houston-Wilson & Lieberman, 2003). In the classroom, this may involve giving a student with ASD one sticker to place on a sticker chart in response to an encouraged, adaptive behaviour (e.g., conversating with another student; Matson & Boisjoli, 2009). Token economies help target skill acquisition, decrease behavioural concerns, and increase positive behaviour for students with ASD (Gillis & Pence, 2015). Specific considerations should be made when using token economies. These include the student's developmental level, the nature of the reward, and the mechanism and frequency at which the student receives the reward (Doll et al., 2013).

Social narratives and scripts have gained more popularity with educational professionals and their students with ASD (NAC, 2017). Social scripts are an antecedent-based intervention to reduce challenging behaviour and encourage productive social communication patterns (Zimmerman & Ledford, 2017). Social scripts typically involve a script in preparation for a specific social interaction or situation, which can then be repeatedly practiced (NAC, 2017). For example, if a substitute teacher is planned for the following week, a social narrative regarding this change in routine could be developed and practiced to reduce the distress experienced by the student with ASD. Teacher-implemented social narrative interventions have been found to improve student outcomes in social communication, choice-making, and play skills and decrease maladaptive behaviours in students with ASD (Barry & Burlew, 2004; Zimmerman & Ledford, 2017).

Teacher's Perceptions, Knowledge, and Training of Evidence-Based Practices for Students with ASD

Despite the wide array of practices that have found to help students with ASD using empirical evidence, they are not always widely implemented in the inclusive classroom (Grima-Farrell et al., 2011). Various barriers exist that make the widespread implementation of such practices extremely difficult. Firstly, many classroom teachers struggle to define evidence-based practices and are unaware of what makes a classroom strategy evidence-based (Sciuchetti et al., 2016). Many educators wish to base their practices on scientific research but struggle to appropriately determine what strategies have been extensively endorsed and considered efficacious (Sciuchetti et al., 2016). This could be influenced by the inaccessibility of research, in that many scientific journals and databases are difficult to find, can be costly, are often difficult to understand, and may not appear directly applicable (Sciuchetti et al., 2016). Also, a study conducted by Stormont et al. (2011) found that most classroom teachers had no prior exposure or knowledge of many of the commonly used evidence-based interventions for students with behavioural, social, and emotional challenges (e.g., Coping Cat, Incredible Years, Triple P). This lack of knowledge is troublesome because teachers cannot effectively implement evidence-based strategies that have been shown to improve student outcomes if they do not know such strategies exist (Sciuchetti et al., 2016). Teachers may then begin to rely on unsupported or minimally supported strategies that could hinder progress, create unrealistic expectations, and possibly harm students with ASD (Marder & deBettencourt, 2015).

Additionally, some teachers have mixed perceptions and hesitations when presented with new evidence-based strategies (Boardman et al., 2005). Some teachers find it challenging to adjust daily routines and instructional practices to implement new and unfamiliar techniques

(Basckin et al., 2021). With the prevalence of ASD increasing alongside many other neurodevelopmental disorders such as ADHD, Learning Disability (LD), and IDD, teachers are expected to quickly adapt to a classroom of students with extensively wide ranges of required supports (Ajuwon et al., 2012). As a result, teachers have often expressed valuing instructional strategies that are feasible, adaptable, and accessible over strategies that are classified as evidence-based (Boardman et al., 2005). Some educators and practitioners have also suggested a disconnect between the illustrated literature on school-based interventions and the practicalities of their implementation in an inclusive environment (Grima-Farrell et al., 2011). There are various potential barriers to the implementation of new strategies that can be overlooked when those strategies are brought into an inclusive education environment. These include time constraints, availability of resources, teacher preparedness, staff collaboration, school-home communication, and administrator support (Chitiyo & Wheeler, 2009; Wilson & Landa, 2019).

Finally, classroom teachers and educators have expressed that they have not received sufficient training to effectively teach students with ASD in an inclusive environment (Wilson et al., 2019). A study conducted by Morrier et al. (2011) found that fewer than 15% of teachers reported receiving training in evidence-based strategies to support students with ASD within their teacher training programs. Recently, evidence-based practices for students with ASD have been included more frequently in teacher training and ongoing professional development (Hsiao & Sorensen-Peterson, 2018). However, these advancements in training only cover a small portion of evidence-based strategies and teachers are left feeling unprepared (Hsiao & Sorensen-Peterson, 2018). Classroom teachers have increasingly requested more training, resources, and support in teaching their students with ASD in the inclusive classroom (Lindsay et al., 2013). These findings emphasize the need for suitable, feasible, and practical training for teachers of

students with ASD in order to bridge the gap between research and practice, enhance teacher attitudes, knowledge, and competency, and ultimately improve student outcomes (Roberts & Simpson, 2015).

Accessible Strategies Supporting Inclusion for Students by Teachers (ASSIST)

In response to the numerous studies illustrating the need for accessible training for teachers of students with ASD in the inclusive classroom, the *Accessible Strategies Supporting Inclusion for Students by Teachers (ASSIST)* was developed (<https://assistforteachers.ca/>). *ASSIST* is a self-guided, eLearning professional development program created by Dr. Penny Corkum alongside a team of students, psychologists, educators, and researchers. The program's purpose is to allow teachers to learn evidence-based strategies to help support their students with neurodevelopmental disorders in the inclusive classroom.

The *ASSIST* program includes three modules, *ASSIST for LD*, *ASSIST for ADHD*, and *ASSIST for ASD*. Each module includes six sessions that provide information specific to each neurodevelopmental disorder. Teachers can navigate the six sessions at their own pace, but each is estimated to take about one hour to complete. The current study is about the *ASSIST for ASD* module. Session one of the *ASSIST for ASD* module begins with an in-depth overview of ASD, including ASD core symptoms, associated characteristics, and diagnostic practices, as well as addressing common myths surrounding the disorder. The second session of *ASSIST for ASD* focuses on the importance of understanding functions of behaviour. Various aspects of behavioural interventions are introduced, such as environmental adjustments and the ABC model of behavioural support (i.e., antecedents, behaviours, and consequences). Teachers are then given tools to develop an *ASSIST* support plan specific to their students with ASD, which begins with monitoring and recording their student's behaviours and choosing SMART (specific,

measurable, attainable, relevant, time-bound) goals. In the third session, teachers are encouraged to examine the data they collected on their student's behaviour and use this to create a support plan while encouraging the acquisition of new skills. The fourth session provides additional information on strategies to set students up for success, touching on topics such as classroom layout, seating arrangements, instructional strategies, classroom rules and routines, and transitions. Session five discusses possible consequences for behaviours (e.g., rewards, ignoring, natural and logical consequences) and provides additional information on the associated characteristics of ASD. The sixth and final session of the *ASSIST for ASD* module helps teachers plan for the future with tips on maintaining and adapting a support plan, preparing for changes in ASD presentation and comorbid disorders, and gaining additional support from other professionals.

With the demands and expectations of teachers consistently growing, the goal was to create a program that was accessible, adaptable, and feasible for the teacher to implement. The self-guided and online nature of the *ASSIST* program allows teachers to easily and conveniently access the resources when a student with ASD may join their classroom instead of waiting for a professional development presentation. *ASSIST* also emphasizes collaboration between other educators, school-based practitioners (e.g., SLPs, school psychologists), and caregivers. It should be noted that the strategies within the program can be generalized and helpful for students who may need mild to moderate levels of support. However, students with more severe deficits may need additional interventions beyond the scope of the *ASSIST* program.

A study by Ali et al. (2021) assessed the useability of the *ASSIST for ASD* module and found that ASD advocates, support professionals, and classroom teachers found the module useful, valuable, credible, useable, and accessible when reviewing and assessing each session.

Overall satisfaction scores were high across all sessions, and many participants gave high ratings for their willingness to recommend the program, perceived readiness for its use, and the extensiveness of the information presented. The results led researchers to suggest that the module has the potential to be used by classroom teachers to help support students with ASD in the inclusive classroom.

Implementation Research

After exploring the useability of the *ASSIST* program, the next step is to explore its implementation or its ability to be carried into effect. Implementation research is a relatively new and upcoming area that aims to assess and answer questions regarding the implementation of an initiative, program, policy, or intervention (Peters et al., 2014). Within health care and other areas of professional practice, many new initiatives and programs are developed and tested within well-controlled environments, often with empirically driven goals (Nilsen, 2020). These practices can leave room for implementation flaws when the program progresses into a real-world setting. Equitable implementation research strives to lessen the disconnect between empirical research and the practical applications of evidence-based practices by creating frameworks with solid theoretical underpinnings (Nilsen, 2020). These frameworks help determine and evaluate what will be most effective and helpful when implementing an intervention (Nilsen, 2020). They are also designed to uncover any concerns that should be addressed before the widespread implementation of an initiative (Nilsen, 2020). Generally, principles of implementation research include emulating real-world conditions, considering the many contextual variables at play (e.g., cultural, political, environmental, economic), and creating something that is best suited for the target population that will, in turn, improve conditions or outcomes (Peters et al., 2014).

Implementation Frameworks

When exploring the implementation and effectiveness of the *ASSIST for ASD* module, it was important to select an implementation framework that was best suited for the program and the exploration. Implementation frameworks are used to indicate whether an initiative should be considered successful and effective using different measurable outcome variables (Peter et al., 2014). One example of such an implementation framework is the Behaviour Change Wheel (BCW; Michie et al., 2011). Many interventions specifically set out to facilitate effective behaviour change, and thus Michie et al. (2011) reviewed aspects of multiple behaviour change intervention frameworks to develop a new framework that addressed their limitations. The resulting BCW framework functions as a system to determine if interventions illustrate a distinguishable link between their outcomes and mechanisms of action while also identifying areas that may have contributed to the intervention's failure to reach the desired goal (Michie et al., 2014). The BCW includes seven policy categories: fiscal measures, guidelines, environmental/social planning, communication/marketing, legislation service provision, and regulation (BCW, 2022). There are also nine intervention functions: restrictions, education, persuasion, incentivization, coercion, training, enablement, modelling, and environmental restructuring (BCW, 2022). The intervention functions and policy categories are linked to a model of behaviour called the Capability-Opportunity-Motivation Behaviour model (COM-B; Michie et al., 2014). This component allows interventions to be developed beginning with the desired target behaviour, further categorized into psychological capability, physical capability, physical opportunity, social opportunity, automatic motivation, and reflective motivation (BCW, 2022). The BCW is a very comprehensive implementation framework, and it is used quite widely when developing, understanding, and explaining policies and interventions (Michie et al., 2014;

Nilsen, 2020). When evaluating a previously developed intervention, it is used slightly less frequently. Due to the BCW's comprehensiveness, its scope was deemed disproportionately wide and complex for the use of the *ASSIST* program.

Another example of a commonly used implementation framework is the model of behaviour change presented by Ritterband et al. (2009) for internet interventions. This framework includes nine components that work to develop, predict, and explain symptom improvements and behaviour changes in response to an internet intervention. The nine steps include user characteristics, environmental factors, website use, website support, website content and appearance, mechanisms of change, behaviour change, symptom improvement, and treatment maintenance. This model proposes that each of these components influence and affect one another step-by-step. For example, an internet intervention has been designed for individuals experiencing some health issues that could improve with lifestyle changes, environmental factors such as internet accessibility and family encouragement may influence the mechanisms of change (e.g., the individual's motivation and beliefs surrounding the program), which may then affect the extent of behaviour change and symptom improvement. This framework was especially of interest when considering the evaluation of *ASSIST*, given its specificity on internet/eHealth interventions. However, similarly to the BCW, the framework is quite broad in a way that over-extended what was needed to evaluate the components of *ASSIST*.

RE-AIM

Another typical implementation framework is RE-AIM, presented by Glasgow et al. (1999). The RE-AIM framework was developed to determine and operationalize the impact of community-based, social-ecological thinking, systems-based, and public health interventions as a function of five components: reach, efficacy, adoption, implementation, and maintenance. This

framework employs the notion that for an intervention to be successful, it must appropriately account for each of these five components. Each component is evaluated to determine the impact and efficacy of an intervention and to magnify areas that may need improvement.

Reach represents the individuals involved in an intervention, which primarily encompasses participant characteristics and demographics of those who receive or participate in an intervention and those who do not within a given population (Glasgow et al., 1999). Reach can be challenging to operationalize in that determining the representativeness of a sample within a population and accounting for characteristics of non-participants can be taxing and sometimes unattainable. Important considerations to make within the reach component are determining if the intervention reached participants in need of such interventions and if their characteristics are demonstrative of the overall population for which the intervention was designed. Efficacy represents the general impact of an intervention, including an evaluation of both positive and negative outcomes. It is essential to assess both positive and negative impacts to ensure that its potential harms do not outweigh the strengths and improvements of an intervention. The nature and type of intervention determine specific variables that could represent the impact of an intervention. Adoption represents the number of agents that are willing to initiate a program. In health research, this may refer to the number of health departments, communities, or clinics willing to adopt a program. Implementation represents the extent to which the intervention was initiated as it was intended. This may include an individual's ability to follow through and adhere to what is outlined in the intervention and may extend to how a setting (e.g., hospital, community centre, school) implements and adheres to the program. Finally, Maintenance represents the sustainability of the intervention and if it can be maintained over time with similar effects.

The RE-AIM framework has been used broadly across a multitude of intervention types, most commonly those assessing physical activity, obesity, and disease management (Gaglio et al., 2013). However, the components of RE-AIM are not explicitly health-specific and thus have also been used to assess various educational interventions. One example is a study conducted by Cheney and Yong (2014) that used the RE-AIM framework to create a checklist for school staff to select, evaluate, and adapt different social-behavioural interventions within their Tier 2 programs. The different components of RE-AIM were used to guide school staff when selecting students in need of Tier 2 intervention (Reach), using progress monitoring and evaluations (Effectiveness), making use of professional development activities to increase buy-in (Adoption), making materials available to schools (Implementation), and encouraging the interventions use after its conclusion (Maintenance). There have been many other school-based studies that have made use of the RE-AIM framework for things like nutrition-based interventions (Larsen et al., 2017), the Lunchtime Enjoyment Activity and Play (LEAP) intervention (Hyndman et al., 2014), and physical activity interventions (Smedegaard et al., 2017).

The RE-AIM framework does have some limitations. Of the many publications that have referenced the RE-AIM framework, there seems to be repeated confusion between the Reach and Adoption components, failure to include all components, and inconsistency in how the components are defined (Gaglio et al., 2013). However, RE-AIM has many strengths, such as its simplicity, malleability, and ability to work in different contexts (Gaglio et al., 2013). Because of these listed strengths, its appropriateness in school settings, and conciseness, RE-AIM was selected as the most suitable implementation framework to evaluate the *ASSIST for ASD* module.

CHAPTER TWO

SUPPORTING TEACHERS WHEN WORKING WITH STUDENTS WITH AUTISM SPECTRUM DISORDER IN THE INCLUSIVE CLASSROOM

Autism spectrum disorder (ASD) is one of the most common neurodevelopment disorders of childhood, with recent estimates reporting that as many as 1 in 66 children in Canada have a diagnosis of ASD (Public Health Agency of Canada [PHAC], 2018). ASD is characterized by persistent deficits in social communication and restricted and repetitive patterns of behaviour, activities, or interests (American Psychiatric Association [APA], 2022). With improved knowledge and advocacy surrounding ASD and other mental health disorders, multiple policies, legislation, and educational practices have begun to emphasize the need for inclusive education (Anthony et al., 2011; Grynova & Kalinichenko, 2018; Inclusive Education Canada [IEC], 2020; Individuals with Disabilities Education Act [IDEA], 2022). Inclusive education is meant to generate opportunities for students with disabilities to learn alongside their typically developing peers rather than receive support outside of the general classroom (Zagona et al., 2017). Currently, most children with ASD in North America attend a public school within the general education system and are spending more time in the general inclusive classroom than ever before (National Center for Education Statistics [NCES], 2016; NCES, 2022).

