The diagnosis of attention-deficit/hyperactivity disorder (ADHD) by psychologists, pediatricians, and general practitioners.

Shelley Wilkin Bloch

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THE DIAGNOSIS OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD)
BY PSYCHOLOGISTS, PEDIATRICIANS, AND GENERAL PRACTITIONERS

by

Shelley Wilkin Bloch

M.A. University of Windsor, 1996

A Dissertation
Submitted to the Faculty of Graduate Studies and Research
through the Department of Psychology
in Partial Fulfillment of the Requirements for
the Degree of Doctor of Philosophy at the
University of Windsor

Windsor, Ontario, Canada

2001

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ABSTRACT

It was the goal of the current study to provide a comprehensive assessment of the
diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD) and several factors which
may relate to diagnostic accuracy in particular. Specifically, the study used four
conditional probability indices --sensitivity, specificity, hit rate, and miss rate-- to
examine the relationship between diagnostic accuracy and the profession of the
practitioner making the diagnosis, behaviour:symptom information, and gender
information of a case. A mail survey method was used to present eight written case
vignettes, which depicted four male and four female symptom presentations, to Ontario
psychologists, pediatricians, and general practitioners for diagnosis. Symptom
presentations included ADHD -Combined Type, ADHD -Predominately
Hyperactive/Impulsive Type, ADHD -Predominately Inattentive Type, and a non-ADHD
vignette. Data was also collected from professional groups regarding practitioner
attributes and practice- and diagnosis-related variables. One hundred and twenty
individuals returned completed surveys for a response rate of approximately 14%.
Overall, results suggested that practitioners tended to diagnose ADHD when symptom
information indicated that such a diagnosis was warranted; however they also tended to
diagnose ADHD in the non-ADHD case, for which such a diagnosis was inappropriate.
Misdiagnoses rates in terms of subtype ranged from 22% to 92% across presentations,
with the most common misdiagnosis being ADHD -Combined Type. Results also
indicated that diagnostic accuracy, as defined by various conditional probability indices, differed depending on the profession of the practitioner making the diagnosis, behaviour/symptom information, and gender information of the case. Results are discussed with respect to differences between professional groups as well as possible limitations of the current classification system.
ACKNOWLEDGMENTS

The dissertation is a test of endurance. My genuine thanks extends to all those who helped me to be successful in finally reaching the end! I would particularly like to thank my committee members - Joe Casey, Martin Morf, and Wilf Innerd - for all of the time, feedback, and support given to me throughout this entire process. It would be VERY difficult to imagine a committee who was more fair and supportive than you have been with me. You made the experience pleasurable (despite the pain!) and I sincerely appreciate it! I would also like to thank Chuck Cunningham, my external examiner, for his interest in the project and willingness to serve as a member of the committee. Your suggestions were invaluable. Of course, particular thanks also goes to my advisor, Bob Orr, who read through countless drafts, offered many suggestions, and supported the completion of the project “long-distance”. I have appreciated the role you have played throughout my grad school years. Thanks are also due to all those who participated in the study. I know that time is at a premium and appreciate your effort and support.

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To my parents - Any success I have had is due to you. Thank you for being a great example of what parents should be!

To my husband - I could never have done any of this without your constant love, unquestioning support, and endless patience and calm. Sorry for being so crazy sometimes!

To my brother - Thanks for letting me take up space on your hard drive. I am lucky to know you.

To my fellow grad school friends - Thanks for letting me complain and for understanding and commiserating!

And to my best friend - This entire project evolved from our endless discussions and from your support and help. As always, I was able to count on your advice, cry on your shoulder, and celebrate finally paying enough dues (PRU - I think you are wonderful!)
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CHAPTER I

INTRODUCTION

Overview

Attention-Deficit/Hyperactivity Disorder (ADHD) is generally regarded as one of the most common behavioural disorders in children (e.g., Barkley, 1990; Cohen, Riccio, and Gonzalez, 1994; Cunningham and Cappelli, 1993; Epstein, Shaywitz, Shaywitz, and Woolston, 1991; Goldman, Genel, Bezman, and Slanetz, 1998). Its primary symptoms of inattention, hyperactivity, and impulsivity represent some of the most frequent reasons for child referral for mental health contact and this has likely led to ADHD becoming one of the most frequently diagnosed childhood psychiatric disorders (e.g., Barkley, 1990; Shaywitz, Fletcher, and Shaywitz, 1995). Although ADHD is considered a childhood onset disorder, its influence often persists throughout development and it is associated with increased risk for a variety of academic, emotional/behavioural, and social difficulties (e.g., Barkley, 1997, 1998; Szatmari, Offord, and Boyle, 1989). As a result, ADHD typically presents significant individual, familial, and societal costs (e.g., Barkley 2000).

The reported frequency and the associated risks and costs of ADHD suggest that issues of diagnosis and classification of this disorder are important. While symptoms of inattention, hyperactivity, or impulsivity are the hallmarks of ADHD, they do not guarantee that such a diagnosis is warranted in all cases. For example, other psychiatric disorders, learning disabilities, and environmental influences can produce symptoms similar to those of children with ADHD (e.g., Cotugno, 1993; Detweiler, Hicks, and Hicks, 1995; Schaugency and Rothlind, 1991; Weinberg and Emslie, 1991; Weinstein,
Staffelbach, and Biagio, 2000; Thomas, 1995). The possibility of “look-alike” ADHD highlights the importance of the diagnostic process in appropriately distinguishing this disorder from other conditions which present similar symptoms. Accurate diagnosis is critical to the selection of the subjects used to study ADHD, to the research related to the disorder, and ultimately to the practices used in its treatment and management (e.g., Boyle, Offord, Racine, Szatmari, Fleming, and Sanford, 1996; Schaughency & Rothlind, 1991; Shaywitz et. al., 1995). As a result, diagnosis should be viewed as the cornerstone of our knowledge and understanding of ADHD. Unfortunately, despite its importance, issues of diagnosis have often been minimized or overlooked. At present, there is incomplete understanding of who is making the ADHD diagnosis, how it is being made, and the factors which may relate to it.

Consequently, the focus of the present study was on the diagnosis of ADHD in children. An overarching goal of the study was to provide a description of various aspects which may be related to ADHD diagnosis (e.g., practitioner attributes, practice-related variables, diagnosis-related variables\(^1\)). The primary purpose of the study was to examine how certain factors relate to diagnosis and in particular, diagnostic accuracy, investigating actual case diagnosis as opposed to solely gathering self-reported practice information. Specifically, the study examined the relationship between diagnostic accuracy and the profession of the practitioner making the diagnosis, behaviour/symptom

\(^1\) Examples of practitioner attributes include age, gender, recency of training etc. Examples of practice-related variables include years of practice, number of children/adolescents seen daily, appointment length etc. Example of diagnosis-related variables include reported certainty for the diagnosis, steps suggested to confirm the diagnosis, familiarity with ADHD, treatment recommendations etc.
information, and gender information of a case.

In brief, the diagnostic process of three groups of practitioners—psychologists, pediatricians, and general practitioners—was examined via a mail survey method. An analogue approach (i.e., using constructed vignettes) was used wherein each practitioner was presented with a written case vignette that described current presenting behaviours/symptoms of a child based on informant report. Data was collected regarding a variety of practitioner attributes and regarding the various practice- and diagnosis-related variables (i.e., practitioner age, gender, years of practice, number of children/adolescents seen daily, appointment length, certainty for the diagnosis, steps suggested to confirm diagnosis, familiarity with ADHD, treatment recommendations). Because the primary purpose of the project was to examine how specific case elements related to diagnostic accuracy, two primary elements, behaviour symptom information and gender of the child in the vignette, were varied across cases. Diagnoses were measured and the relationship of the variation of the case elements on diagnostic accuracy was assessed using conditional probability indices (e.g., hit rate, miss rate, sensitivity, and specificity). The study also explored additional differences between the professional groups with respect to practice-related and diagnostic-related variables.

To provide a context for the current study, a review of literature pertaining to both diagnosis and ADHD follows. Initially, general information regarding diagnosis, classification, and diagnostic accuracy is presented, followed by a consideration of the diagnosis of childhood disorders in particular. A review of the definition, history, diagnostic features, epidemiology, course, etiology, and treatment of ADHD is then
presented. Finally, several critical issues, namely practitioner characteristics, symptomatology issues, and gender issues, which are important with regard to the diagnosis of ADHD are examined.

**Diagnosis and Classification: General Remarks**

**Definitions and purposes.** Traditionally, *diagnosis* has referred to the determination or designation of diseases by their symptoms (e.g., Barlow and Durrand, 1995; Garfield, 1993). This "disease entity" perspective clearly has medical roots and has been quite successful as a model within the medical field (e.g., Garfield, 1993). Given this success, according to Garfield, 1993, it is not surprising that this traditional concept has been extended to both psychiatry and psychology and that these disciplines have attempted to apply the "disease perspective" to mental disorders/psychopathology. While seemingly well-suited to the medical domain, the success of this perspective within the psychological realm has been more variable, which is likely due to the complex, multifaceted nature of psychopathology itself (e.g., Garfield, 1993).

Whatever its nature or roots, the notion of diagnosis is intertwined with the concept of classification. In general, classification refers to the "assignment of people or objects to categories based on shared characteristics" (e.g., Barlow & Durrand, 1995, p.706). Typically, classification is formalized in written systems which delineate the categories to which individuals can be assigned. The written systems of classification are termed the *nosology* of a clinical field while the term *nomenclature* refers to the names of the categories which form the nosology (e.g., Barlow & Durrand, 1995). Undoubtedly, a reciprocal connection exists between the processes of diagnosis and classification.
While diagnosis typically leads to classification, it is clear that classification systems in turn guide and assist diagnosis by providing a standard nosology.

Several purposes and benefits of formal diagnosis and classification have been discussed in the literature (e.g., Blashfield, 1991; Boyle et. al, 1996; Chess, 1997; Schbaughency & Rothlind, 1991). For example, classification systems guide diagnosis, attempting to simplify the complex domain of psychopathology (e.g., Barlow & Durrand, 1995). By defining and standardizing the domain of psychopathology, these systems theoretically allow for increased accuracy and reliability of diagnoses and clearer communication among professionals (e.g., Barlow & Durrand, 1995; Boyle et. al, 1996; Chess, 1997; Schbaughency & Rothlind, 1991). In turn, these factors can act to improve research and subsequently further advance and direct knowledge, understanding, and treatment (e.g., Blashfield, 1991; Schbaughency & Rothlind, 1991). Ideally, improved outcomes for individuals and the progress of the field are obtained. However, despite these possible advantages, it should be noted that our current system of diagnosis and classification is not without criticism regarding how well it satisfies these objectives (e.g., Carson, 1991; Garfield, 1993; Mash & Dozois, 1996; Wakefield, 1992).

**Current Diagnostic/Classification Systems.** Although various approaches to classification exist, one of the most common appears to be the categorical classification system (e.g., Blashfield, 1991; Mash and Dozois, 1996). Despite the existence of other approaches such as dimensional systems, the categorical approach dominates in North America (e.g., Kaplan, Sadock, and Grebb, 1994; Wilens, 1996) and is typified by the most commonly used diagnostic manual, the Diagnostic and Statistical Manual of Mental
Disorders (DSM; American Psychiatric Association, 1994). Since its introduction in 1952, the DSM has undergone four revisions such that the current version is known as the DSM-IV (American Psychiatric Association, 1994). Multi-axial in nature, the DSM-IV is a classification of mental disorders which can be used by regulated professionals to aid in the diagnostic process (American Psychiatric Association, 1994).

The DSM-IV is a categorical approach which "divides mental disorders into types based on criteria sets with defining features" (DSM-IV; American Psychiatric Association, 1994, p.xxii). At present, the DSM-IV groups disorders into 16 major diagnostic classes which further subdivide into various categories. Each category is defined by a list of criteria. During the process of diagnosis, individuals are seen to either "fit" the criteria and thus belong to the category, or they do not "fit" the criteria and are not considered as members of that category (e.g., Blashfield, 1991). Ideally, in categorical systems the members of a specific category are relatively homogeneous and there are few overlaps between categories (Blashfield, 1991). Practically, however, the DSM-IV does recognize heterogeneity within categories (i.e., members of the same category do not have to be identical in symptom presentation) as well as comorbidity (i.e., members can belong to more than one category; American Psychiatric Association, 1994).

Despite its wide adoption, the DSM-IV specifically, and categorical systems in general, are not without limitations nor aspects that can be and have been criticized/questioned. For example, with respect specifically to the DSM-IV, criticisms have included suggestions that there is undue focus on reliability of categories as
opposed to validity (e.g., Carson, 1991; Wakefield, 1992). This emphasis on agreement/consistency is viewed as overshadowing the importance of the usefulness of the categories (e.g., Wakefield, 1992). Heterogeneity and comorbidity issues, which are seen as inherent features of the DSM-IV, have also been viewed as posing serious problems with respect to diagnosis given the possibility of disorder overlap and the difficulties in differential diagnosis that result (e.g., Carson, 1991; Wakefield, 1992).

More generally, it has been suggested that significant limitations arise with categorical systems such as the DSM-IV, because categories describe, but may not explain, and as such their utility may be limited (e.g., Carson, 1991; Frances, First, Widiger, Miele, Tilly, Davis, and Pincus, 1991). As well, it has been argued that categorical systems place an inappropriate focus on the individual and the notion of “something wrong in-the-person” (e.g., Wakefield, 1992). It is argued that this focus may be misplaced and that environmental aspects are sometimes ignored, thus resulting in the misdirection of assessment and intervention (e.g., Wakefield, 1992). Furthermore, it has been suggested that the “disease-entity” approach of categorical models may be inappropriate for mental disorders (Carson, 1991; Frances et al., 1991; Wakefield, 1992). Criticisms to this end have focused on the difficulties and the dissatisfaction with the definition of the concept of “mental disorder” (which is seen by critics to involve a complex interplay of biological, psychological, and environmental factors and etiologies; Frances et al., 1991). Related to this, there have been suggestions that the medical community (in particular, psychiatry), perpetuates a categorical model and a “medical” definition of mental disorders to their benefit (e.g., Wakefield, 1992). Finally, it has also
been proposed that classification and labels contribute to a biased view of individuals which can be detrimental (e.g., Fox and Stinnett, 1996; Szasz, 1961).

Although suggestions have ranged all the way from replacing the categorical model with other systems of classification to abolishing the entire practice of classification altogether (e.g., Barlow and Durrant, 1995), it remains that classification and the DSM-IV are generally viewed as useful, needed, and recommended in spite of flaws (e.g., Barlow and Durrand, 1995; Frances et al., 1991; Goldman et al., 1998; Kaplan et al., 1994; Mash & Dozois, 1996; Wilens, 1996). While the current system is far from perfect, abandoning its use would lead to other difficulties. For example, failure to use standard criteria allows for idiosyncratic definitions of the disorder which may also not be accurate or reliable (e.g., McMahon, 1994). Bias, illusory correlations, heuristics, disregard for base rates, or the application of misinformation also seem more likely to occur without the use of a standardized system, with the implication that accuracy and reliability of diagnosis would be reduced (deMesquita & Gilliam, 1994; Wilens, 1996). In addition, there would be no “common language” related to disorders and communication/research efforts would be hampered (Barlow & Durrand, 1995). In sum, it has been noted that despite its possible flaws, the DSM-IV represents the best available knowledge at present and that ignoring it in the process of diagnosis is tantamount to negligence (Barkley, 2000).

**Regulation.** The act of diagnosis and classification is regulated in many areas. Currently, in Ontario, the Regulated Health Professions Act (1991) restricts diagnosis through the definition of controlled acts for various professional health-care groups. In
brief, a controlled act can be performed only by a person who is authorized by a Health Profession Act or by an individual to whom the act has been delegated by the authorized member (e.g., Evans, 1997). According to the Regulated Health Professions Act (1991), communication of a diagnosis is a controlled act accorded to a limited subset of health care workers. Thus, with respect to mental disorders, physicians (including general practitioners, pediatricians, psychiatrists) and psychologists are the defined groups which may communicate a diagnosis. Outside of this realm, health-care workers are not permitted to independently communicate a diagnosis and are subject to penalties if they disregard the controlled nature of this act.

**Diagnostic Accuracy.** The existence of a classification system for diagnosis which defines classes and categories implies that diagnostic accuracy can be assessed. Several concepts related to diagnostic accuracy, including *gold standard, true positives, true negatives, false positives, false negatives, sensitivity, specificity, hit rate, and miss rate* are important. While many of these concepts are used to refer to the accuracy of tests or symptoms in detecting/indicating a disorder (e.g., Fletcher, Fletcher, and Wagner, 1996; Kaplan et. al., 1994; Milich, Widiger and Landau, 1987; Waldman and Lilienfeld, 1991), they can be applied more generally to diagnosis in the current context.

The assessment of diagnostic accuracy is based on the assumption of the “gold standard”, that is, the knowledge of whether a disorder is “truly present or not”\(^2\) (e.g., Fletcher et. al., 1996, p. 45). As noted by Fletcher and colleagues, 1996, four relationships between this gold standard (or true disorder status) and the diagnosis are

\(^2\) In reality, knowing whether the disorder is truly present or not is difficult as “the gold standard is often elusive” (e.g., Fletcher et. al., 1996, p. 45).
possible, of which two can be seen to reflect correct diagnosis and two incorrect. For example, when the disorder is truly present and the diagnosis indicates its presence, the case is described as *true positive*. When the disorder is truly not present and the diagnosis does not indicate its presence, the case is described as *true negative*. Both of these situations reflect diagnostic accuracy. In contrast, when the disorder is truly present but the diagnosis fails to indicate its presence, the case is described as *false negative*. When the disorder is truly not present and the diagnosis indicates its presence, the case is described as *false positive*. Both of these situations reflect diagnostic inaccuracy. Table 1 depicts these relationships between the true disorder status (i.e., the gold standard) and the diagnosis.

Table 1

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For the sake of simplicity, true positive and true negative diagnoses are defined as the *hit rate* (i.e., accurate diagnoses) while false positive and false negative diagnoses are defined as the *miss rate* (i.e., inaccurate diagnoses). Hit and miss rates are expressed using *conditional probability indices* (i.e., defined as quantitative statements of the likelihood of events based on part of a population and typically expressed as proportions which range from 0.0 to 1.0, or alternatively as percentages; e.g., Baldessarini,
Finklestein, and Arana, 1983; Grimm, 1993; Widiger, Hurt, Frances, Clarkin, and Gilmore, 1984). There is a reciprocal relationship between hit and miss rates - as one increases the other will decrease.

