

A PSYCHOMETRIC EXAMINATION OF THE KNOWLEDGE OF ADHD SCALE

A Thesis Submitted to the College of

Graduate Studies and Research

In Partial Fulfillment of the Requirements

For the Degree of Master of Education

In the Department of Educational Psychology and Special Education

University of Saskatchewan

Saskatoon, SK

By

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ABSTRACT

Saskatchewan-based pre-service and in-service teachers' knowledge of ADHD was assessed and data was collected to accumulate psychometric evidence for the modified K-ADHD (Jerome, Gordon, & Hustler, 1994) scale. Using results from a questionnaire administered to pre-service ($n = 100$) and in-service ($n = 66$) teachers, the current study did find a significant difference on the K-ADHD (Jerome et al., 1994) scale between groups. Divergent and convergent validity evidence was found for the K-ADHD (Jerome et al., 1994) for both groups. However, reliability estimates were questionable between in-service ($\alpha = .66$) and pre-service ($\alpha = .82$) teachers, possibly due to asymmetric outlier contamination. The evidence found for the K-ADHD (Jerome et al., 1994) scale suggests problems with the psychometrics of the instrument. Future implications and research are discussed.

ACKNOWLEDGEMENTS

I would like to thank the following people in no particular order for their support and contributions to this project. Thank you to my supervisor, Dr. Laurie Hellsten, for her expertise and guidance. Thank you to the members of my committee, Dr. Laureen McIntyre (for also allowing me to use sections of the AOLK) and my external advisor, Dr. Keith Walker. Thank you to Dr. Mark Sciutto for granting me permission to use the KADDS and Dr. Jeneva Ohan for granting me permission to use sections of the questionnaire from my undergraduate thesis.

Thank you to the teachers for participating and administrators of the Horizon School Division for granting me permission to conduct this study. Thank you to the University of Saskatchewan pre-service teachers for their participation. Lastly, thank you to my family, friends, and colleagues.

A special thank you to my parents, Glenn and Bonnie, for their love and support and to my son, Coen, who inspires me every day.

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CHAPTER 1

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most frequently diagnosed mental health disorders observed in childhood (Pierrehumbert, Bader, Thevoz, Kinal, & Halfon, 2006), with the main concern being hyperactivity (Cantwell, 1996). The world-wide pooled prevalence rate of ADHD is 5.29% (Polanczyk, Silva de Lima., Lessa Horta, Biederman, & Rohde, 2007), with prevalence estimates ranging from 5-10% for Canadian school aged children (Scahill & Schwab-Stone, 2000). This estimate suggests that approximately one child per classroom will be diagnosed as having ADHD (Ohan, Cormier, Hepp, Visser, & Strain, 2008). ADHD is a problem of inhibiting behaviours, motivation, sustained attention, and effort (Barkley, 1998). Children with ADHD experience difficulties at school that are related to the symptoms of the disorder (Kos, Richdale, & Hay, 2006). These symptoms include: deficient study skills, poor test performance, disorganized reports, desks, and notebooks, and lack of attention to group discussion or lectures (DuPaul & Stoner, 2003) which often result in academic underachievement (Barkley, 1998).

Classroom instruction can be challenging for teachers with students who exhibit symptoms of the disorder (Fabiano & Pelham, 2003), as teachers may be assigned the task of implementing and maintaining daily interventions to promote educational success in children with ADHD (Curtis, Pisecco, Hamilton, & Moore, 2006). Elementary school teachers are secondary in their contact with children, apart from the parents or primary caregivers (Cooper & O'Regan, 2001). Therefore, educators play a crucial role in the assessment and intervention of children exhibiting ADHD within their classroom, by providing detailed information about the

child's educational and behavioural functioning. They are urged to make timely assessment recommendations of the disorder to promote current and future school success (DuPaul & Stoner, 2003). As a result of these recommendations, teachers may spend extra time and effort in structuring their classes and providing greater detail in their lessons (Atkinson, Robinson, & Shute, 1997).

Teachers' knowledge and beliefs have been thought to function as filters for interpreting new information, experiences, and behaviour (Verloop, Driel, & Meijer, 2001; Pajares, 1992; Putnam & Borko, 1997). Teachers' cognitions are not changed readily and can take years to shape and mold to subsequently alter their actions (Verloop et al., 2001). Knowledge that is practical develops through the interaction of cognitions, knowledge, and beliefs and impacts innovative educational strategies (Verloop et al., 2001). Moreover, teachers consider educational innovations that are practical and related to their familiar routines, which are associated to feelings and perceptions of comfort (Verloop et al. 2001). Often, teachers abandon intervention strategies over time because their beliefs, experiences, attitudes and intentions were not considered when developing new skills (Trigwell, Prosser, & Taylor, 1994; Verloop et al., 2001). Therefore, it seems relevant to understand ADHD knowledge, attitudes, and beliefs of beginning teachers to develop educational strategies that are familiar and practical to new teachers so that they adopt and maintain the new techniques. Furthermore, teachers' knowledge of assessment and treatments of ADHD seems critical for the child who has ADHD in their classroom, as the information and beliefs that teachers' hold regardless of the accuracy of content is potentially impacting their choices in intervention strategies and how they feel and behave towards their students with ADHD.

Research on teachers' knowledge has mainly focused on in-service teacher populations, with the exclusion of pre-service teachers. Although it has been suggested that pre-service and in-service teachers' knowledge is comparable (Jerome et al., 1999), few studies have assessed the similarities and differences (Kos et al., 2006) between these groups. Studying both in-service and pre-service teachers knowledge seems a worthwhile endeavour as studies have found contradicting evidence that years of teaching experience, the number of children taught with ADHD, and the number of books read on the disorder (Jerome et al., 1994; Kos et al., 2004; Piccolo-Torsky & Waishwell, 1998; Ohan et al., 2008; Sciutto et al., 2000; Sciutto et al., 2004) are significantly related to ADHD knowledge scores. Understanding knowledge differences of ADHD between these groups can impact in-service training and pre-service curriculum. Workshops or classes can be effectively designed and structured to address the discrepancies of knowledge deficiencies between the groups.

Teachers' knowledge of ADHD should be assessed on some very important domains, such as, etiology, diagnosis, and treatment, in order to get full representation of knowledge of the disorder. Teachers' understanding of the causes, diagnosis, and treatment of ADHD is important because it impacts the identification and management of the disorder (Arcia, Frank, Sanchez-LaCay, & Fernandez, 2000). For example, teachers with higher levels of ADHD knowledge perceived benefits to educational support for students with ADHD (Ohan et al., 2008). Thus, if teachers see the value in support for their students, they will more likely engage in help-seeking behaviours (Ohan et al., 2008). If domains are undetermined within a scale, then the reliability and validity of the scores are questionable when interpreting the results. This appears to be an important point, as it cannot be assumed that teachers have a good knowledge base of the

disorder if the construct evidence of the scale is unclear. Several scales have been used to assess teachers' knowledge of ADHD including the Knowledge of ADHD Scale (K-ADHD; Jerome et al., 1994), the Knowledge of Attention Deficits Disorders Scale (KADDS; Sciutto et al., 2000), the Knowledge of ADHD Rating Evaluation (KARE; Vereb & DiPerna, 2004), and ADHD Knowledge of Opinion Survey (AKOS; Graczyk et al., 2005).

As research has gained in sophistication over the years, with the use of newer analytic techniques and the combination of existing techniques, researchers are still neglecting the importance of scale development whereby accurately measuring the construct of interest. The scale development process has two main objectives, to create measures that demonstrate validity and reliability (Hinkin, 1995). DeVellis (2003) stated that validity concerns whether a variable is the latent cause of covariance among the items, while reliability concerns the degree a factor influences a set of items. A *don't know* option was added to the K-ADHD (Jerome et al., 1994) scale in addition to the true and false options to eliminate a 50% chance of guessing a correct response (Sciutto et al., 2000). The K-ADHD (Jerome et al., 1994) scale has shown consistent results from Canada and America (Jerome et al., 1994) to Australia (Ohan et al., 2008) and New Zealand (Curtis, Pisecco, Hamilton, & Moore, 2006). However, the researchers for this instrument have relied on face validity to capture teachers' knowledge of ADHD without providing sound evidence for the reliability and construct validity of this scale. The psychometric properties of the K-ADHD (Jerome et al., 1994) have not been thoroughly tested to support the widespread use of the scale.

A general understanding of construct validity is based on the integration of evidence that is dependent on the interpretation and meaning of test scores (Messick, 1993). Validity is more

than an attribute to test development. Test score interpretations have social consequences from the decision-making of those scores (Messick, 1993), thus the importance of sound instruments. One procedure used for gathering evidence for the construct validity of a scale is through the examination of its internal consistency. Internal consistency basically refers to the homogeneity of the items in the test or the degree to which item responses correlated with the overall test score (Hinkin, 1995). It assesses the internal structure of the instrument, and a popular technique to evaluate this is through the use of Cronbach's alphas (Franzen, 2000). This technique assumes that the items in the scale tap into a single (unidimensional) construct, whereby increases in inter-item correlations will increase the Cronbach's alpha (Franzen, 2000). However, stating evidence based on internal consistency alone does not determine the construct validity of the scale (DeVellis, 2003).

Convergent and divergent validity are both subtypes of construct validity. Convergent validity is the extent to which a construct should be theoretically related in reality. Divergent validity is the opposite, whereby the extent to which constructs should not be theoretically related in reality (Cohen, 1988). The KADDS (Sciutto et al., 2000) has shown promising results with adequate reliability estimates. Including a comparable scale with the K-ADHD (Jerome et al., 1994), such as the KADDS, aids in gathering convergent evidence through the analysis of the same construct of interest (i.e., knowledge of ADHD). High correlations between the K-ADHD (Jerome et al., 1994) scale and the KADDS (Sciutto et al., 2000) would further justify the use of the K-ADHD scale (Jerome et al., 1994). On the other hand, by including the Marlowe Crowne Social Desirability Scale (MC-SDS, Form C; Crowne & Marlowe, 1960; Reynolds, 1982) and the Assessment of Language Knowledge (AOLK; McIntyre, 2005) two measures which should

not correlate highly with the construct of the K-ADHD (Jerome et al., 1994) scale through discriminant validity. Specifically, differences on group scores should be noticed between the K-ADHD (Jerome et al., 1994) scale from the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) and the AOLK (McIntyre, 2005), because the variables of interest should not have significant relationships with one another (Hinkin, 1995). Furthermore, the concepts should not be related, thus producing low correlations.

Problem Statement

Educators' knowledge of ADHD has been assessed using a variety of measures. However, the construct validity of these scales has not been thoroughly examined. Without proper empirical testing of the psychometrics of these scales, it is undetermined if the items within these scales are valid to properly assess teachers' knowledge of ADHD. Although research indicates that educators typically have a general understanding of ADHD, there are inconsistencies in the literature, which may be due to improper testing of the scales.

Nature of the Study

This study examines the reliability and validity of the K-ADHD (Jerome et al., 1994) scale on two groups: In-Service Teachers (IST) and Pre-Service Teachers (PST). The scale's psychometric properties have been analysed on each sample, due to the likelihood that IST and PST should have different levels of knowledge of ADHD. The KADDS (Sciutto et al., 2000) is used to provide convergent validity evidence for the K-ADHD scale (Jerome et al., 1994). Both measures are included, as they are scales used specifically to identify teachers' knowledge of ADHD. The MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) and the AOLK (McIntyre,

2005) scale have also been included to provide divergent validity evidence for the K-ADHD Scale (Jerome et al., 1994).

Research Questions

The following research questions guide the current study:

1. Are there any differences between in-service and pre-service teachers' knowledge of ADHD on the K-ADHD scale (Jerome et al., 1994)? If so, what are those differences?
2. What psychometric evidence can be found to support the use of the K-ADHD scale (Jerome et al., 1994)?

Purpose of the Study

The purpose of the study was to first assess IST and PST level of knowledge about ADHD. Descriptive statistics were used to assess their level of knowledge, while inferential statistics were used to compare test scores of ADHD knowledge between the groups. The second purpose was to explore the reliability and validity of the K-ADHD scale (Jerome et al., 1994). Quantitative methods, such as t-tests, correlations, item-analysis, and Cronbach's alphas were used to gather empirical evidence for the K-ADHD scale (Jerome et al., 1994). Both an in-service and pre-service sample was obtained to determine whether the K-ADHD scale (Jerome et al., 1994) can be used to assess ADHD knowledge for both IST and PST as indicated by Jerome and colleagues (1999).

Assumptions

In-service teachers are not expected to be experts on the ADHD disorder. However, it seems useful to identify what teachers know, do not know, or have misconceptions about relating

to this disorder. Barkley (1998) suggests that knowledge about ADHD is imperative in making steps towards considering and creating treatment recommendations. It has been assumed that the more teachers' know about ADHD, the more effective they will be in managing a child with this disorder in their classroom. Although it seems sensible to conclude that if teachers are not knowledgeable on the nature, course, outcome, and causes of ADHD and hold misperceptions about therapies, then the implementation of behaviour management programs with these teachers will be unsuccessful (Barkley, 1998). However, many studies have used the K-ADHD scale (Jerome et al., 1994) to test teachers' knowledge, although the validity and reliability of this scale has not been empirically reported.

It was assumed that the K-ADHD (Jerome et al., 1994) and the KADDS (Sciutto et al., 2000) measure the same concept (i.e., ADHD knowledge). Therefore, convergence was expected through significantly high correlations between these scales. Furthermore, there are not many measures that test teachers' knowledge in any research context. Therefore, the AOLK (McIntyre, 2005) was used in this study to compare another teacher knowledge scale to the K-ADHD (Jerome et al., 1994) scale. It was expected that the AOLK (McIntyre, 2005) would show divergence through low correlations with the K-ADHD (Jerome et al., 1994) scale. It was further assumed that social desirability could have been an issue on items of the K-ADHD (Jerome et al., 1994) scale, which is why the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) was included. Lastly, it was assumed that test fatigue would not be an issue for participants. Therefore, scales were counterbalanced to reduce possible order effects.

Definitions

Attention Deficit Hyperactivity Disorder. Attention Deficit Hyperactivity Disorder is defined as a neurodevelopmental disorder characterized by persistent and maladaptive symptoms of inattention and (or) hyperactivity-impulsivity (American Psychiatric Association, 2000). There are three subtypes of the disorder including combined type, predominantly inattentive type, and predominantly hyperactive-impulsive type (APA, 2000). ADHD is listed under the Disruptive Behavior Disorders in the *DSM-IV-TR* (APA, 2000). A diagnosis can be made if the child exhibits six out of a possible 18 combinations of symptoms. Diagnoses for all subtypes needs to persist for a minimum of six months, be inconsistent with the developmental level of the child, show significant impairments in social, academic, and occupational functioning, be present in two or more settings, and symptoms need to be exclusive during the course of another pervasive developmental disorder, psychotic disorder, or schizophrenia and is not accounted for by another mental disorder (APA, 2000).

Teacher Knowledge. Teacher knowledge is the total knowledge that a teacher has at a point in time which may originate from formal schooling, practical experiences, and/or day-to-day practice, that underlies his or her actions (Carter, 1990; Calderhead, 1996, Verloop et al., 2001). This knowledge also includes what a person believes to be true, even though it may not be verifiable from objective sources (Alexander, Schallert & Hare, 1991).

In-Service Teachers. In-Service Teachers (IST) are those who are actively teaching elementary school children (i.e. kindergarten to grade 8) within the Horizon School Division, in rural Saskatchewan.

Pre-Service Teachers. Pre-Service Teachers (PST) are those who are studying at the University of Saskatchewan in Saskatoon, Saskatchewan and are enrolled in the undergraduate program in Education.

Rural Elementary Schools – Schools where children are taught kindergarten to grade 8, and are located within or surrounding of towns with a population of under 10,000 people. (du Plessis, Beshiri, Bollman & Clemenson, 2002).

CHAPTER 2

Literature Review

The purpose of this chapter is to review research on ADHD in the context of the school environment. This chapter consists of the symptoms of ADHD and the impact on school performance, the role that teachers have in identification of the disorder and implementation of interventions, and the scales used to assess teachers' ADHD knowledge.

The classroom may be one of the most difficult settings for a child with ADHD to be in (Kos, Richdale, & Hay, 2006). Children are required to engage in behaviours that oppose the core characteristics of this disorder. They are encouraged to conform and act passively so that the system runs smoothly (Cooper & O'Regan, 2001). However, it may not always be the student who has the deficit, but the system. It is often overlooked that school can be at times both stagnant and stressful for a student with ADHD, especially in such a fast-paced time (Cooper & O'Regan, 2001). Schools impose strict rules on communication, physical movement, and appearances, and failure to conform to these social *norms* within the system leads to punishment (Cooper & O'Regan, 2001). However, these behaviours may in part be more insightful of a system that needs to evolve.

In order to understand what role teachers and the education system play with the phenomenon of ADHD, it is important to test what they know of the disorder. ADHD knowledge has been thought to be associated with the interpretations and attitudes towards the behaviour displayed from the child with the disorder, which influences the referral and intervention process. Knowledge, whether insufficient, inaccurate, or plentiful, may assist in identification of children with ADHD. The level of knowledge may lead to under-identification or over-

identification of the disorder (Sciutto & Feldhamer, 2005), and could also lead to proactive intervention choices (Ohan et al., 2008) or lack of intervention choices (Graczyk et al., 2005).

Symptoms

Subtyping of the disorder should be reviewed as each type exhibits different behavioural problems, which ultimately affects academic achievement (Anastopoulos & Shelton, 2001).

There are three subtypes of ADHD: inattentive, hyperactive-impulsive, and combined.

Inattention. Those with the inattentive type predominantly exhibit difficulties with inattention and impulsivity with the exclusion of overactivity (DuPaul & Stoner, 2003).

Children with this type are likely to experience problems with memory retrieval and perceptual-motor speed, and are characteristically viewed as withdrawn, daydreamy, lethargic, and confused (Parker, 2005). This has lead researchers to postulate that this subtype has a greater incidence of learning disabilities, relative to others with the full ADHD syndrome (DuPaul & Stoner, 2003).