Navigating a general classroom environment can be challenging for students with ASD. The level of challenge may be influenced by symptom severity and co-occurring disorders such as intellectual developmental disorder (IDD) and attention-deficit/hyperactivity disorder (ADHD; APA, 2022; Chiang et al., 2018; Estes et al., 2010; Jang & Matson, 2015; Joshi et al., 2010). Students with ASD tend to have more significant social communication, behavioural, and emotional regulation difficulties than their typically developing peers and often need extra

support and adaptations to help reach their highest potential in the inclusive classroom (Adams, 2005; Ashburner et al., 2010; Brodzeller et al., 2017).

As time spent in the general inclusive classroom for those with ASD has increased, classroom teachers now have more responsibility in adjusting and adhering to the varying levels of impairment and required supports of their students with ASD (Leblanc et al., 2009). Many classroom teachers have reported lacking the knowledge and skills to provide adequate instruction to their students with ASD within the general inclusive classroom (Roberts & Simpson, 2016). Teachers also report that the training and resources they do receive to support their students with ASD are insufficient, inaccessible, or impracticable (Lindsay et al., 2013; Morrier et al., 2011; Wilson et al., 2019). The Canadian Teachers' Federation (CTF) conducted a widespread survey across the Canadian provinces and territories where it was found that properly supporting students with ASD and other neurodevelopmental disorders was among one of the most pressing concerns for Canadian teachers, causing a considerable amount of distress (Froese-Germain & Riel, 2012). To address teachers' distress and to ensure students with ASD receive education that allows them to flourish, there must be more accessible, manageable, and feasible training about evidence-based practices for classroom teachers of students with ASD (Corkum et al., 2014; Lindsay et al., 2013; Roberts & Simpson).

In response to the vast need for accessible training for teachers of students with ASD in the inclusive classroom, the *Accessible Strategies Supporting Inclusion for Students by Teachers (ASSIST)* was developed (<https://assistforteachers.ca/>). *ASSIST* is a self-guided, eLearning professional development program created by Dr. Penny Corkum alongside a team of students, psychologists, educators, and researchers. The program's purpose is to provide teachers with the opportunity to learn evidence-based strategies to help support their students with

neurodevelopmental disorders in the inclusive classroom. The *ASSIST* program includes three modules, *ASSIST for Learning Disabilities (LD)*, *ASSIST for ADHD*, and *ASSIST for ASD*. Each module includes six sessions that provide information specific to each neurodevelopmental disorder. Each session is estimated to take about one hour to complete. The current study focuses on the *ASSIST for ASD* module.

The *ASSIST for ASD* module supports teachers in developing and implementing evidence-based strategies to create a positive classroom environment for their students with ASD. The *ASSIST* program was designed to be feasible, accessible, and adaptable, to account for the considerable and increasing demands and expectations within the teacher role. The self-guided and online nature of the program allows teachers to easily and conveniently access the resources when a student with ASD joins their classroom rather than waiting for a professional development presentation or seeking information on the internet. *ASSIST* also emphasizes collaboration between other educators, school-based practitioners (e.g., speech-language pathologists (SLPs), school psychologists), and caregivers. The strategies within the program are generalizable and helpful for students who may need mild to moderate levels of support.

A study conducted by Ali et al. (2021) examined the usability of the *ASSIST for ASD* module and found that classroom teachers, ASD advocates, and ASD support professionals recounted the module as being useful, valuable, and accessible when reviewing and assessing each session. Participants rated their overall satisfaction highly across all sessions, and many participants responded positively to questions regarding their willingness to recommend the program, perceived readiness for its use, and the extensiveness of the information presented. The results led researchers to suggest that the module had the potential to be used by classroom teachers to help support students with ASD in the inclusive classroom.

Since the successful evaluation of the *ASSIST for ASD* module's useability, the next step became to explore the module's implementation, or its ability to be carried into effect. Implementation science is a relatively new and upcoming area that aims to assess and answer questions regarding the implementation of an initiative, program, policy, or intervention (Peters et al., 2014). Within health care and other areas of professional practice, many new initiatives and programs are developed and tested within well-controlled environments, often with empirically driven goals (Nilsen, 2020). These practices can leave room for implementation flaws when the program progresses into a real-world setting. Equitable implementation research strives to lessen the disconnect between empirical research and the practical applications of evidence-based practices by creating frameworks with solid theoretical underpinnings (Nilsen, 2020). These frameworks help determine and evaluate what will be most effective and helpful and uncover any concerns that should be addressed before the widespread implementation of an initiative.

One widely used implementation framework is the RE-AIM framework (Glasgow et al., 1999), which stands for Reach, Efficacy, Adoption, Implementation, and Maintenance. This framework is primarily used to assess the implementation of public health, community-based, systems-based, and social-ecological interventions. Each component is evaluated to determine the impact and efficacy of an intervention and to magnify areas that may need improvement. RE-AIM was selected as the implementation framework for the current study due to its simplicity, malleability, and its ability to be applied to educational settings (Gaglio et al., 2013; Hyndman et al., 2014; Larsen et al., 2017; Smedegaard et al., 2017).

The current study is an implementation-effectiveness hybrid study, as it examines outcome variables to evaluate effectiveness in addition to the implementation of the module.

Exploring effectiveness is already a large part of implementation research because typically when implementing an initiative, a fundamental goal is to improve outcomes and to evaluate if an initiative is successful, helpful, and effective (Nilsen, 2020). This study also aimed to assess the overall satisfaction of the *ASSIST for ASD* module. An essential motivator in creating a program to be used by teachers was that teachers would be happy and satisfied with it in a way that addresses their desire for more training. Lastly, due to the timing of this study being amidst the COVID-19 pandemic, it was also important to explore and consider how elements of the pandemic (i.e., online teaching) impacted outcomes.

There are four overarching research questions for the current study: (1) Is *ASSIST for ASD* implemented by classroom teachers in the manner it was designed to be implemented? (2) What is the clinical effectiveness of *ASSIST for ASD*? (3) What is teachers' satisfaction with *ASSIST for ASD*? (4) How did the COVID-19 pandemic impact the implementation and effectiveness of *ASSIST for ASD*? The research questions within the current study are exploratory in nature, and thus hypotheses were not generated. The RE-AIM framework (Glasgow et al., 1999) was used to assess the effectiveness and implementation overarching research questions, and the specific research questions corresponding to each component of RE-AIM are as follows:

- Reach: (1) How did recruitment methods work to reach and engage potential participants? (2) Did recruitment methods result in a diverse and representative sample of teachers?
- Effectiveness: (1) What were the positive impacts of the module on proximal factors (i.e., teacher's attitudes, beliefs, and use of evidence-based strategies)? (2) What were

- the positive impacts of the module on distal factors (i.e., teacher distress and well-being)? (3) Were there any negative impacts of the module?
- Adoption: (1) What proportion of teachers utilized the module? (2) What was adherence like to the module?
 - Implementation (1) What was the extent to which teachers utilized the strategies within the module? (2) What facilitated and impeded the implementation of the strategies presented in the module?
 - Maintenance: (1) Do teachers report continuing to use the strategies at 6-month post-intervention?

Method

Participants

Participants of the current study included Canadian classroom teachers who identified interest in the *ASSIST for ASD* module and met the eligibility criteria to participate in the study. For teachers to be included in the study, they had to be currently working as a teacher in a regular classroom setting in a Canadian school (i.e., grades 1 to 12) with at least one student in their classroom with ASD. Teachers also had to be comfortable using English to participate in the study. If teachers previously reviewed *ASSIST* content, participated in a previous *ASSIST* study, or planned to be on a leave of absence at any point during the duration of the study, they were not eligible for the study and were thus excluded.

Measures

Screening Questionnaire (Pre-Intervention). The Screening Questionnaire (Appendix A) was author developed and includes 9-items that assesses teachers' eligibility to participate in the study. The questions require teachers to self-report if they are currently teaching in a

Canadian school (i.e., grades 1 to 12), are comfortable using English to participate in the study, and if they currently have a student in their classroom with ASD. Teachers were also asked to report if they planned to take a leave of absence during the current school year or if they had previously viewed or participated in the *ASSIST* program. The responses to this questionnaire determined whether participants met the eligibility criteria to participate in the study. If teachers did not meet the eligibility criteria, they were sent a thank you message that included contact information to be used if participants had questions. When participants indicate if they are living in Canada, they were also asked to provide a response as to which province or territory they were currently residing. These responses were also used when reporting general demographics of the participants who were included in the study.

Participant Characteristic Questionnaire (Pre-Intervention). The Participant Characteristic Questionnaire (Appendix B) was author developed and is a 16-item self-report measure designed to gain general demographic information on participants. This measure was administered pre-intervention and includes questions regarding age, sex, ethnicity, highest degree obtained, school community characteristics, and teaching career information (e.g., current grades being taught, grades taught previously, length of teaching career). Eight of the 16 items were used in the current study to describe the sample of teachers that desired to use the *ASSIST for ASD* module. One of these items asked about how teachers learned of the *ASSIST* program. This item was comprised of multiple options in which participants were asked to select all that applied (e.g., Google ad, LinkedIn, Facebook post). This item was used to provide more insight into the assessment of the Reach component of RE-AIM, specifically regarding what led teachers to participate in the program.

Teacher Attitudes and Beliefs Questionnaire (Pre- and Post-Intervention). An adapted version of the Teacher Attitudes and Beliefs Questionnaire (TAB; Kos, 2008; Appendix C) was used to assess teachers' beliefs, knowledge, and attitudes about children with ASD. It is an 18-item questionnaire using a five-point Likert scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*) in which teachers were asked to rate their agreement on statements surrounding topics of lack of control (e.g., Students with ASD could control their behaviour if they really wanted to), negative classroom effects (e.g., Having a student with ASD in my class would disrupt my teaching), diagnostic legitimacy (e.g., ASD is a valid diagnosis), and perceived competence (e.g., I have the skills to deal with students with ASD in my class). Total scores on this measure can range from 18 to 90. On Factor 1: Lack of Control, scores can range from 6 to 30, on Factor 2: Negative Classroom Effects, scores can range from 5 to 25, on Factor 3: Diagnostic Legitimacy, scores can range from 4 to 20, and on Factor 4: Perceived Competence, scores can range from 3 to 15. Some items were reverse coded based on the nature of the statement. Higher scores indicate more agreement on negative statements surrounding teacher attitudes and beliefs towards students with ASD. A total score for each factor as well as a total score across all four factors was calculated at both pre- and post-intervention, which was used to assess the Effectiveness component of RE-AIM.

Instructional and Behavior Management Approaches Survey (Pre- and Post-Intervention). The Instructional and Behaviour Management Approaches Survey (IBMAS; Martinussen et al., 2011; Appendix D) is a 36-item self-report measure that assesses teachers' use of various instructional adaptations, strategies, and behaviour management approaches that are often recommended for students with neurodevelopmental disorders. At both pre- and post-intervention, teachers were asked to rate on a five-point scale from 1 (*rarely*) to 5 (*most of the*

time) the frequency in which they used the various strategies. Total scores could range from 36 to 180. This measure also had two subscores that represented behavioural approaches and academic approaches, each individually could range from 18 to 90. A total score for each participant was calculated from all the 36 items and was used to assess the Effectiveness component of RE-AIM.

Distress Thermometer (Pre- and Post-Intervention). The Distress Thermometer (Appendix E) is an adapted measure from the National Comprehensive Cancer Network (NCCN; 2019) and Ownby (2019) that was used to measure the current self-reported level of distress in a participant's teaching role at both pre- and post-intervention. It is a single-item measure in which participants rate their level of distress on a visual thermometer from 0 (*no distress*) to 10 (*extreme distress*) which was used to assess the Effectiveness component of RE-AIM.

Subjective Well-Being (Teacher) Questionnaire (Pre- and Post-Intervention). The Subjective Well-Being (Teacher) questionnaire (Appendix F) was adapted from the Statistics Canada General Social Survey (2016) and was used to measure participant satisfaction within their teaching role. This questionnaire contains one item and was completed at both pre- and post-intervention regardless of how many sessions were completed. Teachers were asked to rate their satisfaction on a scale from 0 (*very dissatisfied*) to 10 (*very satisfied*) which was used to assess the Effectiveness component of RE-AIM.

Computer-generated user statistics. Computer-generated user statistics were obtained to aid in the measurement of both the Reach and Adoption components of the RE-AIM framework. Information such as the total number of access codes distributed, the total number of login attempts, and the total number of sessions completed were calculated and reported through software mechanisms within the online program. The total number of access codes distributed

was used for the Reach component to describe the number of participating teachers. The number of login attempts and the total number of sessions completed were used for the Adoption component to look at adherence. This information was only accessible to the research team and was calculated throughout the duration of the study as the data became available following participants' usage of the program.

Teacher Satisfaction Questionnaire (Post-Intervention). The Teacher Satisfaction Questionnaire (Appendix G) was author developed and was used to assess teacher's overall satisfaction with the *ASSIST for ASD* module. This measure was displayed post-intervention to participants who reported reviewing at least one session of the module. This measure included 19 items that were to be answered on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) or 6 (*not applicable*). Total scores could range from 15 to 65 on these items. The questions fell within themes of how easy the material was to understand, adapt, and implement, and how useful the program was. Fifteen items on this measure were used in the current study to assess overall teacher satisfaction of *ASSIST for ASD*.

Implementation Questionnaire (Post-Intervention). The Implementation Questionnaire (Appendix H) was author developed and contains 15-items used to determine teachers' use of the strategies presented in the module, as well as to identify any potential perceived barriers of the *ASSIST* program. This measure was displayed post-intervention to participants who reported reviewing at least one session of the *ASSIST for ASD* module. Six items were selected to be used for the current study. Five of the six items selected were used to assess the Implementation component of RE-AIM. The first of the six required teachers to select one of five options that best reflected their perceived current usage of the strategies presented in the *ASSIST for ASD* module in their classroom (i.e., Yes, most of the strategies; Yes, some of the

strategies; Yes, a few of the strategies; No, none of the strategies; No, as teaching moved to online teaching and as such, I was not able to implement these strategies). The second item required teachers to select one of five options that best reflected their perceived frequency of the usage of classroom strategies presented in *ASSIST* (i.e., Always [everyday], Often [4 days per week], Sometimes [2 or 3 days per week], Rarely [1 day per week], or Not at all [0 days a week]). The third, fourth and fifth item used to assess Implementation included questions about why the program was easy to use, hard to use, and what changes could be made to encourage involvement for the full 6-8 weeks of the module. These three questions were all qualitative in nature, and teachers could respond through an open text box. The final item used from this questionnaire was used to assess the Effectiveness component of RE-AIM. This item was open text format and thus provided qualitative data on perceived ways the *ASSIST for ASD* module may have had unintended negative impacts.

6-Month Follow-Up Questionnaire (Post-Intervention). The 6-Month Follow-Up Questionnaire (Appendix I) is a six-item questionnaire that was author developed that was used to assess the continued usage of the strategies presented in the *ASSIST for ASD* module. Participants received this questionnaire six months after they received access to the module and were asked to provide feedback on the status of their completion of the program and the continuation of the strategies presented in the module. Four items on this measure were selected for the current study and two of those items asked participants to select a response on either a 4-point Likert scale regarding their use of the strategies at 6-months post-intervention (Yes, most; Yes, some; Yes, a few; or No), or a 5-point Likert scale (i.e., Always [everyday], Often [4 days per week], Sometimes [2 or 3 days per week], Rarely [1 day per week], Not at all [0 days a week], or Highly likely, Likely, Somewhat likely, Not likely, or N/A [I did not start the

program]). An additional item asked participants to qualitatively specify which parts of the *ASSIST for ASD* module they continued to use through an open text box. These items were used to assess the Maintenance component of RE-AIM.