Two other conditional probability indices related to the relationship between the true disorder status and the diagnosis include sensitivity and specificity. In the most general sense, sensitivity refers to the proportion of individuals with a disorder who are identified/diagnosed as having the disorder, while specificity refers to the proportion of individuals without a disorder who are not identified/diagnosed as having the disorder; Fletcher et. al., 1996; Kaplan et. al., 1994; Zarin and Earls, 1993). When sensitivity is high, individuals with a disorder are rarely missed (i.e., it is rare to have false negatives) while when specificity is high, individuals without a disorder are rarely misclassified as having the disorder (i.e., it is rare to have false positives; e.g., Fletcher et. al., 1996; Zarin et. al., 1993). While ideally, high sensitivity and high specificity are preferred, this is often not possible and there is frequently a “trade-off” wherein one “can be increased only at the expense of the other” (Fletcher et. al., 1996, p. 50). Thus when sensitivity is maximized, the possibility of diagnosing individuals with a disorder when it is not present may be increased (i.e., false positive errors are increased). When specificity is maximized, the possibility of not diagnosing individuals with a disorder when it is present may be increased (i.e, false negative errors are increased). As a result, sensitivity should be emphasized when there is a significant consequence for missing a disorder while specificity should be emphasized when there is a significant consequence for misclassifying an individual with a disorder (e.g., Fletcher et. al., 1996).

Theoretically, conditional probability indices such as sensitivity and specificity are
said to be independent of base rates (i.e., defined as the prevalence rate of disorder within a particular setting/context; Baldessarini et al., 1983; Widiger et al., 1984). However, it has been suggested that despite this, there is no guarantee that these indices will not fluctuate across samples because of the impact of severity of cases (e.g., Robins, 1985). For example, sensitivity for a sample will generally increase when the number of severe cases increases (i.e., because severe cases are generally detected more readily than mild cases), while specificity will increase as severity, and thus prevalence of the disorder, decreases (e.g., Robins, 1985).

**Diagnosis and Classification: Childhood Disorders**

According to Mash and Dozois, 1996, while the diagnosis and classification of psychopathology has a relatively long history with regards to adults, historically less attention has been given to these concerns with regards to child populations. This lack of attention has reportedly reflected the general lack of concern with children as a unique population vis-à-vis psychopathology. Furthermore, it is suggested that until recently, our understanding of childhood disorders has been based on the study of adult psychopathology and the application of this knowledge to children. However, according to Mash and Dozois, 1996, interest in child psychopathology as an unique entity has grown, contributing to a corresponding increase in interest in diagnosis and classification of disorder related to children. In fact, these authors have suggested that this interest reflects the growing realization that children are indeed a unique population; that childhood disorders can assert a lifelong influence; and that the roots of many adult disorders have their origins in childhood.
The increased interest in childhood disorders (e.g., Mash & Dozois, 1996), has highlighted a number of significant new challenges within the domain of childhood psychopathology, diagnosis, and classification—undoubtedly due to the status of children as unique and distinct from adults. For example, diagnosis is challenged by the recognition of the importance of development when considering childhood disorders. According to Mash and Dozois, 1996, many “negative” childhood behaviours are developmentally appropriate at certain times and ages but become inappropriate and considered “disordered” with age. This poses a challenge with regards to diagnosis because of the difficulty in first delineating and then ascertaining the threshold at which a behaviour is considered “disordered.” Moreover, the ever-changing developmental status of children allows the same disorder to be represented by differing symptoms depending on the age of the child. This characteristic has encouraged the notion of children as “moving targets” for diagnosis (e.g., Mash & Dozois, 1996). According to Schaughey & Rothlind, 1991, diagnosis of children is also complicated given the possible impact of context and environmental factors (i.e., non-biological or genetic factors). It is noted that children are typically dependent and often susceptible to external influences. While some behaviours can appear problematic and thus suggest that a diagnosis is in order, understanding of context can place the “problems” outside of the child, a shift which is not compatible with the notion of a mental disorder (e.g., Cotugno, 1993; Schaughey & Rothlind, 1991). Finally, diagnosis is seen to be complicated by comorbidity (i.e., the presence of two or more disorders in an individual at the same time; e.g., Mash & Dozois, 1996; deMesquita and Gilliam, 1994; Pliska, 1992;
Schaughency & Rothlind, 1991) which makes categorization and classification even more difficult. These aforementioned challenges are present with all childhood disorders, however, they are of particular concern, given the focus of the present study, with regards to Attention-Deficit/Hyperactivity Disorder (ADHD).

**Diagnosis and Classification of Attention-Deficit/Hyperactivity Disorder (ADHD): General Summary**

**Defining Features.** The primary features of Attention-Deficit/Hyperactivity Disorder (ADHD) have long been considered to be inattention, hyperactivity, and impulsivity (e.g., American Psychiatric Association, 1994; Barkley, 1991a, 1996, 1997, 1998, 2000). In order to be considered reflective of ADHD, these features must exceed, in terms of frequency and severity, those behaviours seen in individuals at comparable developmental levels (e.g., American Psychiatric Association, 1994).

According to Barkley, 2000, problems with inattention typically reflect difficulty in sustaining attention and effort on a variety of tasks. It is noted that children who display this feature typically show impairments in persistence as well as resistance to distraction when undertaking tasks. They are usually seen as distractible, disorganized, and forgetful. They also tend to become bored quickly with repetitive, dull tasks, to lose concentration during long tasks, to engage in much “off-task” behaviour, to switch frequently between activities, and to appear to have difficulty following rules and instructions (e.g., Barkley, 1991b, 1996, 1998, 2000).

Hyperactivity is usually exhibited by behaviours that are described as excessively active (e.g., Barkley, 1996, 1998, 2000). It is noted by Barkley, 2000, that children with
this trait are viewed as being driven and constantly “on the go.” They fidget, have difficulty remaining seated, and frequently move, run, climb, and talk. Unrelated extraneous movements during tasks are often noticed. Furthermore, it is suggested that these behaviours tend to be pervasive across various settings (e.g., Barkley, 1991a, 1996, 1998), although they will not necessarily be seen to the same degree in all situations (e.g., Barkley, 2000).

According to Barkley, 2000, impulsivity is evident in the difficulty with control and delay of gratification. Typically, children with these difficulties are viewed as deficient in their ability to stop ongoing behaviours, to think before they act, to wait their turn, and to resist short-term temptations in favour of long-term rewards. They often interrupt others and react quickly without “thinking”. It is also noted that more recent conceptualizations of the disorder suggest that hyperactivity and impulsivity reflect a unitary dimension which is best characterized as problems with inhibition (i.e., the ability to delay responses, particularly those which would result in immediate gratification; Barkley, 1998, 2000).

**Historical Background.** Although awareness of the symptoms of inattention, hyperactivity, and impulsivity has reportedly been evident throughout history, clinical interest in children with these behaviours is a relatively recent phenomenon (e.g., Barkley, 1996). Around the turn of the century, George Still, an English physician (1902), described the constellation of symptoms now identified as ADHD as a deficit in “volitional inhibition” attributing their display to poor moral control (e.g., Barkley, 1996, 1998; Detweiler et al., 1995). Although perhaps misguided in its focus on moral
deficiencies, Still's work did accurately outline many of the features of modern day
ADHD as well as many observations which have now been corroborated by research (i.e.,
gender rates, associated features; Barkley, 1996).

In contrast to Still's early focus on moral deficiencies, by mid-century the focus
shifted to an emphasis on brain functioning as children exhibiting the relevant symptoms
were classified under terms such as brain damage or minimal brain dysfunction (e.g.,
Barkley, 1996, 1998; Detweiler et. al., 1995). Lack of concrete evidence as well as
increased concern regarding behavioural features led to a focus on hyperkinesis and
hyperactivity by the 1960's (e.g., Barkley, 1996; Detweiler et. al., 1995). Following this
notion, the second edition of the Diagnostic and Statistical Manual of Mental Disorders
(DSM-II) contained the category "Hyperkinetic Reaction of Childhood" which defined
hyperactivity as the primary deficit of this disorder (American Psychiatric Association,
1968).

By the 1970's, the view of these symptoms as a behavioural reaction of childhood fell
out of favour and the importance of symptoms besides hyperactivity became highlighted
by researchers such as Virginia Douglas of McGill University (e.g., Barkley, 1996, 1998).
The consideration of symptoms such as inattention and impulsivity as well as
hyperactivity was reflected in the DSM-III by the creation of a category termed Attention
Deficit Disorder (ADD). Two subtypes of ADD were presented: ADD with and without
hyperactivity (e.g., American Psychiatric Association, 1980). Concern about the validity
of the ADD subtype led to its removal from the 1987 revision of the DSM such that one
primary category renamed ADHD, which provided only a single list of mixed criteria,
was provided (e.g., DSM-III-R; American Psychiatric Association, 1987).

Dissatisfaction with this heterogeneous ADHD category coupled with factor analytic studies (e.g., such as Lahey, Applegate, McBurnett, Biederman, Greenhill, Hynd, Barkley, Newcorn, Jensen, Richters, Garfinkel, Frick, Ollendick, Perez, Hart, Waldman, Shaffer, 1994) has again led to the creation of subtypes in the DSM-IV (American Psychiatric Association, 1994) including a) ADHD, Combined Type (symptoms of both inattention and hyperactivity/impulsivity), b) ADHD, Predominately Inattentive Type (symptoms of inattention only), and c) ADHD, Predominately Hyperactive/Impulsive Type (symptoms of hyperactivity/impulsivity only). Despite this current manner of defining ADHD in the nomenclature, debate still continues with regard to subtyping within the disorder (e.g., Barkley, 1996, 1998). Recent models of ADHD are now focusing on the role of behavioural disinhibition to its symptomatology (Barkley, 1996, 1998, 2000). In addition, consideration of the meaning and role of inattention appears to be of central concern (e.g., Barkley, 1996, 1998; Shaywitz et. al., 1995).

**Diagnosis Features.** Currently, the category of Attention-Deficit/Hyperactivity Disorder (ADHD) is defined by the DSM-IV as a “persistent pattern of inattention and/or hyperactivity/impulsivity that is more frequent and severe than is typically observed in individuals at a comparable level of development” (DSM-IV; American Psychiatric Association, 1994, p.78). The DSM-IV presents lists of symptoms that fall under two general headings—inattention and hyperactivity/impulsivity. A requirement of six of the symptoms under either heading that have “persisted for at least 6 months and that [are]
maladaptive and inconsistent with developmental level" must be met in order for a diagnosis to be considered (DSM-IV; American Psychiatric Association, 1994, p.78). In addition to satisfying these criteria, the inattentive or hyperactive/impulsive symptoms presented by the child must produce significant impairment in social, academic, or occupational functioning; must be present in at least two settings; must show some evidence before the age of 7 years; and must not occur exclusively during the course of several disorders (e.g., Pervasive Developmental Disorder, Schizophrenia) or be better accounted for by a number of other disorders (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, Personality Disorder; DSM-IV; American Psychiatric Association, 1994). The complete list of DSM-IV criteria is found in Appendix A. As previously indicated, three possible subtypes can be diagnosed: a) ADHD, Combined Type, b) ADHD, Predominately Inattentive Type, and c) ADHD, Predominately Hyperactive/Impulsive Type.

Given that no definitive tests exist by which to determine ADHD, diagnosis according to the DSM-IV approach is made based on an individual's "fit" to the criteria. While the diagnostic process may vary, generally it is accepted that a multi-method approach which includes careful history taking, parent teacher and child interviews, rating scales, and various other measures, is preferable (e.g., Barkley, 1991; Detweiler et. al., 1995; Goldman et. al., 1998; Guevremont, DuPaul, and Barkley, 1990; Schaugheny & Rothlind, 1991).

**Epidemiology.** Although estimates vary widely, ADHD is reported to occur in approximately 3-7% of school-age children (e.g., American Psychiatric Association,
1994; Barkley, 1997, 1998; Biederman et al., 1991; Wilens, 1996). Epidemiological data from the Ontario Child Health Study (OCHS) indicated ADHD prevalence rates of 9% in boys and 3.3% in girls (Szatmari, Offord, and Boyle, 1989). These prevalence rates from the OCHS indicate that the disorder is significantly more common in boys (Szatmari, Offord, and Boyle, 1989). Other literature also suggests that boys are overrepresented with male-to-female ratios ranging from 3:1 to 9:1 (American Psychiatric Association, 1994; Barkley, 1996). Of note is that while epidemiological studies indicate male to female ratios of approximately 3:1, clinic-referred children evidence ratios of 6:1 to 9:1, suggesting that boys with ADHD symptoms are more likely to be referred (Barkley, 1996; Gaub and Carlson, 1997). Although prevalence rates vary widely, ADHD is known to occur in various cultures and across all socioeconomic levels (American Psychiatric Association, 1994; Barkley, 1996, 2000).

Course. Onset of ADHD symptoms is often first noticed during the preschool years, typically in displays of hyperactivity and impulsivity and occasionally in oppositional and aggressive behaviour (e.g., American Psychiatric Association, 1994; Barkley, 1996; Mariani and Barkley, 1997; McGee, Williams, and Feehan, 1992). Typically, the hyperactivity and impulsivity noted early in childhood persist during the elementary school years with the addition of problems in sustaining attention (e.g., Barkley, 1996). Problems with oppositional and aggressive behaviour often develop or increase at this time and are associated with the persistence of the disorder into adolescence and adulthood (e.g., Barkley, 1996; Hart, Lahey, Loeber, Applegate, and Frick, 1995).

In contrast to the early notion that children “outgrow” ADHD, research indicates that
50% to 80% of children diagnosed with ADHD will continue to be affected by the disorder into adolescence and 30% to 50% of these adolescents will be affected into adulthood (American Psychiatric Association, 1994; Barkley, 1996, 1998, 2000; Biederman and Steingard, 1989; Biederman, Faraone, Spencer, Wilens, Mick, and Lapey, 1994; Hart et. al., 1995; Pelham et. al., 1998). Of note here is that while all symptoms tend to show patterns of decline, symptoms of hyperactivity and impulsivity seem to decline more rapidly with age than symptoms of inattention (e.g., Barkley, 1996, 1998; Goldman et. al., 1998; Hart et. al., 1995). It must also be noted however that this decline is relative — adolescents and adults with ADHD still show greater severity of symptoms compared to normative peers (e.g., Barkley, 1996).

**Etiology.** No definitive biological nor psychosocial cause of ADHD has been pinpointed (e.g., Barkley, 1996; Kronenberger and Meyer, 1996; Schaughency & Rothlind, 1991). Exploration of etiological factors has generally centered on biological aspects and appears promising (e.g., Barkley, 1996, 1998). Current neuropsychological research for example, has clearly implicated brain structure and function in ADHD symptomatology (e.g., Heilman, Voeller, and Nadeau, 1991; Lou, Henriksen, and Bruhn, 1984; Riccio, Hynd, Cohen, and Gonzalez, 1993); although it must be noted that the exact brain mechanisms and/or their interaction with other factors, are not yet fully understood (e.g., Barkley, 1996). In addition, consideration of the high heritability of ADHD has engendered significant interest in genetic influences, particularly in the role of several genes related to dopamine (e.g. Barkley, 1996, 1998, 2000; Kronenberger & Meyer, 1996). Although research in this area also appears quite promising,
understanding of genetic influences still remains unclear at present.

The influence of environmental contributors to ADHD appears even less well understood than the role of biological factors. While it has been noted that some investigations have suggested that factors such as food additives, refined sugar, allergens, lead, and maternal alcohol consumption or tobacco use during pregnancy may play a role in ADHD, it has been concluded that the results have failed to provide consistent evidence of the causal contribution of such factors and generally these explanations have not been empirically supported (e.g., Barkley, 1991, 1996, 1998; Kronenberger & Meyer, 1996; Searight, Nahlik, and Campbell, 1995). Thus, while it seems likely that environmental factors exhibit some influence, their contribution may extend more to severity than to the initial cause of ADHD (e.g., Kronenberger and Meyer, 1996).

**Treatment.** While there appears to be no “cure” for ADHD, a number of interventions have been suggested to show some effectiveness in reducing symptom severity or mitigating the impairment that symptoms produce (e.g., Barkley, 1991b, 1998; DuPaul and Barkley, 1993; Pelham et. al., 1998). Both psychopharmacological (e.g., stimulants, antidepressants, antihypertensives) and psychosocial (e.g., psychoeducation, behaviour therapy, parent and teacher training in contingency management, cognitive interventions) treatments have been investigated, with psychopharmacological approaches appearing to be by far the most commonly used and studied (e.g., Barkley, 1998; Pelham et. al., 1998).

Within the psychopharmacological domain, the most common and most studied treatment for ADHD is stimulant medication treatment (e.g., Barkley, 1991b, 1998;
Copeland, Wolraich, Lindgren, Milich, and Woolson, 1987; Cunningham, Siegel, and Offord, 1991; Frankenberger, Lozar, and Dallas, 1990; Jacobvitz, Sroufe, Stewart, and Leffert, 1990; Kronenberger and Mayer, 1996; Pelham et al., 1998; Searight et al., 1995). The practice of treating children with stimulants has reportedly increased over the past several decades (Robison, Sclar, Skaer, and Galin, 1999) such that survey estimates suggest that 1% to 5% of public school children are receiving stimulant medication (e.g., Frankenberger et al., 1990; Jacobvitz et al., 1990). While methylphenidate (i.e., Ritalin) is currently the most frequently prescribed of the stimulants, other medications such as dextroamphetamine (i.e., Dexedrine), pemoline (i.e., Cylert), dextroamphetamine/amphetamine composite (i.e., Adderall), and Clonidine (i.e., Catapres) are also used (e.g., Barkley, 1998; Goldman et al., 1998; Manos, 1999). Response/improvement rate for school age children for any single stimulant drug is reported to be approximately 70% - 80% compared to placebo rates of 10% - 18% (e.g., Goldman et al., 1998; Kronenberger and Mayer, 1996; Searight et al., 1995). It has also been reported that up to 90% of children will show some response to at least one of the stimulants (e.g., Goldman et al., 1998).

In contrast to prior claims, the effect of stimulants for children with ADHD is not "paradoxical"—children with ADHD do not show an atypical response nor are they sedated by the medication (e.g., Goldman et al., 1998; Jacobvitz et al., 1990; Rosenberg, Holtttum, and Gershon, 1994; Wilens, 1996). Stimulants produce similar effects (i.e., enhanced attention and concentration and the noted associated reductions in unrelated activity) for children with or without ADHD (e.g., Goldman et al., 1998;
Jacobvitz et. al., 1990). Thus, a favourable response to medication does not confirm an ADHD diagnosis (e.g., Goldman et. al., 1998; NIH Consensus Statement, 1998; Jacobvitz et. al., 1990).

There is clear support with regards to school age children for the short term efficacy of stimulants with regards to attention span, concentration, and on-task behaviours (e.g., Barkley, 1998; Goldman et. al., 1998; NIH Consensus Statement, 1998; Rosenberg et. al., 1994). A recent large scale randomized clinical trial of treatment strategies indicated that medication treatment alone, as compared to behavioural or combined treatments, was the most effective in reducing ADHD symptomatology (Multimodal Treatment Study of Children with ADHD (MTA) group, 1999). However, the results and interpretations of this study are not completely without question nor without suggestion for alternate interpretations and improvements (e.g., Cunningham, 1999). In addition, despite the MTA results, efficacy of stimulant treatment in terms of retention, retrieval, relearning, problem solving abilities, and anger control has not been demonstrated and the long term effectiveness of stimulants has not been established for any domain of functioning (e.g., Frankenberg et. al., 1990; Jacobvitz et. al., 1990; Pelham, Wheeler, and Chronis, 1998; Physician's Desk Reference, 1998).