Hyperactivity/Impulsivity. The majority of children who are labelled as hyperactive/impulsive are preschoolers to early elementary school-aged children (DuPaul & Stoner, 2003). Children with this subtype may be prone to the same comorbid disorders as children with the combined type, such as oppositional defiant disorder and conduct disorder. Therefore, it has been postulated that hyperactivity/impulsivity may be a precursor for ADHD combined type in the middle to later elementary school years (DuPaul & Stoner, 2003).

Combined. Children with the combined type predominantly exhibit impulsivity, aggression, overactivity, peer rejection, and noncompliance (DuPaul & Stoner, 2003). Children with this type are more at risk of experiencing problems with school suspensions, antisocial behaviour, and disruptive behavioural disorders such as, conduct disorder or oppositional defiant

disorder. In general, academic impairments are greater in children that exhibit inattentive and combined types (DuPaul & Stoner, 2003). Behavioural impairments are greater in children with hyperactive-impulsive and combined type, with children exhibiting the combined type as being viewed as the most impaired of the three (Gadow et al., 2004).

Etiology

To date, there has not been a single known cause found for the reason ADHD exists (DuPaul & Stoner, 2003). The definition of this disorder supports a medical model and suggests that a biological or neurological malfunction exists to explain the child's behaviour (Kean, 2005). Genome scans have linked regions that might include disorder-related susceptibility genes, however, genes linkages that show moderately large effects are unlikely to exist (Biederman & Faraone, 2005). The only indication of a biological vulnerability is that children with ADHD show thinner brain tissue in the brain region associated with attention (National Institute of Mental Health [NIMH], 2008). However, this tissue thickens as children grow, and ADHD symptoms diminish (NIMH, 2008). Furthermore, United States government bodies have been criticized in promoting a medical model, because they profit from the promotion, medication, and research related to ADHD (Kean, 2005). Since the global acceptance of the diagnosis of ADHD, there has been reluctance in explaining these behaviours to be possibly or partially a result of inadequate educational programs (Kean, 2005), which is impacted by teachers' knowledge and training. The risk in adopting the medical model is that behaviour problems are seen as medical problems, thus allowing teachers to relinquish responsibility in finding alternative teaching techniques and classroom and playground management (Kean, 2005).

Cognitive Functioning and Academic Achievement

Cognitive functioning plays a large role in the differences between children with ADHD and their conventional classmates. ADHD is not a disorder of skill, but rather one of performance (DuPaul & Stoner, 2003). Children with ADHD do not tend to lack in problem-solving skills, but appear to be deficient in efficient use of proper strategies during the task (Barkley, 1990). In fact, working memory seems to be a critical component in planning, arithmetic word problem solving, and organization and implementing calculation procedures (Marzocchi, Cornoldi, Lucangeli, De Meo, and Fini (2002). Passolunghi, Cornoldi, and De Liberto (1999) also found that good and poor problem-solvers are equally efficient in selecting relevant information in problems. However, poor problem-solvers remember less relevant information and more irrelevant information. This finding is important for children with the inattentive subtype of ADHD, as they tend to focus on information that is unrelated (Lucangeli & Cabrele, 2006).

Barkley (1988) suggests that deficits in executive functioning and behavioural inhibition are the primary contributors for academic underachievement. Flory, Milich, Lorch, Hayden, Strange, and Welsh (2006) examined the core deficits involved in story comprehension among children with ADHD. Children with ADHD mentioned more errors when telling their stories, displayed weaker abilities in executive function planning and working memory, displayed more problems with disinhibition and inattention, demonstrated weaker abilities in phonological processing ability and verbal skills, than the control group (Flory et al., 2006).

Learning Difficulties

The prevalence of children with ADHD who also have a learning disability ranges anywhere from 7% to 92% (DuPaul & Stoner, 1994). On the contrary, students with Learning Disabilities (LD) are seven times more likely to be diagnosed with ADHD than their counterparts (DuPaul & Stoner, 1994). This suggests that there is overlap between ADHD and learning disabilities. In fact, Jakobson and Kikas (2007) found that children with combined type ADHD and learning disabilities performed significantly lower than their counterparts in visuospatial abilities, working memory, and verbal skills. Furthermore, Aaron, Joshi, Palmer, Smith, and Kirby (2002) found differences in reading disability and inconsistent attention associated with ADHD. Children with inattentive type ADHD had elevated attention variance scores, however they did not have a recognizable reading problem (Aaron, et al., 2002). Children with inattentive type ADHD also had below-average listening comprehension scores despite their average scores on reading comprehension (Aaron, et al. 2002). In addition, Aaron et al. (2002) suggests that reading requires less sustained attention than listening. Kamphaus and Frick (1996) suggest that significantly weak assessment and intervention outcomes are linked to children who have ADHD and learning disorders. These findings highlight the importance of behaviour modification and alternative methods of teaching in the school system, as children with comorbid ADHD/LD are at great risk for academic underachievement.

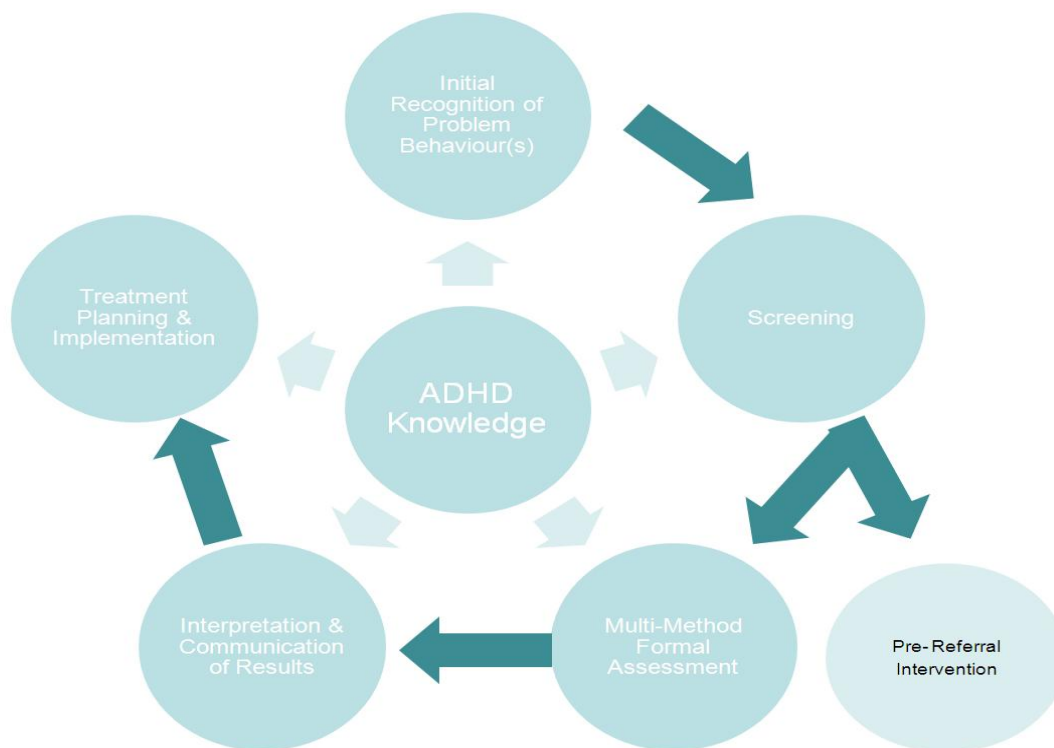
ADHD Knowledge and the Intervention Process

Teachers provide a lot of useful information when assessing a child with ADHD, as they are typically the second informants, next to the parents (Matson, 1993). Their information is

important because they have a better understanding of how the child with ADHD is behaving in the context of similar aged peers (Matson, 1993). Direct observation of children with ADHD is also a part of the assessment, which derives mainly from teachers (Matson, 1993). Children who exhibit symptoms of ADHD often have vast discrepancies in their academic performance. In fact, children often exhibit comorbid-learning disorders with ADHD (Matson, 1993). It is important to specifically document where the discrepancies are exhibited because of the unevenness in academic performance. Typically, children with ADHD show inconsistencies between intellectual potential and level of academic achievement (Matson, 1993). Thus, the importance of early intervention is stressed for children with ADHD.

Not only are a variety of instruments used to aid in the behavioural assessment, but parents, teachers, health care professionals, and social workers all have a multidisciplinary role in the assessment and intervention process for children with ADHD (Sciutto & Feldhamer, 2005). Education and knowledge of ADHD is important in order to offer the best treatment possible for a child with the disorder. Therefore, it is plausible to suggest that up-to-date information on ADHD is the most important intervention tool that parents, teachers, and health care providers can possess (Barkley, 1995). Figure 1 is a typical model of the intervention process for children with ADHD proposed by Sciutto and Feldhamer (2005).

Figure 1. The Intervention Process suggested by Scitutto and Feldhamer (2005).



Scales Assessing Teachers' Knowledge of ADHD

Knowledge of ADHD Scale (K-ADHD). Jerome, Gordon, and Hustler (1994) surveyed 850 Canadian and 439 American elementary school teachers' general knowledge concerning ADHD. The sample consisted of suburban, urban, and rural teachers from Southwestern Ontario, Canada and two school districts of New York State and Broward County, Florida. The authors created a questionnaire that consisted of 20 true and false questions regarding diagnosis and treatment of this disorder. The results indicated that teachers overall scored well with correct responses of 78% ($M = 15.50$) for Canadians and 77% ($M = 15.40$) for Americans (Jerome et al., 1994). The data was normally distributed and had a standard deviation of 2.17. Teachers appeared to be well informed that ADHD is not a disorder due to poor self-control, but

is based on biological vulnerabilities. Furthermore, teachers also understood that there are several ways to manage children with ADHD, and that medication was not the definitive answer (Jerome et al., 1994). However, teachers were less knowledgeable about dietary issues and long-term prognosis. Interestingly, 66% of all teachers believed that sugar or food additives are causes of ADHD (Jerome et al., 1994). There were major inconsistencies with some teachers agreeing that ADHD is a disorder that children could outgrow, while also agreeing that children with ADHD are more at risk of becoming delinquent as teenagers (Jerome et al., 1994). It is apparent from this study that detailed information about treatment and management of ADHD is needed for teachers. However, a limitation of this study is measuring knowledge on a true or false scale. Respondents have a 50% chance of guessing a correct or incorrect response, thus, inflating the percentages in either direction (Sciutto et al., 2000). Adding an option of *don't know* would distinguish results between what teachers believe to be the answer and what they truly do not know (Sciutto et al., 2000). Furthermore, the validity of this instrument is somewhat questionable as the psychometric evidence is limited.

In a similar study, Piccolo-Torsky and Waishwell (1998) used the Jerome et al. (1994) questionnaire to assess 154 Washington Township School System elementary school teachers' knowledge. Teachers correctly answered 81% of the items. Again, teachers were the least knowledgeable on areas of diet and long-term prognosis. The most surprising finding of this study was that the teachers who knew the most about teaching children with the disorder did not have children with ADHD in their class or else they did not recognize the children as having the disorder. Psychometric evidence such as mean scores and standard deviations were not reported.

Jerome et al. (1999) took the knowledge scores of a Canadian sample of teachers from the Jerome et al. (1994) study and compared them to 42 teachers in-training from a southwestern Ontario university. Teacher trainees scored 77% ($M = 15.40$) of the items correctly. The distribution was positively skewed. Trainee-teachers' knowledge is similar to the original study in areas of biological and family influences, causation, treatments, and myths. Both groups still held many misconceptions about dietary treatments. However, there were some vast differences between practicing and training teachers. For example, 69% of trainees and 41% of teachers agreed that most children with ADHD will outgrow the disorder and become normal adults. Furthermore, 40% of trainees and 70% of teachers agreed that children with ADHD have an increased risk of becoming delinquent teenagers. Reasons for the differences between groups is unclear, therefore, these findings merit replication due to the small sample size.

Bekle (2004) surveyed 30 practicing primary teachers' and 40 final year primary education students' knowledge of ADHD from Perth, Australia. A modified version of the true/false Jerome et al. (1994) questionnaire was used to assess ADHD knowledge, in that, a few questions from the original questionnaire were omitted. A section, using a 7-point Likert type scale, was added to assess teachers' attitudes towards children with ADHD. The results were very similar to the Jerome et al. (1999) study which indicated that the participants had a similar knowledge base of ADHD with practicing teachers on average scoring 82% correct ($M = 16.57$, $SD = 1.80$) and student teachers on average scoring 76% correct ($M = 15.03$, $SD = 1.90$). However, similar to the Jerome et al. (1994) study, there were still many misconceptions about dietary issues and prognosis. Although a decade had passed since the original Jerome et al.

study, sugar and food additives were still viewed as a cause of ADHD, and dietary changes still were perceived as useful treatments.

Ohan et al. (2008) surveyed 140 primary school teachers from the metropolitan area of Melbourne, Australia. The Jerome et al. (1994) questionnaire was used to assess teachers' knowledge and was modified to include 19 of the 20 items. The teachers were also asked to read vignettes that described children with inattentive behaviors, or hyperactive-impulsive behaviors, or a combination of hyperactive-impulsive and disruptive behaviors. Following the vignettes, participants rated their perceptions and behaviors of children with ADHD. The distribution for teachers' knowledge was fairly normally distributed with a slight negative skew. Teachers' knowledge was categorized into low ($M = 12.99$ or lower), average ($M = 13.00$ to 15.99), and high ($M = 16.00$ or higher) knowledge groups through calculations of upper and lower quartiles. Mean scores for all groups were calculated with *High* knowledge ($M = 16.68$, $SD = .78$), *Average* knowledge ($M = 14.21$, $SD = .87$), and *Low* knowledge ($M = 11.18$, $SD = 1.40$). Teachers overall knowledge score was 76%, (median, 14.00; mode, 15.00), which is consistent with other studies that have used the Jerome et al. (1994) scale (Bekle, 2004; Jerome et al., 1999; Piccolo-Torsky, & Waishwell, 1998).

Lastly, Curtis et al. (2006) used the Jerome et al. (1994) questionnaire to survey 159 United States of American and 261 New Zealand elementary school teachers' knowledge of ADHD from urban and suburban schools. The results indicated that American teachers scored on average 84% correctly ($M = 16.86$, $SD = 2.18$) and New Zealand teachers scored on average 76% correctly ($M = 15.28$, $SD = 2.57$) on the ADHD Knowledge Scale. Although scores for

American and New Zealand teachers are relatively high, there is a discrepancy between the knowledge scores emphasizing cross-cultural differences in knowledge of ADHD.

Knowledge of Attention Deficit Disorders Scale (KADDS). Scitutto et al. (2000) surveyed 149 elementary school teachers' knowledge of ADHD from public schools in the New York area. The KADDS uses a true, false, or don't know format to rate 36 statements about ADHD. The addition of the *don't know* option allowed the experimenters to differentiate between incorrect beliefs or misperceptions (incorrect responses) from lack of knowledge (don't know). The included three subscales of ADHD scales: symptoms/diagnosis (9 items), treatment (12 items), and associated features (15 items). On average, teachers answered only 48% of the questions correctly ($M = 17.21$, $SD = 6.70$). The KADDS shows acceptable internal consistency with Cronbach's alphas ranging from .71 on the subscales to .86 for the overall scale. The results indicated that teachers' scored significantly better on questions in the area of symptom/diagnosis, than on treatment and general information. Furthermore, teachers responded to the 'don't know' option more frequently on the treatment and general information subscales, than on the symptom/diagnosis subscale. This finding suggests that teachers held fewer misconceptions about symptom/diagnosis than the other two subscales.

West, Taylor, Houghton, and Hudyma (2005) administered a modified version of the KADDS questionnaire to 256 elementary and secondary school teachers from the metropolitan area of Perth, Australia. This modified version of the KADDS, referred to as KADD-Q, is a 67-item scale that uses true, false, and don't know options. Causes, characteristics, and treatment of ADHD were the domains of knowledge that were assessed. Reliability of the scale was estimated with Cronbach's alphas for teachers' ($\alpha = .91$) and parents' ($\alpha = .93$) knowledge of

ADHD. The subscales also displayed good internal consistency for teachers and parents with alphas ranging from .79 to .86. Teachers' knowledge was a low 54% ($M = 36.08$, $SD = 10.96$), with primary teachers scoring higher ($M = 37.49$, $SD = 9.24$) than secondary teachers ($M = 32.91$, $SD = 11.95$). Overall, teachers were found to be more knowledgeable about the causes of the disorder than on characteristics and treatments of ADHD. Some of the more common incorrect responses made by the teachers were that children with ADHD do not talk excessively in class, tend to be verbally aggressive, and may be highly anxious following stimulant medication. It was found again that many teachers still believe that altering the child's diet is an effective treatment for the disorder. In addition, teachers do not know if homeopathic remedies or Electroconvulsive Therapy (ECT) are effective treatments for children with ADHD. Although the homogeneous sample is a limitation, the findings suggest that there are significant gaps in teachers' knowledge of the disorder.

Knowledge of ADHD Rating Evaluation (KARE). Vereb and DiPerna (2004) evaluated 47 elementary school teachers' knowledge of ADHD from suburban, urban, and rural districts in Pennsylvania and New Jersey. The KARE is a 53-item questionnaire designed to test four domains of knowledge about ADHD. The first domain was knowledge of ADHD including, etiology, symptoms, and prognoses. The second domain tested was knowledge of treatments including implementation and effectiveness of common treatments. These two domains were evaluated using the true, false, and don't know response. The third and fourth domains, the acceptability of medication and of behavior management were evaluated by using a 4-point Likert format ranging from 1 equaling not at all likely to 4 equaling very likely. Reliability estimates for the subscales ranged from .58 to .81, and the test-retest reliability scores showed

stability with a range of .76 to .80. Teachers' scores on the knowledge of ADHD scale was a moderate 70% ($M = 21.57, SD = 3.68$), while scores on the knowledge of treatments scale was a low 54% ($M = 6.53, SD = 1.69$). Again, this confirms with other studies (Scuitto et al., 2000; West et al., 2005) that teachers' knowledge of treatments for ADHD is limited.

ADHD Knowledge and Opinions Scale (AKOS-R). Graczyk et al. (2005) examined teachers' knowledge of ADHD and attitudes toward interventions for students with ADHD in the United States. The AKOS-R contained 17 true and false questions regarding ADHD. On the Intervention Effectiveness Scale, participants were asked to rate the perceived usefulness of interventions for students with ADHD. Teachers answered 63% of the items correctly ($M = 10.69, SD = 2.36$) on the AKOS-R scale.