COVID-19 Impact and Status Update Questionnaire (Post-Intervention). The COVID-19 Impact and Status Update Questionnaire (Appendix J) was author developed and contains nine items. It asks questions regarding the degree of impact the COVID-19 pandemic had on participants' ability to review and implement the content of *ASSIST for ASD*. Four items were used in the current study that inquired about teaching location changes, percentage of time teaching online, and general impacts of the pandemic on teaching. Some items requested participants to input either a percentage or a qualitative response in an open text box, while others asked that they select an option from a four-point Likert scale (0 = *Not at all*, 1 = *Just a little*, 2 = *Some*, 3 = *A Fair Amount*, 4 = *A Lot*). These items were used to address the research question pertaining to the COVID-19 pandemic impact on implementation and effectiveness of the module. Three additional items were used to assess the Implementation component of RE-AIM. The first item asked participants how carefully they reviewed the session content, which they were asked to rate on a Likert scale of 1 (*Not Carefully*) to 5 (*Very Carefully*). The next question asked what percentage of the strategies participants tried to use, which was answered by inputting a percentage into an open text box. Lastly, participants were asked how successful they felt they were in completing the session plans, which they rated on a Likert scale of 1 (*Not at All*) to 7 (*Very Successful*).

Procedure

The current study made use of data that was initially collected for a larger project that received ethical clearance from the IWK Health Centre Ethics Board in Halifax, Nova Scotia on

June 21, 2021, and received further ethical clearance from the Mount Saint Vincent University (MSVU) Research Ethics Board on May 13, 2022. The research was funded by Kids Brain Health Network.

Various methods were used to recruit participants. These methods included social media (e.g., *ASSIST* Facebook, LinkedIn, and Instagram), the internet (e.g., Google ads, website ads, internet search), print (e.g., print advertisements, newspaper), and people (e.g., school boards, professional or community organizations, emails). The recruitment campaign began on March 1, 2021 and closed on April 27, 2021. If teachers were interested in participating, they were invited to click a link that directed them to the REDCap (Research Electronic Data Capture) electronic database, which is a web-based software platform that is used to remotely collect data for research studies (Harris et al., 2009, 2019). It is here where they were then able to complete the Screening Questionnaire (Appendix A) to confirm eligibility which was then followed by the Teacher Consent Form (Appendix K).

Once consent was provided, participants received an email containing an invitation to complete the pre-intervention questionnaires. All questionnaires were similarly completed via the data collection software, REDCap (Harris et al., 2009, 2019). Following the completion of the pre-intervention questionnaires, the participants were sent an email containing their personal login information for *ASSIST for ASD*. At this point, teachers were able to work through the *ASSIST for ASD* module. Each of the six sessions included in the module were estimated to take about one hour. Participants were given 8 weeks to complete the six sessions, with sessions opening weekly for access throughout the 8 weeks. Participants who completed at least one session received an email invitation to complete the post-intervention questionnaires. All participants were entered into a draw for three Amazon gift cards valued at either \$50, \$75, or

\$100 as compensation for their time and effort. Post-intervention data was collected in July 2021 and follow-up data was collected between January and February 2022.

Data Analysis

Quantitative Data

The IBM Statistical Package for Social Sciences software for Mac, Version 27.0 (SPSS; n.d.) was used to analyze all quantitative data. Within SPSS, paired-samples *t*-tests and descriptive statistics were conducted to interpret all quantitative data. Prior to running the paired-sample *t*-tests, Shapiro-Wilks tests of normality were conducted to ensure the differences between pre- and post-scores on the measure of interest were normally distributed without significant outliers. The Shapiro-Wilks test of normality was used given its appropriateness for smaller sample sizes ($N \leq 50$; Mishra et al., 2019). In the instance that the differences between the pre- and post-scores were not normally distributed, non-parametric tests (i.e., Wilcoxon Signed Rank test) were conducted as a substitute. Cohen's *D* effect sizes were interpreted based on benchmarks suggested in Cohen's (1988) interpretation (i.e., small [$d = 0.2$], medium [$d = 0.5$], or large [$d = 0.8$]).

Qualitative Data

Qualitative data were analyzed using the content analysis procedures suggested by Hsieh and Shannon (2005) that included six stages: (1) familiarization with the data and its contents; (2) generation of initial codes; (3) search for common themes; (4) review of found themes; (5) naming and defining the themes found; and (6) production of results. However, it became clear that the responses provided by participants in the current study were too concise to be appropriately encapsulated through such a process that aims to quantify the responses with codes. Thus, adaptations were made to the content analysis procedures of Hsieh and Shannon

(2005) that included four stages: (1) familiarization with the data and its contents; (2) search for common themes; (3) review of found themes; and (4) creation of a qualitative summarizations that encapsulated the found themes.

Results

This section is organized based on the four overarching research questions and as such is not sequential to the components of RE-AIM. There was gradual attrition throughout the process of data collection, and this organization does not provide a chronological account of this attrition. Therefore, a diagram illustrating the number of participants at each phase of data collection can be found in Figure 1. The results of the Shapiro-Wilks tests of normality for analyses requiring a paired samples *t*-test or a Wilcoxon Signed-Ranks test can be found in Table 1.

Research Question 1: Is *ASSIST for ASD* Implemented by Classroom Teachers in the Manner it was Designed to be Implemented?

The Reach, Adoption, Implementation, and Maintenance components of RE-AIM were used to assess whether the *ASSIST for ASD* module was delivered and used as it was intended. Each of these components of RE-AIM have a number of corresponding research questions. The definitions of each RE-AIM component, its corresponding definition, research question, measures, and variables can be found in Table 2.

Reach

How Did Recruitment Methods Work to Engage Potential Participants? A total of 1371 people visited the *ASSIST* website during the recruitment period and 341 people consented to participate in the *ASSIST* implementation study across all three of the available modules (i.e., *ASSIST for ADHD*, *ASSIST for LD*, *ASSIST for ASD*). Two hundred and seventy-three people completed pre-intervention questionnaires to determine their eligibility. Two hundred and sixty-

one people met the eligibility criteria and were thus given access to an *ASSIST* login. Of the 261 participants who consented and received login codes, 83 selected the *ASD* module and were thus included in the current study.

Of the 83 participants in the current study, 56 participants (67.4%) were recruited through word of mouth (i.e., email, professional or community organization, school board), 21 participants (25.3%) were recruited via social media (i.e., YouTube, *ASSIST* Facebook post, group, live, or other, *ASSIST* LinkedIn, *ASSIST* Instagram), and 6 participants (7.2%) were recruited via the internet (i.e., Google Ad, *ASSIST* website, internet search, podcast). A newspaper ad was also used to recruit participants through print; however, no participants in the current study reported hearing of the program through this mechanism.

Did Recruitment Methods Result in a Diverse and Representative Sample of Teachers? Of the 83 participants who consented to participate in the study, 25 (30.1%) were currently teaching in British Columbia, 21 (25.3%) in Nova Scotia, 15 (18.1%) in Ontario, six (7.2%) in New Brunswick, six (7.2%) in Alberta, five (6.0%) in Prince Edward Island, three (3.6%) in Manitoba, one (1.2%) in Saskatchewan, and one (1.2%) in Nunavut. Due to attrition, only 75 (90.4%) of the participants filled out measures that collected the remainder of the demographic information. Participants' age ranged from 23 to 64 years old ($M = 40.31$, $SD = 10.30$). Sixty-nine participants (92.0%) self-identified as female, five participants (6.7%) self-identified as male, and one participant (1.3%) identified as non-binary. Fifty-eight participants (77.3%) identified as White, five (6.7%) identified as South Asian, three (4.0%) identified as Aboriginal, three (4.0%) identified as Filipino, one (1.3%) identified as Chinese, four participants (6.6%) selected other, and one participant (1.2%) preferred not to respond. Of those who selected other, one participant (1.2%) identified as Caucasian, one participant (1.2%)

identified as Métis, one participant (1.2%) identified as Mixed, and one participant (1.2%) identified as Jewish. When participants were asked to report their highest level of education, 34 (45.3%) reported having a bachelor's degree or an equivalent, 32 (42.7%) reported having a master's degree, two (2.7%) reported having a Ph.D., four (5.3%) reported having an Ed.D., and three (4.0%) selected other. Of those who selected other, two (2.4%) reported obtaining a Post Bachelor Certificate, and one (1.2%) reported obtaining a Post Graduate Certificate. Twenty-four participants (32.0%) reported working in a town setting, 20 (26.7%) in a rural setting, 22 (29.3%) in a city with under 500 000 people, and nine (12.0%) in a city with more than 500 000 people. The number of years participants had been teaching ranged from 1 to 30 years ($M = 12.23$, $SD = 7.91$). When asked what grade they were currently teaching, 11 (14.7%) were teaching grade one, six (8.0%) grade two, three (4.0%) grade three, five (6.7%) grade four, eight (10.7%) grade five, four (5.3%) grade six, six (8.0%) grade seven, four (5.3%) grade eight, two (2.7%) grade nine, four (5.3%) grade ten, one (1.3%) grade 11, four (5.3%) grade 12, and 17 (22.7%) selected other. Of those who selected other, eight participants (9.6%) disclosed that they were teaching multiple or split classes, three (3.6%) disclosed they were teaching pre-kindergarten, two (2.4%) were teaching resource, and four (4.8%) were teaching special skills classes.

Adoption

What Proportion of Teachers Utilized the Intervention? Eighty-three participants consented to participate in the study which meant 83 teachers received codes to the module. Of the 83 participants who received codes, 47 (56.6%) logged on to the module.

What was Adherence Like to the ASSIST for ASD module? Of the 83 participants, 51 (61.4%) did not complete any sessions. Of those who began the sessions, 32 participants (38.5%) completed session one, 23 (27.7%) completed session two, 14 (16.9%) completed session three,

11 (13.3%) completed session four, 9 (10.8%) completed session five, and eight (9.6%) completed all six sessions.

Implementation

What was the Extent to Which Teachers Utilized the Strategies Within the Program? Twenty-five participants answered a number of questions about the implementation of *ASSIST* strategies. Participants were asked to rate how carefully they reviewed the module content on a scale from 1 (*Not Carefully*) to 5 (*Very Carefully*). Most participants responded somewhere in the middle of not carefully and very carefully ($M = 3.60$, $SD = 0.76$). Participants indicated using between 20% and 80% ($M = 52\%$; $SD = 19.73$) of the strategies following the presentation of the module. Finally, participants were asked to rate how successful they believed they were in following the session plans within the module on a scale from 1 (*Not at All*) to 7 (*Very Successful*). Most participants responded somewhere in the middle of not at all and very successful ($M = 3.76$, $SD = 1.42$).

The following questions were only displayed to participants who responded that they had implemented strategies from at least one session. Twenty participants filled out the first question, which asked if they were currently using any of the strategies from the *ASSIST for ASD* module in their classroom. Two participants (10.0%) said they were using most of the strategies, six (30.0%) said they were using some of the strategies, six (30.0%) said they were using a few of the strategies, five (25.0%) said they were using none of the strategies, and one (5.0%) selected N/A. Only the participants who selected yes to the previous question were displayed the next question, which asked how often they were currently using the strategies from the *ASSIST for ASD* module. Fourteen participants answered this question, and nine (14.3%) said they were using the strategies every day, two (14.3%) said often or about 4 days per week, nine (64.3%)

said sometimes or 2 to 3 days per week, one (7.1%) said rarely or about once a week, and no participants selected the response stating they used the strategies 0 days per week or not at all. The average response fell between often and sometimes.

What Facilitated and Impeded the Implementation of the Strategies Presented in the Module? Participants provided qualitative information on numerous questions that were used to explore facilitators and barriers to the use of the *ASSIST for ASD* module. A summarization of the general themes found among the responses about ease of use, challenges with use, and suggested program changes can be found below.

a) Ease of use. Participants were first asked to elaborate on factors that may have made the *ASSIST* program easy to use. Seventeen participants answered this question. Many participants spoke to the online, asynchronous, self-paced delivery of the program. One participant stated “It being online will be extremely helpful,” another stated “Online modules were easy to use (...),” and another said “Easy to go through on my own time and pace.” Additional comments were made about the useability and accessibility of the module and its content. One participant said the information was “(...) easily explained.,” and another credited the “Accessible language and expectations.” The content and design of the program were also reported as making it easy to use. One participant stated “Slide presentations were clear,” another stated “I liked the symbols that were consistent throughout,” another shared “(...) useable lessons,” and another credited “Ability to go back and review.” Lastly, participants spoke to the supplementary resources that were available throughout the sessions, with one participant saying “(...) so many support resources.”

b) Challenges with use. Participants were also asked to give qualitative feedback through an open text box formatted question about what made the *ASSIST* program hard to use and why

that may have been. Twenty participants answered this question. Some participants provided responses about the COVID-19 pandemic negatively influencing their use of the program, with one participant saying “Covid – constant changes,” and another saying “Remote teaching.” Many teachers shared responses that reflected their experience in their teaching role and the limitations that their schedules presented. One participant said “Trying to work through it AND teach/plan/etc. at the same time,” another said “Just to schedule my time to get things done,” and another said “(...) honestly, feeling quite burnt out.” Lastly, the timing of the module also presented as a common theme, one participant said, “The time restraint, and choosing to do this at the end of the year vs mid-year,” and another said “I wish the modules were all released at once or as soon as you finished one. Sometimes I wasn't busy and could have done a module, but it wasn't out yet. Then I had to try to fit it in while busy with other work.”

c) Suggested Program Changes. Finally, participants were asked what changes could have been made to that may have helped them stay more involved in the *ASSIST* program. Seventeen participants responded to this open text box formatted question. Most participants reported that they felt that no changes were necessary. Of the few who did leave suggestions, some were about the timing of the module. Participants noted that it would have been helpful if the module had become available for use either earlier in the school year or in a timeframe where there would be more opportunity to give it their full attention. One participant said, “I would like to be able to access the other modules in September,” and another said, “Probably if I had started earlier in the year.” A few participants also requested more interaction within the program, with responses such as “Some accountability to enter the plan or strategy to try the following week,” “More interaction, meeting once a month, follow up if missed,” and “Perhaps a buddy system or mentorship program within *ASSIST*.”

Maintenance

Do Teachers Report Continuing to Use the Strategies at 6-Months Post

Intervention? Participants were asked questions about their usage of the *ASSIST* strategies 6-months post intervention as well as their intended future use of the strategies. Twelve participants answered these questions. The first question asked participants if they were currently using any of the strategies at 6-months post intervention, two participants (16.7%) said yes, most of them, three (25.0%) said yes, some of them, one (8.3%) said yes, a few, and six (50.0%) said no, they were not using any. Responses seemed to be evenly split between the yes responses and the no response. Six participants selected a “Yes” option to this first question which meant they were then invited to answer the following questions. When asked to report the frequency in which the strategies were being used 6-months after their initial presentation, two (33.0%) said always, no participants said often or around four days per week, three participants (50.0%) said sometimes, or around two to three times per week, one participants (16.7%) said rarely, or around one day per week, and no participants said they were not using them at all. These responses showed that of those who continued to use the strategies, most used them repeatedly or at least frequently. When asked about the likelihood in which they would use the strategies in the future with other students (i.e., in the next month, in the next one to two years), four (66.0%) said they were highly likely to do so, one (16.7%) said they were likely to do so, and one participant (16.7%) said they were somewhat likely to continue the use. No participants selected “Not Likely” or “N/A, I did not start the program.”

Finally, participants were asked to share through an open-text box what parts of the *ASSIST* program they were continuing to use 6-months post intervention. Six participants provided feedback. All reported using some aspect of the behavioural strategies presented, such

as, “Tracking behaviour, identifying reason for behaviour, teaching replacement behaviour,” and “Classroom organization, strategies prompting behaviours, visual schedules and personal picture prompts,” and “(...) how I look at behaviour, making changes in the environment, identifying where behaviour is coming from.”