Although generally accepted as safe and effective, the use of stimulant medication is not completely without controversy (e.g., Goldman et. al., 1998). Dominant issues include concerns regarding the possible long term effects of psychotropic medication on the developing brain; the possible impact of side effects; the misapplication of medication as a "quick fix" for behavioural control; the reported increase in stimulant
use noted over the past decade; the overshadowing of other, non-biological treatments; the possible abuse of medication; the lack of adequate comprehensive assessment; and the lack of training in differential diagnosis in various practitioners who make the diagnosis (e.g., Barkley, 2000; Desgranges, Desgranges, and Karsky, 1995; Frankenberg et. al., 1990; Goldman et. al., 1998; Jacobvitz et. al., 1990; Jadad et. al., 1999; Sabatino and Vance, 1994). While many compensatory attempts have been suggested to address these concerns (e.g., recommendations for comprehensive assessment and careful monitoring, use of blind medication trials, increased investigation and exploration of alternate approaches, avoidance of drug use with children under 6 years), the extent to which these recommendations are applied is unclear (e.g., Frankenberg et. al., 1990; Goldman et. al., 1998; Jacobvitz et. al., 1990; Physician’s Desk Reference, 1988; Rosenberg et. al., 1994).

While the noted issues and concerns have prompted suggestions to supplement psychopharmacological intervention with psychosocial treatments (e.g., behaviour therapy, psychoeducation, parent and teacher training in contingency management, cognitive interventions), reports of the efficacy of these combinations have been mixed (e.g., Barkley, 1991b, 1998; Detweiler et. al., 1995; DuPaul & Barkley, 1993; Goldman et. al., 1998; Kronenberger et. al., 1996; McMahon, 1994). However, recent research has appeared more favourable for certain specific combinations (e.g., medication and behaviour therapy via parent/teacher training; Barkley, 1998; Pelham et. al., 1998), and in particular, for the efficacy of combined treatments on a variety of variables which may occur in conjunction with ADHD (e.g., oppositional behaviour, internalizing symptoms,
social skills, reading achievement; MTA group, 1999). In addition, suggestions as to how to improve outcome for behavioural or combined interventions by improving facets of these programs as well as service delivery have been offered (e.g., Cunningham, 1999; Cunningham, Bremmer, and Boyle, 1995).

Associated Conditions. A number of behavioural, emotional, social, and academic difficulties are reported to be associated with ADHD. Firstly, several disorders are commonly found to be comorbid with ADHD. In fact, it has been estimated that up to 65% of children with ADHD will also meet the criteria for another disorder (e.g., Goldman et. al., 1998; deMesquita and Gilliam, 1994). In particular, reports suggest overlap between ADHD and other disruptive disorders such as Oppositional Defiant Disorder and Conduct Disorder; between ADHD and mood and anxiety disorders; and between ADHD and learning disorders (e.g., Abikoff and Klein, 1992; Barkley, 1996, 1998; Biederman et. al., 1991; Ford, Racusin, Davis, Ellis, and Thomas, 1999; Goldman et. al., 1998; Pelham et. al., 1998; Pliska, 1992; Sabatino et. al., 1994; Schaugency & Rothlind, 1991; Searight et. al., 1995; Weinstein, Staffelbach, and Biaggio, 2000; Wilens, 1996). It must be noted that despite the relatively high comorbidity rates, it is often difficult in practice to distinguish if there is symptom overlap and therefore the disorders are comorbid, or if the symptom pattern "looks like" ADHD but is really reflective of another single disorder and a differential diagnosis is in order (e.g., Biederman et. al., 1991; deMesquita and Gilliam, 1994; Schaugency and Rothlind, 1991; Weinstein et. al., 2000). Although there is recognition of the difficulty of distinguishing between comorbidity and differential diagnosis, there appear to be few
concrete guidelines regarding how best to address this issue.

In addition to the relationship between ADHD and other disorders, associations between this disorder and various other factors have also been indicated. For example, in comparison with matched sample of children who have not been diagnosed with ADHD, children with ADHD are more likely to have academic and school performance difficulties; social interaction problems with family, peers, and teachers; low self esteem; certain chronic health problems (e.g., upper respiratory infections, asthma, and allergies); and accident “proneness” (e.g., Barkley, 1991b, 1996, 1998; Szatmari et. al., 1989).

Given the defining features of the disorder, such relationships might be expected. However, it is clear that such factors may exert significant costs to the individual and the wider social context.

**Diagnosis and Classification of Attention Deficit Hyperactivity Disorder (ADHD):**

**Critical Issues**

With a general knowledge of ADHD firmly in place, it is now possible to consider several issues which appear significant with regard to ADHD diagnosis and diagnostic accuracy related to this disorder. For example, practitioner, symptom, and gender issues may all significantly influence diagnosis accuracy and are thus relevant to this project. Each of these issues is considered in turn. Of note here is that underlying all issues is the general paucity of basic information regarding who is making the ADHD diagnosis, how the diagnosis is being made, and the factors which may affect diagnosis and diagnostic accuracy. While a number of reviews and surveys regarding treatment practices/services for ADHD are available (e.g., Hoagwood, Kelleher, Feil, and Comer, 2000; Jadad et. al.,
1999; Jensen, Bhatara, Vitiello, Hoagwood, Feil, and Burke, 1999; Jensen, Kettle, Roper, Sloan, Dulcan, Hoven, Bird, Bauermeister, and Payne, 1999), review of the literature revealed few comprehensive studies of actual case diagnosis related to this disorder. Given that diagnosis precedes treatment, this imbalance seems illogical.

**Practitioner Issues.** As previously indicated, the communication of a diagnosis in Ontario is a controlled act defined by the Regulated Health Professions Act (1991) which is limited to specific professionals. Generally, with respect to mental disorders, the controlled act of diagnosis is accorded to physicians (e.g., general practitioners, pediatricians, psychiatrists) and psychologists. Thus, the communication of a diagnosis of ADHD will invariably arise from a member of one of these various groups. Considerations related to three of these professional groups (i.e., general practitioners, pediatricians, psychologists) are now presented, given their possible importance/impact on diagnostic accuracy.

Undoubtedly, differences exist in terms of orientation and training between professional groups such as general practitioners, pediatricians, and psychologists, related to the diagnosis of mental disorders/psychopathology, and by extension, ADHD. Examination of the current course curriculum in the training for general medical practitioners indicates that the topic of psychiatry/behaviour is covered during 2 weeks in first year and 3 weeks in the second year of training (Faculty of Medicine and Dentistry, University of Western Ontario, 2000-2001). The current course schedule for training format indicates a 1 hour introduction, 3 hour lecture, and 2 hour small group learning activity for each week of the topic, totaling approximately 6 hours/week. Thus,
according to this schedule, general practitioners receive approximately 30 hours of training in psychiatry/behaviour outside of clinical placements. Training for pediatricians (while not available through the University of Western Ontario), would be similar to that noted above for the general medical professional with the addition of some coverage of the topic of psychiatry during the further 3 - 4 years of specialized training in pediatrics (Faculty of Medicine, University of Toronto, 2000-2001). Thus, pediatricians receive more training than general practitioners in psychiatry/behaviour, although this would be limited by the range of other topics covered. The general orientation of both medical professions assumes a focus on physical issues.

Examination of course curriculum within the Clinical Psychology program (offered as well at the University of Western Ontario) indicates a minimum of 2 courses related to psychopathology (approximately 72 hours of instruction), 1 course related to clinical assessment of psychopathology (approximately 36 hours of instruction), various courses related to clinical skills, and a number of required assessment and intervention practica, as well as internship (Clinical Psychology, University of Western Ontario, 2000-2001). The general orientation of psychology assumes a focus on biopsychosocial issues.

Comparisons of these models of training suggest that psychologists receive more hours of training devoted to psychopathology (and by implication, to the DSM-IV), prior to graduation than general practitioners and pediatricians. Furthermore, although not related to these training models, it has been suggested that training quality for various professionals may also differ. For example, Schulberg, McClelland, Coulehan, Block, and Werner, 1986, have suggested that effective techniques of teaching biopsychosocial
concepts and practices to primary care physicians are lacking and they conclude that this may affect the diagnosis and diagnostic accuracy of these individuals. In addition, a recent study of family physicians and pediatricians revealed that only one fourth of these professionals relied on the standard criteria in order to make a diagnosis (e.g., Wolraich et. al., 1990).

In addition to those related to training, other differences between professional groups have received support in the literature. For example, Bennett and Sherman (1983) surveyed pediatricians and family physicians/general practitioners regarding their self-reported practices with respect to the assessment and management of hyperactivity. The results suggested a variety of differences between these two professional groups. For example, pediatricians were more likely to report the use of diagnostic aids such as informant reports during evaluation and made more frequent referrals to a psychologist for additional assessment. As well, although both groups favoured the use of stimulant drug treatment, pediatricians were more likely to incorporate some type of behavioural management in conjunction with the drug treatment.

Similarly, a survey study conducted by Wolraich, Lindgren, Stromquist, Milich, Davis, and Watson (1990), also revealed differences between pediatricians and family practitioners with respect to the diagnosis and management of ADHD. For example, significant differences were noted regarding the time spent in evaluating the child, the resources used when making a diagnosis, and the treatments employed. On average, pediatricians reported spending almost twice the amount of time during the initial evaluation of the child (i.e., 50 minutes versus 29 minutes for family physicians).
Pediatricians also suggested using parent and teacher reports and "psych-ed" reports significantly more frequently than family physicians during the determination of the diagnosis. In contrast, family physicians were more likely to indicate that the child's behaviour during the office visit was a significant resource when considering a diagnosis. With respect to treatment, while both groups reported the use of stimulant medication as the treatment of choice, pediatricians were more likely to incorporate behaviour modification therapies and were less likely to recommend sugar-restricted diets.

Comprehensiveness of the assessment process of various professionals has also received some attention. While multi-method comprehensive assessment has been overwhelmingly recommended (e.g., Barkley, 1991a; Cohen et. al., 1994; Detweiler et. al., 1995 Frankenberger et. al., 1990; Goldman et. al., 1998; Mitsis, McKay, Schultz, Newcorn, and Halperin, 2000; Molina, Pelham, Blumenthal, and Galiszewski, 1998; NIH Consensus Statement, 1998; Physician's Desk Reference, 1988; Schauhency & Rothlind, 1991), there are no regulations to ensure this process and it falls completely under the practitioner's discretion. While data are not available regarding the comprehensiveness of the approach of psychologists, there have been suggestions in the literature that primary care physicians may lack the time to perform a comprehensive diagnostic evaluation related to biopsychosocial problems and may assume an organic cause of problems until proven otherwise (e.g., Schulberg et. al., 1986).

While all of these considerations suggest that differences exist between professional groups, they are limited in two primary ways; with the exception of information related to training, they generally relate only to pediatricians and family physicians and
secondly, they are restricted to practitioner self-reported practices as opposed to more “objective” practices. Unfortunately, there is little available research to remedy these limitations. At present, the nature of the differences between various regulated professional groups that may communicate diagnoses (e.g., pediatricians, general practitioners, and psychologists) with respect to actual ADHD diagnosis is unclear.

However, while conclusive data are unavailable, based on all of the noted considerations, it is logical to hypothesize that factors such as extent and quality of training, evaluation time, comprehensiveness of the evaluation, and reliance on in-office behaviour may affect diagnosis and diagnostic accuracy. It is presumed that increased training with respect to psychopathology and the DSM-IV, longer evaluation times, more comprehensive evaluation methods, and less reliance on in-office behaviour would result in higher hit rates (i.e., true positive and true negative diagnoses and thus increased accuracy) and lower miss rates (i.e., false positive and false negative diagnoses and thus diagnostic inaccuracy). Based on this hypothesis and the implications of some of the aforementioned research related to these factors, it seems likely that in the diagnosis of ADHD, psychologists would be most accurate, followed by pediatricians, and then followed by general practitioners.

Besides these issues related to diagnostic accuracy, there has also been a general lack of examination of other “practitioner attributes” and how these may influence diagnosis.

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3 Detailed definitions of these concepts are presented on page 10.
For example, some researchers have suggested that recency of training affects assessment, diagnosis, and management of ADHD (e.g., Bennett & Sherman, 1983; Copeland et. al., 1987). A survey conducted by Copeland et. al. (1987) indicated that pediatricians who reported more recent training also reported treating fewer ADHD patients and evaluating fewer patients for whom an ADHD diagnosis was warranted. Thus, it seems likely that recency of training could also influence diagnosis and is thus worthy of investigation. The possible impact of other practitioner-related variables (e.g., practitioner years of practice, number of children/adolescents seen daily, appointment length, certainty for the diagnosis, steps suggested to confirm diagnosis, familiarity with ADHD, treatment recommendations etc.) have not been assessed.

In sum, practitioner issues appear significant with regards to the diagnosis of ADHD. The professional group to which the practitioner belongs and certain practitioner attributes all may possibly related to diagnostic accuracy. Thus, investigation of the professional group of the practitioner and practitioner attributes appears warranted to further understanding of the diagnosis and diagnostic accuracy.

**Symptom/Criteria Issues.** In addition to issues related to the profession of the practitioner making the diagnosis, a variety of important issues arise related to symptom/criteria for ADHD. For example, a consideration of the impact of specific individual symptoms on ADHD as well as the issues of comorbidity, differential diagnosis, and subtyping are important with respect to the examination of the ADHD diagnosis and diagnostic accuracy.

There are several indications that certain symptoms or symptom patterns may
influence diagnosis. For example, while the cardinal symptoms of inattention, hyperactivity, and impulsivity have been emphasized as the hallmarks of ADHD, there have been suggestions that the hyperactivity/impulsivity cluster that tends to be the salient factor to practitioners in the diagnosis of ADHD (e.g., Epstein et. al., 1991). Logically, highly active and impulsive behaviours tend to be quite observable and also tend to be experienced as more problematic to those around the child (e.g., Cohen, Cohen, Kasen, Velez, Hartmark, Johnson, Regas, Brook, and Streuning, 1993; Silverthorn, Frick, Kuper, and Ott, 1996). Given this, it is possible that the presence of such behaviours may encourage referral and an ADHD diagnosis more than the presence of inattention alone.

Several lines of evidence support the notion that hyperactivity and impulsivity are markers for identifying children with ADHD. For example, some researchers have found that it is activity level, not inattention, that best discriminates children with ADHD from psychiatric and normal controls (e.g., Halperin, Matier, Bedi, Sharma, and Newcorn, 1992; Halperin et. al., 1993), thus promoting hyperactivity as a legitimate marker for ADHD. Similarly, two studies which examined symptom utility highlighted the importance of hyperactive and impulsive symptoms as markers for the disorder. For example, Milich, Widiger, and Landau, 1987, examined the utility of symptoms towards the differential diagnosis of ADHD and Conduct Disorder, and found that symptoms which reflected hyperactivity such as “can’t sit still” and “runs around” had the highest
positive predictive power and were among the most useful inclusion criteria for ADHD. A similar study conducted by Waldman and Lilienfeld, 1991, which examined the differential diagnosis of ADHD and Oppositional Defiant Disorder, found that symptoms which reflected impulsivity, such as “blurs out answers” and “has difficulty waiting turn,” had the highest predictive power and were the most useful as inclusion criteria for ADHD. Of note is that both of these studies related to differential diagnosis indicated that the inattentive symptom “easily distracted” had low positive predictive power (i.e., its presence was related to a low probability of the disorder being present) and was most useful as an exclusion criterion (i.e., its absence ruled out the disorder).

It has also been suggested that the uneven prevalence rates between boys and girls demonstrate a bias towards hyperactivity and impulsivity (e.g., Epstein et. al., 1991; Lahey et. al., 1994). This bias may result due to the typically differing symptom presentations of the genders. Because girls tend to show less hyperactivity or behavioural symptomatology than boys, it has been proposed that they are generally under-diagnosed due to an emphasis on hyperactive behaviours in ADHD diagnoses (e.g., Epstein et. al., 1991; Lahey et. al., 1994). This conclusion is consistent with the finding that prevalence rates equal out between the genders in adulthood, suggesting that knowledge of the tendency for hyperactivity to decline with age leads to a consideration of other factors such as inattention (e.g., Wilens, 1996).

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4 Positive predictive power refers to the probability of a disorder given the presence of a symptom. Negative predictive power refers to the probability of the absence of a disorder given the absence of a symptom. A symptom that is useful as an inclusion criterion is one which is efficient in identifying the presence of a disorder while one that is useful as an exclusion criterion is one that is useful in the sense that its absence effectively rules out the disorder (Milich et. al., 1987).
In contrast to the focus on hyperactivity and impulsivity, some research suggests that it is inattention that is the important factor in suggesting the presence of ADHD (e.g., Copeland et. al., 1987; Wolraich et. al., 1990). For example, two studies which surveyed pediatricians and family physicians/general practitioners found that, according to their self reports, symptoms of distractibility/inattentiveness were perceived as the most important contributors to ADHD diagnosis, overactivity was the second most important, and impulsivity was third in the ranking (e.g., Copeland et. al., 1987; Wolraich et. al., 1990).

A second important issue at the symptom level is that of differential diagnosis, determining which diagnosis, if any, is most appropriate. Research has clearly indicated the difficulty of differential diagnosis of ADHD (e.g., Cohen, Riccio, and Gonzalez, 1994; Epstein et. al., 1991; Schaugency & Rothlind, 1991; Weinberg & Emslie, 1991). As indicated at the outset, although a child may display symptoms of inattention, hyperactivity, or impulsivity, this does not guarantee that a diagnosis of ADHD is necessarily appropriate because a number of explanations for such behaviours are possible. For example, a variety of disorders can mimic "ADHD" in children, including mood disorders such as "Major Depressive Disorder" or "Bipolar Disorder", anxiety disorders such as "Generalized Anxiety Disorder" or "Post Traumatic Stress Disorder", disruptive behavioural disorders such as "Conduct Disorder" and "Oppositional Defiant Disorder", and learning disorders; e.g., Cotugno, 1993; deMesquita & Gilliam, 1994; Sabatino & Vance, 1994; Schaugency & Rothlind, 1991; Thomas, 1995; Weinberg & Emslie, 1991; Weinstein et. al., 2000). However, when symptoms reflect these disorders,
the diagnosis of these behaviours as ADHD is inconsistent with exclusionary criteria in
the DSM-IV which indicate that the behaviours may not be better accounted for by
another disorder (see Appendix A). Furthermore, behaviours of inattention,
hyperactivity, or impulsivity are also sometimes seen in children from highly chaotic
backgrounds or in those exposed to family violence (e.g., Jaffe, Wolfe, and Wilson,
1990; Schaugency & Rothlind, 1991). Should these behaviours reflect only a child’s
reaction/response to the environment, the diagnosis of ADHD would be inconsistent with
the notion of a mental disorder as defined by the DSM-IV.