Other. Kos, Richdale, and Jackson (2004) had 120 primary-school teachers from Catholic and private schools, and 45 final-year education students complete a knowledge questionnaire in Victoria, Australia. The questionnaire was designed to assess perceived knowledge of ADHD as compared to actual knowledge of ADHD. Perceived knowledge was rated by placing a mark on a 10-cm visual analog scale, anchored very little to a lot, which represented what they thought they knew about the disorder. Actual knowledge was assessed by using true, false, and don't know options about 27 statements used from the K-ADHD (Jerome et al., 1994), the KADDS (Scuitto et al., 2000), and additional items constructed by the experimenters. Perceived knowledge scores of 48% for teachers ($M = 4.77, SD = 2.20$) and 29% for students ($M = 2.94, SD = 2.00$) were found. Actual knowledge scores were also greater than perceived knowledge scores for teachers with 61% correct ($M = 16.40, SD = 4.00$), while students scored 53% correct ($M = 14.20, SD = 4.60$). Most importantly, training on ADHD and

experience teaching a student with ADHD appeared to be significantly associated with teachers' knowledge of the disorder. However, the findings of this study should be viewed with caution as a representative sample was not obtained, as the only schools involved were Catholic and private.

Critique of Instruments

Although the K-ADHD (Jerome et al., 1995), KADDS (Sciutto et al., 2000), AKOS-R (Graczyk et al., 2005) and others (Kos et al., 2004) have reported some psychometric evidence to validate use of the instruments, there still remains a lot of insufficient psychometric evidence to support their use. The K-ADHD (Jerome et al., 1994) scale has reported little psychometric evidence and some crucial steps in scale development have been neglected (i.e. expert panel review, reliability evidence). For example, expert panel judges should be obtained in the preliminary construction phases in development of the instruments. The judges rate the items within the scale and the Validity Index (VI; Aiken, 1980) and/or Content Validity Index (Martuza, 1977) should be quantified and reported into a psychometric representation (content coefficient) of their judgments about the scale and items. The purpose in finding the content coefficient is to evaluate the level of congruence in the experts' opinions that the items within the scale meet an acceptable level of fit within domains. In fact, it appears that the K-ADHD (Jerome et al., 1994) scale was (among others) simply constructed and then tested on samples without an initial review of the items' ratings using the means and variances. Thus, a crucial step in scale development has been missing on this and most ADHD teachers' knowledge scales. Furthermore, the main findings reported on the K-ADHD (Jerome et al., 1994) are the scale's mean, standard deviation, and correlations to demographics, with the exclusion of coefficient

alphas, factor analysis, and test-retest reliabilities. Furthermore, the K-ADHD (Jerome et al., 1994) scale has not been empirically tested for convergence with other similar scales or divergence against different instruments. It is of concern that the scale has had widespread use, as the validity and reliability evidence is very limited.

The reliability of the KADDS (Sciutto et al., 2000), as reported in the manual (Sciutto and Feldhamer, 2005), has reported high internal consistency values ranging from .80 to .90 (Sciutto et al., 2000; Sciutto, Nolfi, & Bluhm, 2004; Sciutto & Terjesen, 2004; Herbert, Krittenden, & Dalrymple, 2004; and Bender, 1996). In fact, scales with very good coefficient alphas range from .80 to .90, with a minimally accepted lower bound alpha of .70 (DeVellis, 2003). The results show unacceptable to respectable internal consistency values for the subscales ranging from .52 to .75. Test-retest reliability correlations ranged from .59 to .76 for the subgroups, and .76 for the total scale. The scale has been studied across three samples (Sciutto et al., 2004; Sciutto et al., 2000; and Sciutto & Terjesen, 2004), where KADDS scores were concurrently correlated to the number of children previously taught with ADHD and with those who have had more experience with children with ADHD. Furthermore, KADDS scores were also positively correlated with exposure to ADHD information across two studies (Sciutto et al, 2004, and Sciutto & Terjesen, 2004). Although some reliability estimates are low, inclusion of this scale should aid in accumulating convergent validity for the K-ADHD scale (Jerome et al., 1994), as the construct (knowledge of ADHD) appears to be the same. However, factor analysis has not been conducted on this scale and it has not been assessed against other scales. Furthermore, the KADDS has not reported a CVI (Martuza, 1977) to confirm the content of the scale.

Vereb and DiPerna (2004) conducted an expert review of the items within the KARE, however, a VI or CVI was never reported in their findings. The mean scores of the items ranged from 2.34 to 3.78 out of four, with items scoring less than 3.00 resulting in elimination, retention, or revision. Maintaining items with an unbalanced distribution during the development phase of scale development is problematic, because a solid measure will initially include items that will broadly encompass both closely related concepts and the target concept (Clark & Watson, 1995). Items that discriminate on the extreme upper end of the continuum biases the scale, as the construct may be too narrowly defined, which possesses good predictive convergence, but is deficient in predictive divergence (Clark & Watson, 1995). Furthermore, analysis of the items did not include content validity coefficients to assess whether overall items ratings obtained a .78 criterion with a minimum of six experts, or an overall scale rating of .90 or higher (Lynn, 1986). Reliability estimates for each domain were mixed from .58 to .81, with the knowledge of treatments domain at an unacceptable level of .58. Furthermore, knowledge of ADHD was not related to knowledge of ADHD treatments ($r = .14, p = .34$), which may be due to the poor alpha level of the treatments scale. Test-retest results show stability ranging from .76 to .80 after a 4-week interval (Vereb & DiPerna, 2004). Although this study took many steps that other researchers did not, regarding the expert analysis, the study failed to report evidence from the expert panel or conduct a factor analysis to explore or confirm the items selected.

Contrary to the KARE (Vereb & DiPerna, 2004), the AKOS (Rostain, Power, & Atkins, 1993) was pilot studied to unveil a three-factor structure using factor analysis. However, this instrument was intended to test parents' knowledge and opinions on ADHD. It is not known whether this factor structure would sustain the same domains when testing an adequately sized

teacher population. Furthermore, the alpha coefficients on the domains fluctuated from unacceptable to acceptable with respective scores of .54, .63, and .71. Bennett, Power, Rostain, and Carr (1996) went on to revise the AKOS to include another domain, resulting in a four-factor solution with factor loadings greater than .50 on mothers and fathers of children with ADHD. Cronbach's alphas were reported as .85, .89, and .76 (very good to respectable values), with the alpha coefficient missing for the knowledge domain. However, item-total correlations for knowledge ranged from poor to moderate ($r = .15$ to $.62$, $p < .05$). However, Graczyk and colleagues (2005) used the modified AKOS-R on a teacher sample despite the fact that the original scale was intended for parent populations. Furthermore, alpha coefficients were not reported and a significant negative correlation was found between teacher's knowledge of ADHD with classroom intervention ($r = -.33$, $p < .01$). These studies highlight the importance of using scales for the designed population, as the results found can be highly questionable on the unintended sample.

In sum, teachers' knowledge of ADHD has been assessed on various scales, without the scales being properly analyzed for their psychometric properties. This study has reviewed previous research on knowledge scales of ADHD, thus finding the limitations of such instruments. This study further attempts to gather psychometric evidence for the K-ADHD (Jerome et al., 1994) to determine whether it is a valid instrument to test teachers' ADHD knowledge and how Saskatchewan's in-service and pre-service teachers score in comparison to previous studies using the K-ADHD (Jerome et al., 1994).

CHAPTER 3

Research Design and Methodology

This chapter outlines the methods used in this study. The first objective of the current study was to determine whether differences in knowledge scores exist using the K-ADHD (Jerome et al., 1994) scale between an in-service and pre-service teacher sample. The second objective was to gather empirical validity evidence for the K-ADHD scale (Jerome et al., 1994). More specifically, the K-ADHD (Jerome et al., 1994) scale needed to be assessed for evidence of construct validity through reliability estimates, item statistics, and convergent and divergent validity. Questionnaires were administered to an in-service elementary school teacher sample in Horizon School Division, in Saskatchewan, and to a pre-service teacher sample at the University of Saskatchewan.

Methodology

The present study was conducted within the quantitative paradigm. A questionnaire package was used to carry out this research. Questionnaires are advantageous for many reasons. The most important reason to use the questionnaire methodology is because the study assesses teachers' knowledge. Tests are easy to administer when assessing knowledge, and scales have already been used in previous research to measure ADHD knowledge in teachers. However, guessing on any type of scale can lead to spurious results. Inflated or deflated results can be eliminated with an added *don't know* response to the K-ADHD (Jerome et al., 1994) scale (Sciutto et al., 2000). Questionnaires are also advantageous because they control and standardize

administration and responses. Responses in this format are quantifiable, which allows for the application of a wide variety of statistical techniques.

Sample

The participants selected for this study were in-service elementary school teachers within the Horizon School Division in Saskatchewan. This included 21 elementary schools out of a possible 44 schools within the division. Furthermore, pre-service teachers who were enrolled in the education program at the University of Saskatchewan were also asked to participate. It was suspected that a pre-service teacher sample would be significantly different in their knowledge of ADHD than an in-service teacher sample (Beckle, 2004; Jerome et al., 1999). However, only one study in Canada has studied the difference between pre-service and in-service teacher knowledge of ADHD (Jerome et al., 1999). Pre-service teachers are important for this study, because their curriculum could be altered according to their level of knowledge to properly equip these teachers-to-be before entering the workforce. With the high prevalence of ADHD and the fact that children with ADHD often exhibit signs early on in elementary school, teachers should be well informed of the disorder. As early intervention is key in academic achievement, assessment of the diagnosis should take place in the elementary school years, thus highlighting the importance of teacher knowledge of this disorder.

Measures

Demographics. The first section of the questionnaire for in-service and pre-service teachers includes demographic questions and questions about participants' experience with teaching and ADHD derived from Ohan et al., 2008. Questions under Sections 1 and 2 were

coded as follows. Gender was coded dichotomously as, 1 for male, 2 for female. Age, grade teaching, previous years of experience with a child with ADHD, number of children sought help for with ADHD, hours spent in classes or workshops about ADHD were measured continuously and entered exactly as the participants responded. Years of teaching experience was recoded into three categories according to previous research (de la Torre Cruz & Casanova Arias, 2007; Ghaith & Shaaban, 1999; Ghaith & Yaghi, 1997; McIntyre & Hellsten, 2005; Marso & Pigge, 1997): (a) teachers with less than 5 years teaching experience, (b) teacher with 5 to 15 years of teaching experience, (c) teachers with more than 16 years of teaching experience. Grades teaching were also recoded also into three categories: (a) kindergarten to grade 3; (b) grade 4 to grade 8; and (c) teaching all grades. The number of students taught with ADHD was grouped into two categories: (a) taught less than 10 children (coded 1); and (b) taught 10 or more children (coded 2). Questions such as do you have more knowledge today about ADHD, do you have a friend or family member with ADHD, do you feel you have greater awareness in recognizing symptoms of ADHD, and have you attempted to gain information about ADHD were coded into dichotomous variables of 1 for yes, and 2 for no. Answers to questions that are open-ended were coded based on the responses from participants and coded consecutively with 1, 2, 3, etc.

Resource Questions. The second section of the questionnaire included questions about current access to programs or assistance derived from Ohan et al., 2008: “What resources or assistance do you think teachers are currently receiving that help assist with children with ADHD in the classroom? If there are no resources, please indicate ‘no resources;’ how effective these resources have been: “Please circle or underline any of the above resources that you feel are NOT effective;” and which resources they would like to have to assist them: “What resources or

assistance would you like to see created to help you assist children with ADHD in your classroom?” and “Is there anything else that you feel would help you effectively instruct children with ADHD in your classroom?”

Knowledge of ADHD Scale (K-ADHD, Jerome et al., 1994). The K-ADHD scale (Jerome et al., 1994) has been included in a vast number of studies of teachers’ knowledge of ADHD. The Jerome et al. (1994) knowledge scale has provided similar results in these studies. It consists of 20 true and false questions regarding diagnosis and treatment of this disorder. A *don’t know* option was included in the responses to eliminate the chance of guessing a correct answer and to keep the formatting of the responses parallel to the KADDS (Sciutto et al., 2000). Initially, the response options were coded into three categories (1 for true, 2 for false, and 3 for don’t know). They were later coded into dichotomous responses as 0 for incorrect and 1 for correct, with total scores ranging from 0 to 20. All scores that were coded as 3 (don’t know) were recoded as incorrect responses. The required level of measurement is nominal or discrete. Gathering psychometric evidence for the K-ADHD (Jerome et al., 1994) scale aids in verifying or disproving the instrument as an acceptable assessment measure.

Knowledge of Attention Deficit Disorders Scale (KADDS; Sciutto et al., 2000). The KADDS (Sciutto et al., 2000) is an instrument designed to measure knowledge and misperceptions of ADHD. It is comprised of a 36-item rating scale with true (T), false (F), and don’t know (DK) options. The response options were also coded into three categories (1 for true, 2 for false, and 3 for don’t know). They were later coded into dichotomous responses, as 0 for incorrect and 1 for correct, with total scores falling between 0 and 36. All scores that were coded as 3 (don’t know) were recoded as incorrect responses. The required level of measurement is

also nominal or discrete. The response options differentiate between what one knows from what one does not know. For example, Jerome et al. (1994) found that 41% of Canadian and 50% of American teachers incorrectly believed that children would outgrow their ADHD symptoms and become *normal* as adults. This finding does not decipher whether the response was inflated due to the fact that participants could not indicate that they simply did not know the answer.

Furthermore, the KADDS (Sciutto et al., 2000) contains three subscales that reflect content areas relevant to diagnosis or assessment and intervention. These subscales include symptoms/diagnosis, treatment, and associated features.

Marlowe Crowne Social Desirability Scale (MC-SDS, Form C; Crowne & Marlowe, 1960; Reynolds, 1982). The MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) is designed to measure participants' tendency to respond towards culturally approved behaviours (e.g. I am always courteous, even to people who are disagreeable). The MC-SDS, Form C (Crowne & Marlowe, 1960; Reynolds, 1982) is a 13-item scale, with true and false response options. The response options were coded dichotomously as 0 for incorrect and 1 for correct. The total number of possible scores ranged between 0 and 13, with high scores indicating socially desirable responses. As MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) is designed to assess social desirability, this scale should have a very small to no relationship with the K-ADHD scale (Jerome et al., 1994) or the KADDS (Sciutto et al., 2000), which both assess knowledge of attention deficit hyperactivity disorder. As such, the two ADHD measures, the K-ADHD (Jerome et al., 1994) and KADDS (Sciutto et al., 2000), should relate higher to each other and less to the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982). Therefore, inclusion of the MC-SDS should aid in providing divergent validity evidence for the K-ADHD

scale (Jerome et al., 1994). Tested for its' psychometric properties through the use of factor analysis and reporting of internal consistencies, the short Form C MC-SDS is recommended as a brief, easy-to-use social desirability measure (Reynolds, 1982).

Assessment of Oral Language Knowledge (AOLK; McIntyre, 2005). The AOLK (McIntyre, 2005; McIntyre & Hellsten, 2008) is designed to measure teachers' knowledge of oral language in three domains: form (49 items), content (25 items), and use (10 items). For the purposes of the current study, the dichotomously scored form subscale was used and revised to 55 items. The response options were dichotomously coded as 0 for incorrect and 1 for correct. The total number of possible scores ranged between 0 and 55. Teachers' knowledge of language form is generally lower than domains in content and use (McIntyre, 2005). It was hypothesized that subscales of content and use may have been found to correlate with knowledge of ADHD. As education coursework and workshops often address language content, learning disorders, and childhood disorders, the overlap of knowledge found on these subscales may have been difficult to interpret, and were thus eliminated from this study. The form subscale has shown high reliability ($\alpha = .91$; McIntyre, 2005; McIntyre & Hellsten, 2008). The K-ADHD (Jerome et al., 1994) and the KADDS (Sciutto et al., 2000) should have a low correlating relationship with the AOLK (McIntyre, 2005), whereas the two ADHD measures should have a highly correlating relationship to one another. Although the AOLK (McIntyre, 2005) is a relatively new instrument, the content validity and reliability have been adequately tested to support its' use.

Data Collection Methods

The University of Saskatchewan Ethics committee approved this study. A list of

education classes was obtained online using the university's search engine. Professors and lecturers in the education department were contacted to ask permission to address the education students, within their classrooms, at the University of Saskatchewan. Professors were first contacted through email and told of the study through the investigating research student. After their agreement was obtained through email confirmation, education students were encouraged to participate through filling out hard copies of the questionnaires. A letter of informed consent and a questionnaire were distributed to each education student within each class. It was anticipated that participation should take approximately 20 to 30 minutes. University students were asked to return the completed questionnaires in sealed envelopes to the researcher. Those who needed more time to complete the questionnaire were asked to anonymously slip the sealed questionnaire under the researcher's door at the University of Saskatchewan.

One rural school division was obtained for this study out of a possible 29 public and separate school divisions within Saskatchewan. A superintendent of Horizon School Division was contacted through email to ask permission to address elementary school teachers. A total of 44 schools encompass the Horizon School Division, of which 21 elementary schools were contacted to participate. Schools within Horizon School Division that were not contacted consisted of high schools or very small schools where there was low student enrolment. Principals were contacted through email to ask permission to distribute questionnaires to their teachers. After their agreement was obtained, in-service teachers were encouraged to participate through filling out hard copies of the questionnaires. A letter of informed consent and a questionnaire were distributed to each teacher within each participating school. It was anticipated that participation should take approximately 20 to 30 minutes. Teachers were asked

to return the completed questionnaires in sealed envelopes to their principals, so that the principals could use the internal mailing system to return all questionnaires to the researcher.

Upon collection, questionnaires were secured in a filing cabinet in the researchers' office. Only the researcher involved reviewed the questionnaires, and had access to the filing cabinet and computer files. Participants were asked to refrain from exposing their identity on the questionnaires in order for all participants to remain anonymous and all information to remain confidential.