Research Question 2: What is the Clinical Effectiveness of ASSIST for ASD?

The Effectiveness component of RE-AIM was used to assess the clinical effectiveness of the *ASSIST for ASD* module. The Effectiveness component of RE-AIM has three research questions. It’s definition, research questions, measures, and variables can be found in Table 3.

Effectiveness

What were the positive impacts of the Program on Proximal Factors? To explore the effectiveness of the *ASSIST for ASD* module, analyses were conducted to first determine the positive impacts on proximal factors (i.e., teachers’ attitudes, beliefs, and use of evidence-based strategies).

a) Teachers Attitudes and Beliefs. A paired-samples *t*-test was conducted to examine the impact of the *ASSIST for ASD* module on teachers’ attitudes and beliefs. Twenty-five participants completed measures related to their attitudes and beliefs at pre- and post-intervention and were thus included in this analysis. There was not a significant difference in teachers’ attitudes and beliefs at pre- ($M = 38.92, SD = 5.79$) and post-intervention ($M = 39.16, SD = 6.162$), *paired t* (24) = 0.19, $p = 0.85$, $d = 0.38$, with a relatively small effect size. These results suggest that teachers’ overall rating on negative statements about ASD did not significantly change after being exposed to the *ASSIST for ASD* module.

Additional *t*-tests were conducted to separately explore individual factors contributing to teachers’ attitudes and beliefs. The first individual factor represented teachers’ responses to

statements about the negative classroom effects of students with ASD. Scores on negative classroom effects at pre-intervention ($M = 9.76$, $SD = 3.37$) were not significantly different at post-intervention ($M = 10.80$, $SD = 2.67$), $paired\ t(24) = -1.80$, $p = 0.08$, $d = -0.36$, with minimal change indicated through the small effect size.

The second individual factor represented teachers' responses to statements about the lack of control among students with ASD when it comes to their behavioural and social difficulties. Scores on lack of control at pre-intervention ($M = 11.48.76$, $SD = 2.26$) were not significantly different at post-intervention ($M = 12.16$, $SD = 2.54$), $paired\ t(24) = -1.11$, $p = 0.28$, $d = -0.22$, with minimal change indicated through the small effect size.

The third individual factor represented teacher's responses to statements about the diagnostic legitimacy of ASD. Scores on diagnostic legitimacy at pre-intervention ($M = 9.00$, $SD = 1.52$) did not significantly differ from scores at post-intervention ($M = 8.48$, $SD = 1.66$), $paired\ t(24) = 1.19$, $p = 0.25$, $d = 0.24$, with minimal change indicated through the small effect size.

The final factor represented teacher's responses to statements about their perceived competency in teaching students with ASD. Scores on the perceived competence factor at pre-intervention ($M = 7.72$, $SD = 1.88$) were significantly lower than at post-intervention ($M = 8.68$, $SD = 1.93$), $paired\ t(24) = -2.38$, $p = 0.02$, $d = -0.48$, indicating more agreement on negative statements surrounding teachers' perceived competency in their ability to work with students with ASD at post-intervention.

b) Use of Evidence-Based Instructional Adaptations. To further explore potential positive impacts on proximal factors in response to the *ASSIST for ASD* module, pre- and post-intervention scores were examined on reported use of common evidence-based strategies. Twenty-five participants completed measures on the frequency of common instructional

strategies at both pre- and post-intervention and were thus included in this analysis. The differences between pre- and post-intervention scores significantly deviated from a normal distribution, $W(25) = 0.90, p = 0.02$, so a non-parametric test was conducted. A Wilcoxon Signed-Ranks test indicated that there was not a significant difference between post-intervention scores (mean rank = 12.89) and pre-intervention scores (mean rank = 13.06), $Z = -1.25, p = 0.21$. Descriptive statistics also showed minimal change in pre-intervention scores ($M = 124.60, SD = 17.26$) and post-intervention scores ($M = 125.79, SD = 18.93$).

Participants also obtained scores on two individual sub-scales, representing academic evidence-based strategies and behavioural evidence-based strategies. The differences between pre- and post-intervention scores on both the academic ($W(25) = 0.92, p = 0.04$) and behavioural ($W(25) = 0.91, p = 0.04$) subscales significantly deviated from a normal distribution, so non-parametric tests were conducted. For the academic subscale, a Wilcoxon Signed-Ranks test indicated that there was not a significant difference between post-intervention (mean rank = 9.82) and pre-intervention scores (mean rank = 14.77), $Z = -1.20, p = 0.23$. Descriptive statistics also showed minimal differences in scores at pre- ($M = 62.88, SD = 12.26$) and post-intervention ($M = 63.55, SD = 11.90$). For the behavioural subscale, a Wilcoxon Signed-Ranks test indicated that there was not a significant difference between post-intervention (mean rank = 11.50) and pre-intervention scores (mean rank = 12.38), $Z = -0.70, p = 0.48$. Descriptive statistics also indicated minimal change in scores at pre- ($M = 61.71, SD = 7.07$) and post-intervention ($M = 62.24, SD = 8.67$).

What Were the Positive Impacts on Distal Factors? It was also of interest to explore the potential positive impacts of the module on distal factors, such as reported levels of distress and teacher well-being.

a) Teachers' Distress Levels. A paired-samples *t*-test was conducted to see if a significant difference existed between self-reported distress levels before and after the *ASSIST for ASD* module. Twenty-five participants completed this measure at both pre- and post-intervention and were thus included in this analysis. The difference between levels of distress among participants at pre- ($M = 4.80, SD = 1.70$) and post-intervention ($M = 5.52, SD = 2.04$) was not statistically significant, $paired\ t(24) = -1.64, p = 0.11, d = -0.33$ with a small effect size.

b) Teacher Well-Being. An additional paired samples *t*-test was conducted to see if there was a significant difference in teachers' well-being after using the *ASSIST for ASD* module. Twenty-five participants completed measures of well-being at both pre- and post-intervention. There was also not a statistically significant difference between teachers' subjective well-being at pre- ($M = 6.80, SD = 1.80$) and post-intervention ($M = 6.60, SD = 1.60$), $paired\ t(24) = 0.72, p = 0.47, d = 0.14$, with a small effect size.

c) Negative Impacts. The final exploration within the Effectiveness component of RE-AIM was the potential for negative impacts following the completion of the *ASSIST for ASD* module. Seventeen participants provided feedback through an open text box formatted question asking participants if there were any negative impacts of the program. Most participants responded positively, with about 70% of the responses stating there were no negative impacts after completing the program. However, a few participants provided responses relating to time such as "(...) impact on time management" and "Time commitment of course," as negatively impacting their experience. Other contextual factors that were mentioned were "I realized that sometimes I had to depend on other people on my team who were not as engaged as I would have liked," and "I just felt that I had a lot on my plate and therefore was not able to complete all 6 sessions."

Research Question 3: What is the Teacher Satisfaction of *ASSIST for ASD*?

The current study also examined teachers' overall satisfaction with the *ASSIST for ASD* module. The measure and variables used to assess this research question can be found in Table 4. Twenty-five participants rated their agreement with 13 statements about the *ASSIST* program using a scale of 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Total scores ranged from 37 to 63 ($M = 51.46, SD = 7.66$). The highest attainable score on this measure is 65 and when dividing the average score of $M = 51.46$ from this number the satisfaction rate is 79%. Descriptive statistics including means, standard deviations, and ranges were also calculated for each item and can be found in Table 5. The individual statements that were the most endorsed were: The content of the intervention was presented in a manner that was easy to understand ($M = 4.52, SD = 0.586$), the content of the intervention was easily adaptable ($M = 4.32, SD = 0.802$), and I think I could use what I learned and apply this information to other students in my current class or future classes ($M = 4.32, SD = 0.988$). Individual statements that were less endorsed were: Completing the check-in questions at the beginning of each session of the program was easy and resulted in useful feedback ($M = 3.60, SD = 1.041$) and the interventions took just the right amount of time to implement ($M = 3.84, SD = 1.281$). Participants were also asked if they would recommend the *ASSIST* program to other teachers, to which 92% of participants said yes.

Research Question 4: How did the COVID-19 Pandemic Impact Implementation and Effectiveness?

The current study was conducted during the COVID-19 global pandemic. The pandemic had immense impact on the world and the education system, and many were forced to go into lockdown to reduce the spread of the virus. Many schools transitioned to online learning, which had the potential to impact teachers' experience with the *ASSIST for ASD* module. It was

important to ask participants about the degree of impact the pandemic had on the use of the program. The measure and variables used to answer this research question can be found in Table 6. Twenty-five participants answered the first question, which asked if there had been any changes in teaching location due to the COVID-19 pandemic (i.e., move to online teaching). Thirteen participants (52%) said no, where 12 participants (48%) said yes. The second questions asked percentage of the time taught online, which only displayed if the participant answered yes to the previous question. Twelve participants answered this question, and the average response was $M = 42.75\%$, $SD = 31.49\%$. The lowest reported percentage was 0% of time spent teaching online, and the highest reported percentage was 100% of time spent teaching online. Next, the participants who responded yes to the first question were then asked if they thought that the interventions presented in the *ASSIST for ASD* module were adaptable to an online teaching format and were asked to rate this response from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Twelve participants responded to this question, and the average response was $M = 2.75$, $SD = 0.866$. All participants who completed this questionnaire were displayed the final question, which asked to what extent the pandemic has impacted their teaching from the time of starting this study until now. Twenty-five participants responded to this question and the responses were rated on a Likert scale of 0 (*Not at all*) to 4 (*A lot*). The average response was $M = 3.36$, $SD = 1.186$.

Discussion

The rise of inclusive education has made it especially important for general classroom teachers to have the knowledge and skills to use evidence-based practices for students with ASD. However, many classroom teachers report lacking this knowledge and wish to have more opportunities for accessible training (Lindsay et al., 2013; Morrier et al., 2011; Wilson et al.,

2019; Roberts & Simpson, 2016). The *ASSIST* program was developed to address this need. The *ASSIST for ASD* module useability study found that classroom teachers found the module to be useful, valuable, and accessible when reviewing and assessing each session (Ali et al., 2021). The current study explored the implementation, effectiveness, satisfaction, and COVID-19 impact of the *ASSIST for ASD* module in a real-world setting.

Overall, the results highlight that there was difficulty in getting teachers to participate in the intervention, which seemed to largely be due to the implementation timeframe, competing responsibilities, and the program occurring during a global pandemic. However, when they did participate, they appreciated it, used the strategies while completing the program, continued to use the strategies after completing the program, and were very satisfied with the program. Additionally, the majority indicated they would recommend it to others. The remainder of the discussion will review each overarching research question while highlighting the aforementioned components of RE-AIM that correspond to the research questions, and will conclude with strengths, limitations, clinical implications, and then a final conclusion.

Research Question 1: Was *ASSIST for ASD* Implemented by Classroom Teachers in the Manner it was Intended to be Implemented?

Reach

Within the RE-AIM framework, Reach represents the proportion and representativeness of individuals willing to initiate an intervention (Gaglio et al., 2013; Glasgow, 1999). This component highlights that an intervention should target those who need it and represent the larger population it is targeting (Gaglio et al., 2013). Overall, there was a much higher percentage of female participants (92%) compared to male (6.7%) and non-binary (1.38%) participants in the current study. Although this is not necessarily a diverse representation of

gender identity, it is somewhat reflective of the larger population of teachers in Canada since recent statistics show that in Canada, 68% of teachers and professors identify as female, 32% identify as male, and statistics are unknown for teachers who identify as non-binary (Statistics Canada, 2017).

Participants in the current study represented teachers of all grades, all Canadian provinces, a variety of educational backgrounds and years of experience, and a balance between large and small rural and urban communities. However, the large majority of participants' self-disclosed ethnicity was White. In Canada, there is a large underrepresentation of Indigenous and racialized educators (Ryan et al., 2009; Winnipeg Indigenous Executive Circle, 2020), which was found to be reflected within the current sample. Overall, the sample of teachers was reflective of the larger population but was overrepresented by self-identified White females.

When considering recruitment methods, most participants heard about the program from other people, whether that be from emails, professional or community organizations, or school boards. Previous studies have highlighted the efficacy of emails and strong communication efforts between school leaders and school staff in facilitating suitable communication within the school system (Hochbein, 2022; Madariaga, 2017; Tyler, 2016). Despite teachers being the target population for this intervention, school administrators should also be informed and knowledgeable of such interventions.

A fair number of participants were also recruited through social media. Utilizing commonly used social media platforms may be important when implementing initiatives in educational settings in the future. This is consistent with previous findings that illustrate teachers' use of social media as a well-used avenue to connect, learn of resources, and network with other teachers (Prestridge, 2019).

Adoption

Adoption represents the overall willingness to adopt or adhere to an intervention (Glasgow et al., 1999). Adoption and adherence to newly implemented interventions in educational settings can be difficult to exemplify, which has been found in previous studies (De Meij et al., 2008). Despite this, more than half of the teachers in the current study who initially expressed interest in the module took the next step and logged on to the module, which is a positive finding. However, engagement was a common issue throughout the implementation of this module. There was ongoing attrition throughout the release of new sessions. As new sessions were released, a smaller portion of teachers were completing them each time. The issue of timing and time commitment may explain why completing all the sessions may have been less attainable for teachers. Time is a highly discussed topic when considering the fidelity of teacher training, as teachers regularly report not having enough of it (Bayar, 2014; Collinson & Fedoruk). Burnout is commonly experienced by teachers, which also may have influenced participants ability and willingness to engage and adhere to the program (Babb et al., 2022; Pressley, 2021; Trinidad, 2021). Another explanation may be that as the study progressed, the COVID-19 pandemic presented changes that made the sessions become less of a priority or less applicable with new routines (e.g., remote teaching). Despite the difficulty in completing all the sessions, most participants who began a session completed it in its entirety.

Implementation

Implementation represents the extent to which an intervention was implemented as it was intended (Glasgow et al., 1999). For *ASSIST*, the main intention was to increase teachers use of evidence-based practices for their students with ASD. This was successful, as participants reported that they had attempted and utilized some of the strategies semi-frequently. At first

glance, teachers utilizing only 52% of the strategies only some of the time may seem like a lackluster discovery. However, the collection of strategies presented in the module could be more accurately viewed as a tool kit. Often, one does not need to use all the tools in the tool kit when approaching a task, and under that analogy you may not need to implement all the strategies when helping one student. With this viewpoint, it is a rather positive discovery that many teachers did use some of the strategies on a semi-regular basis.

It should also be noted that participants reported reviewing the sessions somewhere in the middle of not carefully and very carefully and did rate themselves less successful in completing the session plans within the module. This could be linked back to the issues of engagement and the COVID-19 pandemic giving teachers many more responsibilities and stressors. Also, many teachers reported moving to online teaching, which may have impeded their ability to successfully complete their session plans.

Teachers were predominantly positive about the module and its ease of use. Common responses were about the online, asynchronous, self-paced delivery of the program, the accessible and easy-to-follow content, clear and helpful program design, and the support resources. Overall, the online and autonomous nature of the program was seen as a big facilitator, which is consistent with previous studies (Delfino, 2007; Wasserman & Migdal, 2019; Yang & Liu, 2004). Also, these features of the program specifically address the need for training to be easily accessible, which has become a common request among teachers in their desire to increase their knowledge of evidence-based practices for their students with ASD (Corkum et al., 2014; Lindsay et al., 2013; Roberts & Simpson).