In addition, the results of some studies have suggested that ADHD may be incorrectly
identified due to rater biases and negative halo effects (e.g., Abikoff, Courtney, Pelham,
and Koplewicz, 1993; Schachar, Sandberg, and Rutter, 1986; Stevens, Quitnner, and
Abikoff, 1998). For example, several studies which examined teacher ratings of
disruptive behaviours found that teachers frequently misidentified children with only
oppositional or disruptive behaviours as also having hyperactive and inattentive
symptoms (e.g., Abikoff et. al., 1993; Schachar et. al., 1986; Stevens et. al., 1998). In
sum, a “unidirectional bias” was noted for these studies suggesting a negative halo effect
of oppositional behaviour on hyperactivity ratings but no halo effect of hyperactivity on
oppositional ratings (i.e., children exhibiting defiance or aggression were judged as
having ADHD, regardless of their activity level; however, children with hyperactive and
inattentive symptoms were not judged as being defiant or aggressive). It was also noted
that knowledge, education, and experience with children with ADHD had no effect on
accuracy of ratings. Thus, diagnostic accuracy may be affected by the types of symptoms
displayed and the perceptions and biases evident in the rater.

Appropriate diagnosis is further complicated by the tendency of ADHD towards comorbidity with various other disorders such as other disruptive behaviour disorders, learning disorders, and mood and anxiety disorders; (Abikoff and Klein, 1992; Barkley, 1990; Cohen et. al., 1994; McMahon, 1994; Schaugency & Rothlind, 1991; Weinberg & Emslie, 1991). In fact, it has been estimated that up to 65% of children diagnosed with ADHD will also meet the criteria for another disorder (e.g., Goldman et. al., 1998; deMesquita and Gilliam, 1994). High rates of comorbidity, in juxtaposition with the knowledge that “ADHD-like” behaviours may actually reflect an alternate disorder, create a confusing situation for the practitioner who must decide which disorder the symptoms reflect or, if more than one category is applicable, the actual relationship between these disorders (e.g., Weinberg & Emslie, 1991). Although the importance of issues of differential diagnosis and comorbidity are commonly cited, few guidelines are provided regarding how to negotiate these issues.

Despite the theoretical attention to issues of differential diagnosis and comorbidity, it has been suggested that such concerns are often ignored in practice (e.g., Schaugency & Rothlind, 1991; Searight et. al., 1995). This is highlighted by the results of studies which have either assessed children with suspected ADHD (e.g., Desgranges et. al., 1995) or comprehensively re-assessed children with prior diagnoses of ADHD (e.g., Cotugno, 1993; Sabatino & Vance, 1994). The results of these studies suggest possible problems regarding misdiagnosis of ADHD, given their reported findings that only 40% to 60% of suspected or previously confirmed cases of ADHD were actually diagnosed with ADHD.
following a careful assessment or reassessment. Thus, in these studies around half of suspected or previously diagnosed children were reportedly not considered to fulfill criteria for ADHD following comprehensive evaluation, even though some of these children had already received a diagnosis and were being treated for ADHD. According to these studies, the misdiagnoses cited were often viewed as reflecting difficulties introduced by issues such as differential diagnosis and comorbidity.  

A final issue related to symptom issues concerns the subtyping of ADHD. Historically, there have been several models of ADHD subtypes (American Psychological Association, 1968, 1980, 1987, 1994). As has been previously described, three subtypes, based on factor analytic studies (e.g., Lahey et. al., 1994) are currently defined: ADHD – Combined, Predominately Inattentive, and Predominately Hyperactive/Impulsive. Despite this current conceptualization, debate continues with regard to subtyping of the disorder (e.g., Barkley, 1996, 1998).

In sum, it is clear that a variety of symptom issues are important regarding the diagnosis of ADHD. The impact of these issues on diagnosis and accuracy, however, has been generally under-investigated, and thus, our understanding of their influence is

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Despite the value of these studies in highlighting possible diagnostic difficulties, it should be noted that their results may be tempered somewhat by a consideration of several possible shortcomings. In general, all three of these studies would benefit from additional information/description of materials and procedure (e.g., Who made the original diagnoses and how were they made? Who were the “teams” making the current assessment/reassessment? Were all examiners blind? etc.) as well as providing more data used to support conclusions. The possible main issues for the studies which seem to be unanswered are possible threats to external validity (e.g., results confined to mental health clinic? results confined to children who have not responded to treatment?) and to statistical conclusion validity (e.g., results affected by poor reliability of measures/measurers?). It is presumed that increased detail would improve confidence in at least some of these areas and for the results in general. In addition, the initiation of treatment may have confounded these studies, given that children who were previously diagnosed may have improved markedly in response to stimulant treatment and may have no longer met the diagnostic criteria for ADHD.
incomplete. It appears to be useful to gain a better understanding of how specific symptom, comorbidity, differential diagnosis, and subtyping issues may relate to diagnostic accuracy. Given the limited research, such factors should be more systematically examined.

**Gender Issues.** The gender of the child in question and how that may impact on the diagnosis of ADHD is an additional issue in diagnostic accuracy which needs to be considered. As previously indicated, prevalence ratios suggest that boys outnumber girls in a range from 3:1 to 9:1 (American Psychiatric Association, 1994; Barkley, 1996; Gaub & Carlson, 1997). Rates specific to Ontario indicate that the disorder is significantly more common in boys than girls with prevalence rates of 9% and 3.3% respectively (Szatmari et. al., 1989). However, despite these prevalence rates, it seems somewhat unclear at present whether this difference represents a true distinction between the sexes or whether it reflects bias due to the under-recognition of the disorder in girls or the over-recognition of the disorder in boys. It has been suggested that differing symptom pictures in boys (who tend to exhibit greater hyperactivity, more externalizing behaviours, more conduct problem) versus girls (who tend to exhibit less hyperactivity and externalizing behaviours) have encouraged a referral and diagnostic bias, such that prevalence rates are inflated for boys (e.g., Berry, Shaywitz, and Shaywitz, 1985; Biederman et. al., 1994; Gaub & Carlson, 1997).

In general, this state of affairs has led to some complications. For example, as a result of the lower base rates in girls, research conducted regarding ADHD has been dominated by use of samples of boys (e.g., Berry et. al., 1985; Gaub & Carlson, 1997). In fact, the
majority of subjects in the field trials of the DSM-IV, which were used to determine
diagnostic criteria and subtyping, were boys (e.g., Barkley, 1996). Thus, a great deal of
current knowledge, and even the current diagnostic conceptualizations of ADHD may be
biased towards its expression in boys. Moreover, the implications at the individual level
of diagnosis suggest that gender information may significantly affect diagnosis, given
that diagnostic and prognostic accuracy is known to vary as a reflection of knowledge of
base and prevalence rates (e.g., McDermott, 1996).

While it has been suggested that increasing attention to gender differences has led to
improvements with regards to the diagnosis of girls (e.g., Goldman et. al., 1998), it
remains unclear exactly how gender may influence diagnosis in practice, particularly
when symptom pictures fluctuate. Given that prior studies have clearly implicated the
impact of gender on the diagnosis of other mental disorders (e.g., Loring and Powell,
1988), it remains to be seen how gender issues may influence ADHD diagnosis.

Rationale and Hypotheses

Although diagnosis is undoubtedly the first and most crucial step in defining, treating,
and researching ADHD, few investigations have attempted to document the diagnosis of
this disorder or to investigate factors which may relate to diagnosis and diagnostic
accuracy. For example, there is poor understanding of how specific factors or features of
a case, such as the profession of the practitioner making the diagnosis,
behaviour/symptom presentation, and gender of the child in question, may relate to
ADHD diagnosis and specifically, diagnostic accuracy. Given the reported frequency
and costs associated with ADHD, it would appear that increased knowledge related to the
diagnosis of this disorder would be beneficial. Because the impact of practitioner and case variables which may relate to the diagnosis of ADHD had been insufficiently examined in past studies, it was the primary intent of the current study to examine these variables in order to ascertain how they relate to diagnostic accuracy.

Consequently, the diagnosis of cases by three groups of professionals (i.e., psychologists, pediatricians, general practitioners) was investigated via a mail survey method. Each participant evaluated 1 of 8 written case vignettes that described current presenting behaviours/symptoms of a child based on informant report. Four variations of symptom information were presented. Vignette 1 described combined hyperactive/impulsive and inattentive symptoms (i.e., ADHD, Combined Type). Vignette 2 described predominately hyperactive/impulsive symptoms (i.e., ADHD, Predominately Hyperactive/Impulsive Type). Vignette 3 described predominately inattentive symptoms (i.e., ADHD, Predominately Inattentive Type). Vignette 4 described subclinical/subthreshold hyperactive, impulsive, and inattentive symptoms and extraneous symptoms (i.e., did not meet criteria for a diagnosis of ADHD). The gender of the child depicted (i.e., the target) was also manipulated in vignettes such that each behavioural/symptom vignette variation (i.e., vignettes 1, 2, 3, 4) included a male and female target version. Diagnoses made by all professionals for all vignettes and diagnostic accuracy (as defined by measures such as sensitivity, specificity, hit rate, and miss rate), were measured. Data regarding practitioner attributes, practice-related
variables, and diagnosis-related variables were also collected.  

**Descriptive Data.** The study provided a description of a variety of factors related to ADHD diagnosis (e.g., practitioner attributes, practice-related variables, diagnosis-related variables). The collection of this descriptive data also permitted the exploration of a variety of relationships and differences between variables (e.g., differences between professional groups related to practitioner attributes and practice- and diagnosis-related variables).

While descriptive data related to the diagnosis of ADHD was needed and is clearly beneficial towards creating a more comprehensive picture of the diagnosis of ADHD, this study also contributed to the understanding of ADHD diagnosis by allowing several hypotheses to be tested. In particular, hypotheses related to the relationship of practitioner and case variables on diagnostic accuracy were generated and examined. As noted previously, diagnostic accuracy can be defined according to several concepts including: *hit rate* (i.e., accurate diagnoses of true positive and true negative diagnoses), *miss rate* (i.e., inaccurate diagnoses or false positive and false negative diagnoses), *sensitivity* (i.e., percentage of people with a disorder accurately identified as having the disorder) and *specificity* (i.e., percentage of people without a disorder identified as not having the disorder). Diagnostic accuracy would be reflected by high hit rates (i.e., high true positive and negative diagnoses) and low miss rates (i.e., high false positive and

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6 Examples of practitioner attributes include age, gender, recency of training, etc. Examples of practice-related variables include years of practice, number of children/adolescents seen daily, appointment length etc. Examples of diagnosis-related variables include reported certainty level for diagnosis, steps suggested to confirm diagnosis, familiarity with ADHD etc.
negative diagnoses) as well as high sensitivity and high specificity.

**Hypothesis 1.** Examination of the training of various professionals related to psychopathology/DSM-IV indicates that psychologists receive the most hours of training, followed by pediatricians, followed by general practitioners (e.g., University of Toronto, 2001; University of Western, 2001). There have also been suggestions that the training quality for medical professionals may be compromised (e.g., Schulberg et. al., 1986). Survey literature has also indicated that many pediatricians and general practitioners do not rely on standard criteria in making a diagnosis (Wolraich et. al., 1990). In addition, there are suggestions that there are differences between professional groups on factors which may affect diagnosis such as length of evaluation time and comprehensiveness of the assessment process of various professional groups (with general results suggesting that primary care physicians may have less time to perform comprehensive evaluation, Schulberg et. al., 1986; and specific results suggesting that pediatricians spend more time and have more comprehensive processes than general practitioners, e.g., Wolraich et. al., 1990).

Given that more training and improved training quality should lead to increased familiarity with psychopathology, the DSM-IV, and thus ADHD; that reliance on standard criteria; and that an orientation towards more lengthy and comprehensive assessment procedures would be likely to contribute to increased diagnostic accuracy, it was expected that a) *psychologists would be the most accurate in diagnosis across all vignettes* b) *pediatricians would be the next accurate in diagnosis across all vignettes* and c) *general practitioners would be the least accurate in diagnosis across all*
vignettes. These expectations were assumed to hold true irrespective of the behavioural/symptom presentation and the gender of the child depicted in the vignette.

**Hypothesis 2.** Studies suggest that the particular constellation of DSM-IV symptoms may significantly influence ADHD diagnosis. For example, several studies have highlighted hyperactivity as the salient factor guiding diagnosis (e.g., Epstein et. al., 1991; Halperin et. al., 1992; Halperin et. al., 1993; Milich et. al., 1987; Waldman et. al., 1991). To a somewhat lesser extent, survey studies have also outlined the reported importance of inattention as a contributor to the diagnosis of ADHD (e.g., Copeland et. al., 1987; Wolraich et. al., 1990). In addition, studies have also indicated that misdiagnosis of other disorders as ADHD is not infrequent (e.g., Desgranges et. al., 1995; Cotugno, 1993; Sabatino & Vance, 1994). Consequently, it was expected that a) **Vignette 1,** which reflected symptoms of both hyperactivity/impulsivity and inattention (i.e., ADHD, Combined Type), would result in the greatest diagnostic accuracy, b) **Vignette 2,** which presented hyperactivity/impulsivity symptoms only (i.e., ADHD, Predominately Hyperactive/Impulsive Type), would result in the second greatest diagnostic accuracy, c) **Vignette 3,** which presented inattention symptoms only (i.e., ADHD, Predominately Inattentive Type), would result in the third greatest diagnostic accuracy, and d) **Vignette 4,** which presented subclinical hyperactivity/impulsivity or inattentive symptoms and non-ADHD symptoms (i.e., did not meet criteria for a diagnosis of ADHD), would result in the lowest diagnostic accuracy. These expectations were assumed to hold true

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7 It is noted that while this hypothesis has remained unchanged since the proposal of this project, the rationale behind the hypothesis has been changed based on consultation and a reconsideration of its logic.
irrespective of the practitioner making the diagnosis and the gender of the child depicted in the vignette.

**Hypothesis 3.** Prevalence rates of ADHD suggest that boys are diagnosed more frequently than girls by ratios of 3:1 to 9:1 (American Psychiatric Association, 1994; Barkley, 1996; Gaub & Carlson, 1997; Szatmari et al., 1989), investigation of this gender difference in prevalence reveals the possibility of referral and diagnostic bias due to the often differing symptom pictures of boys and girls, with the possibility that clinicians tend to recognize the disorder more frequently in boys because of the particular symptoms they tend to display (e.g., Berry et al., 1985; Biederman et al., 1994; Gaub & Carlson, 1997). Given this, it is suggested that symptoms of hyperactivity, impulsivity, and distractibility would be particularly noted when they were displayed by girls. As a result, because the vignettes used in the current study depict similar levels of activity, impulsiveness, and inattention for boys and girls, it was expected that overall, the likelihood of ADHD diagnosis would be highest for girls and lowest for boys, irrespective of the professional making the diagnosis and behavioural/symptom presentation. It was also expected that diagnostic accuracy would be highest for girls and lowest for boys.

**Design**

The present study used a 4x2x3 between-subjects factorial design. An analogue approach was used in which case vignettes varying in behaviour/symptom information

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8 It is noted that this hypothesis has been changed since the proposal of this project, based on consultation and a reconsideration of the logic of the former prediction which posited no differences.
(combined hyperactive/impulsive and inattentive symptoms; predominately hyperactive/impulsive symptoms; predominately inattentive symptoms; and non-hyperactive/impulsive and non-inattentive symptoms) and gender of the target child depicted in the vignette (male and female) were randomly distributed to a sample of the members of three professional groups (psychologists, pediatricians, and general practitioners). Each participant evaluated 1 of the 8 possible vignettes. Diagnosis was measured and diagnostic accuracy was defined according to four conditional probability indices -hit rate, miss rate, sensitivity, and specificity. Data regarding practitioner attributes and practice-related and diagnosis-related variables were collected for the professional groups and differences related to these variables were assessed.
CHAPTER II

METHOD

Participants

Three hundred and twenty members from each of three professional groups (i.e., psychologists, pediatricians, general practitioners) regulated to perform the controlled act of diagnosis in Ontario were initially contacted to participate in the study, for a total of nine hundred and sixty possible participants. Approximately 14% of this initial sample responded to the survey, for a sample of 135 individuals. Of these, 15 respondents provided incomplete data (e.g., reported being too busy to complete the survey, reported that the survey was inapplicable to their current practice setting, change of address reported), resulting in a final sample of 120 individuals. Unless otherwise specified, all data pertain to the final sample of 120 participants. Where data are missing, the number of participants is noted. In addition, means are reported when data are reasonably evenly distributed while medians are reported when data are unevenly distributed.

The final sample was comprised of 57 psychologists (47.5%), 42 pediatricians (35.0%), and 21 general practitioners (17.5%) and consisted of 69 male and 51 female adults ranging in age from 29 years to 71 years with an average age of 48 years ($SD = 9.6$). With respect to their training, participants reported an average of 10 years post secondary training ($SD = 2.6; n = 102$). Seventy four participants (61.7%) reported training exclusively within Ontario, Canada, 21 participants (17.5%) reported multi-site training both within and outside of Canada, 12 participants (10.0%) reported multi-site training exclusively within Canada, and the remaining 13 participants (10.7%) reported
training exclusively outside of Canada (e.g., United States, Europe). Reported year of
graduation from training ranged from 1954 to 2000, with approximately 50% of the final
sample reporting a graduation date of 1982 or later.

With respect to current practice conditions, the majority of participants reported
practicing in urban (83.2%) as opposed to rural (9.3%) or combined (7.5%) settings (n =
107). Fifty participants (44.6%) specified practicing within Southwestern Ontario, 49
participants (43.8%) within Southeastern Ontario, 8 participants (7.1%) within
Northeastern Ontario, and 5 participants (4.5%) within Northwestern Ontario (n = 112).
Current reported practice settings included private practice (50.8% of participants),
hospital (26.7% of participants), mental health facility (10.0% of participants), and
alternate settings (12.5% of participants). Reported number of years of practice ranged
from 1 to 45 years, with an average of 17.4 years (SD = 10.1).

While proportions ranged from 0% to 100%, participants reported a median of 95% of
current practice focused on children and/or adolescents (M = 70.9, SD = 35.9). The
median number of children or adolescents seen daily was reported to be 3 and 2
respectively (M = 8.9, SD = 12.9, and M = 3.0, SD = 3.5). Reported appointment lengths
ranged from 5 minutes to 7 hours 30 minutes, with a median of 45 minutes (M = 60
minutes, SD = 1.02) noted across the sample. With respect to reported familiarity with
ADHD, 58% of participants reported being very familiar, 32.8% familiar, and 9.2%
somewhat familiar with the disorder (n = 119). No participants reported being

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9 It was noted on questionnaires that the lengthy appointment times related to the average reported time length
for psychological testing appointments.
unfamiliar with ADHD. Number of reported workshops or continuing educational experiences with ADHD ranged from 0 to 22, with an average of 4 workshops/continuing education reported across the sample (SD = 4.2; n = 72).

**Measures**

**Demographic Information.** A demographic survey included questions regarding age, gender, professional degrees, number of years of post secondary education, location of training, year of graduation, number of years of practice, current practice setting, location of practice, proportion of practice focused on children/adolescents, average number of children/adolescents seen daily, average length of appointment with children/adolescents, and perceived degree of familiarity and number of continuing educational experiences with a variety of childhood disorders. A copy of this form is presented in Appendix B.