Statistical Analysis

The statistical application software to be employed to analyze the data collected will be SPSS Version 15.0. SPSS was used to determine the descriptive and inferential statistics of this study. The descriptive statistics were used to describe the samples, while the inferential statistics were used to analyze the observed differences between groups and scales. Separate one-way ANOVAs and independent t tests were used to assess the relationships between teachers' (in-service and pre-service) knowledge of ADHD and the background characteristics. Cronbach's alphas and item correlations will be used to assess the reliability of the K-ADHD scale (Jerome et al., 1994). Furthermore, reliability analysis was also conducted to ensure the consistency of the KADDS (Scuitto et al., 2000), MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982), and the AOLK (McIntyre, 2005). Correlations were used to assess the validity of the K-ADHD scale (Jerome et al., 1994). Convergent validity was analyzed with correlations between the K-ADHD (Jerome et al., 1994) scale and the KADDS (Scuitto et al., 2000). Divergent validity was analyzed with correlations between the K-ADHD scale and the MC-SDS (Reynolds, 1982) and the AOLK (McIntyre, 2005). Items were also assessed to determine if respondents answered the

K-ADHD (Jerome et al., 1994) items in a socially desirable manner, through the use of correlations with the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982). Exploratory Factor Analysis (EFA) is another statistical technique that should be used to assess the instrument's structural validity. EFA could have been used to describe the domains within the scale, determine the latent variables, and condense the number of items within the scale (DeVellis, 2003). However, approximately 300 participants would have been required for this procedure, while the samples in this study consisted of approximately 100 participants or less.

Data Cleaning

Descriptive statistics and graphic representations were used to analyze the accuracy in which the data has been entered (Tabachnick & Fidell, 2007). The data was double-checked from the original data against the data file to ensure its' accuracy (Tabachnick & Fidell, 2007). In the circumstances where a missing value was random, the mode for the particular variable was inserted, as all scales used were dichotomously coded. Mode insertion was not used in the majority of circumstances where entire scales were not completed. Case-wise deletion was not used to deal with the problem missing data, as deletion would result in a very significant loss of data, which would result in the loss of power in the results. Distortion of the data would result in the attempt to delete cases for missing data, as the cases that have missing data still hold critical information for the study (i.e., other scales completed) (Tabachnick & Fidell, 2007). However, the majority of participants responded to items on the K-ADHD (Jerome et al., 1994) and the KADDS (Sciutto et al., 2000), with many not answering items mainly from the AOLK (McIntyre, 2005).

Ethics

An ethics application was submitted for this study and approved on November 13, 2008 (see Appendix A). Data collection, analyses, and storage have met the ethical standards of the University of Saskatchewan Behavioural Research Ethics Board. The questionnaires obtained were anonymous, as participants were asked not to put any identifiable information on the questionnaires. Individual performance on the scales was not discussed, and the individual results were not used for comparison. The study focused on group samples of comparison between in-service and pre-service teachers, and comparisons between the four scales used as the dependent variables. Information obtained from each school within the Horizon School Division was not identified, discussed, or used for analysis purposes. Furthermore, information obtained from each pre-service class was not identified, discussed, or used for analysis purposes. All possible identifying information has been destroyed.

CHAPTER 4

Results

The purpose of this chapter is to report the statistical analyses of the study. The data analysis is reported in the order starting with descriptive information about the samples followed by analyses in response to the research questions of interest.

In-Service Teacher Descriptive Analysis

In-service teacher participants were 66 elementary school teachers who were teaching in the rural area encompassing the small city of Humboldt, Saskatchewan. Teachers on average were 43.34 years of age ($SD = 10.87$; range = 23.00 – 60.00), with 18.73 years of teaching experience ($SD = 9.96$; range = 1.00 – 38.00). Teachers reported teaching on average 9.24 students with ADHD ($SD = 8.84$; range = 0.00 – 50.00), and recommended help on average for 5.65 students with ADHD ($SD = 8.84$; range = 0.00 – 50.00). On average, these teachers also reported spending 7.68 hours in ADHD workshops or classes ($SD = 10.11$; range = 0.00 – 50.00), and read on average 2.26 books on the disorder ($SD = 2.82$; range = 0.00 – 10.00). Approximately 35 teachers (53.00%) identified the internet as their main source of information for ADHD. A further listing of IST characteristics is displayed in Table 1. Characteristics for IST raw scores on the four scales are reported in Table 2.

Table 1.

In-Service Teachers' Characteristics

Characteristics	<i>N</i>	Frequency (%)
Sex		
Male	8	12.1
Female	58	87.9
More knowledge today about ADHD		
Yes	57	86.4
No	8	12.1
Family or friend with ADHD		
Yes	27	40.9
No	39	59.1
Attempted to gain ADHD information		
Yes	45	68.2
No	19	28.8
Currently receiving resources or assistance to help		
Yes	38	57.6
No	24	36.4
TOTAL	66	100.0

Note: Missing data percentages are not included.

Table 2.

In-Service Teachers' Raw Scores on Scales

Scale	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
K-ADHD	64	6	19	13.70	3.03
KADDS	66	8	31	19.58	5.29
MC-SDS	56	0	12	5.66	3.43
AOLK	56	2	49	26.80	9.85

Pre-Service Teacher Descriptive Analyses

Pre-service participants were 103 education students who were enrolled at the University of Saskatchewan in the metropolitan area of Saskatoon, Saskatchewan. Students on average were 25.6 years of age ($SD = 5.13$; range = 20.00 – 43.00), with 2.95 years of studying accomplished ($SD = 1.56$; range = 1.00 – 7.00). On average, students reported helping to teach 3.75 students with ADHD ($SD = 4.55$; range = 0.00 – 20.00), spending 2.61 hours in ADHD workshops or classes ($SD = 6.78$; range = 0.00 – 50.00), and reading 1.02 books on the disorder ($SD = 1.75$; range = 0.00 – 10.00). Approximately 29 students (28.16%) identified the internet as their main source of information for ADHD. A further listing of PST characteristics is displayed in Table 3. Characteristics for PST raw scores on the four scales are reported in Table 4.

Table 3.
Pre-Service Teachers' Characteristics

Characteristics	<i>N</i>	Frequency (%)
Sex		
Male	24	23.3
Female	79	76.7
More knowledge today about ADHD		
Yes	58	56.3
No	45	43.7
Family or friend with ADHD		
Yes	41	39.8
No	62	60.2
Attempted to gain ADHD information		
Yes	37	35.9
No	65	63.1
TOTAL	103	100.0

Note: Missing data percentages are not included.

Table 4.

Pre-Service Teachers' Raw Scores on Scales

Scale	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
K-ADHD	102	0	20	12.39	4.20
KADDS	100	0	30	17.47	6.17
MC-SDS	100	0	13	5.40	3.08
AOLK	94	1	40	21.20	8.18

Data Cleaning of In-Service and Pre-Service Teacher Samples

Each scale and group was analyzed separately to check for missing values. Total missing scales were coded to indicate the frequencies of the scales that were missing. The number of IST who had completed all items on each scale was 44 (66.7%). There were 2 (3.0%) respondents who did not complete the K-ADHD (Jerome et al., 1994) scale, who also did not complete the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982), and the AOLK (McIntyre, 2005). Four (6.1%) respondents did not complete the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) solely, while 12 (18.2%) respondents did not complete the AOLK (McIntyre, 2005) solely. In addition, 4 (6.1%) respondents did not complete both the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) and the AOLK (McIntyre, 2005). As there is more than 5.0% of missing data, this eliminates the possibility of conducting a completed cases analysis (Weiner, Freedheim, & Schinka, 2003).

The number of students who had completed all items on each scale was 67 (65.0%). All PST completed the K-ADHD (Jerome et al., 1994) scale in its' entirety. There was one (1.0%)

student who did not complete the KADDS (Sciutto et al., 2000), and also one (1.0%) who did not complete the MC-SDS (Crowne-Marlowe, 1960; Reynolds, 1982). Contrarily, there were 30 (29.1%) students who did not complete the AOLK (McIntyre, 2005). Furthermore, there were two (1.9%) respondents who did not complete the KADDS (Sciutto et al., 2000), MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982), and the AOLK (McIntyre, 2005). Another two (1.9%) respondents did not complete the K-ADHD (Jerome et al., 1994), KADDS (Sciutto et al., 2000), and the AOLK (McIntyre, 2005). As previously discussed, there was more than 5.0% missing data, which eliminated the possibility of conducting a completed cases analysis (Weiner et al., 2003).

The K-ADHD (Jerome et al., 1994) scale did not have variables with 5% or more missing values for both IST and PST. Therefore, in circumstances where the entire scale was not missing, the random missing value was either inserted with a 0 or 1 depending on which number was the mode for the particular item, within each group. For the KADDS (Sciutto et al., 2000), there were no variables with 5% or more missing values for both IST and PST. A 0 or 1 was inserted for random missing values, which was dependent on the mode for the particular item of concern. In regards to the K-ADHD (Jerome et al., 1994) and the KADDS (Sciutto et al., 2000), it can be assumed that missing cases were not due to a lack of knowledge, or respondents would have completed the *don't know* option for those items. For the MC-SDS, the scale had variables with 15.2% missing values for IST and did not have variables with 5% or more missing values for PST. These values were left coded as missing as the entire scale was not completed in these circumstances. Lastly, the AOLK had variables that ranged from 18.2% to 27.3% with missing values for IST. For the PST, the AOLK had variables with missing values that ranged from 9.7%

to 27.2%. As there was no *don't know* option for respondents to fill out if there was a lack of knowledge, much of the missing data within this scale can be assumed to be due to insufficient knowledge. Therefore, the values were left coded as missing so that the analysis could be run on completed variables only.

Missing cases analysis was conducted to assess if the data was missing completely at random (MCAR). Separate variance t tests showed that there were no patterns in missingness on the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) and the AOLK (McIntyre, 2005) for IST. Little MCAR's test was not significant ($\chi^2(18) = 20.30$; $p = .316$) for IST suggesting that the missing data on the scales are missing completely at random (MCAR). Separate variance t tests could not be conducted for PST as all variables tested fewer than 5.0% of the cases as missing values (Tabachnick & Fidell, 2007), with the exception of the AOLK (McIntyre, 2005). All scales scores were z score standardized to assess normality and potential outliers (Tabachnick & Fidell, 2007). Standardized scores for IST on the K-ADHD (Jerome et al., 1994) ranged from -2.48 to 1.66 with a negative skew. Standardized scores for PST on the K-ADHD (Jerome et al., 1994) ranged from -3.07 to 1.69 with a negative skew. Four cases on the K-ADHD (Jerome et al., 1994) and two cases on the KADDS (Sciutto et al., 2000) were identified as outliers and recoded as missing values. After cases were deleted, the K-ADHD (Jerome et al., 1994) resulted with a skewness of -1.63 and kurtosis of .23, while the KADDS (Sciutto et al., 2000) resulted in skewness of -1.04 and kurtosis of -.25.

Standardized scores on the KADDS (Sciutto et al., 2000) ranged from -2.19 to 2.16, also with a negative skew. For IST, standardized scores on the KADDS (Sciutto et al., 2000) ranged from -2.83 to 2.03, also with a negative skew. For IST, standardized scores on the MC-SDS

(Crowne & Marlowe, 1960; Reynolds, 1982) ranged from 1.65 to 1.85, with a positive skew. For PST, standardized scores on the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) ranged from -1.75 to 2.46, with a positive skew. Lastly, IST standardized scores on the AOLK (McIntyre, 2005) ranged from -2.52 to 2.25, with a negative skew. PST standardized scores on the AOLK (McIntyre, 2005) ranged from -2.47 to 2.30, with a negative skew. All scales appeared to be fairly normally distributed for IST with slight deviations, as reported in Table 5. Graphical representations were also assessed for outliers on IST (see *Figure 2, Figure 3, Figure 4, and Figure 5*).

Table 5.
Skewness and Kurtosis Values for In-Service Teachers

Measures	Skewness	Kurtosis
K-ADHD	-0.38	-1.04
KADDS	-0.43	-0.65
MC-SDS	0.09	-1.42
AOLK	-0.46	0.28

Figure 2. *In-Service Teachers' Boxplot for the K-ADHD*

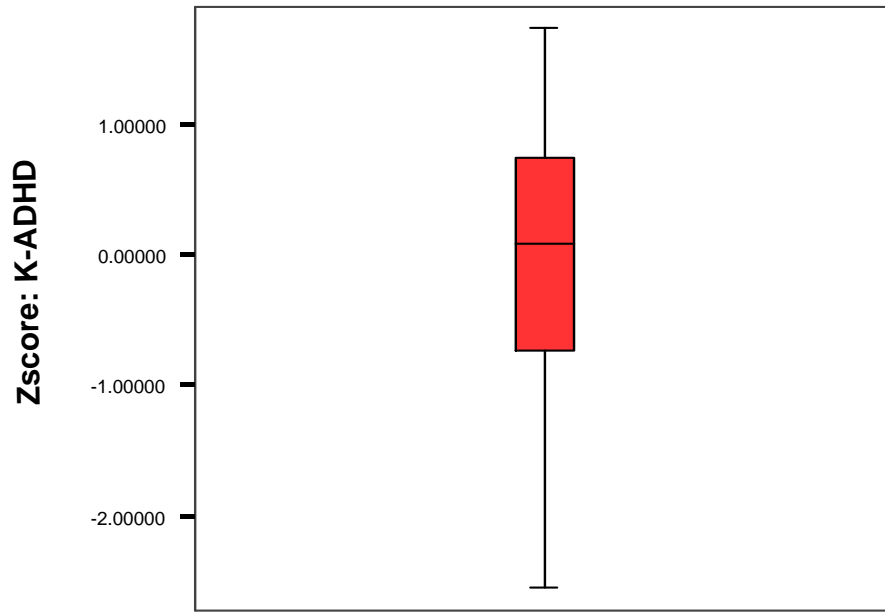


Figure 3. *In-Service Teachers' Boxplot for the KADDS*

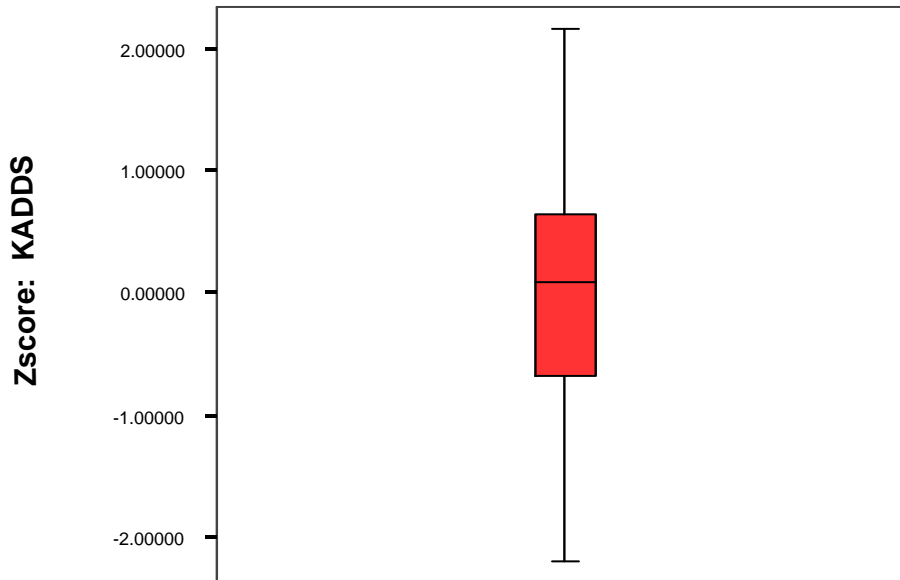


Figure 4. *In-Service Teachers' Boxplot for the MC-SDS*

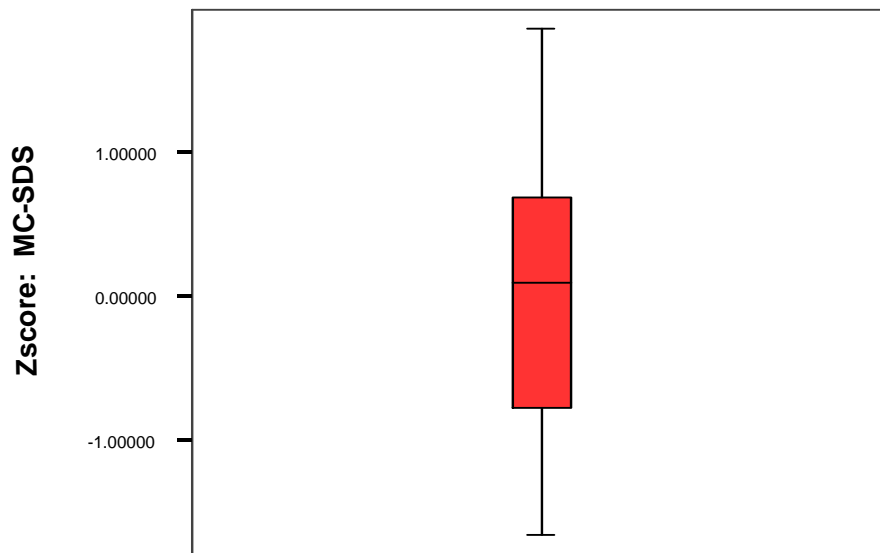
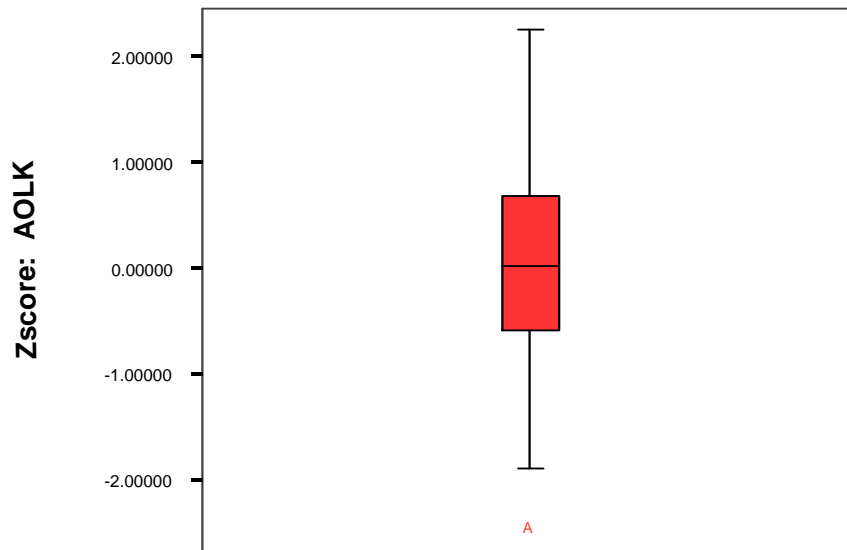


Figure 5. In-Service Teachers' Boxplot for the AOLK



One case on the AOLK (McIntyre, 2005) was identified as an outlier and recoded as a missing value, for IST. All scales did not appear to be normally distributed for PST, as reported in Table 6. Graphical representations were also assessed for outliers on PST (see *Figure 6*, *Figure 7*, *Figure 8*, and *Figure 9*).