Most participants reported that multiple contextual factors made the program challenging to use. These included the COVID-19 pandemic, burnout, and changes in teaching. However,

many participants spoke of the challenges caused by the timing of the module's presentation. Based on the course of the program's implementation, participants often were only starting with a few months of school remaining until the summertime. This gave participants a shorter window for implementation, as well as an added task during a very busy time in the school year. It should be noted that the intention was to implement this initiative at the beginning of the school year. However, a barrier to this was the length of time it often takes for initiatives to be implemented within an education system. The timing of the module was the most requested actionable change, with a few people also requesting more engagement and interaction throughout the program. However, a positive discovery when considering implementation and the module's ability to inform evidence-based practices is that most participants stated that no changes to the program were necessary.

Maintenance

Maintenance represents the long-term continuation of an intervention's strategies or outcomes (Glasgow et al., 1999). Maintenance is often difficult to achieve when targeting long-lasting behaviour change, which was indicated through a review conducted by Harden et al. (2015) that showed minimal individual-level maintenance at 6-months post intervention for 82 different behavioural interventions. For the current study, few participants filled out measures at 6-months post-intervention, making the exploration of Maintenance somewhat limited. However, half of those who completed these measures 6-months post-intervention were still using the strategies and reported using them every day or almost every day at this stage. Of the participants who continued to use the strategies, they similarly reported being highly likely to continue this use. These results generally indicate a continuation of strategies at post-intervention, with many reporting to mainly be using the behavioural strategies (i.e., tracking behaviour, identifying

reasoning for behaviour, teaching replacement behaviour). The pattern of behavioural strategies being used by teachers at 6-months post intervention is an achievement, as the most endorsed evidence-based practices and interventions for ASD are behavioural (Smith & Iadarola, 2015; NAC, 2015).

Research Question 2: What is the Clinical Effectiveness of *ASSIST for ASD*?

Effectiveness

When exploring the Effectiveness of the *ASSIST* module, or the overall outcomes of the intervention (Glasgow et al., 1999), impacts on proximal and distal factors were examined. There were no changes in the first proximal factor after exposure to the intervention, which was teachers' overall attitudes and beliefs about ASD and their capabilities in teaching students with ASD. However, when zoning in on specific factors of teachers' attitudes and beliefs, their perceived competency teaching their students with ASD was significantly poorer after the module.

It should first be noted that this measure for teacher attitudes and beliefs was adapted from a measure presented by Kos (2008), which was initially designed for attitudes towards students with ADHD. The results reflecting poorer attitudes could be explained by the possibility that the adjusted statements lacked reliability or internal consistency when the statements were about students with ASD. Also, the nature of the statements within the perceived competence factor may have made teachers feel that their role in managing their students' behaviour was overemphasized. This finding is consistent with previous research that has shown that teachers often feel overwhelmingly unprepared and incompetent to teach students with disabilities (Cardona, 2009; Marin, 2014). In the future, it may be important to incorporate more

empowering and self-affirming content within the module to increase teachers' perceptions of their competence.

There was also no change in the second proximal factor after the intervention, which was the use of common evidence-based strategies. As with the last measure, the measure that was used to assess this factor was originally created for students with ADHD. Because of this, the measure may not have adequately represented common instructional adaptations made for students with ASD. For example, one of the items representing an instructional adaptation for students with ASD on this measure is "Lowering expectations." Alternatively, referring back to the tool kit example, it could be that a small and unchanging number of the instructional adaptations listed on this measure worked well for their student with ASD. Thus, an increase was unnecessary.

There was also no change found in distal factors (i.e., teacher distress and teacher well-being) in response to the *ASSIST for ASD* module. This could potentially be explained by a lack of sensitivity within these measures. Also, the COVID-19 pandemic and the stressors associated with it may have influenced distress and well-being to a point that positive impacts from the module could not be visible.

In summary, the module did not result in effective change as it intended. The ability to endorse positive change in things like attitudes, well-being, beliefs, and instructional practices may have been less attainable due to the ongoing attrition in participation for each of the sessions. Perhaps more consistent and active engagement during a more routine school year would result in more effective change. Finally, measures used for the effectiveness component may have lacked reliability and validity wherein measures with a stronger foundation in ASD symptomology and presentation may have resulted in more positive impacts.

Despite the lack of statistically identifiable positive impacts, almost all participants reported there were no negative impacts after completing the *ASSIST for ASD* module. Furthermore, it is important to note that none of the respondents reported any negative harms for their students. A small few did identify that the time commitment and impact on time management negatively impacted their experience. As mentioned previously, teachers often have a large number of responsibilities and a lack of time for any additional activities which can consequently lead to burnout (Babb et al., 2022; Pressley, 2021; Trinidad, 2021).

Also, one participant spoke about how their participation in the program revealed that many of their team members were not as engaged as they would have liked them to be. The *ASSIST* program and the implementation of a variety of school-based evidence-based practices requires much collaboration and teamwork. Increasing engagement across schools and education systems could work to increase engagement among team members to lessen this perceived negative impact. The benefits of working collaboratively within an education system have also been indicated through previous studies (Vangrieken, 2015).

Research Question 3: What is Teacher Satisfaction of *ASSIST for ASD*?

Overall, teachers were happy and satisfied with the *ASSIST for ASD* module. There was a 79% satisfaction rate and 92% would recommend the program to other teachers. There was minimal variation among the items on the satisfaction measure with few standouts. However, items with slightly lower scores were time of implementation and check-in and feedback within the module. Although still relatively high scores, these were both consistent with other findings in the current study, such that the timeframe for implementation was too short and that some participants wanted more engagement and feedback throughout the program. The high

satisfaction among teachers is encouraging, as satisfaction and acceptability have been identified as facilitators to the successful implementation of initiatives (Proctor et al., 2011).

Research Question 4: How Did the COVID-19 Pandemic Impact the Implementation and Effectiveness?

The results of this study should be interpreted with caution, as it was implemented during an exceptional time where there were many changes in environment, stressors, and demands that are still being researched. Some examples of changes experienced by teachers in response to the pandemic are threats to their quality of life, stressors regarding their students' basic needs, overall well-being, navigating assessments and feedback, as well as experiencing burnout and poorer mental health (Babb et al., 2022; Baker et al., 2021; Purwanto et al., 2020). Due to these changes, COVID-19 likely had an impact on the implementation and effectiveness of the *ASSIST for ASD* module. The pandemic impacted teachers' experience with teaching during the duration of the study and half of the participants reported transitioning to online teaching for approximately half of the time. Many of the strategies presented in the module best translate to an in-person classroom setting. However, participants did find the module to be relatively adaptable to an online environment which is a positive finding.

Strengths and Limitations

A primary limitation to the current study is that it was conducted during the COVID-19 pandemic which impacted engagement and adherence. There were many changes experienced by teachers within the timeframe of the current study due to the pandemic (e.g., remote teaching, burnout) that may have impeded their ability to complete an additional and yet unrequired professional development activity. Overall, difficulties with engagement posed the largest limitation and resulted in attrition throughout the duration of the study. Very few of the

participants who provided data at the beginning of the study provided data for the remainder of the study to the 6-month post-intervention point. Because of this, many analyses had only a small sample of participants. Also, some of the measures used in the current study may not have been conducive to the symptomology of ASD as they were not specifically validated for students with the disorder. Lastly, the measures used may not have been sensitive enough to detect statistical changes. Perhaps obtaining more participants, and thus more statistical power, would better uncover statistical changes in effectiveness (i.e., proximal and distal positive impacts).

Despite these limitations, the current study has many strengths. The first being the mixed-methods approach that was used. Using both quantitative and qualitative measures allowed participants to provide feedback through multiple formats. As such, qualitative responses helped inform and confirm quantitative responses. Participants were also able to provide insight on facilitators and barriers and rate their agreement on multiple proposed statements.

Additionally, the use of the RE-AIM framework could be viewed as a strength. When doing equitable and justifiable implementation research, it is important to select an implementation framework that works within the context of the study and has strong theoretical underpinnings (Nilsen, 2020). RE-AIM has previously been used successfully in multiple educational settings and has many strengths relevant to the current study, such as its simplicity and adaptability (Cheney & Yong, 2014; Larson et al., 2017; Hyndman et al., 2014; Smedegaard et al., 2017; Gaglio et al., 2013). Using an implementation framework facilitated the exploration of the implementation and effectiveness of *ASSIST* in a way that considered contextual factors, target population characteristics, adherence, and outcomes within a real-world setting. Thus, applying the RE-AIM framework to *ASSIST* as a mechanism to ensure all factors were considered could be viewed as a strength.

Future Research and Program Additions

It would be of interest to further explore the implementation and effectiveness of the *ASSIST for ASD* module during a period when COVID-19 is less prominent and causing less disruptions and distress. Also, it may be of interest to adjust measures and explore the effectiveness of the module on proximal and distal factors with more sensitivity and specificity. This could be done by using measures validated for ASD populations as well as obtaining a larger sample size while maintaining engagement. Finally, further research should be done on student outcomes in response to the *ASSIST for ASD* module to see if it has any effect on behavioural and social symptoms, academic achievement, and student satisfaction. Based on results and participant feedback, adding elements of self-affirming content to encourage perceived competency, opportunities for accountability and check-ins within the module, and making all of the sessions available at the beginning could be further considered prior to widespread implementation of the module.

Clinical Implications

Taking into consideration the implementation and satisfaction of the *ASSIST for ASD* module within the current study, a few clinical and practical implications should be further considered. The program itself was mostly praised by teachers. Of those who used it, many reported making use of the strategies on a semi-regular basis. The current study illustrates the *ASSIST for ASD* module as a useful and well-informed program for teachers of students with ASD. Because of this, school psychologists may want to use *ASSIST for ASD* as a first-step support when teachers ask for strategies and guidance for their students with ASD.

The main commonality among the barriers in implementation for this program was time. Time has been found to be one of the greatest limitations to teacher learning and school change

(Collinson & Fedoruk Cook, 2001). The next step begins with how to give teachers the time to complete the program or how to increase their engagement. A possible response could be to have the module become a required activity to complete if a student with ASD joins their class. However, due to growing responsibilities of teachers within and outside of the school year, it may be of further importance to expand and develop the teachings of evidence-based practices for students with neurodevelopmental disorders within teacher training programs.

The current study also highlights the importance of considering how many responsibilities teachers, school leaders, and administrators have and the barriers this creates to the widespread implementation of evidence-based strategies training. These responsibilities have been exacerbated during the COVID-19 pandemic and the aftereffects are still ongoing which should continue to be considered. A positive finding is that despite these barriers, when teachers are able to get more training and complete an intervention like *ASSIST*, they use the strategies and see their value. This should encourage school psychologists to work with schools and advocate for teachers to have more time and quicker and easier access to well-informed and thoughtfully developed interventions for evidence-based practices for students with ASD. And due to the quick, accessible, feasible, and manageable nature of the *ASSIST for ASD* module and its ability to introduce evidence-based practices in a satisfactory way, it could become a school psychologist's first step and preliminary tool to facilitate this advocacy.

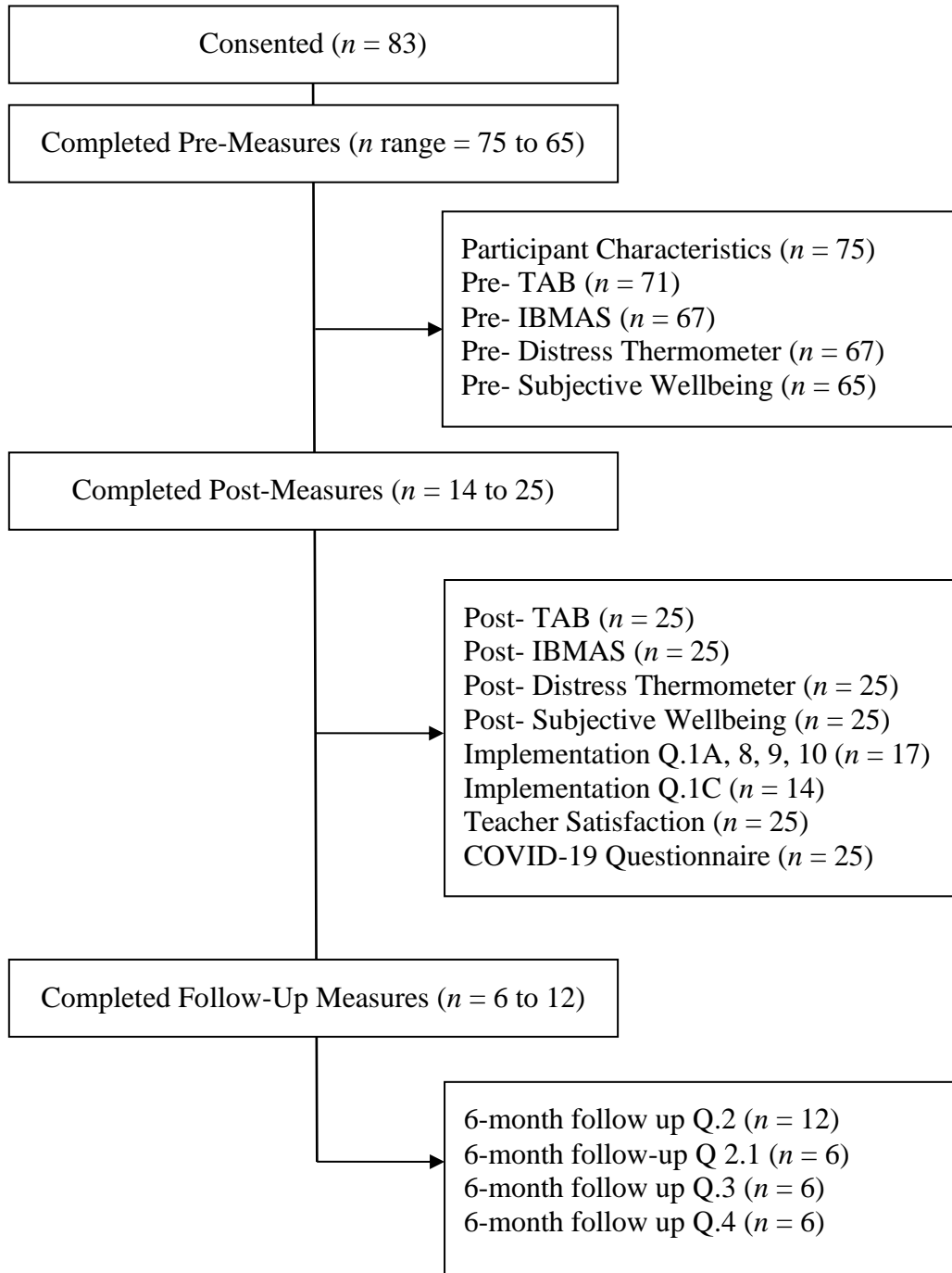
Conclusion

The current study aimed to explore the implementation, effectiveness, and satisfaction of the *ASSIST for ASD* module, and to place these in the context of the COVID-19 pandemic which was occurring at the time of this study. What was found is that a generally representative sample of teachers were able to make use of many of the *ASSIST* strategies on a semi-regular basis,

continue to use these strategies 6-months later, and were highly satisfied with the program after its completion. There was gradual attrition throughout the study as engagement was one of the primary barriers in the implementation of this program. Limitations within this study were that there were no indications of clinical effectiveness, and the study took place during the COVID-19 pandemic, which likely impacted the programs implementation and effectiveness. However, participants reported that there were no negative impacts to the program and that they would be willing to recommend this program to other teachers of students with ASD.

Figure 1

Sample Sizes Consort Diagram for the ASSIST for ASD Module



Note. This consort chart illustrates the sample size ranges at each phase of data collection as well as the total sample size for questionnaires that were used for analyses.