**Case Vignettes.** Case vignettes which varied in terms of symptom information and gender of the child depicted in the vignette (i.e. the target) were used to assess how such elements related to diagnostic accuracy. Four levels of symptom information (combined hyperactive/impulsive and inattentive symptoms; predominately hyperactive/impulsive symptoms; predominately inattentive symptoms; and non-hyperactive/impulsive and non-inattentive symptoms) were manipulated in the vignettes. Gender of the target (male versus female) was also manipulated. As a result of the manipulation of these elements, four case vignettes variations were created, each with a male and female target version (see Appendix C).
<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined: Hyperactive/Impulsive</td>
<td>vignette #1m</td>
<td>vignette #1f</td>
</tr>
<tr>
<td>and Inattentive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predominately Hyperactive/Impulsive</td>
<td>vignette #2m</td>
<td>vignette #2f</td>
</tr>
<tr>
<td>Predominately Inattentive</td>
<td>vignette #3m</td>
<td>vignette #3f</td>
</tr>
<tr>
<td>Non-Hyperactive/Impulsive and Inattentive</td>
<td>vignette #4m</td>
<td>vignette #4f</td>
</tr>
</tbody>
</table>

Each vignette was constructed with reference to DSM-IV criteria and was created to read as a narrative, following the format popular in current casebooks (e.g., DSM-IV Casebook; Spitzer, Gibbon, Skodol, Williams, and First, 1994). Symptom information was based on the variation of symptom type (hyperactive/impulsive versus inattentive) and symptom degree of expression (low versus high). With regard to symptom type, symptoms written to reflect Hyperactive/Impulsive behaviours were modeled entirely upon those symptoms defined by criterion A2 of the DSM-IV category for ADHD (see Appendix A). This criterion lists eight possible hyperactive/impulsive symptoms (e.g., “often fidgets with hands or feet or squirms in seat”; “is often on the go or often act as if driven by a motor”; “often has difficulty awaiting turn”). Similarly, symptoms written to reflect Inattentive behaviours were modeled entirely upon those symptoms defined by criterion A1 of the DSM-IV category for ADHD (see Appendix A). This criterion lists eight possible symptoms (e.g., “often has difficulty sustaining attention in tasks or play...
activities”; “is often easily distracted by extraneous stimuli”; “is often forgetful in daily activities”). The specific statements used to portray each symptom of ADHD criteria in the DSM-IV are presented for the four main vignette versions in Appendix C.

Symptom degree of expression was defined as “high” if the vignette depicted six of the eight possible symptoms within criterion A (1 and 2), the number of symptoms which is required by the DSM-IV in order for the criterion to be considered “met”. Symptoms expression was defined as “low” if the vignette depicted only 1 of the symptoms, a number which is below the threshold for diagnosis according to the DSM-IV. In combination with symptom type, this variation allowed for four possible case vignette variations: high hyperactivity/impulsivity & high inattention; high hyperactivity/impulsivity & low inattention, low hyperactivity/impulsivity & high inattention, and low hyperactivity/impulsivity & low inattention. These combinations translate into four corresponding DSM-IV diagnoses: ADHD, Combined Type; ADHD, Predominately Hyperactive/Impulsive Type; ADHD, Predominately Inattentive Type; and no ADHD diagnosis.

All vignettes, irrespective of symptom type or degree of expression, were created to include the same number of total symptoms, thus eliminating this variable as a possible confound. Thus, high/low combinations and low/low vignettes included “filler” symptoms which were drawn randomly from other DSM-IV categories (e.g., Oppositional Defiant Disorder, Conduct Disorder, Major Depressive Disorder, Posttraumatic Stress Disorder, Generalized Anxiety Disorder). The specific statements used to depict criteria are presented in Appendix C. Efforts were made to ensure that
although symptoms of various disorders were presented, neither of the high/low vignettes met the criteria for any other disorder. However, the low/low vignette was created to allow for the possibility of a differential diagnosis of Major Depressive Disorder—a disorder which is frequently interpreted as ADHD in children (e.g., Cotugno, 1993; Sabatino & Vance, 1994).

As previously indicated, “low” symptom expression was not portrayed as an absence of symptoms but rather included one of the required six symptoms of ADHD from each of the two sets (i.e., Inattentive and Hyperactive/Impulsive) needed to constitute a diagnosis. The symptoms for both the hyperactive/impulsive set and the inattentive set were chosen because of their salience as symptoms of ADHD (e.g., Copeland et. al., 1987; Wolraich et. al., 1990). They were kept constant across vignettes and included: A2a) “often fidgets with hands or feet or squirms in seat” for the hyperactive/impulsive set; and A1h) “is often easily distracted by extraneous stimuli” for the inattentive set.

The constancy of these symptoms across all vignettes was intended to provide consistency across vignettes and to improve their face validity for respondents.

Finally, all vignettes kept the age of the target child in the description constant at 9 years of age and included descriptions of symptoms which satisfied DSM-IV criteria B (Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years), C (Some impairment from the symptoms is present in two or more settings), and D (There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning) within the category of ADHD. The presentation of these symptoms was kept constant across vignettes because all three are
required, along with the satisfaction of criterion A1 or A2, in order for a diagnosis of ADHD to be made. In addition, this presentation further promoted consistency across vignettes.

The four vignette variations which were created through the combination of symptom type and symptom level of expression (combined hyperactivity/impulsivity & inattention; predominately hyperactivity/impulsivity; predominately inattention; and non-hyperactivity/impulsivity & inattention) were further expanded by manipulating gender information of the target. The target child in all vignettes was given a gender-neutral name, “Chris”, to allow for consistency across all vignettes. In order to manipulate target gender, all personal pronouns within the vignette were changed to reflect either male or female. This manipulation created male and female target figure versions for each of the four possible vignettes.

Case vignettes were pilot tested with six graduate students from the University of Windsor in order to ensure that each vignette reflected the intended disorder (i.e., Vignettes 1, 2, and 3 identified and labeled as ADHD, and Vignette 4 identified and labeled as a non-ADHD disorder). The second and third year graduate students had all been trained in psychopathology, diagnosis, and the DSM-IV. Students were instructed to refer to the DSM-IV specifically in making a diagnosis. Results of this piloting indicated that Vignettes 1, 2, and 3 were labeled as ADHD by all the students, with some minor variations in subtyping. Vignette 4 was labeled as a non-ADHD disorder by five of the students but received an ADHD label by one student. In general, these results suggested that the vignettes represented the intended disorders and could be diagnosed
accurately with respect to ADHD status (i.e., ADHD or non-ADHD) as represented in the DSM-IV. Feedback from the students led to some minor changes in wording and re-organization of the symptoms within the vignettes.

Case Vignette Questionnaires. Following each vignette was a brief questionnaire which asked the participant to answer several questions. Initially, the participant was asked to indicate a single primary hypothesized diagnosis for the target figure, level of certainty of this diagnosis, and rationales for both the diagnosis and certainty level. The participant was then asked to indicate any additional hypothesized diagnoses, specify whether each was seen as a coexisting disorder (i.e., comorbid) or an alternate disorder which needed to be ruled out (i.e., differential diagnosis), and provide a rationale for any secondary diagnoses. Subsequently, the participant was asked to indicate the steps he/she would take to confirm the primary diagnosis and rule out alternate diagnoses, as well as for his/her recommendation for the treatment suggested for the child. Additional space was provided to the participant to add any further comments. A copy of the questionnaire is presented in Appendix D.

The case vignette questionnaires, along with the vignettes and the other survey materials (i.e., cover letter, consent form) were piloted with four psychologists in order to ensure that materials were self-explanatory and error-free. Feedback from the psychologists revealed no difficulties with the materials suggesting that the format, instructions, and questions were clear and logical.

Procedure

Subject selection. The initial pool of 960 participants was randomly selected from the
membership lists relevant to each profession. For example, the Canadian Medical Directory 1999, an annual directory of medical professionals classified by geographical location and specialty, was used to randomly select participants from the population of general practitioners and pediatricians in Ontario. Similarly, the Ontario College of Psychologists Directory 1998/99, an annual directory classified by geographical location and service area, was used to randomly select participants from the population of registered psychologists in Ontario.

The listings of general practitioners and pediatricians in Ontario were obtained from a listbroker and were provided as computer data to the researcher. As previously indicated, this directory was restricted to Ontario practitioners and was organized by geographical location via postal codes. As a result, it provided an accurate representation of the entire province of Ontario’s general practitioners and pediatricians. In consideration of the number of members within each of these groups, a computer program was used to select, by geographical location, every 26th individual from among the population of general practitioners and every 2nd individual from the population of pediatricians. This selection provided a sample of 320 general practitioners and 320 pediatricians currently practicing across Ontario.

The Ontario College of Psychologists Directory 1998/99, was used to select participants from among the population of registered psychologists in Ontario. This directory included main area of service (e.g., clinical psychology, school psychology), main population served (e.g., children, adolescents, adults, families), and provided a geographical listing of practitioners. Initially, a subset of those practitioners who
indicated clinical psychology as a main area of service and children and/or adolescents as the main population served was drawn from among the population of psychologists. This selection, which yielded a total of 436 individuals, ensured that each participant would be an appropriate candidate for the purposes of the survey. Psychologists who were known personally to the researcher were then eliminated from this list, resulting in a total of 426 individuals. Three hundred and twenty individuals were then randomly drawn from this subset by geographical location so as not to over- or under-represent any particular area in Ontario as well as to provide consistency with the selection process used with general practitioners and pediatricians.

Survey distribution. Each of the participants selected from the membership lists was sent a survey package via regular mail. Packages included a cover letter (see Appendix E), a consent form (see Appendix F), a demographic information form (see Appendix B), a single case vignette followed by several questions related to the case (see samples in Appendix C and D), and a self-addressed pre-paid return envelope. The demographic questionnaire and the case study were coded with numbers in the top right hand corner in order to preserve confidentiality of participants and for matching purposes (i.e., to ensure that each case study could be linked to the appropriate demographic questionnaire).

While the cover letter, consent form, and demographic information form were identical in all packages, the vignettes were altered and randomly assigned within each professional group. As previously indicated, the case vignettes varied in terms of symptom information and gender of the target. Four vignette variations were available, each with male and female target figure versions. Random assignment of the vignettes
within each of the four professional groups led to the distribution of an equal number of vignette variations within each group.

**Response Coding.** The qualitative nature of some of the questions included on the case vignette questionnaire required the coding of these responses following the return of the surveys. Examples of open-ended questions from the case vignette questionnaire which required coding included: 1b) *Please provide a rationale for the primary hypothesized diagnosis given for the child presented in the case.* 1d) *Please provide a rationale for the certainty level of the primary diagnosis.* 3) *Please indicate the steps, if any, that you would take to confirm the primary diagnosis and rule out alternate diagnoses,* and 4) *Please indicate the treatment you would recommend to the family* (see Appendix D). In addition, responses with respect to question 1a), which asked participants to indicate a single primary diagnosis for the child presented in the case, were coded into both general disorder (i.e., ADHD versus not ADHD) and specific categories (i.e., ADHD - various subtypes and other specific DSM-IV disorders such as Major Depressive Disorder, Oppositional Defiant Disorder etc.). The accuracy of the term used in the primary diagnosis (i.e., current nomenclature used versus outdated or inaccurate classifications) was also coded. In addition, all surveys were coded for the general level of caution expressed by participants with respect to diagnosing a case based on the data provided in the vignette (i.e., need for caution stated explicitely versus need for caution implied versus no need for caution expressed nor implied).

All case vignette questionnaires were coded by the researcher using a general process recommended for coding qualitative data (e.g., Neuman, 1997). Initially, all survey
responses for questions 1b, 1d, 3, and 4, were screened in order for the researcher to
develop a general idea of the types of responses offered for each question. This open
coding process was used to create a list of themes for each question. Subsequently, a
selective coding process was used to categorize participants’ responses for these
questions according to the themes defined during the open coding phase. An example of
this process can be seen for question 4 which asked participants to recommend a
treatment based on their diagnosis of the case. Initially, screening of the responses
during the open coding phase led to the creation of several themes including: medical
interventions, behaviour modifications interventions, therapy interventions, combined
interventions (i.e., medical and psychological), referral to another professional, refusal
to recommend based on the information provided, and other. Each response was then
carefully examined and coded as representing one of the above thematic categories. The
same general process was used to code the qualitative data provided in the other noted
questions.

Response Coding: Reliability. In order to ensure consistency in the coding process,
20 surveys were randomly selected and responses were recoded by a sixth-year graduate
student who had been trained in the coding process. Recoding was conducted for the
general diagnosis made by the practitioner (q. 1a), the specific diagnosis made (q. 1a),
the rationale for the diagnosis (q. 1b), the rationale for the certainty level (q. 1d), the
steps used to confirm the diagnosis (q. 3), the recommended treatment (q. 4), and the
level of caution for the diagnosis expressed by the practitioner. Correlation coefficients
ranged from .58 to .94 (see Table 2), suggesting adequate interrater reliability for all
coded responses.\textsuperscript{10}

Table 2

\textbf{Correlation Coefficients for Coded Responses}

<table>
<thead>
<tr>
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<th>Cohen’s Kappa</th>
</tr>
</thead>
<tbody>
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<td>General Diagnosis</td>
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</tr>
<tr>
<td>Specific Diagnosis</td>
<td>0.73</td>
</tr>
<tr>
<td>Rationale for Diagnosis</td>
<td>0.94</td>
</tr>
<tr>
<td>Rationale for Certainty Level</td>
<td>0.94</td>
</tr>
<tr>
<td>Steps to Confirm Diagnosis</td>
<td>0.58</td>
</tr>
<tr>
<td>Recommended Treatment</td>
<td>0.86</td>
</tr>
<tr>
<td>Level of Caution for Diagnosis</td>
<td>0.61</td>
</tr>
</tbody>
</table>

\textbf{Survey of Nonrespondents.} Following completion of the study, a random sample of 20 individuals who did not respond to the initial survey was contacted to obtain a description of their demographic characteristics in order to permit a comparison between this group and those participants who returned the study materials. Nonrespondents were drawn from the original listing of 960 participants. They were contacted via electronic mail and asked to answer questions regarding age, gender, year of graduation, number of years in practice, practice location, proportion of practice focused on children/adolescents, and average client appointment length. Confidentiality was maintained by using the blind cc: code such that participants could only view their own and the researcher’s electronic address.

\textsuperscript{10} Cohen’s Kappa, which is appropriate for use in cases where scorers make ratings using nominal scales of measurement (e.g., Cohen, Swerdick, and Smith, 1992) was selected as the appropriate choice of correlation coefficient given the nature of the data.
CHAPTER III

RESULTS

Participation Rate

Of the 960 individuals (320 psychologists, 320 pediatricians, and 320 general practitioners) who were contacted to participate in the study, 135 individuals returned surveys, for a response rate of approximately 14%. Of these, 15 respondents provided incomplete data (e.g., reported being too busy to complete the survey, reported that the survey was inapplicable to their current practice setting, were no longer available at the address listed), resulting in a final sample of 120 individuals. Unless otherwise specified, all data pertain to the final sample of 120 participants. Where data are missing, the number of participants is indicated.

Participants

Demographics. Of the 120 respondents who returned fully completed survey materials, 57 (47.5%) were psychologists, 42 (35.0%) were pediatricians, and 21 (17.5%) were general practitioners. A one sample chi square test was performed in order to examine the distribution of professional group (i.e., psychologist, pediatrician, general practitioner). A significant difference in the distribution of professional group was found, $\chi^2 (2, N = 120) = 16.4, p < .00$, suggesting that there was an unequal representation of psychologists, pediatricians, and family general practitioners in the final sample.

Data was collected regarding various demographic and training variables across the final sample and the three professional groups were compared with respect to gender, age, number of years of training, location of training, and year of graduation/recency of
training. Frequency data for the various professional groups related to gender and location of training are presented in Table 3. Means and Standard Deviations for all other variables are presented in Table 4.

No significant differences were found when one-way analyses of variance were performed on professional group and age, $F(2, 117) = 2.8, \ p > .06$ and professional group and year of graduation, $F(2, 114) = .33, \ p > .72$, or when crosstabulations were performed on professional group and gender, $\chi^2 (2, N = 120) = .24, \ p > .88$. Results of crosstabulations on professional group and location of training were inconclusive due to violation of test assumptions (i.e., greater than 20% of cells having an expected count less than 5). A significant difference was found when a one way analysis of variance was performed on professional group and years of training, $F(2, 99) = 7.31, \ p < .001$ (see Table 4). Post hoc analyses \(^{11}\) indicated that pediatricians differed in terms of years of training from both psychologists and general practitioners, with averages of 1.5 and 2.5 more years of training than psychologists and general practitioners respectively. No significant difference with respect to years of training was noted between psychologists and general practitioners. In sum, with the exception of the noted differences in years of training, professional groups were relatively similar with respect to demographic and training variables.

\(^{11}\) A Scheffe method was selected for all post hoc comparisons as it is reported to be one of the most conservative and flexible of these methods (Tabachnik and Fidell, 1989).
Table 3

Frequencies and Differences of Demographic and Training Variables According to Professional Group

<table>
<thead>
<tr>
<th></th>
<th>Psychologists (n = 57)</th>
<th>Pediatricians (n = 42)</th>
<th>General Practitioners (n = 21)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency (%)</td>
<td>Frequency (%)</td>
<td>Frequency (%)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>34 (60.0)</td>
<td>23 (54.8)</td>
<td>12 (57.1)</td>
<td>69 (57.5)</td>
</tr>
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<td>Female</td>
<td>23 (40.0)</td>
<td>19 (45.2)</td>
<td>9 (42.9)</td>
<td>51 (42.5)</td>
</tr>
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<td>Location of Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td>39 (68.4)</td>
<td>19 (45.2)</td>
<td>16 (76.2)</td>
<td>74 (61.7)</td>
</tr>
<tr>
<td>Other province</td>
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<td>1 (2.4)</td>
<td>0</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td>United States</td>
<td>5 (8.8)</td>
<td>2 (4.8)</td>
<td>0</td>
<td>7 (5.8)</td>
</tr>
<tr>
<td>Europe</td>
<td>1 (1.8)</td>
<td>2 (4.8)</td>
<td>1 (4.8)</td>
<td>4 (3.3)</td>
</tr>
<tr>
<td>Multiple locations</td>
<td>12 (21.1)</td>
<td>17 (40.5)</td>
<td>4 (19.1)</td>
<td>33 (27.5)</td>
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<tr>
<td>Other</td>
<td>0</td>
<td>1 (2.4)</td>
<td>0</td>
<td>1 (0.8)</td>
</tr>
</tbody>
</table>

**results inconclusive due to violations of test assumptions (i.e., greater than 20% of cells having an expected count less than 5).
<table>
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<tr>
<th>Year</th>
<th>Education Year of Completion</th>
<th>Post Hoc E &amp; F Mean SD</th>
<th>Post Hoc G Mean SD</th>
<th>Post Hoc H Mean SD</th>
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<td>1981.1</td>
<td>9.6</td>
<td>9.6</td>
<td>9.1</td>
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</tr>
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<td>10.7</td>
<td>10.7</td>
<td>10.7</td>
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<tr>
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<td>0.02</td>
<td>0.02</td>
<td>10.01</td>
</tr>
</tbody>
</table>

Table 4: Means, Standard Deviations, and Differences Between Demographic and Training Variables According to Professional Group
**Vignette Variations Returned by Participants**

The distribution of vignettes returned by the 120 respondents was examined in order to ensure that there was an equal representation of all eight vignettes across participants (see Table 5). One sample chi-square tests were performed separately on both vignette symptom variations (i.e., vignette 1, 2, 3, or 4) and vignette gender variations (i.e., male versus female target figures) in order to examine the distribution of vignette variations across respondents. No significant differences in the distribution of values were found on vignette symptom information, $\chi^2 (3, N = 120) = 4.2, p > .20$, nor gender of the target depicted in the vignette $\chi^2 (1, N = 120) = .47, p > .40$, suggesting that there was an equal representation of vignettes 1 - 4 and target male/female variations within the final sample. Consequently, vignettes 1 through 8 were equally as likely to be received and thus returned by respondents.