Table 6.

Skewness and Kurtosis Values for Pre-Service Teachers

Measures	Skewness	Kurtosis
K-ADHD	-3.52	1.90
KADDS	-1.98	-0.54
MC-SDS	0.40	-0.79
AOLK	-1.17	-0.46

Figure 6. Pre-Service Teachers' Boxplot for the K-ADHD

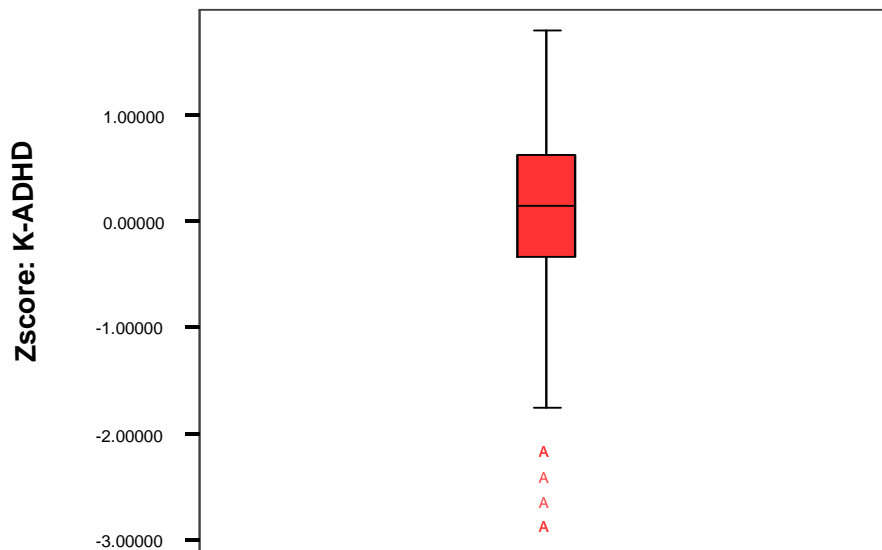


Figure 7. Pre-Service Teachers' Boxplot for the KADDS

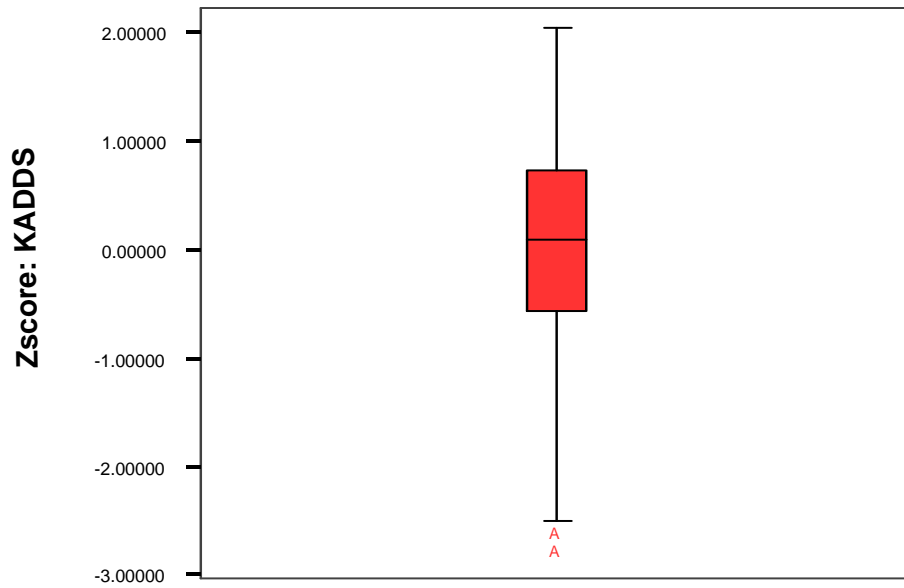


Figure 8. Pre-Service Teachers' Boxplot for the MC-SDS

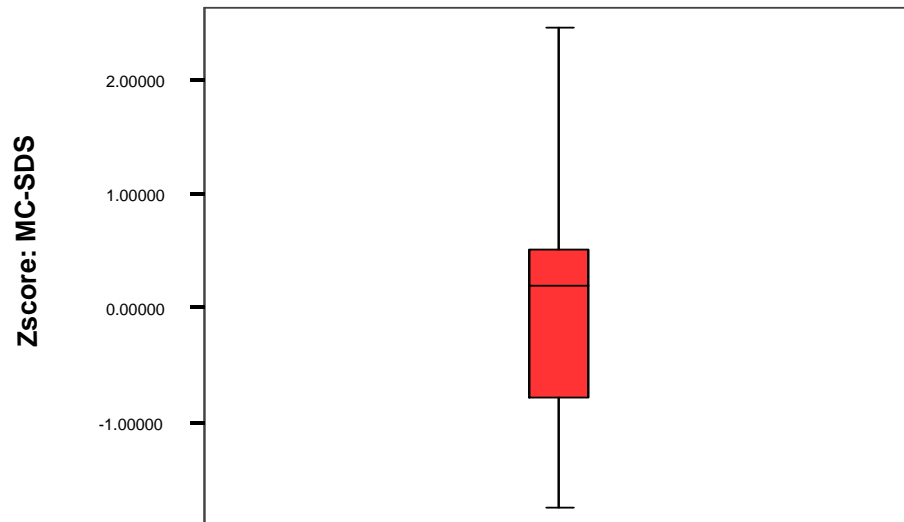
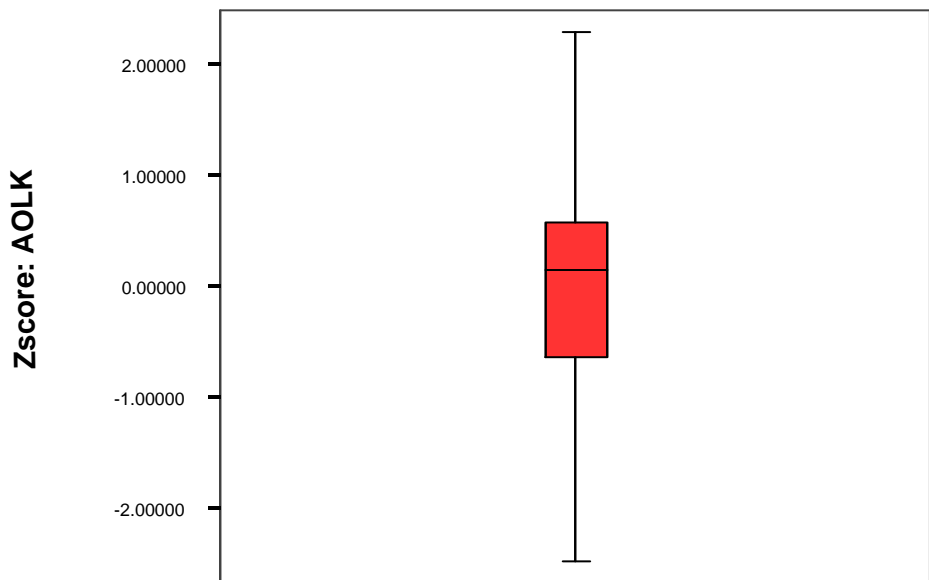


Figure 9. Pre-Service Teachers' Boxplot for the AOLK



For the PST, the K-ADHD's (Jerome et al., 1994) scale distribution deviated from normality. Therefore, transformations of the scores on the K-ADHD (Jerome et al., 1994) were performed, by reflecting the variable (Weiner et al., 2003). More specifically, the variable was transformed by taking the square root of the constant (highest score plus one) less the scale scores (Tabachnick & Fidell, 2007). This transformation resulted in skewness of -.47 and kurtosis of -.24, which approaches normality. Transformations were also conducted on the KADDS (Sciutto et al., 2000) and the AOLK (McIntyre, 2005), which improved the distributions but did not change the outcome of the subsequent statistical analysis. Therefore, the decision was made not to use the transformed data, but the cleaned distributions of the K-ADHD (Jerome et al., 1994) (skewness -1.63, kurtosis .23), and KADDS (Sciutto et al., 2000) (skewness -1.04,

kurtosis -.25), and the original distribution of the AOLK (McIntyre, 2005) (skewness -1.17, kurtosis -.46) even though these distributions were slightly non-normal.

In-Service Teacher Scale Scores by Characteristics

In-Service teachers scale scores were analyzed by independent variables. One-way ANOVAs and independent t tests were conducted for each independent variable by scale score, due to missing values, unequal *N*'s, and small sample. The probability value was corrected to .01 by dividing the Bonferonni Correction factor (the .05 alpha level was divided by 4, where 4 is the number of dependent variables). Table 7 reports IST characteristics on the K-ADHD (Jerome et al., 1994) standardized scale score. A significant difference was found on the K-ADHD (Jerome et al., 1994) scale and the number of children taught with ADHD, $t(59) = -3.52$, $p = .001$. It was found that teachers who taught 10 or more students with ADHD performed better than those who taught less than 10 students with ADHD. It was also found that those who spent 10 or more hours in workshops or classes on ADHD performed better than those who spent less than 10 hours, $t(59) = -2.67$, $p = .010$. No significant differences were found on the K-ADHD (Jerome et al., 1994) scale and teaching experience, $F(2,61) = .572$, $p = .567$; grades taught, $F(2,58) = 1.04$, $p = .360$; friend or family with ADHD, $t(60) = 1.52$, $p = .134$.

Table 7.

Standardized K-ADHD Scores by In-Service Teachers' Characteristics

Characteristics		<i>N</i>	<i>M</i>	<i>SD</i>
Teaching	< 5 years	6	-.242	1.14
experience	5 - 15 years	17	.204	1.05
	> 16 years	41	-.049	.97
Students taught	< 10 students	34	-.30*	.96
	10 or more	27	-.50*	.78
with ADHD	students			
Hours in	< 10	46	-.14*	.90
workshops/class	10 or more	15	.62*	1.10
about ADHD				
Family or friend	Yes	26	.23	.89
with ADHD	No	38	-.16	1.05

* $p < .01$.

Table 8 reports IST characteristics on the KADDS (Sciutto et al., 2000) standardized scale score. The same significant differences were found on the KADDS (Sciutto et al., 2000) and the number of children taught with ADHD, $t(61) = -4.07, p = .000$. A significant difference was also found on the KADDS (Sciutto et al., 2000) and number of hours spent in workshops or classes, $t(61) = -2.94, p = .005$, with those spending more time performing better than those who spent less time in workshops and classes. A significant difference was also found between teachers who had a friend or family member with ADHD, $t(64) = 3.57, p = .001$, with teachers

with a friend or family member with ADHD performing better than those who do not. No significant differences were found on the KADDS (Sciutto et al., 2000) and years of teaching experience, $F(2,63) = .065, p = .937$, grades taught, $F(2,59) = .666, p = .518$.

Table 8.

Standardized KADDS Scores by In-Service Teachers' Characteristics

Characteristics		<i>N</i>	<i>M</i>	<i>SD</i>
Teaching Experience	< 5 years	6	-.140	.65
	5 - 15 years	17	.002	.94
	> 16 years	43	.019	1.08
Students taught with ADHD	< 10 students	35	-.37*	.93
	10 or more students	28	.53*	.79
Hours in workshops/class about ADHD	< 10 hours	47	-.18*	.94
	10 hours or more	16	.64*	1.03
Family or friend with ADHD	Yes	27	-.49*	.90
	No	39	-.34*	.94

* $p < .01$.

Table 9 reports IST characteristics on the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) with no significant findings for the number of children taught with ADHD, $t(51) = 2.07, p = .043$; number of hours spent in workshops or classes, $t(51) = 1.85, p = .070$;

family member or friend with ADHD, $t(54) = -1.16, p = .250$; years of teaching experience, $F(2,52) = 1.44, p = .246$; and grades taught, $F(2,50) = 1.70, p = .194$.

Table 9.

Standardized MC-SDS Scores by In-Service Teachers' Characteristics

Characteristics		<i>N</i>	<i>M</i>	<i>SD</i>
Teaching Experience	< 5 years	4	.390	.63
	5 - 15 years	14	.432	.70
	> 16 years	38	-.200	1.07
Students taught with ADHD	< 10 students	30	.26	.91
	10 or more students	23	-.31	1.08
Hours in workshops/class about ADHD	< 10 hours	40	.16	.96
	10 hours or more	13	-.42	1.00
Family or friend with ADHD	Yes	22	-.19	.84
	No	34	.12	1.08

Table 10 reports IST characteristics on the AOLK (McIntyre, 2005). No significant differences were found on the AOLK (McIntyre, 2005) with number of children taught with ADHD, $t(50) = -.894, p = .376$; number of hours spent in workshops or classes, $t(50) = .457, p = .650$; family member or friend with ADHD, $t(53) = .372, p = .711$; years of teaching experience, $F(2,53) = 2.50, p = .092$; and grades taught, $F(2,50) = 1.05, p = .358$.

Table 10.

Standardized AOLK Scores by In-Service Teachers' Characteristics

Characteristics		<i>N</i>	<i>M</i>	<i>SD</i>
Teaching Experience	< 5 years	4	-.589	.50
	5 - 15 years	12	-.132	.77
	> 16 years	39	.166	1.01
Students Taught with ADHD	< 10 students	26	-.07	.83
	10 or more students	26	.17	1.10
Hours in workshops/class about ADHD	< 10 hours	38	.10	1.02
	10 hours or more	14	-.04	.72
Family or friend with ADHD	Yes	24	.10	.94
	No	31	.00	.97

Pre-Service Teacher Scale Scores by Characteristics

Pre-service teachers scale scores were analyzed by the numbers of hours in workshops or classes, and if pre-service teachers had a friend or family member with ADHD. Not all independent variables could be analyzed, as pre-service teachers do not possess a professional “A” level teaching certificate. Variables such as: grades taught, years of teaching experience, and

number of children taught with ADHD were not assessed. T tests were conducted for the independent variables. The probability value was corrected to .01 by dividing the .05 level by 4 (dependent variables). Table 11 reports PST characteristics on the K-ADHD (Jerome et al., 1994) scale with no significant differences found for hours in workshops or classes about ADHD, $t(90) = -.275, p = .784$; and having a family or friend with ADHD, $t(96) = -1.08, p = .284$.

Table 11.

Standardized K-ADHD Scores by Pre-Service Teachers' Characteristics

Characteristics		<i>N</i>	<i>M</i>	<i>SD</i>
Hours in workshops/class about ADHD	< 10 hours	85	.07	.86
	10 hours or more	11	.36	.71
Family or friend with ADHD	Yes	40	.00	.92
	No	58	.19	.79

Table 12 reports PST characteristics on the KADDS (Sciutto et al., 2000) with no significant differences found for hours in workshops or classes about ADHD, $t(90) = -.107, p = .915$; and having a family or friend with ADHD, $t(96) = -.479, p = .633$.

Table 12.

Standardized KADDS Scores by Pre-Service Teachers' Characteristics

Characteristics		<i>N</i>	<i>M</i>	<i>SD</i>
Hours in	< 10 hours	85	-.01	.94
workshops/class	10 hours or more	11	.56	.75
about ADHD				
Family or friend	Yes	41	.00	.97
with ADHD	No	57	.09	.90

Table 13 reports PST characteristics on the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) with no significant differences found for hours in workshops or classes about ADHD, $t(92) = .234, p = .816$; and having a family or friend with ADHD, $t(98) = -.882, p = .380$.

Table 13.

Standardized MC-SDS Scores by Pre-Service Teachers' Characteristics

Characteristics		<i>N</i>	<i>M</i>	<i>SD</i>
Hours in	< 10 hours	87	.01	.99
workshops/class	10 hours or more	11	-.28	1.03
about ADHD				
Family or friend	Yes	41	-.11	.94
with ADHD	No	59	.07	1.04

Table 14 reports PST characteristics on the AOLK (McIntyre, 2005) with no significant differences found for hours in workshops or classes about ADHD, $t(86) = -1.71, p = .091$; and having a family or friend with ADHD, $t(92) = -.763, p = .448$.

Table 14.

Standardized AOLK Scores by Pre-Service Teachers' Characteristics

Characteristics		<i>N</i>	<i>M</i>	<i>SD</i>
Hours in	< 10 hours	82	-.01	.96
workshops/class	10 hours or more	11	.10	1.36
about ADHD				
Family or friend	Yes	39	-.09	1.16
with ADHD	No	55	.07	.87

Research Question 1:

Is there a difference in ADHD knowledge between pre-service and in-service teachers? If so, what are those differences?

Independent t-tests were performed on the raw scores of the K-ADHD (Jerome et al., 1994) and the KADDS (Sciutto et al., 2000) to determine whether the samples differed in the knowledge about ADHD. No significant differences were found between the groups on the K-ADHD (Jerome et al., 1994), $t(160) = -1.60, p = .111$. A significant difference was found on the KADDS (Sciutto et al., 2000), $t(162) = -1.99, p = .049$, with in-service teachers scoring higher than pre-service teachers. However, if the p value is corrected to .01 to reflect the four

dependent variables assessed, then the difference disappears. Independent t-tests were also performed on the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) and the AOLK (McIntyre, 2005) to further assess if the groups varied on dependent variables. No significant difference was found on the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982), $t(154) = -.49$, $p = .628$. However, a significant difference was found on the AOLK (McIntyre, 2005), $t(147) = -4.13$, $p = .000$, with in-service teachers scoring substantially higher than pre-service teachers. Table 15 displays raw scores on the K-ADHD (Jerome et al., 1994), KADDS (Sciutto et al., 2000), MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982), and AOLK (McIntyre, 2005) for both samples post data cleaning

Table 15.