Table 1

Shapiro-Wilks Test of Normality Results

Measure	Shapiro-Wilks Statistic	df	Sig.
TAB (total score)	0.92	25	0.06
TAB (Negative Classroom Effects)	0.95	25	0.36
TAB (Lack of Control)	0.93	25	0.07
TAB (Diagnostic Legitimacy)	0.97	25	0.55
TAB (Perceived Competence)	0.95	25	0.26
IBMAS (total score)	0.90	25	0.02*
IBMAS (academic)	0.92	25	0.04*
IBMAS (behavioural)	0.91	25	0.04*
Distress	0.95	25	0.24
SWB	0.92	25	0.06

*Notes. TAB = Teacher Attitudes and Beliefs Questionnaire, IBMAS = Instructional and Behaviour Management Approaches Survey, Distress = Distress Thermometer, SWB = Subjective-Wellbeing (Teacher), N = 25, *p < 0.05*

Table 2

Research Question 1 RE-AIM Definitions, Research Questions, Measures, and Variables

Core and Definition	Research Question	Measures	Variables
Reach: The absolute number, proportion, and representativeness of individuals who are willing to participate in a given initiative.	<ol style="list-style-type: none">1. How did recruitment methods work to reach and engage potential participants?2. Did recruitment methods result in a representative and diverse sample of teachers?	<ol style="list-style-type: none">1. Computer-generated user statistics2. Participant Characteristics Questionnaire (q. 1-7, 10)_a, Screening questionnaire (q. 3)	<ol style="list-style-type: none">1. Total number of access codes distributed2. Province/territory of residence and other demographic information (sex, ethnicity, age, education, and teaching career information)_a
Adoption: The absolute number, proportion, and representativeness of intervention agents who are willing to initiate a program	<ol style="list-style-type: none">1. What proportion of teachers utilized <i>ASSIST for ASD</i>?2. What was adherence like to the <i>ASSIST for ASD</i> module?	<ol style="list-style-type: none">1. Computer-generated user statistics2. Computer-generated user statistics	<ol style="list-style-type: none">1. Number of teachers who logged into the module2. Number of sessions completed

Implementation: The intervention agents' fidelity to the various elements of an intervention's protocol. This includes consistency of delivery as intended and the time and cost of the intervention.

1. What was the extent to which teachers utilized the strategies within the program?
2. What facilitated and impeded the implementation of the strategies presented in the module?

1. COVID Impact and Status Update (q. 5, 6, 7)^b,
- Implementation Questionnaire (q. 1A^c, 1C^d)
3. Implementation Questionnaire (q. 8, 9, 10)^c

1. How carefully the sessions were reviewed, percentage of strategies used, success in using the session plans^b, number of strategies currently being used^c, and frequency of the strategy use^d
2. What made the program easy to use, what made it hard to use, and what changes could be made^c

Maintenance: The individual level is defined as the long-term effects of a program on outcomes 6 or more months after the most recent intervention contact.

1. Do teachers report continuing to use the strategies at 6-months post intervention?

1. 6-Month Follow-Up Questionnaire (q. 2^e, 2.1^f, 3^f, 4^f).

1. Current use of the strategies at 6-months post intervention^e, frequency of strategy use, likelihood of future use, and what strategies are still being used^f

Note. $N = 83$, except $an = 75$, $bn = 25$, $cn = 17$, $dn = 14$, $en = 12$, $fn = 6$

Table 3*Research Question 2 RE-AIM Definitions, Research Questions, Measures, and Variables*

Core and Definition	Research Question	Measures	Variables
Effectiveness: The impact of an intervention on outcomes, including potential negative effects, quality of life, and economic outcomes.	1. What were the positive impacts of the program on proximal factors (teacher attitudes, beliefs, and use of evidence-based strategies)?	1. Teacher Attitude and Beliefs Questionnaire, Instructional and Behaviour Management Approaches Survey	1. Total score that includes four factors (lack of control, negative classroom effects, diagnostic legitimacy, and perceive competence) representing attitudes and beliefs, total score and two sub scales (academic and behavioural) common instructional strategies
	2. What were the positive impacts on distal factors (teacher distress and well-being)?	2. Distress Thermometer, Subjective Well-Being (Teacher)	2. Total scores on two singular ratings of self-reported level of distress and subjective well-being
	3. Were there any negative impacts of the program?	3. Implementation Questionnaire _a (q. 4)	3. Qualitative responses on a question asking if there were any unintended negative impacts _a

Note. N = 25, except an = 20

Table 4*Research Question 3 Measures and Variables*

Measure	Variable
Teacher Satisfaction Questionnaire	Total score comprised of 13 items rated on a scale of 1 to 5 (q. 1-11, 11.2, and 12)
Teacher Satisfaction Questionnaire	Individual scores on 13 singular items rated on a scale of 1 to 5, items asked about user-friendliness, usefulness of worksheets, adaptability, and other aspects of the program (q. 1-11, 11.2, and 12)
Teacher Satisfaction Questionnaire	Individual score on 1 additional item, asking if they would recommend this program to other teachers

Note. N = 25

Table 5*Descriptive Statistics for Individuals Items on the Teacher Satisfaction Questionnaire*

	Mean	Standard Deviation	Range
Easy to understand	$M = 4.52$	$SD = 0.586$	3 to 5
Adaptability of content	$M = 4.32$	$SD = 0.802$	3 to 5
I think I could use what I learned and apply it elsewhere	$M = 4.32$	$SD = 0.988$	1 to 5
Encouraged a collaborative process	$M = 4.28$	$SD = 1.208$	2 to 5
Presented in a collaborative manner	$M = 4.28$	$SD = 1.100$	2 to 5
The delivery was accessible and user-friendly	$M = 4.28$	$SD = 0.843$	3 to 5
The flexibility made it easier to implement	$M = 4.12$	$SD = 1.013$	1 to 5
The supplemental information was useful	$M = 4.08$	$SD = 0.954$	2 to 5
I was able to implement the interventions suggested by the <i>ASSIST</i> program.	$M = 4.04$	$SD = 1.207$	2 to 5
I learned new things	$M = 4.00$	$SD = 1.258$	1 to 5
The worksheets were useful	$M = 3.96$	$SD = 1.399$	1 to 5
Took just the right amount of time to implement	$M = 3.84$	$SD = 1.281$	1 to 5
Easy to do check-ins with useful feedback	$M = 3.60$	$SD = 1.041$	2 to 5

Note. $N = 25$

Table 6*Research Question 4 Measures and Variables*

Measure	Variable
COVID-19 Impact and Status Update Questionnaire	Individual item (q. 1), have there been changes in your teaching location as a result of the COVID-19 pandemic (yes/no)
COVID-19 Impact and Status Update Questionnaire	Individual item (q. 1.1), percentage of time teaching online _a
COVID-19 Impact and Status Update Questionnaire	Individual item (q. 1.2), were the interventions adaptable to an online environment _a
COVID-19 Impact and Status Update Questionnaire	Individual item (q. 2), rating of the overall impact of COVID-19 pandemic on teaching

Note. $N = 25$, except $n = 12$

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<https://doi.org/10.1016/j.bbr.2013.04.004>

APPENDIX A

*Items containing and asterisk were included in the analysis for the current study

Screening Questionnaire

Author made, 2021. Modified from our previous screening questionnaires from past studies.

[Pre-Intervention Measures Only]

Instructions: Thank you for your consideration to participate in the *ASSIST Sustainability and Implementation Study*. This study is evaluating the “scale out” of the *ASSIST* online program for teachers of children with one of three neurodevelopmental disorders: Attention-Deficit/Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), or a Learning Disorder (LD). The first step is to make sure that this implementation study is appropriate for you to participate in. This questionnaire will take about 2 minutes to complete. If you are eligible based on this questionnaire, you will be directed to the Information and Consent Form which will provide details about the study and your research rights. If you are not eligible, you will receive an automated notification of this outcome.

[Note: Bolded responses are required to participate in the study. If no bolded response, the question is only used for description purposes and not to assess eligibility]

*1. Are you currently working as a teacher in a regular mainstream classroom setting within a Canadian school? [**Yes/No**]

[If NO] This study is designed for teachers currently working in a regular mainstream classroom setting in a Canadian school (grades 1 to 12).

*2. Is English the language of instruction in your classroom. [**Yes/No**]

[IF YES] Proceed to question 3.

[If NO] The *ASSIST* program is currently only available in English. You can either proceed with this study but understand the information is in English, or you can leave your email address and we will let you know when we have a study being conducted with the French version of *ASSIST*.

Would you like to continue (Yes/No).

[IF NO] Please leave an email at which we can contact you in the future (textbox).

*3. Do you live and teach in Canada? [**Yes/No**]

a. [IF YES] In which province/territory do you live? [Drop down menu of province and territories]

[If NO] This study is designed for teachers currently living and teaching in Canada

*4. Do you have a student in your class with ADHD, Autism Spectrum Disorder, or a Learning Disability that you would like to help by using the *ASSIST* program? [Yes/No]

[If NO] This study is designed for teachers who have a student in their classroom that they would like to help by using the *ASSIST* program.

*5. What grade do you teach? [Grade Drop Down – Pre-Kindergarten; Kindergarten, **1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12**]

[If Pre-Kindergarten or Kindergarten was selected] This study is designed for teachers of grades 1 to 12.

*6. Which module of *ASSIST* would you like to access:

- i. ADHD [checkbox]
- ii. Autism Spectrum Disorder (ASD) [checkbox]
- iii. Learning Disabilities (LD) [checkbox]

*7. Have you participated in a previous *ASSIST* or *Teacher Help* studies or reviewed the *ASSIST* or *Teacher Help* content? [Yes/No]

[If YES] This study is designed for teachers who have not previously participated in *ASSIST* or *Teacher Help* studies or reviewed the *ASSIST* or *Teacher Help* content.

*8. Do you plan to be on a leave of absence at any time over the course of this school year? [Yes/No]

[If YES] This study is designed for teachers who do not plan to be on a leave of absence at any time over the course of this school year.

9. How did you hear about the *ASSIST* program? Please check all that apply.

- Google Ad
- Website Ad
- YouTube Ad
- Email
- Internet search (please specify) [Textbox]
- Professional/community organization (please specify) [Textbox]
- Print advertisement (please specify) [Textbox]
- School board (please specify) [Textbox]
- Newspaper (please specify) [Textbox]
- ASSIST* Facebook
 - Facebook post
 - Facebook group
 - Facebook Live event
- ASSIST* LinkedIn
- ASSIST* Instagram

Other Facebook account or group (please specify) [Textbox]
Other LinkedIn account or group (please specify) [Textbox]
Podcast (please specify) [Textbox]
Other (please specify) [Textbox]

Message for Non-Eligibility

If the potential participant does not meet the basic inclusion criteria for the study, they will receive this message:

Thank you for your consideration to participate in the *ASSIST Sustainability and Implementation Study*. Based on your responses, you are not eligible to participate in this study. To participate you must be:

1. Currently working as a teacher in a regular classroom setting in a Canadian school (grades 1 to 12) and be able to complete the program in English.
2. Currently have one student in your classroom with ADHD, LD, or ASD who you would like to help by using this program.

If you would like to discuss further, please contact the *ASSIST* research coordinator at: assist@dal.ca

APPENDIX B

Participant Characteristics Questionnaire

Author made, 2021. Modified from our previous participant characteristics questionnaires from past studies.

[Pre-Intervention Measures Only]

Instructions: The following questions ask for some basic information about you. This will allow the research team to describe, as a group, the study sample, and assess conditions in which teachers access and implement the *ASSIST* online program. We will also ask you about how you first learned about *ASSIST* and factors that impacted your decision to join the program. This questionnaire will take approximately 5 minutes to complete.

General Information

*1. Your age [drop down menu]

- Numbers for drop down menu: 21,22,23,24,25...65+

*2. Your sex [dropdown menu]

- Male
- Female
- Other, please specify [text box]

*3. How would you best describe your ethnic or cultural heritage? [Drop Down: White/Black/Aboriginal/South Asian/Chinese/Filipino/Latin-American/Arab/West Asian/South East Asian/Korean/Japanese/Other (Please Specify) [Textbox]]

*4. What is your highest level of education completed? [dropdown menu]

- Bachelors (or equivalent)
- Master's
- PhD
- EdD
- Other, please specify: [text box]

*5. How would you describe the community where you teach? [Rural/Town/City under 500,000 people/City over 500,000 people]

*6. For how long have you been teaching? Please round up to the nearest year. [dropdown menu] years

- Numbers for years: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,... 30+

*7. What grade are you currently teaching? [dropdown menu]

- Numbers for dropdown menu: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
- Other, please specify (e.g., if teaching a split class) [text box]

8. Which grade(s) have you taught in your teaching career? [dropdown menu, multiple check options]

- Elementary (1-6) [If selected 8.1 appears]
- Junior High School (7-9) [If selected 8.2 appears]
- Senior High School (10-12) [If selected 8.3 appears]

8.1. If you taught elementary, for how many years did you do so?
[Dropdown menu] Numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,... 30+

8.2. If you taught junior high, for how many years did you do so?
[Dropdown menu] Numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,... 30+

8.3. If you taught high school, for how many years did you do so?
[Dropdown menu] Numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,... 30+

ASSIST Program

*9. Which ASSIST module are you planning to complete?

- ASSIST for Attention-Deficit/Hyperactivity Disorder (ADHD)*
- ASSIST for Autism Spectrum Disorder (ASD)*
- ASSIST for Learning Disabilities (LD)*

The following questions ask you about how you first found out about the ASSIST program and what factors impacted your decision to participate.

*10. How did you hear about the ASSIST program? Please check all that apply.

- Google Ad
- Website Ad
- YouTube Ad
- Email
- Internet search (please specify) [Textbox]
- Professional/community organization (please specify) [Textbox]
- Print advertisement (please specify) [Textbox]
- School board (please specify) [Textbox]
- Newspaper (please specify) [Textbox]
- ASSIST Facebook
 - Facebook post
 - Facebook group
 - Facebook Live event
- ASSIST LinkedIn
- ASSIST Instagram
- Other Facebook account or group (please specify) [Textbox]

Other LinkedIn account or group (please specify) [Textbox]
Podcast (please specify) [Textbox]
Other (please specify) [Textbox]

11. What information in the advertisement for *ASSIST* caught your attention?
[Open text box]

12. What made you interested to participate in the program?
[Open text box]

13. What did you think the program could help you accomplish?
[Open text box]

14. How could we get more teachers to participate in a program like this? Please check all that apply and elaborate in the text boxes.

- Through an organization (please elaborate) [Open text box]
- School board
- Social media channels (please elaborate) [Open text box]
- Referral (please elaborate) [Open text box]
- Other (please elaborate) [Open text box]

15. What kind of information or evidence did you consider when deciding to participate in the *ASSIST* program?
[Open text box]

16. How much does knowing that this program is evidence-based (i.e., tested scientifically to demonstrate its effectiveness) weigh into your decision to use the program?

- It does not weigh into my decision-making
- It contributes a small amount to my decision-making, and is not one of the main factors
- It contributes a fair amount to my decision-making, but is only one of many factors
- It contributes a lot to my decision-making, and is a key factor
- It is the only factor I consider in my decision-making

APPENDIX C

Teacher Attitudes and Beliefs Questionnaire

Author made, 2017. Adapted from:

Kos, J. (2008). What do primary teachers know, think and do about ADHD? *Australian Council for Educational Research, Teaching and Learning and Leadership*:
http://research.acer.edu.au/tll_misc/8

[Pre- and Post-Intervention Measure; This questionnaire is displayed to all participants at post-intervention regardless of how many sessions completed or implemented]

Instructions: Please indicate which answer best reflects your belief for each question, based on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree).

All items are rated on the following scale:

- Strongly Disagree (1)
- Disagree (2)
- Neutral (3)
- Agree (4)
- Strongly Agree (5)

This questionnaire will take approximately 5 minutes to complete.