**Summary of Diagnoses and Misdiagnoses**

**Diagnoses.** A summary of the diagnoses made by the three professional groups for all vignettes is presented in Table 6 in order to provide an overall picture of diagnoses made. For Table 6, frequency data for five possible diagnoses is presented including: ADHD - Combined Type; ADHD - Predominately Hyperactive/Impulsive Type; ADHD - Predominately Inattentive Type; Non-ADHD disorders; and refusals to diagnose (defined as either making no diagnosis or stating an explicit objection to making a diagnosis of ADHD). The bolded numbers reflect accurate diagnoses in terms of diagnostic label according to both disorder (i.e., ADHD) and corresponding **subtype** for vignettes 1, 2, 3 (i.e., Combined type for vignette 1; Predominately Hyperactive/Impulsive type for...
<table>
<thead>
<tr>
<th></th>
<th>Vignette 4</th>
<th>Vignette 3</th>
<th>Vignette 2</th>
<th>Vignette 1</th>
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<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>14 (8.7%)</td>
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<td>12 (7.8%)</td>
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</tr>
<tr>
<td></td>
<td>13 (7.8%)</td>
<td>6</td>
<td>12 (7.8%)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>8 (4.7%)</td>
<td>4 (2.5%)</td>
<td>6 (4.0%)</td>
<td>3 (1.9%)</td>
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<tr>
<td></td>
<td>5</td>
<td>4 (2.4%)</td>
<td>6 (3.9%)</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>10</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>(%)</td>
<td>J</td>
<td>J</td>
<td>J</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----</td>
<td>-----</td>
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</tr>
<tr>
<td>ADHD</td>
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<tr>
<td>Hyperactive/Hyperactive</td>
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<tr>
<td>Predominantly Inattentive</td>
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<tr>
<td>Predominantly Hyperactive</td>
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<tr>
<td>Combined</td>
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<tr>
<td>MDD</td>
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<tr>
<td>Depressive</td>
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<tr>
<td>Refusal to ADHD</td>
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<td>ADHD</td>
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<tr>
<td>Combined</td>
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<table>
<thead>
<tr>
<th>Diagnoses</th>
<th>(%)</th>
<th>J</th>
<th>J</th>
<th>J</th>
<th>J</th>
<th>J</th>
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<tbody>
<tr>
<td>ADHD</td>
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<tr>
<td>Hyperactive/Hyperactive</td>
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<tr>
<td>Predominantly Inattentive</td>
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<tr>
<td>Predominantly Hyperactive</td>
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**Table 6**

Frequencies, Percentages, and Accuracy of Diagnoses Across All Venelles According to Professional Group
<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Refusal to ADHD</th>
<th>ADHD - Non</th>
<th>Inattentive</th>
<th>Hyperactive/Impulsive</th>
<th>Combined</th>
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<tr>
<td>2&lt;sub&gt;(15.4)&lt;/sub&gt;</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3&lt;sub&gt;(23.1)&lt;/sub&gt;</td>
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<td>0</td>
<td>0</td>
</tr>
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<td>8&lt;sub&gt;(61.3)&lt;/sub&gt;</td>
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<td>4</td>
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### Pediatrics

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<tbody>
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<td>Male</td>
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<td>Female</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Non-ADHD</td>
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<td>7</td>
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<tr>
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<td>1</td>
<td>6</td>
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<tr>
<td>Hyperactive/Impulsive</td>
<td>4</td>
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</table>

**General Practitioners**

(Cont.)
vignette 2; and Predominately Inattentive type for vignette 3) and accurate disorder diagnosis (i.e., not ADHD) for vignette 4.

In sum, a diagnosis of ADHD was made for 101 of the 120 total cases/vignettes overall. For vignettes in which an ADHD diagnosis was appropriate (i.e., vignettes 1, 2, and 3) an ADHD diagnosis was made in 76 of 86 possible cases (approximately 88%). For the vignette in which an ADHD diagnosis was not appropriate (i.e., vignette 4), an ADHD diagnosis was made in 23 of 34 possible cases (approximately 68%).

**Misdiagnoses.** The diagnoses made by all participants across all vignettes was also considered with respect to the types of errors or misdiagnoses made (see Table 7). For Table 7, frequency data for five possible diagnoses is presented including: ADHD - Combined Type; ADHD - Predominately Hyperactive/Impulsive Type; ADHD - Predominately Inattentive Type; Non-ADHD disorders; and refusals to diagnose (defined as either making no diagnosis or stating an explicit objection to making a diagnosis of ADHD). Misdiagnoses are highlighted in bold.

As can be seen in Table 7, while vignette 1 showed a misdiagnosis rate of approximately 22%, vignettes 2, 3, and 4 showed misdiagnosis rates of greater than 67% across practitioners. Of note is that an examination of the specific subtypes diagnosed for vignettes 2, 3, and 4 indicate that they were often misdiagnosed as being ADHD, Combined Type. For vignette 2, a misdiagnosis of Combined Type was made in 80% of cases compared to an 8% rating for the accurate subtype diagnosis of Predominately Hyperactive/Impulsive type. For vignette 3, a misdiagnosis of Combined Type was made in 42% of cases compared to a 33% rating for the accurate subtype diagnosis of
Table 7

*bolded numbers reflect misdiagnoses

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Vignette 1 (Combined)</th>
<th>Vignette 2 (Predominately Hyperactive/Impulsive)</th>
<th>Vignette 3 (Predominately Inattentive)</th>
<th>Vignette 4 (not ADHD)</th>
<th>Total Misdiagnoses</th>
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<tbody>
<tr>
<td>ADHD -Combined</td>
<td>29 (78.3)</td>
<td>20 (80.0)</td>
<td>10 (41.7)</td>
<td>16 (47.1)</td>
<td>46 (38)</td>
</tr>
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<td>ADHD -Predominately Hyperactive/Impulsive</td>
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<td>2 (8.0)</td>
<td>1 (4.2)</td>
<td>1 (2.9)</td>
<td>2 (1.6)</td>
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<tr>
<td>ADHD -Predominately Inattentive</td>
<td>6 (16.2)</td>
<td>0</td>
<td>8 (33.3)</td>
<td>8 (23.5)</td>
<td>14 (11.7)</td>
</tr>
<tr>
<td>Not ADHD</td>
<td>2 (5.4)</td>
<td>3 (12.0)</td>
<td>5 (20.8)</td>
<td>9 (26.5)</td>
<td>10 (8.3)</td>
</tr>
<tr>
<td>Total Misdiagnoses</td>
<td>8 (21.6)</td>
<td>23 (92.0)</td>
<td>16 (66.7)</td>
<td>25 (73.5)</td>
<td>72</td>
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<tr>
<td>Total</td>
<td>37</td>
<td>25</td>
<td>24</td>
<td>34</td>
<td>120</td>
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</table>
Predominately Inattentive type. For vignette 4, a misdiagnosis of Combined Type was made in 47% of cases compared to 27% rating for a “not ADHD” diagnosis.

Summary of Diagnostic Accuracy

In addition to considering merely the diagnostic label itself as an indication of accuracy, as noted previously, diagnostic accuracy can also be defined according to several conditional probability indices including: sensitivity (i.e., proportion of individuals with a disorder identified as having the disorder), specificity (i.e., proportion of individuals without a disorder identified as not having the disorder), hit rate (i.e., proportion of true positive and true negative diagnoses or accurate diagnoses), and miss rate (i.e., proportion of false negative and false positive diagnoses or inaccurate diagnoses). In terms of the current study, sensitivity refers to the proportion of true ADHD cases diagnosed as ADHD; specificity refers to the proportion of true non-ADHD cases not diagnosed as ADHD; hit rate refers to the proportion of ADHD cases diagnosed as ADHD and the proportion of non-ADHD cases not diagnosed as ADHD (i.e., accurate diagnosis); and miss rate refers to the proportion of ADHD cases not diagnosed as ADHD and the proportion of non-ADHD cases misdiagnosed as ADHD (i.e., inaccurate diagnosis).

Diagnostic accuracy is reflected by high hit rates (i.e., high true positive and true negative diagnoses) and low miss rates (i.e., low false positive and false negative diagnoses) as well as, ideally, by high sensitivity and high specificity. It is noted that there is an inverse relationship between hit and miss rates (i.e., as hit rates increase, miss rates decrease). In addition, it is noted that increased sensitivity generally also increases
the possibility of false positive errors and that increased specificity generally also
increases the possibility of false negative errors. The sensitivity, specificity, hit rate, and
miss rate of diagnoses of professional groups, vignette symptom information, and gender
of the target/child in question are presented in Table 8. The base rate of the disorder
within each category is also reported in Table 8.

Evaluation of Hypotheses

The primary purpose of the present study was to examine how specific practitioner
and case factors related to ADHD diagnosis, and specifically, diagnostic accuracy in true
and subthreshold ADHD cases. Independent measures of the study included: three
professional groups (i.e., psychologists, pediatricians, and general practitioners); four
behavioural/symptom presentations (Vignette 1, combined hyperactive/impulsive and
inattentive symptoms; Vignette 2, predominately hyperactive/impulsive symptoms;
Vignette 3, predominately inattentive symptoms; and Vignette 4, non-
hyperactive: impulsive and non-inattentive symptoms); and two gender variations of the
child presented in the vignettes. Unless otherwise noted, the dependent measure was
defined according to four conditional probability indices which relate to diagnostic
accuracy: hit rate, miss rate, sensitivity, and specificity.

Hypothesis 1. Examination of conditional probability indices for the diagnoses of the
three professional groups across all vignettes indicated that overall, hit rates ranged from
.64 to .79 and correspondingly miss rates ranged from .21 to .36. Thus, in general,
practitioners were relatively proficient (with at least 64% accuracy for true positive and
true negative cases) across all vignettes. Sensitivity and specificity indices for the
### Table 8

**Diagnostic Accuracy Using Conditional Probabilities According to Professional Group, Vignette Symptom Information, and Target Gender Information**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Base Rate</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Hit Rate</th>
<th>Miss Rate</th>
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<td>.86</td>
<td>.54</td>
<td>.79</td>
<td>.21</td>
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<tr>
<td>pediatricians</td>
<td>.69</td>
<td>.89</td>
<td>.15</td>
<td>.66</td>
<td>.34</td>
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<tr>
<td>general practitioners</td>
<td>.68</td>
<td>.94</td>
<td>.0</td>
<td>.64</td>
<td>.36</td>
</tr>
<tr>
<td><strong>Vignette Symptom Information</strong></td>
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<td>.12</td>
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<tr>
<td>vignette 3</td>
<td>1.0</td>
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<td>n/a</td>
<td>.79</td>
<td>.21</td>
</tr>
<tr>
<td>vignette 4</td>
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<td>n/a</td>
<td>.27</td>
<td>.27</td>
<td>.73</td>
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<td><strong>Target Gender Information</strong></td>
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<td>.35</td>
<td>.75</td>
<td>.25</td>
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**Note:**
- **Base Rate** = cases with disorder divided by total cases.
- **Sensitivity** = cases with disorder who are diagnosed with disorder divided by cases with disorder.
- **Specificity** = cases without disorder who are not diagnosed with disorder divided by cases without disorder.
- **Hit Rate** = cases with disorder who are diagnosed with disorder and cases without disorder who are not diagnosed with disorder (i.e., true positive and true negative cases) divided by total cases.
- **Miss Rate** = cases with disorder who are not diagnosed with disorder and cases without disorder who are diagnosed with disorder (i.e., false positive and negative cases) divided by total cases.
groups indicated that sensitivity ranged from .86 to .94 while specificity ranged from 0 to .54. Thus, while all groups appear to be relatively proficient in making a diagnosis when it is appropriate, professional groups appear to show more limited proficiency in ruling out the disorder when an ADHD diagnosis is inappropriate.

Comparisons of the conditional probability indices for the diagnoses of the three professional groups across all vignettes indicated that hit rates were highest, and correspondingly miss rates were lowest for psychologists, followed by pediatricians, followed by general practitioners (hit rates = .79, .66, .64; miss rates = .21, .34, .36 respectively).12 This result suggests that overall, psychologists showed the highest accuracy with respect to true positive diagnoses (i.e., diagnosing ADHD when the disorder was present) and true negative diagnoses (i.e., not diagnosing ADHD when the disorder was absent); pediatricians showed the next highest level; and general practitioners showed the lowest level.

Comparisons of sensitivity and specificity indices between the groups indicated that sensitivity was highest for general practitioners, followed by pediatricians, followed by psychologists (sensitivity = .94, .89, and .86), while conversely specificity was highest for psychologists, followed by pediatricians, followed by general practitioners (specificity = .54, .15, and 0). These results suggest that overall, while general practitioners and pediatricians show high proficiency (i.e., over 90% accuracy) in

12 Although the terms higher and lower are used when comparing conditional probability indices, “there are no adequate procedures for drawing statistical inferences regarding their relative magnitudes” (Waldman and Lilienfeld, 1991, p. 734).
identifying cases when ADHD is present, they also tend to make substantial false positive
errors (i.e., diagnose ADHD when it is not present, with accuracy rates for not diagnosing
ADHD of 15% and 0% respectively). Psychologists, while showing relatively similar
proficiency (i.e., approximately 86% accuracy) in identifying cases, tend to make fewer
false positive errors (with an accuracy rate for not diagnosing ADHD of 54%) than the
other two professional groups. Thus, while all groups appear to be relatively proficient
in making a diagnosis when it is appropriate, psychologists appear to show somewhat
higher proficiency in ruling out the disorder when appropriate. This result is of note
when considering the base rates of ADHD within each group. As noted previously, lower
prevalence or base rate should actually increase specificity (e.g., Robins, 1985), which is
in contrast to the data for the groups presented in Table 8 (i.e., base rates for ADHD are
slightly lower for pediatrician and general practitioner groups; however, specificity
indices for these groups remain lower than for psychologists).

Thus, given all of these considerations, hypothesis 1, which predicted the highest
diagnostic accuracy for psychologists, followed by pediatricians, followed by general
practitioners, was supported when considering the trends according to conditional
probability indices as indicators of accuracy.

**Hypothesis 2.** Examination of conditional probability indices for the diagnoses of the
four behaviour/symptom vignette versions across all professional groups indicated that,
hit rates ranged from .79 to .95 for vignettes 1, 2, and 3, but vignette 4 had a hit rate of
only .27. Sensitivity and specificity indices for the vignettes indicated that overall
sensitivity was higher (i.e., greater than approximately 80% accuracy for vignettes 1, 2, 3) than specificity (i.e., approximately 27% accuracy for vignette 4). Thus, while proficiency appears to be relatively high for true combined, hyperactive/impulsive, and inattentive presentations, it seems less so in the non-ADHD case.

Comparisons of the conditional probability indices for the diagnoses of the four behaviour/symptom vignette versions across all professional groups indicated that hit rates were highest, and correspondingly miss rates were lowest for vignette 1, followed by vignette 2, followed by vignette 3, followed by vignette 4 (hit rates = .95, .88, .79, and .27; miss rates = .05, .12, .21, and .73 respectively). This result suggests a trend with accuracy being highest for the combined type presentation followed by the predominately hyperactive/impulsive type presentation, followed by the inattentive type presentation, followed by the non-ADHD presentation (which appeared substantially lower in terms of accuracy than vignettes 1, 2, and 3).

Comparisons of sensitivity and specificity indices between the vignettes indicated that sensitivity was highest for vignette 1, followed by vignette 2, followed by vignette 3 (sensitivity = .95, .88, and .79) and that the specificity for vignette 4 was .27. These results suggest that overall, there is generally high proficiency in picking up cases when ADHD is present (although this decreases slightly across combined, predominately hyperactive/impulsive, and predominately inattentive presentations); however, there is also a tendency to make substantial false positive errors (i.e., diagnose ADHD when it is

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Sensitivity is only applicable to cases in which the disorder status is positive while specificity is applicable to cases in which the disorder status is negative.
not present). This result is of note given consideration of the base rates of ADHD within each group. As noted previously, while sensitivity should increase with higher prevalence rates, lower prevalence should actually increase specificity (e.g., Robins, 1985), which is in contrast to the data presented for vignette 4 in Table 8 (i.e., base rates for ADHD were lower for vignette 4, however, specificity indices were also low).

Thus, given all of these considerations, hypothesis 2, which predicted the highest diagnostic accuracy for vignette 1 followed by vignette 2, followed by vignette 3, followed by vignette 4, was generally supported when considering the trends identified using conditional probabilities as indicators of accuracy. However, it should be noted that while hit rates and sensitivity indices for vignettes 1, 2, and 3 seemed similar, accuracy related to vignette version appeared to distinguish between the ADHD vignettes (i.e., 1, 2, 3), and the non-ADHD vignette (i.e., 4).

**Hypothesis 3.** Comparisons of diagnoses made for male and female target vignette versions across all professional groups and behaviour/symptom presentations indicated that 46 girl target presentations (of a possible 56 total presentations) were diagnosed with ADHD while 55 boy target presentations (of a possible 64 total presentations) were diagnosed with ADHD (see Table 6). No significant differences were found when crosstabulations were performed on target gender and ADHD diagnosis, $\chi^2 (2, N = 118) = .021, p > .99$, suggesting that girl and boy presentations were equally as likely to receive an ADHD diagnosis. Thus, hypothesis 3 (part 1), which predicted that girl vignettes would be more likely to receive an ADHD diagnosis than boy vignettes was not
supported.

Comparisons of the conditional probability indices indicated that hit rates were slightly higher for girl presentations than for boys (hit rates = .75, .67; miss rates = .25, .33 respectively). Sensitivity appeared relatively equal for girl and boy vignettes (i.e., .88 and .89 respectively) while specificity appeared somewhat higher for girl versions than boy (i.e., .35 versus .20). Thus, hypothesis 3 (part 2), which predicted that accuracy would be higher for girl vignettes than for boy vignettes, could be considered supported in light of the trends identified using conditional probabilities as indicators of accuracy. However, it should be noted that the differences between the two gender versions is relatively small. In addition, given that sensitivity should increase with higher prevalence rates and lower prevalence should actually increase specificity (e.g., Robins, 1985), the base rates of ADHD which appeared higher for girl versions, suggest that the differences, particularly in terms of specificity, may relate to prevalence rate in this case.