Cleaned Raw Scores on K-ADHD, KADDS, MC-SDS, and AOLK for In-Service and Pre-Service Teachers

Scale	In- Service Teachers			Pre-Service Teachers		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
K-ADHD	64	12.87	3.57	98	13.73	3.03
KADDS	66	19.57*	5.29	98	17.82*	5.73
MC-SDS	56	5.66	3.43	100	5.40	3.08
AOLK	55	27.25**	9.34	94	21.20**	8.18

* $p < .05$, ** $p < .01$

Welch's F tests were further conducted to reduce the possibility of a Type I error, when equal variances of groups cannot be assumed. Significant differences between the IST and PST groups were found on the K-ADHD (Jerome et al., 1994) scale $F(1, 162) = 5.51$, $p = .020$; the

KADDS (Sciutto et al., 2000) $F(1, 153) = 5.51, p = .020$; and the AOLK (McIntyre, 2000) $F(1, 101) = 15.93, p = .000$ indicating that the equality of variance assumption is violated. No significance was found between the IST and PST groups on the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) $F(1, 104) = .222, p = .638$. The Welch's F test is considered more powerful than the t-test, thus reporting more accurate results that differences exist between IST and PST groups. However, once the p value is adjusted to .01 to reflect the dependent variables, most of the differences between groups disappear.

Although significant differences for ADHD knowledge were not found after correcting the p value on the t-test and Welch's F test, there are differences in how in-service and pre-service teachers responded to items within the tests. Frequencies were analyzed on the K-ADHD (Jerome et al., 1994) scale to assess individual items between IST and PST. Table 16 is a listing of percentage of correct and incorrect responses between groups. Generally, IST had higher percentages of correct responses than PST. However, this was not found on all items. The reverse was found on 5 out of 20 items.

Table 16.

Frequency of Scores on the K-ADHD scale for In-Service and Pre-Service Teachers

Item	IST		PST	
	Frequency (%)		Frequency (%)	
	True	False	True	False
1. ADHD can be caused by poor parenting practices	15.2	81.8*	25.2	73.8*
2. ADHD can often be caused by sugar or food additives	51.5	45.5*	35.9	63.1*
3. Children with ADHD are born with biological vulnerabilities toward inattention and poor self-control	69.7*	27.3	57.3*	41.7
4. A child can be appropriately labeled as ADHD and not necessarily be over-active.	47.0*	50.0	68.0*	31.1
5. Children with ADHD always need a quiet, sterile environment in order to concentrate on tasks.	42.4	54.5*	34.0	65.0*
6. Children with ADHD misbehave primarily because they don't want to follow rules and complete assignments.	3.0	93.9*	12.6	86.4*
7. The inattention of children with ADHD is not primarily a consequence of defiance, oppositionality, and an unwillingness to please others.	75.8*	21.2	61.2*	37.9

8. ADHD is a medical disorder that can only be treated with medication.	27.3	69.7*	33.0	66.0*
9. Children with ADHD could do better if they only would try harder.	7.6	89.4*	14.6	84.5*
10. Children with ADHD outgrow their disorder and are normal as adults.	15.2	81.8*	35.9	63.1*
11. ADHD can be inherited.	59.1*	37.9	44.7*	54.4
12. If medication is prescribed, educational interventions are often unnecessary.	19.7	77.3*	20.4	78.6*
13. If a child can get excellent grades one day and awful grades the next, then he/she must not have ADHD.	10.6	86.4*	23.3	75.7*
14. Diets are usually not helpful in treating ADHD.	9.1*	87.9	11.7*	87.4
15. If a child can play Nintendo for hours, he/she probably isn't ADHD.	13.6	83.3*	20.4	78.6*
16. Children with ADHD have a high risk for becoming delinquent as teenagers.	37.9*	59.1	34.0*	65.0
17. Children with ADHD are typically better behaved in 1-to-1 interactions than in a group situation	80.3*	16.7	51.5*	47.6
18. ADHD often results from a chaotic, dysfunctional family life.	9.1	87.9*	24.3	74.8*

19. ADHD occurs equally often in girls and boys.	40.9	56.1*	46.6	52.4*
20. ADHD occurs more in minority groups than in Caucasian groups.	51.5	45.5*	62.1	36.9*

* correct response.

Frequencies were also analyzed on the KADDS (Sciutto et al, 2000) to see if participants responded in the same manner to similar items on the K-ADHD (Jerome et al., 1994). Table 17 is a listing of percentage of correct and incorrect responses between groups. It was generally found again that IST had higher percentages of correct responses than PST. The reverse was found on 11 out of 36 items.

Table 17.

Frequency of Scores on the KADDS for In-Service and Pre-Service Teachers

Item	IST		PST	
	Frequency (%)		Frequency (%)	
	True	False	True	False
1. Prevalence.	80.3	19.7*	76.7	20.4*
2. Parenting skills.	13.6	86.4*	16.5	80.6*
3. Extraneous stimuli.	90.9*	9.1	85.4*	11.7
4. Compliance with fathers.	4.5*	95.5	15.5*	81.6
5. Diagnosis before age 7.	13.6*	86.4	15.5*	81.6
6. Biological relatives.	24.2*	75.8	25.2*	71.8
7. Physical cruelty to other people.	34.8	65.2*	31.1	66.0*
8. Antidepressant drugs.	27.3*	72.7	17.5*	79.6
9. Squirm in their seats.	93.9*	6.1	80.6*	16.5
10. Parent and teacher training.	81.8*	18.2	70.9*	26.2
11. Inflated sense of self-esteem.	45.5	54.5*	59.2	37.9*
12. Termination of treatment.	18.2	81.8*	31.1	66.0*
13. Adult diagnosis with ADHD.	93.9*	6.1	81.6*	15.5
14. Destroy other people's things.	59.1	40.9*	58.3	38.8*
15. Side effects of stimulant drugs.	72.7*	27.3	56.3*	40.8
16. Clusters of symptoms.	81.8*	18.2	76.7*	20.4

17. Depression and ADHD.	43.9*	56.1	32.0*	65.0
18. Psychotherapy and treatment.	51.5	48.5*	70.9	26.2*
19. Outgrow symptoms.	33.3	66.7*	40.8	56.3*
20. Medication and treatment.	34.8*	65.2	46.6*	50.5
21. Symptoms in two or more settings.	72.7*	27.3	63.1*	34.0
22. Sustained attention to video games.	10.6	89.4*	23.3	73.8*
23. Sugar and hyperactivity.	78.8	21.2*	64.1	33.0*
24. Diagnosis and special education.	22.7	77.3*	54.4	42.7*
25. Stimulant drugs to treat.	33.3*	66.7	36.9*	60.2
26. Organization.	87.9*	12.1	71.8*	25.2
27. Problems in novel situations.	92.4	7.6*	89.3	7.8*
28. Physical features.	54.5	45.5*	39.8	57.3*
29. ADHD prevalence in males and females.	36.4	63.6*	47.6	49.5*
30. Problem behaviors of ADHD children.	69.7	30.3*	71.8	25.2*
31. Children with ADHD are distinguishable.	69.7*	30.3	53.4*	43.7
32. Poor school performance.	81.8*	18.2	55.3*	41.7
33. Chaotic home environments.	28.8*	71.2	30.1*	67.0
34. Interventions and problems with inattention.	77.3	22.7*	84.5	12.6*
35. Electroconvulsive Therapy and treatment.	84.8	15.2*	68.0	29.1*
36. Punishment as treatment.	16.7	83.3*	30.1	67.0*

* correct response.

NOTE: Items have been abbreviated. Refer to Dr. Mark Sciotto for scale details.

Research Question 2:

What psychometric evidence can be found for the K-ADHD scale (Jerome et al., 1994) on in-service and pre-service teacher samples?

In response to the second question, reliability evidence was gathered on the scales' raw scores to test the appropriateness of the scales' use. The internal consistency of the scale was analyzed to determine the reliability of the K-ADHD scale (Jerome et al., 1994) for each sample. The internal consistency on the KADDS (Sciutto et al., 2000), MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982), and the AOLK (McIntyre, 2005) were also analyzed to support using these scales to draw comparisons. Table 18 depicts the internal consistencies for all scales for each group. The results suggest that nearly all the alpha levels are acceptable, except the K-ADHD (Jerome et al., 1994) within the in-service teacher group.

Table 18.

Cronbach's Alphas for Scales in In-Service and Pre-Service Teachers

Scale	Cronbach's Alphas	
	IST	PST
K-ADHD	.66	.81
KADDS	.80	.84
MC-SDS	.89	.75
AOLK	.81	.85

The K-ADHD (Jerome et al., 1994) scale was further analyzed by its' item-total statistics to assess whether items within the scale could be deleted to increase the alpha level. Table 19

displays the item-total statistics for IST. The results for IST suggest that the alpha values fluctuate modestly around the .66 level of the total scale when an item is dropped from the analyses. Furthermore, there are also small fluctuations noticed in the item means and variances when an item is deleted.

Table 19.

Item-Total Statistics for K-ADHD in In-Service Teachers

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	12.89	8.96	.42	.67
2	13.27	8.23	.24	.65
3	13.02	8.14	.32	.64
4	13.25	8.22	.25	.65
5	13.17	8.24	.24	.65
6	12.77	9.20	-.04	.67
7	12.95	8.43	.24	.65
8	13.02	8.52	.17	.66
9	12.81	8.79	.20	.66
10	12.89	8.13	.44	.63
11	13.13	8.05	.32	.64
12	12.94	8.66	.15	.66
13	12.84	8.58	.27	.65
14	13.64	8.68	.24	.65

15	12.88	8.43	.31	.65
16	13.34	7.79	.42	.63
17	12.91	8.98	.03	.67
18	12.83	8.68	.24	.65
19	13.16	7.85	.39	.63
20	13.27	8.14	.28	.65

Table 20 displays the item-total statistics for PST. The results of the alphas for PST suggest that the alpha values decrease slightly when an item is dropped. As displayed, the item means, variances and item-total correlations fluctuate modestly when an item is omitted from the scale. To further assess scales items, inter-item correlations were conducted. Inter-item correlations for in-service teachers ranged from $r = .00$ to $r = .49$, with the majority of items having a weak correlation to each other (i.e. $r < .20$). Inter-item correlations for pre-service teachers ranged from $r = .00$ to $r = .56$, with the majority also having weak to modest correlations to one another (i.e. $r > .20 < .50$).

Table 20.

Item-Total Statistics for K-ADHD in Pre-Service Teachers

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	11.65	16.21	.40	.80
2	11.75	16.25	.35	.81
3	11.81	15.86	.44	.80
4	11.71	16.41	.32	.81
5	11.74	16.57	.26	.81
6	11.52	16.21	.56	.80
7	11.77	16.37	.31	.81
8	11.73	16.44	.30	.81
9	11.54	16.43	.44	.80
10	11.75	15.97	.42	.80
11	11.94	15.76	.46	.80
12	11.60	16.08	.48	.80
13	11.63	16.10	.45	.80
14	12.27	16.93	.30	.81
15	11.60	15.99	.52	.80
16	12.05	16.52	.28	.81
17	11.87	16.21	.34	.81
18	11.64	16.35	.37	.81

19	11.86	15.86	.43	.80
20	12.02	16.40	.30	.81

Validity of the K-ADHD scale (Jerome et al., 1994) was analyzed in relation to the KADDS (Scuitto et al., 2000), MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982), and the AOLK (McIntyre, 2005) for IST. Table 21 displays the correlations between the scales for IST. The results suggest a significant correlation between the K-ADHD (Jerome et al., 1994) and the KADDS (Scuitto et al., 2000) for IST at $p < .01$. Furthermore, the K-ADHD (Jerome et al., 1994) did not show significant correlations with the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) and the AOLK (McIntyre, 2005) for IST. The KADDS (Scuitto et al., 2000) also did not show significant correlations with the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) and the AOLK (McIntyre, 2005).

Table 21

Correlations for the K-ADHD, KADDS, MC-SDS, and AOLK for In-Service Teachers

Scale	K-ADHD	KADDS	MC-SDS	AOLK
K-ADHD	1	.63**	-.00	-.00
KADDS	.63**	1	-.08	.22
MC-SDS	-.00	-.08	1	-.05
AOLK	-.00	.22	-.05	1

** $p < .01$

In comparison, Table 22 displays the correlations between the scales for PST. The results suggest that the K-ADHD (Jerome et al., 1994) is significantly related to all other scales, with

the most significant correlation to the KADDS (Sciutto et al., 2000) at $p < .01$. Furthermore, the KADDS (Sciutto et al., 2000) and the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) had significant correlations to the AOLK (McIntyre, 2005) at $p < .05$.

Table 22

Correlations for the K-ADHD, KADDS, MC-SDS, and AOLK for Pre-Service Teachers

Scale	K-ADHD	KADDS	MC-SDS	AOLK
K-ADHD	1	.74**	-.21*	.28**
KADDS	.74**	1	-.15	.24*
MC-SDS	-.21*	-.15	1	-.25*
AOLK	-.28**	.24*	-.25*	1

** $p < .01$, * $p < .05$

Correlations were also conducted for each item on the K-ADHD (Jerome et al., 1994) scale with total scores on the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) to assess whether respondents answered to particular items in a socially desirable manner. Table 23 indicates the correlations per item on the K-ADHD (Jerome et al., 1994) and the MC-SDS on both samples. These results indicated that item 10 for the pre-service teachers had a significantly small correlation to the MC-SDS (Marlowe & Crowne, 1960; Reynolds, 1982) suggesting the possibility of a socially desirable response.

Table 23.

Item Correlations on the K-ADHD with Total Scores on the MC-SDS for In-Service and Pre-Service Teachers

K-ADHD	r^a	r^b
Item	MC-SDS	MC-SDS
1	.09	-.07
2	-.08	-.16
3	.12	-.10
4	.02	-.03
5	-.14	-.05
6	.07	-.04
7	-.22	.00
8	.25	-.01
9	.15	-.09
10	-.00	-.28**
11	-.12	-.11
12	-.09	-.16
13	-.02	-.12
14	-.01	.04
15	.12	-.14
16	.02	-.10
17	.01	-.13
18	.06	-.03

19	-.17	-.19
20	-.03	.01

^a indicates IST, ^b indicates PST, ** p<.01

The results indicate that the revised K-ADHD (Jerome et al., 1994) scale has some evidence of construct validity (i.e., convergent and divergent) in both in-service and pre-service teacher samples. However, the internal consistency of the K-ADHD (Jerome et al., 1994) scale for both samples was questionable. Furthermore, the total item statistics do not indicate much variance between the items or moderate to large inter-item correlations. Therefore, the revised K-ADHD (Jerome et al., 1994) should be modified to consider scale development aspects, such as: response options, scale length, domain specifications, and variances among items, to name a few.

CHAPTER 5

Discussion

The purpose of this chapter is to discuss the findings in this study. This chapter will discuss the findings, implications, limitations, and future directions. The goal of the study was to assess in-service and pre-service teachers' knowledge of ADHD, and the validity of the K-ADHD (Jerome et al., 1994) scale.

Findings

The dual purpose of the study was to examine teachers' knowledge (in-service and pre-service) about ADHD and to investigate the validity of the K-ADHD (Jerome et al., 1994) scale.

Research Question 1: Are there any differences between in-service and pre-service teachers' knowledge of ADHD on the K-ADHD (Jerome et al., 1994) scale? If so, what are those differences?

To the first purpose, in-service teachers' knowledge did differ from pre-service teachers' overall knowledge on the K-ADHD (Jerome et al., 1994) scale and the KADDS (Sciutto et al., 2000) at the $p < .05$ level when Welch's F tests were conducted. This finding is not surprising given that the populations are different. For example, teachers who taught more than 10 students with ADHD and spent more than 10 hours in workshops or classes outperformed their colleagues who did not have the extent of experience with students with ADHD or time spent on in-service training. Pre-service teachers do not have extensive experience with students with ADHD and have not spent time on ADHD in-service training. Therefore, it was expected that there would be differences in knowledge of ADHD.

The finding is also important because it is most likely that only one of these knowledge scales would be selected to conduct future studies. Therefore, the items on the scales should be analyzed closer to determine domains of specifications. As both scales assess knowledge of ADHD, it is plausible that some of the content is the same on the scales. However, the difficulty and distribution of items among content areas may differ (Hoyt, Warbasse, & Chu, 2006). To further analyze these discrepancies, frequencies were computed to identify correct responses on items from both the K-ADHD (Jerome et al., 1994) and the KADDS (Sciutto et al., 2000).

For example, more PST (63%) correctly identified that ADHD cannot be caused by sugar or food additives than IST (46%) on the K-ADHD (Jerome et al., 1994) scale. Furthermore, slightly more PST (12%) than IST (9%) correctly identified that diets are not helpful in treating ADHD on the K-ADHD (Jerome et al., 1994) scale. However, 33% of PST and 21% of IST correctly identified that reducing dietary intake of sugar or food additives is generally ineffective in reducing the symptoms of ADHD on the KADDS (Sciutto et al., 2000). The fact that more PST than IST correctly answered questions on these scales regarding dietary issues related to ADHD may indicate that curriculum over the years may be changing to address this issue. Furthermore, pre-service teachers have access to more recent information in their classes versus in-service teachers who would have to go out of their way to access this information. However, the continuing low correct percentages for both samples is indicative that teachers' cognitions are not easily changed (Verloop et al., 2001), regardless of accuracy. It is also possible that pre-service teachers adopt the knowledge of their mentor teacher as a reference for their own knowledge development (Verloop et al., 2001). Thus, if in-service teachers have not changed their views on diet being related to ADHD, then pre-service teachers may be unsure of the

correctness of this issue. Therefore, the information that mentor teachers are passing along to pre-service teachers may be contradictory to what the pre-service teachers are learning in class.

On the contrary to the issue of diet as a treatment for ADHD, teachers cannot be blamed for adopting their dietary views. Both IST (53.0%) and PST (28.2%) indicated that the internet is a major source of their ADHD information. Furthermore, not only are websites promoting alternative homeopathic medicine, but medical doctors are also promoting dietary strategies for children with ADHD on websites. It is plausible that these sites are posting information from resources that have not been peer reviewed. There are studies that support the belief that dietary strategies aid in alleviating symptoms of ADHD. For example, McCann, Barrett, and Cooper (2007) found that artificial food coloring and additives caused increased hyperactivity in 3 to 4 year olds and 8 to 9 year olds. In addition, Stevens et al. (1995) found improved conduct problems and attention after supplementing children with omega-3 and omega-6 fatty acids. Furthermore, Bilici et al. (2004) indicated that zinc alleviated symptoms of impulsivity, hyperactivity, and difficulties in socialization in children and adolescents with ADHD. There is some recent evidence to suggest positive treatment effects of diet and supplementation on children with ADHD (Richardson, 2006; Sinn & Bryan, 2007). However, these findings are fairly isolated and a body of evidence still does not support this belief.