*Reversed coding

****Factor 1: Lack of Control***

ADHD	LD	*ASD
You cannot expect as much from a student with ADHD as you can from other students.	You cannot expect as much from a student with LD as you can from other students.	You cannot expect as much from a student with ASD as you can from other students.
Students with ADHD could control their behaviour if they really wanted to.	Students with LD could do better academically if they really wanted to.	Students with ASD could control their behaviour if they really wanted to
Students with ADHD misbehave because they are naughty.	Students with LD misbehave because they are naughty.	Students with ASD misbehave because they are naughty.
Students with ADHD could do better if only they'd try harder.	Students with LD could do better if only they'd try harder.	Students with ASD could do better if only they'd try harder.
Students with ADHD misbehave because they don't like following rules.	Students with LD misbehave because they don't like following rules.	Students with LD misbehave because they don't like following rules.
*Managing the behaviour of students with ADHD is easy.	Managing the learning challenges of students with LD is easy.	Managing the behavioural and social challenges of students with ASD is easy.

****Factor 2: Negative Classroom Effects***

ADHD	LD	*ASD
Having a student with ADHD in my class would disrupt my teaching.	Having a student with LD in my class would disrupt my teaching.	Having a student with ASD in my class would disrupt my teaching.
I would feel frustrated having to teach a student with ADHD.	I would feel frustrated having to teach a student with LD.	I would feel frustrated having to teach a student with ASD.
Students with ADHD should be taught by special education/specialist teachers, not classroom teachers.	Students with LD should be taught by special education/specialist teachers, not classroom teachers.	Students with ASD should be taught by special education/specialist teachers, not classroom teachers.
The extra time teachers spend with students with ADHD is at the expense of students without ADHD.	The extra time teachers spend with students with LD is at the expense of students without LD.	The extra time teachers spend with students with ASD is at the expense of students without ASD.
Other students don't learn as well as they should when there is a student with ADHD in the classroom.	Other students don't learn as well as they should when there is a student with LD in the classroom.	Other students don't learn as well as they should when there is a student with ASD in the classroom.

****Factor 3: Diagnostic Legitimacy***

ADHD	LD	*ASD
ADHD is a valid diagnosis.	LD is a valid diagnosis.	ASD is a valid diagnosis.
ADHD is an excuse for students to misbehave.	LD is an excuse for students to misbehave	ASD is an excuse for students to misbehave.
ADHD results in a legitimate educational problem.	LD results in a legitimate educational problem.	ASD results in a legitimate educational problem.
ADHD is a behaviour disorder that should not be treated with medication.	LD is a behaviour disorder that should not be treated with medication.	ASD is a behaviour disorder that should not be treated with medication.

****Factor 4: Perceived Competence***

ADHD	LD	*ASD
I have the skills to deal with students with ADHD in my class.	I have the skills to deal with students with LD in my class.	I have the skills to deal with students with ASD in my class.
I have the ability to effectively manage students with ADHD.	I have the ability to effectively manage students with LD.	I have the ability to effectively manage students with ASD.
I am limited in the way I manage a student with ADHD.	I am limited in the way I manage a student with LD.	I am limited in the way I manage a student with ASD.

APPENDIX D

***Instructional and Behaviour Management Approaches Survey**

Martinussen, R, Tannock, R, & Chaban, P. Teachers reported use of instructional and behavior management practices for students with behavior problems: Relationship to role and level of training in ADHD. *Child Youth Care Forum*, 2011;40: 193-210. doi: 10.1186/1471-2458-12-751.

[Pre- and Post-Intervention Measure; This questionnaire is displayed to all participants at post-intervention regardless of how many sessions completed or implemented]

Instructions: Please indicate the frequency with which you have used the various instructional adaptations, instructional strategies, and behavioural management approaches over the last [month at baseline, 6-8 weeks at post-intervention]

All items are rated on the following scale:

- Rarely (1)
- Once in a While (2)
- Occasional Use (3)
- Sometimes (4)
- Most of the Time (5)

This questionnaire requires approximately 5 minutes to complete.

1. Preferential seating 1 2 3 4 5
2. Providing assistance during transitions 1 2 3 4 5
3. Proximity control 1 2 3 4 5
4. Providing positive teacher attention 1 2 3 4 5
5. Using nonverbal cues to redirect 1 2 3 4 5
6. Frequent communication with parents 1 2 3 4 5
7. Implementing positive behavior support plans 1 2 3 4 5
8. Selective ignoring 1 2 3 4 5
9. Verbal reprimand 1 2 3 4 5
10. Providing consequences for misbehavior 1 2 3 4 5
11. Teaching appropriate behavior 1 2 3 4 5

12. Functional behavioral assessment 1 2 3 4 5
13. Self-management system (self-monitoring) 1 2 3 4 5
14. Daily report card 1 2 3 4 5
15. Behavioral contract 1 2 3 4 5
16. Time out 1 2 3 4 5
17. Response Cost 1 2 3 4 5
18. Remove student from class for misbehavior 1 2 3 4 5
19. Modifying language for instruction 1 2 3 4 5
20. Chunking assignments into smaller sections 1 2 3 4 5
21. Simplifying instructions/step by step delivery 1 2 3 4 5
22. Providing written directions as well as oral directions 1 2 3 4 5
23. More immediate and frequent feedback 1 2 3 4 5
24. Providing concrete cues/visuals 1 2 3 4 5
25. Providing explicit strategy instruction 1 2 3 4 5
26. Shortening assignments 1 2 3 4 5
27. Teaching student how to organize or plan 1 2 3 4 5
28. Highlighting key points for students 1 2 3 4 5
29. Giving student choice in assignments/tasks 1 2 3 4 5
30. Providing a study or peer tutor 1 2 3 4 5
31. Adjusting materials (color/structure) 1 2 3 4 5
32. Providing alternative formats for tests/assignments 1 2 3 4 5
33. Helping student set goals and monitor progress 1 2 3 4 5
34. Teaching student how to use assignment notebook 1 2 3 4 5

35. Providing advance organizer for content 1 2 3 4 5

36. Lowering expectations 1 2 3 4 5

APPENDIX E

Distress Thermometer

Adapted from: National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Distress management. Retrieved from http://www.nccn.org/professionals/physician_gls/distress.pdf. 2019.

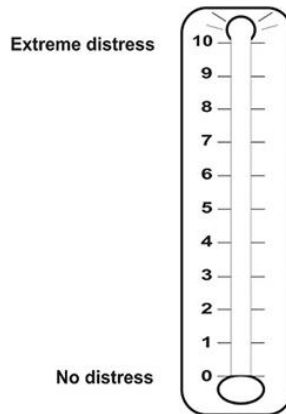
Ownby KK. Use of the Distress Thermometer in Clinical Practice. *Journal of the advanced practitioner in oncology*, 2019;10(2), 175–179.

[Pre- and Post-Intervention Measure; This questionnaire is displayed to all participants at post-intervention regardless of how many sessions completed or implemented]

***Instructions:** Please indicate your own level of distress related to your teaching role on the visual thermometer, ranging from 0 “No distress” to 10 “Extreme distress.” This questionnaire requires approximately 1 minute to complete.

SCREENING TOOLS FOR MEASURING DISTRESS

Instructions: First please circle the number (0-10) that best describes how much distress you have been experiencing in the past week including today.



How much of your distress is a result of COVID-19 related stressors and changes? [Drop down menu with the following options:

- Nothing
- Very little
- Some
- Quite a bit
- A lot

Please explain your rating: [Open textbox]

APPENDIX F

Subjective Well-Being (Teacher)

Adapted from: Statistics Canada. General Social Survey- Canadians at Work and Home.

Retrieved from

https://www23.statcan.gc.ca/imdb/p3Instr.pl?Function=assembleInstr&lang=en&Item_Id=302913. 2016.

[Pre- and Post-Intervention Measure; This questionnaire is displayed to all participants at post-intervention regardless of how many sessions completed or implemented]

Instructions: This questionnaire is used to evaluate your perceived level of satisfaction within your teaching role. This questionnaire will take about 1 minute to complete.

*Using a scale of 0 to 10 where 0 means "Very dissatisfied" and 10 means "Very satisfied", how do you feel about your teaching role as a whole right now?

0 Very dissatisfied

1 I

2 I

3 I

4 I

5 I

6 I

7 I

8 I

9 V

10 Very satisfied

Min = 0; Max = 10

How much of your dissatisfaction within your teaching role is a result of COVID-19 related stressors and changes? [Drop down menu with the following options]:

Nothing

Very little

Some

Quite a bit

A lot

Please explain your rating: [Open textbox]

APPENDIX G

Teacher Satisfaction Questionnaire

Author made, 2021. Modified from our previous teacher satisfaction questionnaires from past studies.

[Post-Intervention Measures Only: This questionnaire is only displayed to those participants that responded that they had reviewed at least 1 session, based on Question 3 on the COVID Impact & Status Update Questionnaire]

Instructions: Based on the 6-point scale below, please indicate your level of agreement with each statement about the *ASSIST* program that you have participated in. We understand that not all teachers were able to review and/or implement all sessions due to the changing COVID-19 restrictions. As such, please complete the following questions reflecting on all the sessions that you were able to review and/or implement. Please only select the N/A option if you were not able to *implement strategies in your classroom* due to moving to online teaching as a result of COVID-19 restrictions.

All items are rated on the following scale:

- Strongly Disagree (1)
- Disagree (2)
- Neutral (3)
- Agree (4)
- Strongly Agree (5)
- Not Applicable (6)

This questionnaire requires approximately 5 minutes to complete.

1. *The content of the intervention was presented in a manner that was easy to understand:
1 2 3 4 5 6
2. *The content of the intervention was easily adaptable:
1 2 3 4 5 6 N/A
3. *Completing the check-in questions at the beginning of each session of the program was easy and resulted in useful feedback:
1 2 3 4 5 6 N/A
4. *The intervention encouraged a collaborative process between the student, teacher, and parent/caregivers:
1 2 3 4 5 6
5. *The intervention was presented in a collaborative manner (as opposed to authoritarian manner):
1 2 3 4 5 6

6. *The interventions took just the right amount of time to implement:

1 2 3 4 5 6 N/A

7. *The delivery of the intervention through the Internet was accessible and user-friendly:

1 2 3 4 5 6

8. *The worksheets that went along with the sessions were useful:

1 2 3 4 5 6 N/A

9. *The supplemental information (e.g., web-links, videos, PDFs) were useful:

1 2 3 4 5 6

10. *The delivery of the intervention in a flexible format (so I could work on it based on my schedule) made it easier to implement:

1 2 3 4 5 6 N/A

11. *I learned new things from the *ASSIST* program:

1 2 3 4 5 6 N/A

11.1. Please explain what you have learned: [text box]

11.2 I think I could use what I learned and apply this information to other students in my current class or future classes:

1 2 3 4 5 6 N/A

12. *I was able to implement the interventions suggested by the *ASSIST* program.

1 2 3 4 5 6 N/A

12.1 *What percentage of the interventions suggested by the *ASSIST* program were you able to implement. [drop down menu]

Numbers for drop down menu: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,... up to 100%

13. My favorite aspects of the intervention were: [Open text box]

14. My least favorite aspects of the intervention were: [Open text box]

15. *Would you recommend this program to other teachers? Yes/No

15.1 Please explain why or why not: [Open text box]

16. If the *ASSIST* team was to develop another module, which mental health disorder or mental health topic would you like the module to cover? [Open text box]

17. Other comments on the intervention: [Open text box]

APPENDIX H

Implementation Questionnaire

Author made, 2021.

[Post-Intervention Measures Only: This questionnaire is only displayed to those participants that responded that they had implemented strategies from at least 1 session, based on Question 4 on the COVID Impact & Status Update Questionnaire]

Instructions: The following questions will ask you to report on your use of the *ASSIST* program. We understand that not all teachers were able to implement all sessions due to the changing COVID-19 restrictions. As such, please complete the following questions reflecting on all the sessions that you were able to implement. This questionnaire will take about 5 minutes to complete.

*1A) Are you currently using any of the strategies provided in *ASSIST* in the classroom?

- Yes, most of the strategies
- Yes, some of the strategies
- Yes, a few of the strategies
- No, none of the strategies
- No, as teaching moved to online teaching and as such I was not able to implement these strategies (x2?)

1B) Which strategies from *ASSIST* are you continuing to use? [Please list the strategies you are using: Open text box]

*1C) How often are you currently using strategies you learned from the *ASSIST* program?

- Always (every day)
- Often (4 days per week)
- Sometimes (2 or 3 days per week)
- Rarely (1 day per week)
- Not at all (0 days a week)

2) Describe how well you felt equipped to use the strategies in *ASSIST*? [Open text box]

3) What are some of the ways *ASSIST* had a positive impact? [Open text box]

4) *Please share any ways *ASSIST* has had any unintended negative impacts. [Open text box]

5) What surprised you about the outcomes of the *ASSIST* program? [Open text box]

6) What has been the most helpful thing you have learned in *ASSIST* and why? [Open text response]

7) What has been the least helpful thing you have learned in *ASSIST* and why? [Open text response]

- 8) *What has made the *ASSIST* program easy to use and why? [Open text response]
- 9) *What has made the *ASSIST* program hard to use and why? [Open text response]
- 10) *What changes to the program could have helped you stay more involved in the *ASSIST* program for the full 6-8 weeks? [Open text box]
- 11) Now that *ASSIST* is over, what challenges, if any, have you faced to continue to use the strategies in the *ASSIST* program? [Open text box]

12) What parts of the program helped you stay involved in *ASSIST* the most? Please check all that apply.

Drop-down options: structure, email reminders, duration and number of sessions, online location, other [Open text box]

13) Is there anything else you would like to tell us about using the *ASSIST* program? [Open text response]

APPENDIX I

6-Month Follow-Up Questionnaire

Author made, 2021.

[Post-Intervention Measure Only]

Instructions: Thank you for your participation in the *ASSIST* Implementation Study. This 6-month follow-up questionnaire will help us to understand whether teachers continue to use the materials that they accessed in the *ASSIST* online program. This questionnaire will take about 5 minutes to complete.

1A) Did you complete or use the *ASSIST* program when it was offered in the 2020-21 school year?

- a) Yes, I completed the entire *ASSIST* program.
- b) I did not complete the entire *ASSIST* program, but I accessed some of the sessions.
 - a. If this is selected, the participant is asked: How many sessions did you complete
[Pull down menu from 1-6]
- c) No, I did not use any of the *ASSIST* program during the 2020-21 school year.

1B) Did you complete or use the *ASSIST* program when it was re-offered in the 2021-2022 school year?

- a) Yes, I have completed the entire *ASSIST* program
- b) I did not complete the entire *ASSIST* program, but I accessed some of the sessions.
 - a. If this is selected, the participant is asked: How many sessions did you complete
[Pull down menu from 1-6]
- c) No, I did not use any of the *ASSIST* program during the 2021-22 school year.

[If the participant answers a or b to either Question 1A or 1B, then the following items will be displayed]

*2. Are you currently using any of the strategies provided in *ASSIST* in the classroom?

- Yes, most
- Yes, some
- Yes, a few
- No

[IF YES]

*Which parts of *ASSIST* are you continuing to use? [Open text box]

*3. How often are you using strategies you learned from the *ASSIST* program?

- Always (every day)
- Often (4 days per week)
- Sometimes (2 or 3 days per week)
- Rarely (1 day per week)

- Not at all (0 days a week)

*4. What is the likelihood that you will continue using the strategies you learned in *ASSIST* in the future with other students? (i.e., in the next month, in the next 1 to 2 years?)

- Highly likely
- Likely
- Somewhat likely
- Not likely
- N/A (I did not start the program)

5. If the *ASSIST* team was to develop another module, which mental health disorder or mental health topic would you like the module to cover? [textbox]

6. Other comments on the intervention: [text box]

APPENDIX J

COVID-19 Impact & Status Update Questionnaire

Author made, 2021.