Professional Groups and Practice & Diagnosis-related Variables

Reported Practice Characteristics. Data was collected regarding various practice-related variables across the final sample of psychologists, pediatricians, and general practitioners. The three professional groups were compared with respect to number of years of practice, location of practice, type of practice setting, proportion of practice focused on children and adolescents, average number of children and adolescents seen daily, and appointment length. Frequency data related to location of practice and type of practice setting are presented in Table 9. Means and Standard Deviations for all other variables are presented in Table 10.
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<th>Type of Practice Setting</th>
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<td>Private Practice</td>
<td>Hospital</td>
</tr>
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<td>28 (9%)</td>
<td>6 (1.0%)</td>
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<tr>
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<td>Psychologists</td>
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<td>4 (6.9%)</td>
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<tr>
<td>19 (6.0%)</td>
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<td>3 (4.9%)</td>
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<td>1 (2.4%)</td>
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<tr>
<td>Psychologists</td>
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<td>Psychologists</td>
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<td>1 (2.4%)</td>
</tr>
<tr>
<td>4 (6.9%)</td>
<td>3 (4.9%)</td>
<td>1 (1.7%)</td>
<td>1 (2.4%)</td>
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<th>Location of Practice</th>
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<tr>
<td>General Practitioners</td>
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<td>Psychologists</td>
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<td>Year of Practice (in years)</td>
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<td>Mean</td>
</tr>
<tr>
<td>SD</td>
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<td>E</td>
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<tr>
<td>Population</td>
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**Means, Standard Deviations, and Differences Between Practice Characteristics According to Professional Group**

Table 10
Significant differences were found when one-way analyses of variance were performed on professional group and proportion of practice focused on children and adolescents, average number of children and adolescents seen daily, and appointment length (See Table 10). Post hoc analyses for the significant effects indicated that the practices of pediatricians were significantly more focused on children/adolescents than the practices of both psychologists and general practitioners (mean differences of 23% and 68% respectively). The practices of psychologists were also significantly more focused on these populations than the practices of general practitioners (mean difference of 45%). As well, post hoc analyses indicated that psychologists and general practitioners saw significantly fewer children and adolescents daily than pediatricians (mean differences of 18 and 15 for children and 4 and 3 for adolescents). Finally, psychologists had significantly longer appointment durations than both pediatricians and general practitioners (mean differences of 1 hour 5 minutes and 1 hour 23 minutes respectively). No other significant differences for professional group and other practice-related variables (i.e., location of practice, type of practice setting, or years of practice) were found.

**Diagnosis-related characteristics.** Data was collected regarding various diagnosis-related variables across the final sample of psychologists, pediatricians, and general practitioners. The three professional groups were compared with respect to accuracy of the diagnostic term used for the primary diagnosis/familiarity with the DSM-IV, reported certainty level for the primary diagnosis, level of caution expressed for the accuracy of the primary diagnosis, the suggested steps to be taken to confirm the primary diagnosis, reported familiarity with ADHD, the number of ADHD workshops/educational
experiences attended since completion of training, and recommendations for treatment. Frequency data related to these variables are presented in Table 11.

Significant effects were found when crosstabulations were performed on professional group and accuracy of the term used in diagnosis, $\chi^2 (4, N = 118) = 17.8, p < .001$; level of caution expressed for the diagnosis, $\chi^2 (4, N = 118) = 14.4, p < .006$, steps taken to confirm the diagnosis, $\chi^2 (2, N = 115) = 20.0, p < .000$, and reported familiarity with ADHD, $\chi^2 (4, N = 119) = 20.4, p < .000$. A significant difference was also found when a one-way analysis of variance was performed on professional groups and number of ADHD workshops/educational experiences attended, $F (2, 69) = 10.9, p < .000$ (See Table 11). Post hoc analyses for this effect indicated that psychologists attended significantly more ADHD workshops than both pediatricians and general practitioners (mean differences of 3 and 5 workshops respectively). There was no difference in number of workshops attended between pediatricians and general practitioners. No other significant differences for professional group and any other diagnosis-related variables (i.e., certainty level for diagnosis, treatment recommendations) were found.

Additional Analyses

Practice & Diagnosis-related Variables and Diagnostic Accuracy. The data collected in the study suggested exploration of relationships between a number of variables and diagnostic accuracy. Review of the literature has suggested that familiarity with the DSM-IV, familiarity with ADHD, recency of training, length of evaluation time, and the comprehensiveness of the assessment approach may be related to ADHD diagnosis and accuracy (Bennett et. al, 1983; Wolraich et. al, 1990). As a result, the relationship of these factors to ADHD diagnostic accuracy was examined. Variables included in the
<table>
<thead>
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<th>Score</th>
<th>Frequency</th>
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<td>5</td>
<td>1</td>
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Table 11: Frequencies of Diagnoses-Related Characteristics According to Professional Group
<table>
<thead>
<tr>
<th>Reported Familiarity with ADHD</th>
<th>0 = 0</th>
<th>1 = 20</th>
<th>2 = 69</th>
<th>3 = 32</th>
<th>4 = 12</th>
<th>5 = 6</th>
<th>6 = 4</th>
<th>7 = 3</th>
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<tbody>
<tr>
<td>Unrelated</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Somewhat familiar</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Familiar</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Very familiar</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<table>
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<tr>
<th>Steps Suggested to Consider</th>
<th>0 = 0</th>
<th>1 = 20</th>
<th>2 = 69</th>
<th>3 = 32</th>
<th>4 = 12</th>
<th>5 = 6</th>
<th>6 = 4</th>
<th>7 = 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preschool</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Psychological, Pediatrician</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>General</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>Total</td>
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<td>0</td>
<td>0</td>
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<tr>
<td>Treatment Recommendations</td>
<td>Frequency</td>
<td>( \chi^2 )</td>
<td>p</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pediatric</td>
<td>16</td>
<td>0.35</td>
<td>.55</td>
<td></td>
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<tr>
<td>Pediatric, General</td>
<td>16</td>
<td>0.35</td>
<td>.55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pediatric, Professional</td>
<td>16</td>
<td>0.35</td>
<td>.55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pediatric, Professional, General</td>
<td>16</td>
<td>0.35</td>
<td>.55</td>
<td></td>
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examination of these relationships consisted of: *ADHD diagnostic accuracy* (defined as either accurate or inaccurate based on disorder diagnosis), *familiarity with the DSM-IV* (defined by the use of current diagnostic terminology versus outdated/inaccurate terminology), *familiarity with ADHD* (defined both by self-reported familiarity with ADHD and by the number of ADHD workshops attended since training completion), *recency of training* (defined by the year of graduation), *evaluation time* (defined both by report of appointment length and by average number of children and adolescents seen daily), and *comprehensiveness of assessment approach* (defined by whether a single step or multi-step approach was reported as an appropriate way to confirm the diagnosis).

Significant correlations were found between diagnostic accuracy and number of ADHD workshops attended ($r = .33, p < .005$), suggesting that accuracy increased as numbers of workshops increased. No significant correlations were noted between accuracy and recency of graduation ($r = -.17, p > .07$), appointment length ($r = .1, p > .31$), average number of children ($r = -.12, p > .24$) or adolescents seen daily ($r = -.08, p > .42$), reported familiarity with ADHD ($\Phi = .10, p > .57$), or familiarity with the DSM-IV ($\Phi = -.05, p > .58$), or comprehensiveness of the assessment approach ($\Phi = -.02, p > .87$), suggesting that accuracy is not significantly related to these variables.

**Survey of Nonrespondents**

Contact was made following the study with 20 randomly selected individuals who did not respond to the original survey in order to allow comparison to the survey respondents regarding various demographic and practice characteristics (including gender, age, year of graduation, years of practice, location of practice, proportion of practice focused on
children and adolescents, and average appointment length). Means and standard deviations for relevant variables for both nonrespondents and respondents are presented in Table 12. Results of crosstabulations performed on respondent status (nonrespondents versus respondents) indicated that nonrespondents were not significantly different from respondents with respect to gender, $\chi^2 (1, N = 139) = 2.2$, $p > .134$, or location of practice, $\chi^2 (3, N = 130) = 3.7$, $p > .40$. Similarly results of independent t-tests revealed no significant differences between nonrespondents and respondents on age, year of graduation, years of practice, proportion of children or adolescents seen daily, or appointment length (see Table 12).

Table 12

**Means, Standard Deviations, and Differences between Demographic and Practice Characteristics According to Response Status**

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<tr>
<td></td>
<td>n</td>
<td>Mean</td>
<td>SD</td>
<td>n</td>
<td>Mean</td>
<td>SD</td>
<td>t</td>
</tr>
<tr>
<td>age (years)</td>
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<td>10.3</td>
<td>20</td>
<td>1985</td>
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<td>10.2</td>
<td>20</td>
<td>15.4</td>
<td>8.5</td>
<td>0.73</td>
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<td>proportion of children/adolescents seen (%)</td>
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<td>70.9</td>
<td>35.9</td>
<td>20</td>
<td>62.5</td>
<td>30.2</td>
<td>1.04</td>
</tr>
<tr>
<td>appointment length (hours:minutes)</td>
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<td>19</td>
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<td>0.02</td>
<td>0.17</td>
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CHAPTER IV

DISCUSSION

The focus of the present study was on the diagnosis of ADHD in children by three groups of Ontario practitioners -- psychologists, pediatricians, and general practitioners. In addition to providing a description of various aspects related to ADHD diagnosis (e.g., practitioner attributes, practice-related and diagnosis-related variables), the study examined the relationship of practitioner and case variables to diagnosis and in particular, to diagnostic accuracy. Specifically, through the use of case vignettes, the study examined the relationship between diagnostic accuracy and the profession of the practitioner making the diagnosis as well as to two specific elements of a case, behaviour/symptom information and gender of the child depicted.

ADHD Diagnosis

Overall, study results indicated that, at the most general level of diagnosis, (i.e., ADHD or not ADHD, irrespective of subtype) practitioners tended to diagnose ADHD when symptom information indicated that such a diagnosis was appropriate. However, practitioners also tended to diagnose ADHD in a subthreshold case in which an ADHD diagnosis was inaccurate and not appropriate. Specifically, across all vignettes and professional groups, a diagnosis of ADHD was made in approximately 88% of “true” ADHD cases; however, an ADHD diagnosis was also made in approximately 68% of the “true” non-ADHD case. These results appear to highlight a tendency of practitioners to diagnose ADHD when it is present but suggest some limitations in the diagnosis of cases when some symptoms are present but in which the diagnosis is not actually appropriate.
Several observations are important with respect to the general results related to ADHD diagnosis. In general, all practitioner groups tended to make a diagnosis of ADHD when symptom information indicated that such a general diagnosis was appropriate. In fact, when a case report described a child who displayed hyperactive/impulsive and/or inattentive behaviours that were significant enough in number to meet the diagnostic threshold for ADHD as defined by the DSM-IV, almost all practitioners (with the exception of those who refused to diagnose their case) made a diagnosis of ADHD. Thus, practitioners appeared to be quite likely to recognize or identify ADHD when its symptoms were presented during an informant report and they tended to make a diagnosis, when requested, upon this identification. The results related to the vignette in which an ADHD diagnosis was not appropriate suggested that many practitioners also tended to diagnose ADHD even when hyperactive/impulsive and/or inattentive behaviours fall below the threshold for meeting the DSM-IV criteria for ADHD.

Several explanations for this tendency are possible. It is noted that the subthreshold vignette, while depicting far fewer symptoms than needed for a diagnosis of ADHD according to the DSM-IV criteria, still described one hyperactive/impulsive symptom (i.e., “often fidgets with hands or feet or squirms in seat”), one inattentive symptom (i.e., “is often easily distracted by extraneous stimuli”), as well as symptoms reflective of other DSM-IV disorders. Thus, it seems that suggestion of behaviours such as inattention, hyperactivity, and impulsivity encouraged practitioners to make an ADHD diagnosis, even when the number of symptoms fell below DSM-IV criteria. It is possible
that the two specific symptoms described were particularly salient to practitioners, perhaps based on clinical experience/judgement, and that other symptoms were misinterpreted due to this bias. In addition, awareness of the high comorbidity rates between ADHD and other disorders may have encouraged the diagnosis of ADHD when symptoms for other disorders were noted. As well, it is possible that rater biases such as halo effects may have contributed to the tendency to diagnose ADHD. It is also feasible that the various symptoms described in vignette 4, which actually reflected symptoms of other disorders (e.g., mood or anxiety disorders) showed sufficient overlap with ADHD criteria as to encourage this diagnosis. Finally, it is possible that the results for this case reflected problems related to the vignette itself, the statements used to portray specific symptoms, or aspects of the current classification system. Further discussion of several of these possibilities follows in the consideration of study limitations.

**ADHD Subtype Misdiagnosis**

A more specific consideration of diagnosis based on analysis of the specific subtype diagnoses made by all professional groups revealed that while subtype misdiagnosis rates were approximately 22% for ADHD -Combined type presentations, misdiagnosis rates increased to approximately 92% for ADHD -Hyperactive/Impulsive Type presentations and 67% for ADHD -Inattentive Type presentations. The misdiagnosis rate for the non-ADHD presentation was approximately 74%. These results suggest that, in contrast to the apparent proficiency of practitioners in making a general diagnosis of ADHD when it is appropriate, with the exception of ADHD-Combined presentations, practitioners often make misdiagnoses in terms of ADHD subtype. Of note was that the most common
misdiagnosis for presentations was ADHD-Combined Type.

The results related to ADHD subtyping misdiagnosis for vignettes suggested a risk for misdiagnosis, particularly when symptoms reflect either hyperactive/impulsive symptoms or inattentive symptoms alone. Examination of misdiagnoses in these cases indicated that the hyperactive/impulsive and inattentive symptom only presentations were typically mislabeled as ADHD-Combined Type, suggesting that there is a possible bias towards assuming a full range of hyperactive, impulsive, and inattentive symptoms when any of the above exist. In addition, such results are of note given consideration of debates related how to best delineate the subtypes of ADHD. Comparisons of the diagnoses and misdiagnoses made by practitioners in this study appear to reinforce a “2 subtype” model of ADHD. Hyperactive/impulsive symptoms alone tend to be viewed (in 80% of cases) as part of the combined presentation as opposed to existing on their own apart from inattention. In contrast, diagnoses for inattentive only symptom cases suggest that there seems to be more recognition of this presentation outside of combined presentations.

Thus, practitioners appear to endorse a concept of ADHD in which hyperactivity/impulsivity presupposes inattention and a model in which subtypes reflect a combined and inattentive only presentation.

In sum, the results related to subtype misdiagnoses indicated that practitioners did not appear able to adequately make distinctions for hyperactive/impulsive or inattentive presentations in particular. In fact, the results of this study suggest that many errors in subtyping occur, which may affect the children given the diagnosis, the research into specific subtypes, and subsequent knowledge and understanding of ADHD. It is noted
however, that in practice, stimulant medication is most commonly used as treatment for ADHD, regardless of subtype (particularly for the combined and hyperactive/impulsive types; Barkley, 1998; Goldman et. al., 1998), and that distinctions related to differential diagnosis (i.e., ADHD or another disorder) are likely more important that distinctions related to subtype. Nonetheless, problems with subtyping misdiagnosis, whether they be related to the actual DSM-IV criteria themselves, or practitioner awareness of the criteria and subtype distinctions are evident and need to be addressed.

Diagnostic Accuracy

Professional Groups. The hypothesis that differences in diagnostic accuracy, defined according to conditional probability indices (i.e., hit rate, miss rate, sensitivity, and specificity), would exist between psychologists, pediatricians, and general practitioners was generally supported by the trends identified using these indices. Specifically, comparisons of conditional probability indices indicated that hit rates (i.e., rate of true positive and true negative diagnosis or accurate diagnosis) were highest at 79% for psychologists, followed by pediatricians at 66%, followed by general practitioners at 64%. These trends suggest some possible differences in accuracy between professional groups in diagnosing ADHD when the disorder is present and not diagnosing ADHD when it is not present.14

Comparisons of sensitivity indices between the groups indicated that sensitivity was

14 However, it must be noted that some constraints in interpretation exist because “there are no adequate procedures for drawing statistical inferences regarding relative magnitudes”, when comparing conditional probability indices, (Waldman and Lilienfeld, 1991, p. 734).
highest at 94% for general practitioners, followed by pediatricians at 89%, followed by psychologists at 86%. Conversely specificity was highest at 54% for psychologists, followed by pediatricians at 15%, followed by general practitioners at 0%. These trends suggest that overall, while general practitioners and pediatricians showed high proficiency (i.e., over 90% accuracy) in identifying cases when ADHD was present, they also tended to make substantial false positive errors (i.e., diagnose ADHD when it was not present) and failed to rule out the disorder when it was not present. Psychologists, while showing relatively similar proficiency (i.e., approximately 86% accuracy) in identifying cases, tended to make fewer false positive errors and seemed more likely to rule out the disorder when it was not present than the other two professional groups. The result related to specificity is of note particularly given a consideration of the base rates of ADHD within each group. As noted previously, lower prevalence or base rates should actually increase specificity (Robins, 1985), which is in contrast to the data showing that both base rates for ADHD and specificity indices were slightly lower for pediatrician and general practitioner groups than for psychologists. Thus, in sum, while all groups appear to be relatively proficient in making a diagnosis when it is appropriate, psychologists appear to show somewhat higher proficiency, albeit still relatively modest, in ruling out the disorder when it is not present.

Several considerations are of note with respect to the results related to professional groups. As noted previously, while both high sensitivity and high specificity are preferred, there is frequently a “trade off” such that when one increases, the other decreases (e.g., Fletcher et. al., 1996). For example, increasing sensitivity tends to
decrease risk for false negative diagnoses (i.e. results in few misses), but also tends to
increase the risk for false positive diagnoses (i.e., diagnosing a disorder when it is not
present) and to decrease specificity. As a result of this trade off, it has been argued that
sensitivity should be emphasized when there is a significant consequence for missing a
disorder and that specificity should be emphasized when there is a significant
consequence for misclassifying an individual with a disorder (e.g., Fletcher et. al., 1996).

The sensitivity/specificity trade off was clearly highlighted by the results related to
both pediatricians and general practitioners which showed high sensitivity seemingly at
the expense of lower specificity. In contrast, psychologists, while still showing relatively
high sensitivity, showed higher specificity than other groups. It is possible that this
distinction may be explained by the perspective of the practitioner related to the
sensitivity/specificity balance. For example, it seems possible that medical professionals
may favour sensitivity as opposed to specificity towards ADHD (possibly due to training
and/or familiarity with mental disorders effects). Within a medical perspective for
example, the perceived consequences of missing a true case (e.g., negative individual and
family effects, possibly increased office visits) may be viewed as more detrimental than
the perceived consequences in diagnosing a false case. This point is supported by several
considerations with respect to medical practitioners in particular. For example, for such
professionals, etiology and treatment are generally focused on biological aspects (e.g.,
Schulberg et. al., 1986), and thus treatment with medication may be seen as the most
appropriate. In addition, for these groups, stimulants are frequently viewed as effective
and relatively “benign” given the range of medications to which they are exposed (e.g.,
Lefcoe, 2000; Rosenberg et. al., 1994). Thus treatment with medication may be viewed as safe with few detrimental effects. Finally, it has been noted that misperceptions, such as the view that only children with ADHD will respond to stimulants are evident with medical groups (e.g., Copeland et. al., 1987). Thus, the use of medication trials may be viewed as an appropriate way to confirm or rule out the disorder within a short time frame. For all of these reasons, false positives would thus likely be seen by medical professionals as less detrimental than false negatives, and thus sensitivity would be favoured over specificity.