For approximately 15 years, teachers have not changed their views on diet and ADHD. Teachers may feel persuaded on this issue by parents, as there are growing numbers of parents who are seeking natural treatments for their children with ADHD and want alternative solutions to stimulant medication (Weber & Newmark, 2007). Dietary changes are not easy to implement and take a lot of time and effort with trial and error of possible combinations of food and

supplements for each child dependent on symptoms. The fact that dietary changes, vitamin supplementation, and herbal and natural health remedies have been overshadowed in the past by the efficiency of stimulant medication may be more indicative of the demands placed at finding timely solutions to ADHD related problems. However, the degree of effects of such dietary or supplementary changes is unclear. Perhaps, the K-ADHD (Jerome et al., 1994) and other knowledge of ADHD scales need to adjust or delete certain items that are controversial or confusing to teachers.

In-service (69.7%) and pre-service (66.0%) teachers' knowledge on the K-ADHD (Jerome et al., 1994) item "ADHD is a medical disorder that can only be treated with medication" was found comparable (Jerome et al., 1994). In-service (33.3%) and pre-service (36.9%) teachers' knowledge on the KADDS (Sciutto et al., 2000) item "Stimulant drugs are the most common type of drug used to treat children with ADHD" was also similar. However, the KADDS (Sciutto et al., 2000) indicated that IST (72.7%) were more aware of the side effects of stimulant drugs than PST (56.3%), while PST (46.6%) were more aware that medication is often used before other behavior modification techniques in severe ADHD cases than IST (34.8%). These findings may be more indicative of in-service teachers' attitudes toward stimulant medication than their knowledge. For instance, IST may be less inclined to view stimulant medication as a treatment option because they are more aware of the side effects these drugs have on children with ADHD. Perhaps, IST are well aware that stimulant medication may cause side effects such as decreased appetite, insomnia, and abdominal pain (Weber & Newmark, 2007). In-service teachers may view that the child's physical well being is far more important than the child's unruly behaviour. For example, Curtis et al. (2006) found that teachers in New

Zealand were less accepting toward medication as an effective means of treatment than teachers from America. Canadian teachers may be similar to New Zealand teachers in their views regarding medication of children with ADHD. However, another possible explanation for these findings coincides with the results in Ohan et al. (2008) in that teachers with low (i.e. raw scores < 13.00 on the K-ADHD) knowledge had less convictions of medication than those with average (i.e. raw scores between 13.00 and 15.00 on the K-ADHD) knowledge. In this study, IST (raw mean score = 12.87) had less overall knowledge on the K-ADHD (Jerome et al., 1994) scale than PST (raw mean score = 13.73). Although knowledge scores were not statistically significantly different, according to Ohan et al., (2008) PST had average scores, while IST had low scores on the K-ADHD (Jerome et al., 1994). However, it is not known if scores on the KADDS (Sciutto et al., 2000) are similarly related to teachers' perceptions and behaviours of ADHD, as the KADDS (Sciutto et al., 2000) has not been used to assess these relationships.

Research Question 2: What psychometric evidence can be found to support the use of the K-ADHD (Jerome et al., 1994) scale?

It is unknown if the internal reliability of the K-ADHD (Jerome et al., 1994) in previous research has been adequate, as studies have failed to report this statistical evidence. The lack of evidence reported in previous research may suggest that the scale produces unstable values (DeVellis, 2003). The reliability evidence on the K-ADHD (Jerome et al., 1994) scale for the in-service teacher sample suggests an undesirable value of .66 (DeVellis, 2003). An alpha less than .70 is considered undesirable because the lower the internal consistency is, the higher the unshared error in scale scores (DeVellis, 2003). In contrast, the internal reliability of the K-ADHD (Jerome et al., 1994) scale for the pre-service teacher sample suggests a very good value

of .81 (DeVellis, 2003). A value over .80 is desirable because the unshared error is reduced in the scale scores (DeVellis, 2003). The plausible reason for differences in coefficient α may be due to the asymmetry of the pre-service teacher sample. The asymmetry of the pre-service sample could have been due to the fact that there were three response options (true, false, and don't know), rather than two (true and false) as per the original K-ADHD (Jerome et al., 1994) scale. Furthermore, pre-service teachers who decided to participate in the study may have had a comfortable knowledge base on ADHD, than those who chose not to participate. As reported, the in-service teacher sample had a skewness of -.38 and kurtosis of -1.04, while the pre-service teacher sample had a skewness of -1.63 and kurtosis of .23 after outliers were eliminated from standardized scores on the scale. As the pre-service teacher sample was more negatively skewed than the in-service teacher sample, the pre-service teacher sample could have been biased by asymmetric outlier contamination (Liu & Zumbo, 2007). In fact, coefficient α estimates may inflate as large as .55 due to asymmetric outlier contamination (Liu & Zumbo, 2007). Specifically, a reliability of .40 can be spuriously inflated to as much as .95, and be reported as highly reliable in error (Liu & Zumbo, 2007). Thus, it is very likely that the reliability of .82 found in the pre-service teacher sample is a positively biased value. This finding may indicate that the K-ADHD (Jerome et al., 1994) scale is solely intended for an in-service teacher sample. Rural IST may be a very homogenous sample, which may decrease the reliability of the scale. Furthermore, some other possibilities for the low reliability estimate for IST is that the scale lacks in the number of items, lacks in item variance, is more reliable with two response options, or is multidimensional in nature (Cortina, 1993).

Item-total statistics on the K-ADHD (Jerome et al., 1994) for the in-service teacher sample did not produce favourable results for the scale. Deletion of items that produced low item-total correlations did not result in adequate coefficient estimates. As displayed in Table 19, the scale means and variance if an item is deleted remains relatively stable. DeVellis (2003) suggested that a good scale has items with a larger spread. Thus, the larger the item variance the more that item contributes to the overall test variance (DeVellis, 2003). Due to the fact that the scale has binary items (i.e. correct or incorrect), very little variance and covariance can be obtained unless the scale is lengthy (DeVellis, 2003). Furthermore, binary items are also fairly easy to answer, which is why the scale mean total (even after items are deleted) is over the centre (i.e. 10) of the range of raw scores (i.e. 0 - 20). The K-ADHD (Jerome et al., 1994) scale in this study is an example of a measure that produces a lopsided mean and low variance for both in-service and pre-service teachers.

Inter-item correlations were also computed to further assess items. Very few items within the scale reached a moderate correlation range ($r = .30$ to $.50$) for IST. The K-ADHD (Jerome et al., 1994) scale has more than 18 items, which should yield acceptable coefficient alpha levels (i.e. $> .70$), even though the items have small correlations (Cortina, 1993). In fact, a unidimensional scale with 18 items can yield an alpha level of .88 when inter-item correlations are .30 (Cortina, 1993). The fact that the K-ADHD (Jerome et al., 1994) scale is producing an alpha level of .65 with the target population of in-service teachers on a 20-item scale suggests that the scale may be multidimensional. Cortina (1993) suggests that scales with 18 items, three dimensions, and inter-item correlations of approximately $r = .30$ will yield a coefficient alpha of .64 (precision at .01). Furthermore, Curtis et al. (2006) reported that the K-ADHD (Jerome et

al., 1994) scale has three domains consisting of etiology, diagnostic characteristics, and treatment, although there has never been any formal indication that subscales exist within the instrument. Thus, the K-ADHD (Jerome et al., 1994) may have an inadequate amount of items if evidence can be found that the scale is multidimensional. If the K-ADHD (Jerome et al., 1994) scale is truly multidimensional, then additional items should be developed.

Validity evidence for the K-ADHD (Jerome et al., 1994) scale is displayed in Table 21 for IST and Table 22 for PST. Cohen (1988) suggests that strong associations between measures are displayed at the $r = .50$ level, and can be viewed as evidence for convergence. Convergent validity evidence for the K-ADHD (Jerome et al., 1994) was found with large significant positive correlations with the KADDS (Sciutto et al., 2000) for both in-service ($r = .63$) and pre-service ($r = .74$) teachers. This finding is expected considering both scales assess the same construct of knowledge of ADHD.

Cohen (1988) also suggested that weak to moderate associations around the $r = .2$ level are viewed as evidence for divergence between measures. Divergent validity evidence was found for the K-ADHD (Jerome et al., 1994) with low correlations with the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) for in-service ($r = -.00$) and pre-service ($r = -.21$) teachers. This was also an expected finding because the K-ADHD (Jerome et al., 1994) and the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982) are measuring different constructs (i.e. ADHD knowledge versus social desirability). Low correlations were also found between the K-ADHD (Jerome et al., 1994) and the AOLK (McIntyre, 2005) for in-service ($r = -.00$) and pre-service ($r = -.28$) teachers. Significantly small associations were found between the KADDS (Sciutto et al., 2000) ($r = .24$) and the AOLK (McIntyre, 2005), and the MC-SDS (Crowne & Marlowe,

1960; Reynolds, 1982) ($r = -.25$) and the AOLK (McIntyre, 2005) for pre-service teachers only. Although the data suggests that some of these low correlations are significant ($p < .05$), the weak associations remains within the boundaries as evidence for divergence between constructs.

It is plausible that PST are more likely to have limited knowledge in both ADHD and oral language, which is why significant negative correlations were found amongst the K-ADHD (Jerome et al., 1994), the KADDS (Sciutto et al., 2000), and the AOLK (McIntyre, 2005). As PST have not completed their studies to qualify themselves as certified teachers, they may not have had classes with special education content. Therefore, their all-around level of knowledge may be the underlying factor producing correlations between these scales. It is also plausible that the less knowledge that PST have, the more likely they are to respond in a socially desirable manner. However, the low correlations between social desirability and the knowledge scales are still within the boundaries as examples of discriminant validity.

In-service teachers did not answer items on the K-ADHD (Jerome et al., 1994) in a socially desirable manner. There was no indication found that items on the K-ADHD (Jerome et al., 1994) should be excluded because all items had a very low correlation to the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982). The pre-service teacher group had one item (item 10) that had a low negative correlation ($r = -.28, p < .01$) to the MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982). This finding suggests that pre-service teachers were more likely to respond in a socially desirable manner to this item. It is possible that pre-service teachers were more sensitive to the wording of this item than in-service teachers, as the item is suggestive of children with ADHD outgrowing the disorder to become *normal* adults. As the disorder is performance focused, the question of *normality* is subject to the excessiveness of *normal*

behaviours exhibited mainly in an educational setting. Pre-service teachers may not understand where excessiveness of certain behaviours becomes *abnormal*, thus responding to this question in a slightly more biased manner. However, this item is difficult to interpret as recent findings with the NIHM suggest that thinner brain regions of children with ADHD thicken as the children grow, thus reducing ADHD symptoms that were previously exhibited (NIMH, 2008). Therefore, the accuracy of this item is questionable, due to recent research findings.

Implications

This study has implications for education administrators, teachers (in-service and pre-service), children with ADHD, and families of children with ADHD.

This study has highlighted the importance of improving knowledge transference of evidenced-based research into practical application. The study is suggestive that many myths, misconceptions, and lack of knowledge still remain surrounding the ADHD disorder. From the analysis, a few suggestions can be made to improve knowledge of ADHD to in-service and pre-service teachers. These suggestions are twofold: (1) the need to incorporate other measures or revise instruments in assessing teacher knowledge of ADHD in order to specify domains of ADHD knowledge; and (2) the need to modify education curriculum and/or in-service training (i.e. workshops).

Although the K-ADHD (Jerome et al., 1994) scale is a convenient tool to quickly assess teachers' general knowledge of ADHD, it has shown to produce low internal consistency for intended in-service teacher populations. Unacceptable or minimally accepted values of alpha may contain more error variance, which leads to lower inter-item correlations. There is some evidence from the study that is suggestive that the K-ADHD (Jerome et al., 1994) scale is not a

unidimensional measure, yet domains have not been established. While many researchers are quick to adopt the use of the K-ADHD (Jerome et al., 1994) due to its' relatively short form, it may be time to use an instrument such as the KADDS (Sciutto et al., 2000) to narrow the scope from general to specific ADHD knowledge domains in teachers. The utility in understanding specific ADHD knowledge in teachers is: (1) to allow for better accuracy in determining what teachers know from what they do not; (2) to effectively design, evaluate, and implement educational and behavioural interventions; and (3) to reliably assess whether knowledge transfer of ADHD to teachers has permanently changed classroom behaviour in both teachers and students. Furthermore, the utility in a scale, such as the KADDS (Sciutto et al., 2000), is that consideration for response format, length of scale, dimensionality, and empirical evidence has been made during scale development. Thus, results found from carefully constructed scales can be more confidently interpreted and reported.

Modifying teachers' knowledge through education curriculum and/or workshops not only impacts how teachers perceive and deal with children who have the disorder, but these children's families are also impacted by the knowledge that teachers hold. Children with ADHD will be affected by the accuracy of information that their teachers hold. In fact, Graczyk et al. (2005) found that urban teachers generally have little faith that common intervention practices (i.e. medication, professional help, or classroom changes) are beneficial treatment options for children with ADHD. Therefore, if teachers do not believe that changes to the classroom are going to help the child, then they will likely be unwilling to implement these techniques. Thus, the child is not likely to receive an intervention plan that effectively addresses his or her needs within the classroom. Rostain, Power, and Atkins (1993) suggest that educators with extensive

ADHD knowledge are likely to have accumulated both correct and incorrect information on the disorder. Furthermore, these teachers are also unlikely to differentiate between the accurate and inaccurate knowledge that they hold (Rostain et al., 1993). It is also probable that parents of children with ADHD are influenced by the information that teachers are passing onto to them regardless of accuracy (DiBattista & Shephard, 1993). Thus, if teachers feel that common interventions are not worthwhile endeavours, then the parents may also view these interventions in a pessimistic manner.

Limitations

There are a few limitations to the findings of this study. This section addresses these issues and how they might be avoided in future studies. The main shortcomings were: (1) relatively small sample sizes; (2) the inability to assess structural validity of the K-ADHD (Jerome et al., 1994) scale; and (3) the inability to assess the stability of the results over time.

Due to the generally small sample sizes obtained using a random sample with a narrow population, a convenience sample was used to obtain data for this study, as the response rates for teacher populations are relatively low. A convenience sample for in-service teachers was collected within the Horizon School Division in rural Saskatchewan, and also for the pre-service teachers, which was collected at the University of Saskatchewan. A convenience sample was used because of the generally low response rate of teachers. The generalization of the study was compromised, as all school divisions within Saskatchewan were not surveyed. Thus, it is unknown if teachers within the Horizon School Division are significantly different than other teacher samples within Saskatchewan. This study can only defensibly generalize to *like* Horizon

School Division schools. The same can also be said about the pre-service teachers, who were obtained from the University of Saskatchewan only.

Furthermore, due to the relatively small samples of in-service ($n = 66$) and pre-service ($n = 102$) teachers, missing data, and unequal N 's in samples, analysis on the data was limited to basic statistical techniques. The use of MANOVA would have been helpful instead of running separate ANOVAs and t-tests, as multiple dependent variables were assessed on in-service and pre-service teachers. For example, a MANOVA may have been a more powerful test to assess differences between in-service and pre-service teachers on the K-ADHD (Jerome et al., 1994) and the KADDS (Sciutto et al., 2000). However, because of missing data and unequal N 's, the minimum of 20 cases per cell would have been violated had a MANOVA been utilized with all variables (Tabachnick & Fidell, 2007). Therefore, pre-empted hypotheses were carefully considered so that they were not complicated, due to anticipated sample sizes. The Welch's F test was of choice to deal with the possibility of the conditions being nonnormal and heterogeneous (Guo & Luh, 2008). Although each scale used for the analysis had varying degrees of missing data, the ratio between in-service and pre-service groups fluctuated around a ratio of 1:2. The 1:2 ratio was a rule of thumb that was considered, as size for unequal variances need to be larger than samples with equal variances (Guo, & Luh, 2008). In fact, "If the standard deviation ratio is 1:2, the corresponding group size ratio is also 1:2," (Guo, & Luh, 2008, p. 965). The standard deviations in this study had less than a ratio of 1:2, however, this ratio was adopted to try to increase power in the study. In sum, although there were shortcomings with the sample sizes and missing data, adequate consideration was taken to accommodate these limitations.

Although this study attempted to collect validity evidence on the K-ADHD (Jerome et al., 1994) scale, time constraints did not warrant collection of large sample sizes to assess the structural validity of the scale. Exploratory factor analysis is typically used to determine the underlying factor structure within a scale and its' reliability. Although there is some idea on the nature of the factors involved in the K-ADHD (Jerome et al., 1994) scale, it could not be statistically explored or confirmed what factors exist within the scale. In addition, although coefficient alphas and inter-item correlations produced evidence for the communalities of the items, this information is not helpful in assessing the stability across time for these groups. Thus, this study was limited in the psychometric evidence that was found, as test-retest reliability and structural validity evidence was not conducted to neither support nor discourage use of the K-ADHD (Jerome et al., 1994) due to time constraints.

Lastly, rural teachers only were assessed for the in-service teacher sample. It is undetermined whether rural teachers differ from urban teachers in Saskatchewan on their ADHD knowledge, as this phenomenon has never been tested. However, Martin and Yin (1999) suggest that there are urban and rural differences regarding beliefs in classroom management in secondary level teachers in America. In fact, rural teachers were found to be more interventionist on instructional management within the classroom than urban teachers (Martin & Yin, 1999). Conversely, urban teachers were found to be more people management oriented (Martin & Yin, 1999). Furthermore, there are differences that exist between the cultures of urban and rural schools. In fact, Reuter (1992) suggested that in American, rural teachers were not encouraged to participate in professional development, as this would lead to increased salary expectations, which the school districts were not willing to compensate. However, urban

teachers were encouraged to advance their careers through encouragement to enroll in graduate programs (Reuter, 1992). It is not known whether these variables impact ADHD knowledge in teachers or whether these findings are true for Canadian teachers. However, the generalizability of the results in the current study is questionable due to possible differences between urban and rural educators.