Instructions: This questionnaire asks about the degree of impact the COVID-19 pandemic and restrictive measures have had on your ability to review and implement the content of the *ASSIST* program. This questionnaire will require approximately 5 minutes to complete.

[Post-Intervention Measure Only]

*1) Since starting in the *ASSIST* study, has there been any changes in your teaching location due to the COVID-19 pandemic (i.e., move to online teaching)? [Yes/No]

If Yes is selected:

*1.1 Thinking about the time from starting the study to now, what percentage of the time were you teaching online? [Open textbox].

*1.2 Did you feel that the interventions presented in the *ASSIST* program were adaptable to an on-line teaching format? (0 Not at all, 1 Just a little, 2 Some, 3 A Fair Amount, 4 A Lot)

1.3 Please elaborate on any aspects of the *ASSIST* program you feel were more challenging to implement in an on-line teaching format than they would be in a classroom setting [Open textbox]

*2) Overall, how much has the pandemic impacted your teaching from the time of starting this study until now? (0 Not at all, 1 Just a little, 2 Some, 3 A Fair Amount, 4 A Lot)

2.1 Please elaborate on how the pandemic impacted your teaching [Open textbox]

3) How many sessions did you *review*? [pull down menu from 0 to 6]

3.1 Displays if Question 3 was answered with less than 6 sessions:

If you were **not** able to *review* the content for all 6 sessions, what were the primary barriers to being able to do so?

- a. COVID-19 related barriers (e.g., school closures, move to online teaching)
- b. Other [Textbox: Please elaborate:]

4) How many sessions were you able to *implement* the suggested strategies? [pull down menu from 0 to 6]

4.1 Displays if Question 4 was answered with less than 6 sessions:

If you were **not** able to *implement* the strategies for all 6 sessions, what were the primary barriers to being able to do so?

- a. COVID-19 related barriers (e.g., school closures, move to online teaching)
- b. Other [Textbox: Please elaborate:]

*5) How carefully did you review the *ASSIST* program content for the sessions you reviewed, including the videos, text, and activities?

1 (Not Carefully At All), 2, 3, 4, 5 (Very Carefully)

*6) What percentage of the strategies from the *ASSIST* sessions you reviewed did you try to use? It is OK to estimate the percentage, we just want to know if you implemented none (0%), a few (e.g., 30%), some (e.g., 65%), or all (100%) of the strategies. [Open textbox]

*7) How successful were you with following the Session Plans generated at the end of each of the 6 sessions for the sessions you completed?

(Not At All)1, 2, 3, 4, 5, 6, 7 (Very Successful)

8) While you were completing *ASSIST* (or if unable to complete the *ASSIST* program, please think of the time since you were first enrolled in the *ASSIST* program), did you receive any additional in-service/professional development training focus on special education/exceptional learners (not specific to ADHD/ASD/LD)?

- Yes [If selected 3.1 appear]
- No
- N/A (I have not started the program)

3.1. Approximately how many hours of in-service/professional development training did you complete on special education/exceptional learners during this time?

[dropdown menu]

Numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,... 30+

9) While you were completing *ASSIST* (or if unable to complete the *ASSIST* program, please think of the time since you were first enrolled in the *ASSIST* program), did you receive any additional in-service/professional development training focused specifically on ADHD/ASD/LD)?

- a. Yes [If selected 4.1 appears]
- b. No
- c. N/A (I have not started the program)

4.1. Approximately how many hours of professional development training did you complete on ADHD/ASD/LD during this time? [dropdown menu]

Numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,... 30+

APPENDIX K

Information and Consent Form- Teacher

Study Title: Evaluation of the sustainability and implementation of the *ASSIST* online program for teachers of children with neurodevelopmental disorders

Short Title: *ASSIST* Sustainability and Implementation Study

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Industry Partner: Velsoft® Inc.

Funding Agency: Kids Brain Health Network

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Introduction

You are being invited to take part in this research study, *Evaluation of the sustainability and implementation of the ASSIST online program for teachers of children with neurodevelopmental disorders*, because you are a classroom teacher practicing in Canada who is currently teaching a child in grades 1 to 12 with a diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), or a Learning Disability (LD). This information and consent form outlines information about the study and your rights as a participant. Before you decide to take part in this study, it is important that you understand the purpose of the study and your research rights by carefully reading this form.

Your participation in this study is voluntary and you are able to withdraw from the study at any time. Consent begins with the initial contact about the study and continues until the end of the study. You may contact the research team by email at assist@dal.ca to answer any questions you have during or after participation. You can withdraw your consent to participate at any time until data analysis begins in June 2021 by contacting the researchers, which will end your participation.

How will the researchers do this study?

There are high rates of students with neurodevelopmental disorders (NDDs) being taught in the classroom, and professional development opportunities for teachers are not always available to learn about how best to support these students in mainstream inclusive classrooms. Through collaboration with educators, the researchers have found that teachers want evidence-based information about NDDs, knowledge about intervention strategies, and a systematic and accessible approach to implementation of these strategies. The research team has previously evaluated the effectiveness of an online program *ASSIST*. They found that the program is well received by teachers, makes a significant impact on student outcomes (e.g., reduced core and associated symptoms; improved quality of life), and improves teachers' sense of teaching competency. For this study, we are evaluating the sustainability and implementation of the *ASSIST* program.

The purpose of this current study is to 1) determine if a direct-to-consumer commercialization model is a viable way to make the *ASSIST* online program sustainable over time, and 2) examine the factors that affect the reach, uptake, adherence, and effectiveness of *ASSIST*. To answer these questions, we are inviting up to 300 teachers from across Canada to access the program for free and will survey the teachers to learn more about the impact of *ASSIST*. We are also examining how teachers can best learn about the *ASSIST* program. We will compare the effect, access, and uptake of the *ASSIST* program by teachers through different marketing channels (e.g., social media, print, websites, etc.).

What will I be asked to do?

After providing consent, you will be asked to complete a series of 6 questionnaires before accessing the *ASSIST* program. These questionnaires will ask questions about you (e.g., age, sex, years of teaching experience, grade being taught, etc.). It will also include questions about how you heard about the *ASSIST* program and factors that impacted your decision to participate. Additional questionnaires will focus on your perception of change in your knowledge, beliefs, skills, implementation practices, teaching competence, stress, and quality of life. The pre-intervention questionnaires will take approximately 20 minutes to complete.

After completing the pre-intervention questionnaires, you will be provided with an access code to the *ASSIST* program and our virtual hub. Should you have any questions or technical difficulties with the program, please contact the researchers at assist@dal.ca.

The *ASSIST* online program consists of six sessions, and each session will take 1-2 weeks to complete (a maximum of 6-8 weeks to complete the entire program). The sessions can be viewed at a time that is convenient for you, although we recommend reviewing it at the beginning of the week and implementing the strategies throughout the week. During each session, you will be asked to watch videos, read helpful information, complete activities, and use different tools. This will take about 1 hour per session.

***ASSIST* Intervention Sessions**

While the content changes depending on the student’s disorder, all *ASSIST* modules follow similar session goals:

Session	Topic Overview
Session 1. All About ADHD/ASD/LD	Evidence-based overview of the disorder (ADHD, ASD, or LD); self-care for teachers; team approach
Session 2. Taking the First Steps	Framework for the intervention; developing an <i>ASSIST</i> Support Plan; learning about the student; home-school communication; special topics
Session 3. The Support Plan	Understanding the student; intervention strategies for core symptoms; developing and implementing an intervention plan; special topics
Session 4. Adding to the Support Plan	Continue building the <i>ASSIST</i> Support Plan by adding Antecedent strategies

Session 5. Additional Needs	Continue building the <i>ASSIST</i> Support Plan by including Consequence strategies; outline the students' associated characteristics and provide strategies to help support them; special topics
Session 6. Keep Moving Forward	Adapting and modifying the <i>ASSIST</i> Support Plan; transition planning; making need changes; assessing further needs

You will select which module you would like to use. Although *ASSIST* is self-guided, you will be encouraged to access additional support by communicating and collaborating with your school team, and with the student's parents. The program guides you on how to individualize the information for your student. After completing each session, you will have developed an individualized plan for implementation.

In addition, you will also receive a voucher to access our virtual hub when you begin the *ASSIST* program. The virtual hub, *Child LABS (Learning/Attention/Behaviour/Sleep)* was developed from a grant by The Waterloo Foundation with matching funds from Kids Brain Health Network. The research team was awarded this grant to develop a hub that would provide a community for parents, educators, and healthcare providers who are all working to support children with NDDs and sleep disorders. The virtual hub includes downloadable resources, a reference list of helpful websites and books, ongoing webinars, a repository of past webinars, events calendar, and the opportunity to connect with others on topics of interest through moderated discussion boards. In the future, this will also be the storefront for our other eLearning and eHealth programs. For the duration of the current study, you will be able to access bi-weekly webinars on topics relevant to the *ASSIST* program (e.g., ways to modify a reward program, how to use your attention to modify student's behaviours).

Before you begin each session, you will also be asked to record how carefully you reviewed the material from the previous session, what percentage of the recommended strategies you used, and how successful you were at using these strategies. The research team will collect information about how many times you accessed the program, and the length of time you accessed each session. The program also allows you to track the impact of using this program. This information is for your own purposes and is not downloaded for research purposes (rather it is deleted once you complete the program). You will have access to the program until June 30, 2021 if you would like to go back and review the materials after you complete the program.

You will be asked to complete 7 online questionnaires at the end of the 8 week implementation period. The set of questionnaires includes 4 of the same questionnaires you completed before accessing the intervention, and will also include a satisfaction questionnaire, a willingness to pay questionnaire, and an implementation questionnaire. These questionnaires will take approximately 25 minutes to complete. We will also ask you to complete a 6-Month Follow-Up Questionnaire that will be sent to you 6 months after you received access to *ASSIST*, which will be used to assess whether you are continuing to use the strategies from the *ASSIST* program.

What are the burdens, risks, and potential harms?

There are no known risks or harms to participants by taking part in this study. It is possible that you may find the time commitment to complete the questionnaires and work through the intervention as burdensome. We have attempted to lessen the burden of participation and make it more convenient by having the study questionnaires online. The ASSIST program is also accessible online through your desktop, laptop, or smartphone. You may contact the research team by email any time you have concerns or questions during your participation at assist@dal.ca.

You will be informed of any new information that may affect your willingness to continue to participate in this study as soon as the information becomes available.

What are the possible benefits?

The study may provide no direct benefit to participants. However, the *ASSIST* program is designed to provide teachers with the skills and tools to help them better support their students with NDDs in the classroom. What we learn from this study may help to make evidence-based professional development interventions more widely accessible to teachers. Findings may also be used to increase scale and spread of other virtual education and mental health programs.

Can I withdraw from the study?

Your participation in the current study is voluntary and you may withdraw at any time until data analysis begins in June 2021. At this point (i.e., once the data is compiled for data analysis, and analysis is completed) your individual data is no longer separable from the completed analysis. There are no risks involved with withdrawing from this study. If the study is changed in any way that could affect your decision to continue to take part, you will be notified of the changes. You may be asked to sign a new consent form if the study is changed. If you decide to withdraw from the study, please do so by emailing research team at assist@dal.ca.

Consent Check: True or False

I may decide NOT to take part in the study -- even after I sign the Consent Form.

True - If True is checked, the following text appears:

✓ Correct! You may stop taking part in the study at any time.

False - If False is checked, the following text appears:

✗ This statement is actually true. You may stop taking part in the study at any time.

If you need additional clarification about this question or would like to discuss this question further, please contact us at assist@dal.ca.

Will the study cost me anything and, if so, how will I be reimbursed?

Internet access is required for participation in the study and the costs of accessing the internet while participating in the study will be the participants' responsibility. There are no further costs to participation. Your participation will take place on your own time, in a place that is convenient to you.

What about possible profit from commercialization of the study results?

It is possible that the *ASSIST* program may be commercialized in the future. You will not receive payment if this happens.

How will my privacy be protected?

All information you provide for this study will be kept confidential. Your name will not be included in any reports or publications based on this research. Only an ID number will be assigned to the questionnaires you complete. Only those individuals directly involved in the data collection will have access to the master list linking your ID number to your name. The master list will be password-protected and stored on a computer on a secure, password-protected server at Dalhousie University. All data collected from this study survey will be collected in a secure database stored on a shared drive at Dalhousie University and only staff immediately involved in the research will have access. All information collected will be kept for a minimum of 5 years after the results have been published in the form of presentations, posters, or journal articles. With your additional consent (below), we may also use quotations from your written responses on the surveys in publications and for marketing purposes; however, they will be de-identified and there will be no reference to you. Please note that since we did not collect the name of your school, school board, or any of your students' names, this information will not be included in any reports. All studies are subject to a potential audit by the IWK Health Centre's Research Ethics Board. Should an audit be conducted, your privacy will continue to be protected to the maximum extent allowable by law.

Consent Check: True or False

Please indicate if the following statement is true or false: We may use quotes from the information you provide on the questionnaires.

- True – If “true” is checked, the following text appears:
 - ✓ Correct! We may use quotes from the information you provide on the questionnaires, but these would not be identifiable to you. We will only use these if you provide additional consent to do this (you will be asked for this at the end of this consent form).

- False – If “false” is checked, the following text appears:
 - ✗ This statement is actually true. We may use quotes from the information you provide on the questionnaires, but these would not be identifiable to you. We will only use these if you provide additional consent to do this (you will be asked for this at the end of this consent form).

If you need additional clarification about this question or would like to discuss this question further, please contact us at assist@dal.ca.

What if I have questions or problems about the study?

If you have any study questions or concerns about taking part in the study, you may contact the research team by email at assist@dal.ca.

What are my research rights?

Completing this Consent Form by clicking the button below indicates that you have understood the information about this research study outlined in this consent form to your satisfaction and that you agree to take part. In no way does this waive your legal rights nor release the investigators or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time.

A copy of this Consent Form is available for download and printing by clicking the “Download this Participant Consent Form” link.

If you have any questions at any time during or after the study about research in general you may contact the Research Office of the IWK Health Centre at (902) 470-8520, Monday to Friday between 8:00a.m. and 4:00p.m Atlantic Time. If you would you like to speak to the research coordinator about this Consent Form or ask questions about the study before you decide if you want to take part, please email assist@dal.ca. If you would like to speak to the research coordinator via telephone, in your email, please state that you would like to be called and provide your phone number. The research team will contact you by telephone.

How will I be informed of study results?

Please indicate below if you would like to receive a summary of the study results by email. If you indicate “Yes”, you will receive an overall lay summary of the findings.

Yes _____ No _____

Future contact

Please indicate below if you would like and agree to be contacted for future studies by the *ASSIST* research team.

Yes _____ No _____

Consent

Study Title: *Evaluation of the sustainability and implementation of the ASSIST online program for teachers of children with neurodevelopmental disorders*

Please click the buttons below to indicate your consent to participate.

I have read the consent form and understand all of the above that is asked of me. I understand the nature of the study and I understand the potential risks/benefits. I understand that I have the right to withdraw from the study at any time without penalty. By selecting the button titled “I agree to participate in this study”, you will be providing consent to participate in this research study.

By selecting the button titled “I do not agree to participate in this study”, you will not be providing consent to participate in this research study.

- I agree to participate in this study
- I do not agree to participate in this study

[If I do not agree to participate in this study is selected] It is not mandatory to respond, but we would be interested in knowing why you chose not to participate in this study so that we can consider this for future research:

Do you give permission for your quotes from questionnaires to be used anonymously for research purposes?

- I give permission for my quotes to be used for research purposes
- I do not give permission for my quotes to be used for research purposes

Do you give permission for your quotes from questionnaires to be used anonymously for marketing purposes?

- I give permission for my quotes to be used for marketing purposes
- I do not give permission for my quotes to be used for marketing purposes

(Participant electronic signature)

(Participant email address)

Date signed: (Date/Month/Year)