The limitations of this study were mainly due to time constraints and the practicalities of collecting primary data. Future studies should be prepared to collect data for an extended period of time in various school divisions in order to collect a sample of approximately 300 in-service and 300 pre-service teachers. The following section will address future directions in assessing teachers' ADHD knowledge, with emphasis on how this knowledge is being integrated into classroom practice.

Future Directions

In order to meet the educational needs of children with ADHD, teachers must first have an adequate knowledge base of the disorder. Assessment for learning should not only be applicable to students, but teachers as well. Often times, it is only the student who is assessed and evaluated in order to implement change to meet his or her needs. However, teachers who develop curriculum and interventions for these children are often overlooked in the assessment/evaluation process. The purpose of evaluating teachers' ADHD knowledge is to provide professional development training for in-service teachers or make improvements to curriculum for pre-service teachers. Considering the comparatively low level of in-service teachers' ADHD knowledge (64%) to other studies, which indicate approximately 10% greater knowledge base of ADHD, it is questionable whether these teachers are adequately meeting the

needs of children with ADHD. However, this finding may indicate that the results in previous studies using the K-ADHD (Jerome et al., 1994) have been inflated from guessing as the *don't know* option was never included. This finding may also not be reflective of all Saskatchewan teachers, but more indicative of the rural culture in general. Thus, future studies should assess the differences on rural and urban teachers' knowledge of the disorder, to assess whether workshops need to address rural teachers specifically.

It should be noted that future researchers of scales should not be concerned about socially desirable responses to items regarding ADHD knowledge. There was no indication that social desirability was a factor to consider on the K-ADHD (Jerome et al., 1994) scale. Furthermore, counterbalancing of the scales involved was a consideration that was made to reduce order effects. However, when examining a scale of interest, it is recommended that the scale of interest be first in the questionnaire. There were a few K-ADHD (Jerome et al., 1994) scales that were not completed yet other scales such as the KADDS (Sciutto et al., 2000), MC-SDS (Crowne & Marlowe, 1960; Reynolds, 1982), and the AOLK (McIntyre, 2005) were completed on the questionnaire. Test fatigue could have been the reason why there was missing data on some of the scales and the why some scales were totally incomplete. However, it is difficult to acquire data to examine a scale without the incorporation of other measures to draw comparisons. Lastly, it should also be considered that the K-ADHD (Jerome et al., 1994) scale should be analyzed against other measures without modifying a *don't know* option. The scale was originally intended to have only binary responses, although there is an excellent chance that the scores are inflated for this reason.

To address the proximity of rural teachers access to higher learning, future studies could look at the use of telecommunications with in-service training. Many teachers already utilize distance education classes. However, these classes are largely self-directed, lack interaction, and are more intensive in time than in-service training. Furthermore, many of these classes are theory driven and much of the practical component cannot be established through distance. In-service training that is interactive and televised, cost efficient, and timely could offer many advantages to rural teachers and their students. In fact, Clarke, Kline, Schumacher, and Evans, back in 1978, addressed the fact that teachers preferred televised in-service training in groups rather than alone. Interactive software applications and broadband capabilities to schools is starting to improve, thus in-service training through these mediums are becoming more realistic. One Hawaiian study highlighted interactive in-service teacher training with closed-circuit television as, “Telecommunications offers us the opportunity to expand the reach of our in-service and to provide training to teachers who otherwise would be unable to improve their skills due to difficulties of distance or resources,” (Power, 1993). Not only could telecommunications advance in-service teachers’ knowledge on various subjects, but it could also be a more accessible form of *standardizing* teacher training because of its’ far-reaching capabilities.

Research on ADHD knowledge in teachers has been ongoing since the inception of the K-ADHD (Jerome et al., 1994) scale. As knowledge of ADHD in teachers has been assessed in many studies since the Jerome study, a relatively weak area of research is how this knowledge is being transferred into every day classroom situations. Ohan and colleagues attempted to bridge this gap recently in the literature with insightful findings on the level of ADHD knowledge impacting several help-seeking behaviours in Australia. However, implications for Canadian

teachers are unknown, as Canadian attitudes towards ADHD interventions may be very different from other countries. Therefore, future studies should not only assess Canadian teachers' ADHD knowledge, but how this knowledge relates to their practical classroom applications.

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APPENDIX A

1. Name of researchers

- a) Shelanne Hepp, Master of Education Candidate
Department of Education Psychology and Special Education
- b) Dr. Laurie Hellsten, Thesis Supervisor
Department of Education Psychology and Special Education

1b. Anticipated start and completion date of the study.

Start: September 1, 2008

Anticipated end date of research: September 2009

2. Title of Study

ADHD: Teachers' Knowledge, Attitudes, and Behaviours

3. Abstract

This project will explore first, how knowledge of ADHD is measured through the validation of two scales. Second, teachers' knowledge of ADHD will be explored, and its impact on their attitudes and behaviours towards children with ADHD. Third, we will also examine teachers' or education students' perceived needs for successfully educating children with ADHD, including what resources they currently have and feel are effective, other resources that they feel would be helpful, and their knowledge of children with ADHD. The information gathered from teachers and/or education students will be used for journal articles and to possibly develop a workshop (or other appropriate resources) that can be provided to teachers in the future.

4. Funding

There are no external sources of funding used on this project.

5. Participants

The participants of this study will be invited from the school divisions within the City of Saskatoon and surrounding areas, and will consist of Kindergarten to Grade 5 elementary teachers and/or elementary education students at the University of Saskatchewan. An invitation for participation (See Appendix A) will be sent to the school divisions and departments for distribution. A minimum of approximately 30 respondents would be

required for our study. A convenience sample of elementary teachers and education students will be selected to participate in the completion of the questionnaire.

6. Consent

Permission to distribute the questionnaires will be sought from the Education Faculty from the University of Saskatchewan and Directors of the school divisions involved in the study. A consent form (See Appendix B) will be reviewed by the participants before they complete the questionnaire. Signed consent forms will not be required because of the desire to ensure anonymous responses.

7. Methods/Procedures

The department head for education will be contacted to ask permission to address the education student teachers at the University of Saskatchewan. An email will be sent to the department head and instructors to ask for permission to distribute questionnaires during class time. Education student teachers will be contacted through a meeting and told of the study through the research student. After their agreement is obtained, education student teachers will be encouraged to participate during an in-class presentation in the last 25 minutes of class time. The researcher will distribute the questionnaire packages to all students. Those who ask want to participate can simply complete the form and return it to the pile at the front of the class so that the researcher can collect them all at once. The researcher will stress that they are not obligated to participate, and once questionnaires are distributed the researcher will wait outside the classroom. Those who have participated can return the questionnaires in the sealed envelop to the instructor, who will return the packages to the researcher. Those who do not want to participate can leave class early or work on assignments/reading. Those who want to participate will need to review the letter of informed consent and a questionnaire will be supplied in each questionnaire package, and distributed to each student. Consent will be assumed once participants complete the questionnaire. It was approximated that participation would take 25 minutes.

The school boards will be contacted to ask permission to address teachers in the Saskatoon and area school system. Superintendents/directors will be contacted through email and told of the study through the research student and asked if they will permit the researcher to contact principals. An email will also be sent to the principals to ask for permission to distribute questionnaires during staff meetings. After their agreement is obtained, principals will be contacted in each division to ask permission for teacher participation. Teachers will be encouraged to participate during the last 25 minutes of staff meetings. The researcher will ask teachers who want to participate to raise their hands, so that a questionnaire package can be distributed to them. The researcher will stress that they are not obligated to participate, and once questionnaires are distributed the researcher will wait outside the staff room. Those who have participated can return the questionnaires in the sealed envelop to the principal, who will return the packages to the researcher. Those who do not want to participate can leave the meeting early. Those who want to participate will need to review the letter of informed consent and a questionnaire will be supplied in each questionnaire package, and distributed to each

teacher of each participating school. Consent will be assumed once participants complete the questionnaire. It was approximated that participation would take 25 minutes.

8. Storage of Data

All research data is anonymous and will be stored in a locked file cabinet in the Department of Educational Psychology and Special Education office at the University of Saskatchewan. All electronic data will be passcoded and stored physically within the cabinet. All accumulated data from the study will be kept for five years upon study completion by the principle investigator, Dr. Laurie Hellsten, at the University of Saskatchewan. Dr. Laurie Hellsten will be responsible for data storage, and all data will be destroyed after five years of storage.

9. Dissemination of Results

The results of this study will be disseminated in the form of a thesis, and journal articles will be submitted to journals such as *The School Psychology Quarterly*.

10. Risk, Benefits, and Deception

No risks are at all foreseen. For example, in similar studies in Vernon, BC, (unpublished study for honour's thesis by Hepp) and in Melbourne, AUS (Ohan, Cormier, Hepp, Visser & Strain, 2008), no problems were encountered or experienced by any of the 138 teachers who participated. The project presents minimal risk to participants, as there is no interaction involved. The participants will give consent by completing the questionnaire. The results of this study will be communicated to school jurisdictions in Saskatchewan, where the results will be available for subsequent testing, analyses, and review by teachers in the Saskatchewan Educational system and education students in the Department of Education at the University of Saskatchewan. There will be a potential benefit to participants, as those who participate may enter their name into a draw to win a \$50.00 gift card.

11. Confidentiality

Signed consent forms will not be required because of the desire to ensure anonymous responses. Participants will be made clearly aware that they are not to reveal their identity on the questionnaires. Each questionnaire will be marked with a number only for data entry purposes. The names of the teachers and education students will not be used in any reports or presentations. The participants will be informed that the information given on the questionnaire will remain confidential.

12. Data/Transcript Release

Transcripts will not be used in this study. The data collected will not be made public and will only be used to ensure the accuracy of the results. The data is anonymous and will be stored by student advisors of Dr. Laurie Hellsten in a locked cabinet following the requirements of the University of Saskatchewan. After 5 years, data will be destroyed.

13. Debriefing and feedback

There is no debriefing other than thanking the participants for their involvement in the study. Results of the study will be made available to participating schools, teachers, and education students.

14. Required Signatures

Master Thesis Student (Date)
Shelanne Hepp

Thesis Supervisor (Date)
Dr. Laurie Hellsten

Department Head, EDPSE (Date)
Dr. David Mykota

15. Required Contact Information

Shelanne Hepp Thesis Student Department of Educational Psychology and Special Education University of Saskatchewan 28 Campus Drive Saskatoon, SK S7N 0X1 Phone: (306) 966-2651 Email: shelanne.hepp@usask.ca	Laurie Hellsten Thesis Supervisor Department of Educational Psychology and Special Education University of Saskatchewan 28 Campus Drive Saskatoon, SK S7N 0X1 Phone: (306) 966-7723 Email: laurie.hellsten@usask.ca
David Mykota Department Chair Department of Educational Psychology and Special Education University of Saskatchewan 28 Campus Drive Saskatoon, SK S7N 0X1 Phone: (306) 966-5258 Email: david.mykota@usask.ca	

Appendix A: Invitation to Participate (Will be sent via mail/electronic methods)



Department of Educational Psychology and Special Education

(Insert Date)

(Insert School Address)

To whom it may concern:

Subject: ADHD: Teachers' Knowledge, Attitudes, and Behaviors

This letter is to introduce research that I am hoping to begin in September with elementary-school teachers and education students in the Saskatoon area. I am a Master's student, under the supervision of Dr. Laurie Hellsten, at the University of Saskatchewan – Department of Educational Psychology and Special Education, and have been researching attention-deficit/hyperactivity disorder (ADHD) for a few years.

As you know, elementary-school teachers are crucial in identifying and helping children with ADHD because it is often the structured classroom in which a child's ADHD symptoms first become a problem. Teachers have repeatedly commented that they lack the resources to manage symptoms of ADHD in their classrooms, and that they would be more effective instructors with resources. To address these concerns, I am conducting research to identify what resources teachers need to manage symptoms of ADHD in the classroom. This is a major issue for many teachers because ADHD is a relatively common problem (up to 1 in 20 children), and many more children may not meet a diagnosis of ADHD but still have several of its symptoms.

This will be done by administering a questionnaire about teachers'/education students' current resources for ADHD (and which, if any, they feel are effective), what resources they feel that they need, their knowledge and attitudes about ADHD, and ways that they would typically manage ADHD symptoms in the classroom. Not only will this information answer questions about teachers'/education students' needs for resources for ADHD, but it will also answer important questions about how teachers'/education students' current resources (or lack of resources) for ADHD affects how they manage ADHD in the classroom. Of course, these questions can only be answered if we have enough teachers/education students' to participate, as otherwise, the answers may only reflect how a few feel rather than how most feel. It is my hope that this information can be used to develop appropriate resources (i.g., 'quick' reference material, workshop) that can be provided to teachers/education students.

This project is currently under review by the University of Saskatchewan Research Ethics Board. I expect that participating will take about 20-30 minutes, and the questionnaire can be filled out voluntarily at a time of teachers'/education students' convenience and sent by mail.

I hope that your Board, Teachers' Union, Department and elementary school teachers/education students will find this project to be worthwhile and exciting. It is my hope that you will extend an invitation to me to introduce my research to your education class/ staff members, so that they may have the opportunity to participate. It is anticipated that participation should take only 20 minutes of their time. Therefore, I would ask if I could have the last 25 minutes of your class/staff meeting for students/teachers to participate. I will provide feedback as to the study results of this to participants through summaries sent to participating schools, and through the department of education at the University of Saskatchewan. The results will also be used for presentation in academic conferences and journals, and as part of the Master's research program.

If you have any questions, please contact the principal investigator, Dr. Laurie Hellsten at (306) 966-7723. If you have any questions or concerns about how you are treated or what your rights are as a research participant, please contact the Chair of the Research Ethics Board at the University of Saskatchewan at (306) 966-2084.

If you are interested in participating or would like to know more about this study, please contact:

Shelanne Hepp
Department of Educational Psychology and Special Education
Email: shelanne.hepp@usask.ca
Phone: (306) 966-2651

Thank you for your time and consideration.

Sincerely,

Shelanne Hepp
Research Assistant
University of Saskatchewan
shelanne.hepp@usask.ca

Appendix B: Participant Consent Form



UNIVERSITY OF
SASKATCHEWAN

Department of Education Psychology and Special Education

PARTICIPANT CONSENT FORM

You are invited to participate in a research project entitled *ADHD: Teachers' Knowledge, Attitudes, and Behaviours*. Please read this form carefully, and feel free to ask questions you might have.

Researcher(s): Dr. Laurie Hellsten, University of Saskatchewan, (306) 966-7723
Shelanne Hepp, University of Saskatchewan, (306) 966-2651

Purpose and Procedure:

Given that ADHD is relatively common (5%; or 1 in 20), teachers often encounter students with ADHD and are faced with challenging decisions (e.g., which children need services, how to approach parents about contacting services for the child, and how to manage the ADHD symptoms in their classroom). However, many teachers do not have the information and/or resources to do this. This project explores the needs of elementary-school teachers, and the expected needs of student teachers, in successfully educating children with ADHD. In addition, this project explores what impacts teachers' and student teachers' decisions about what children are in most need of professional services (e.g., confidence about managing ADHD symptoms, how severe the ADHD are).

As an elementary-school teacher or student teacher, you are being asked to complete the attached questionnaires. The first part of the questionnaire asks about what resources you have, have had, or would like to have about ADHD (e.g., workshop, books, videos). You will then be asked to read descriptions of either boys or girls who have ADHD symptoms, and answer questions about how likely you would be to seek or recommend services for the child, ways that you may manage the child's behaviour, and feelings of confidence or frustration. Finally, you will be asked to complete questions about your knowledge about children with ADHD.

**Teachers:* If you choose to complete the questionnaire, please seal them in the stamped and self-addressed envelope. If you choose not to complete the questionnaire, please return the blank questionnaire to the envelope provided below your mailboxes so that this questionnaire may be used again.

**Student Teachers:* If you are a student teacher, upon completion of the questionnaire, please seal it in the provided envelope and return it to the Education Building room 1245.

Potential Benefits: The potential benefits are that you may enter your name into a draw to win a \$50.00 gift card, and it is planned that this data may be used to develop a workshop or other resources about ADHD for elementary school teachers. The results of this study will be beneficial to school jurisdictions and curriculum developers for education, where the results will be available for subsequent studies and review by teachers in the Saskatchewan Educational system and education students at the University of Saskatchewan.

Potential Risks: This research study presents minimal risk to teacher and/or education student participants and there is no deception technique involved.

Storage of Data: All questionnaires will be kept with the principal researcher, Dr. Laurie Hellsten, for a period of 5 years after the study is completed. Dr. Laurie Hellsten will be responsible for data storage, and after 5 years all data resulting from this study will be destroyed.

Confidentiality: This study will not collect any identifiable information for use. The final report will contain only the descriptive and inferential statistics obtained.

Right to Withdraw: Your participation in this study is voluntary, and you can answer only those questions that you are comfortable with. You may withdraw from the research project for any reason, at any time, without penalty of any sort. If you withdraw from the research project at any time, any data that you have contributed will be destroyed at your request.

Questions: If you have any questions concerning the research project, please feel free to ask at any point; you are also free to contact the researchers at the numbers provided if you have other questions. This research project has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board on November 13, 2008. Any questions regarding your rights as a participant may be addressed to that committee through the Ethics Office (966-2084). Out of town participants may call collect.

Consent to Participate: I have read and understood the description provided above; I have been provided an opportunity to ask questions and have been answered satisfactorily. I consent to participate in the research project, understanding that I may withdraw my consent at any time. A copy of this Consent Form has been given to me for my records.

If you do wish to participate, completing the questionnaires will take approximately 20-30 minutes. Your consent to participate will be assumed by completing the questionnaires. This study is intended to look at teacher's opinions; there are no wrong answers. The questionnaire is anonymous, so please do not put any identifying information on it.

If you have any questions, please contact the research assistant, Shelanne Hepp, at (306) 966-2651, or the principal investigator, Dr. Laurie Hellsten at (306) 966-7723.

Thank you for your participation.

This study received University of Saskatchewan Behavioural Ethics approval on November 13, 2008.

Vita

Shelanne Hepp was born and raised in Humboldt, Saskatchewan. She moved to Kelowna, British Columbia where she received her Bachelor of Arts degree majoring in Psychology from the University of British Columbia Okanagan. She examined teachers' knowledge of ADHD impacting their attitudes and behaviours towards children with ADHD for her undergraduate thesis. She is currently a Master of Educational Psychology and Special Education candidate at the University of Saskatchewan.