In contrast, psychologists may appear less likely to favour sensitivity over specificity. This may be due to a number of possible factors. For example, according to course curriculum descriptions (i.e., University of Toronto, University of Western Ontario), psychologists seem to receive more training related specifically to diagnosis and differential diagnosis of mental disorders such as ADHD. Their training is also presumably less focused on predominately biological aspects. In addition, exploration of some differences between professional groups on variables such as familiarity with ADHD and the DSM-IV, indicated that psychologists attend more ADHD workshops than pediatricians and general practitioners, and use DSM-IV terms more accurately, suggesting possibly increased familiarity with the disorder and with the DSM-IV. These factors (i.e., training in differential diagnosis, increased familiarity with the disorder and the DSM-IV) would be likely to promote an increased awareness of the balance between sensitivity and specificity which ultimately may have contributed to the current findings of higher specificity for psychologists compared to pediatricians and general
practitioners.

**Behavioural/symptom information.** The hypothesis that differences in diagnostic accuracy, defined according to conditional probability indices (i.e., hit rate, miss rate, sensitivity, and specificity), would exist according to differing behaviour/symptom presentations, was generally supported by the trends identified using these indices. Examination of conditional probability indices for the diagnoses of the four behaviour/symptom vignette versions across all professional groups indicated that, hit rates were 95% for vignette 1, 88% for vignette 2, and 79% for vignette 3, but only 27% for vignette 4. Sensitivity and specificity indices for the vignettes indicated that overall sensitivity was greater than approximately 80% for vignettes 1, 2, 3 but that specificity was approximately 27% for vignette 4. In sum, while proficiency appears to be relatively high for true combined, hyperactive/impulsive, and inattentive presentations, it seems sufficiently more limited in non-ADHD cases. This result is of note when considering the base rates of ADHD within each vignette version. As noted previously, while sensitivity should increase with higher prevalence rates, lower prevalence should actually increase specificity -which is in contrast to low base rate and low specificity noted for vignette 4 in comparison to vignettes 1, 2, and 3.

These results suggest a trend with accuracy being highest for the combined type presentation followed by the predominately hyperactive/impulsive type presentation, followed by the inattentive type presentation, followed by the non-ADHD presentation.

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15 Sensitivity is only applicable to cases in which the disorder status is positive while specificity is applicable to cases in which the disorder status is negative.
However, it should be noted that the differences between vignettes 1, 2, and 3 seemed relatively small and that the main distinction between the accuracy related to vignette version appeared to be between the ADHD vignettes (i.e., 1, 2, 3), and the non-ADHD vignette (i.e., 4). These results suggest that overall, there is generally high proficiency in identifying cases when ADHD is present (although this decreases slightly across combined, predominately hyperactive/impulsive, and predominately inattentive presentations). However, there is also a tendency to make substantial false positive errors (i.e., diagnose ADHD when it is not present) and to fail to rule out the disorder when it is not present.

Several issues are important with respect to these results. Firstly, issues related to comorbidity may have relevance. As noted, comorbidity rates of other disorders with ADHD are frequently high. For example, it has been estimated that up to 65% of children with diagnosed with ADHD will also meet criteria for another disorder (e.g., Goldman et. al., 1998; deMesquita and Gilliam, 1994). In particular, high comorbidity between ADHD and disruptive behaviour disorders, learning disorders, and mood and anxiety disorders has been noted (e.g., Abikoff and Klein, 1992; Barkley, 1996, 1998; Biederman et. al., 1991; Ford, Racusin, Davis, Ellis, and Thomas, 1999; Goldman et. al., 1998; Pelham et. al., 1998; Pliszka, 1992; Sabatino et. al., 1994; Schaughency & Rothlind, 1991; Searight et. al., 1995; Weinstein, Staffelbach, and Biaggio, 2000; Wilens, 1996). As a result, the presence of symptoms of other disorders such as those portrayed in vignette 4, may have encouraged the diagnosis of ADHD, as this disorder is frequently comorbid with a variety of other disorders.
In addition, the failure to rule out ADHD when it was not present and the tendency towards false positive errors may have reflected rater bias due to negative halo effects. Past studies such as those conducted by Abikoff et. al. (1993), Schachar et. al. (1986), and Stevens et. al. (1998) found that the presence of oppositional symptoms of defiance and aggression encouraged an ADHD rating even when hyperactivity and inattention were not evident. These halo effects were seen to be independent of rater knowledge, education, and experience with children with ADHD (e.g. Stevens et. al., 1998). It is noted that in the present study, a number of oppositional symptoms were depicted in the non-ADHD vignette (e.g., “frequently refuse to comply with adult requests and directives”, “often initiates physical confrontations”). It is possible therefore, that false positive errors in the present study reflected rater bias particularly related to oppositional symptomatology.

Finally, the salience of symptoms may have relevance for these findings, particularly given a consideration of studies which have examined how certain symptoms relate to the diagnosis of ADHD and other disorders such as Conduct Disorder (CD) and Oppositional Defiant Disorder (ODD). For example, studies conducted by Milich et. al. (1987), Pelham, Gnagy, Greenslade, and Milich (1992), and Waldman et. al. (1991), have focused on the relationship between certain symptoms and diagnosis using conditional probability indices (such as sensitivity, specificity, positive predictive power, negative predictive power16). In so doing, these studies calculated the probability that a

16 It is recalled that positive predictive power refers to the probability of a disorder given the presence of a symptom while negative predictive power refers to the probability of the absence of a disorder given the absence of a symptom.
diagnosed case of ADHD and CD or ODD would present with a particular symptom (sensitivity) as well as the probability of the diagnosis of ADHD and CD or ODD, given the symptom (positive predictive power of the symptom). These probabilities were used to determine the utility of specific symptoms as inclusion or exclusion criteria for diagnosis of ADHD, and/or CD and ODD.

Differences between the indices of sensitivity and positive predictive power hold particular relevance for the results of the current study because of findings that certain symptoms, while highly sensitive (i.e., many ADHD children will present said symptom), actually have poor predictive power (i.e., symptom does not necessarily predict ADHD). For example, in the Milich et. al. (1987), Pelham et. al. (1992), and Waldman et. al. (1991) studies, the symptom “easily distracted” had high sensitivity (.95, .94, and .93 respectively) but lower positive predictive power (i.e., .62, .37, and .54 respectively). This means that while children with ADHD often presented the symptom “easily distracted”, the presence of this symptom did not always predict or indicate the disorder or that a diagnosis was in order. Of note is that in practice, high sensitivity suggests that children with ADHD will often present with the “easily distracted” symptom (and this will be noted repeatedly by practitioners as a feature of many ADHD children); however, because of the low positive predictive power, the presentation of this symptom does not guarantee the disorder and consequently, a diagnosis of ADHD may be incorrect.

Applying this observation to the current research, an examination of the vignettes used in the study reveals that “easily distracted” was present across all vignette versions, including the non-ADHD vignette (i.e., vignette 4). It seems possible that as a result of
experience and repeated observations of this symptom as a feature of many ADHD children, practitioners may have responded to the typically high sensitivity of this symptom, thus increasing risk for false positive errors. Interpreting the results for true negative cases such as those depicted in vignette 4 suggests that choice of symptoms may have affected diagnosis and accuracy. This issue becomes even more relevant with consideration of the utility of symptoms of ADHD which overlap with other disorders such as depression or anxiety disorders (e.g., psychomotor agitation). Further discussion of this possible impact follows in the consideration of study limitations.

**Gender of the Child Presented.** The hypothesis that differences would exist in ADHD diagnosis for male and female target vignette versions across all professional groups and behaviour/symptom presentations was not supported. Girl vignettes were no more likely than boy vignettes to receive an ADHD diagnosis. Thus, gender of the child presented did not seem to influence practitioners’ diagnosis of ADHD.

The hypothesis that diagnostic accuracy, defined according to conditional probability indices (i.e., hit rate, miss rate, sensitivity, and specificity), would exist according to differing gender presentations, was also, supported by the trends identified using these indices. Comparisons of the conditional probability indices indicated that hit rates were slightly higher at 75% for girl presentations than for boys at 67%. Sensitivity appeared relatively equal for girl and boy vignettes at 88% and 89% respectively, while specificity appeared slightly higher at 33% for girl versions than boy at 25%. However, it should be noted that the differences between the two gender versions appeared relatively small. In addition, given that the base rates of ADHD appeared higher for girl versions, the
differences, particularly in terms of specificity, may relate to prevalence rate. Thus, given these considerations, it did not seem that gender had an overwhelming impact on diagnosis or accuracy in this study.

This result suggests several possibilities. Firstly, other considerations related to ADHD diagnosis, such as symptom information, may have been more important to practitioners than gender information when diagnosing the written case vignettes. In addition, it is also possible that the nature of the task, which was somewhat artificial, could have reduced the impact of gender and importance of base rate knowledge on diagnosis.

Study Limitations

Limitations in the present study include issues related to response rate, vignette variations, the nature of the task, and the use of conditional probability indices. Each is considered in turn.

Response Rate. While low response rates (10%-50%) are commonly reported for mail out surveys (e.g., Neuman, 1997; Singleton, Straits, and Miller Straits, 1993), the 14% response rate of this study appears lower than that of similar studies which surveyed pediatricians (e.g., 52% response rate; Copeland et. al., 1987) and general practitioners/family physicians (e.g., 48% response rate; Wolraich et. al, 1990). The reasons for this discrepancy are somewhat unclear; however at least two explanations are plausible.

Firstly, higher response rates could be affected by the status of the researcher. It is possible that the response rates obtained by Wolraich et. al., 1990, reflect a reaction and
willingness of participants to respond due to his position as an expert in behavioural pediatrics (Cunningham, 2001). Thus, future studies conducted by "lower status" individuals may benefit from using strategies or incentives for increasing participation. Secondly, response rate may be affected by the methods used in the survey approach. A variety of recommended measures (Neuman, 1997; see Appendix G) were undertaken in the current study to encourage participant response. For example, significant care was taken during the construction of materials to ensure a professional, attractive, clear, user-friendly, and fully informative package. Materials were piloted with a number of professionals in order to assess their success in meeting these qualities. With respect to the mail-out phase, materials were addressed to specific individuals, prepaid return envelopes were provided, and packages were sent in early spring. However, the one exception to Neuman's (1997) recommendations and possibly a meaningful difference between the current study and related past studies, was the use of repeat mail-out reminders to participants. Only one quite large-scale mail-out was used in the current study which may have contributed to a lower participant response rate. As a result, future survey studies may benefit from sampling a smaller number of participants, allowing for repeated reminder mail-outs, and encouraging a higher response rate.

The response rate of the current study does suggest caution with respect to the generalizability of findings given the possibility of bias due to response selectivity. For example, it is possible to question whether study respondents may be different in significant ways from the general population of practitioners. As a result of this possible concern, a survey of nonrespondents was conducted following the initial survey of
respondents. Comparisons of these nonrespondents with the initial survey respondents indicated no significant differences on a variety of variables, suggesting somewhat increased confidence in the generalizability of study findings. However, clearly a need for caution as well as further study in the area is required before increased assurance of the generalizability of the results is assumed.

A related issue concerns the response rate of the particular professional subgroups. For example, of the 120 respondents, only 21 were general practitioners, as opposed to 57 psychologists and 42 pediatricians. Consequently, this group in particular may not be representative of the larger population of general practitioners and differences found in the study may not be reflective of true differences. Again, caution is imperative regarding the conclusions which can be drawn to larger populations.

Vignette Variations. The four main case vignette versions (i.e., ADHD -Combined Type; ADHD -Predominately Hyperactive/Impulsive Type; ADHD -Predominately Inattentive Type; and Non-ADHD) were created specifically for use in this study. As noted, each depicted twelve total symptoms based on an informant report of a nine-year-old child (either male or female) named Chris. All vignettes were created with meticulous reference to the DSM-IV criteria for the specific subtype of ADHD (i.e., combined, hyperactive/impulsive, inattentive, or non-ADHD) they were intended to reflect. The specific statements used to reflect each diagnostic criterion for all four vignette versions are presented in Appendix C.

Despite the most careful of efforts towards vignette creation, problems related to the vignettes admittedly exist and may have influenced the results. The nature of the
difficulties reflect issues related to the attempt towards constancy across vignettes, the operationalization of symptom criteria into behavioural statements, and the DSM-IV itself (particularly symptom overlap). Each is now considered as possible limiting factor.

As much as possible, consistency was emphasized across the four vignette versions. Besides including the same number of total symptoms, the same name and age of the child in question, and the same presentation of the criteria for ADHD outside of the A1 and A2 sets (i.e., criteria B, C, D, and E), vignettes were created to be of relatively equal length, with the same statements used to reflect a behaviour/symptom (as much as possible), and with two ADHD symptoms (i.e., “often fidgets with hands or feet or squirms in seat” and “is often easily distracted by extraneous stimuli”) extending across all vignettes. While this constancy likely contributed to increased face validity and reduced confounding variables, the similarity and subtle distinctions between vignettes may have been obscured, particularly with a superficial reading. These similarities also may not have led to the best reflection of specific subtypes in all cases.

As noted, vignettes were created to read as narratives while reflecting various criteria for ADHD. Although many of the criteria were depicted in a highly similar form to the exact descriptions in the DSM-IV, it was at times necessary to use representations of the symptoms. For example, “is very disorganized” was used in the text to reflect the DSM-IV criteria for ADHD of “often has difficulty organizing tasks and activities” while “was grounded for destroying a plant trellis when he attempted to climb up the side of the house” was used to represent DSM-IV criterion “often runs or climbs excessively”.

“Often states he dislikes himself and that he feels like a loser” was used in the text to
reflect the criterion of "feelings of worthlessness" in Major Depressive Disorder. It is possible that these representations, while created to be reflective of specific criteria, were not interpreted in the same manner by practitioners.

While this consideration did not appear to be a major problem for vignettes which were intended to reflect ADHD (suggesting concordance between the researcher's and the respondents' interpretations of ADHD symptoms), given the number of misdiagnoses of ADHD made for the subthreshold Non-ADHD vignette, it appeared to be significant with respect to this case in particular. This observation suggests that interpretative differences were more likely related to the behavioural statements used for the symptoms intended to reflect other disorders as opposed to cases in which an ADHD diagnosis was appropriate. In sum, it would appear that practitioners interpreted behavioural statements as ADHD symptoms when in fact, they were created to reflect symptoms of mood, anxiety, or other disruptive disorders. This observation could reflect poor interpretation of symptoms by practitioners (especially given that the results of pilot study with graduate students who were advised to consult the DSM-IV indicated that a Non-ADHD diagnosis was made by over 80% of students for vignette 4), rater bias (especially given the results of prior studies which suggest a negative halo effect of oppositional symptoms on ADHD symptoms) or poor operationalization of the symptoms on the researcher's part. However, it is also plausible to consider it as reflective of more systemic problems with the DSM-IV itself.

A primary difficulty regarding the DSM-IV, which may be particularly relevant for results related to the Non-ADHD case used in this study, relates to the symptom overlap
between various disorders of the DSM-IV. For example, two of the specific criteria for Major Depressive Disorder (MDD) include "psychomotor agitation or retardation nearly every day (observable by others)", and "diminished ability to think or concentrate, or indecisiveness nearly every day (either by subjective account or observed by others)". These symptoms appear closely related to the hyperactivity/impulsivity and distractibility/inattention domains reflected by the behavioural criteria for ADHD. In addition, the broad symptoms for MDD are sufficiently vague that they often must be inferred from particular behaviours -behaviours which are conveniently laid out in the list for ADHD. It is not difficult, particularly given the current awareness of ADHD, to see how such symptoms could be interpreted as reflective of ADHD.

In fact, research which has investigated the utility of symptoms of childhood depressive and anxiety disorders using conditional probability indices (e.g., Laurent, Landau, and Stark, 1993) supports the notion of symptom overlap with ADHD criteria as problematic. For example, in this study, several symptoms (i.e., excessive motor tension, psychomotor agitation, difficulty concentrating) which are captured both by criteria for ADHD and for depression and anxiety were noted, despite low sensitivity, to have high predictive power\(^\text{17}\) for depressive (i.e., .78, 1.0, .72 respectively) and anxiety disorders (.77, .77, .84 respectively). This suggests that while these symptoms are often not necessarily presented by children with mood or anxiety disorders, their presence is often predictive of these disorders. Given that these symptoms have been known to show high

\(^{17}\) It is recalled that positive predictive power refers to the probability of a disorder given the presence of a symptom while negative predictive power refers to the probability of the absence of a disorder given the absence of a symptom.
sensitivity for ADHD and that sensitivity may be more relevant to the actual experience and observations of practitioners, it does not seem surprising that such symptoms may be interpreted as reflective of other disorders.

Moreover, clinical awareness of the problems/consequences associated with “having” many of the ADHD behaviours which are listed as criteria reinforces interpretation of symptoms, which may actually be reflective of other disorders, as being reflective of ADHD. For example, children who display significant behavioural problems tend to have negative interactions with others and to receive negative feedback from their environment (e.g., Kronenberger and Meyer, 1996). As a result, clinical expectations could include consequences such as social difficulties and irritability. While some of these are indeed issues for children with ADHD, these characteristics are also explicitely defined as symptoms of other disorders in the DSM-IV (e.g., MDD lists criteria such as irritability and diminished sense of self worth; social problems such as annoying others, refusing to comply, and initiating physical fights are described as part of disruptive behaviour disorders such as Oppositional Defiant Disorder and Conduct Disorder). The presence of these symptoms, when interpreted within an ADHD framework, could encourage ADHD diagnosis.

In sum, aspects of the DSM-IV likely contribute somewhat to diagnostic confusion. The problem appears to be that in some situations, children display behaviours that in fact actually do meet the criteria for ADHD; however, the reasons for these behaviours may be more accurately explained by other factors than ADHD (e.g., depression, anxiety). It would seem that the results for vignette 4, capture this phenomena very
successfully. Practitioners are thus faced with the need for measures in addition to use of the DSM-IV criteria for ADHD, to differentiate when its diagnosis is appropriate and when the child’s behaviours “look like” ADHD, perhaps seem to meet the criteria for ADHD, but are really reflective of another issue. The results of this study in fact make some contribution to fulfilling this need. In particular, psychologists, who showed the highest accuracy according to probability indices, also reported attending more ADHD workshops, showed increased familiarity with ADHD and the DSM-IV, reported longer evaluation times, and more use of comprehensive assessment methods. The implication for practitioners is that such factors may contribute to increased understanding of ADHD and other DSM-IV disorders and how they may present in children, increased opportunity to assess behaviour and its etiology, and increased likelihood of finding confirmatory or disconfirmatory evidence for the disorder.

While clearly these issues imply some need for improvement of the DSM-IV, they are not meant to denigrate the system completely nor suggest that practitioners totally disregard it. In fact, idiosyncratic definitions of disorders, as opposed to consideration of the DSM-IV, would encourage increased risk for biases. The DSM-IV represents the best current approximation of mental disorders. The challenge is to work at continually improving classification systems as knowledge grows and as their limitations become apparent.

Nature of the Task. In contrast to prior studies which merely collected self report data regarding the assessment and treatment of ADHD, the current study was unique in also requiring practitioners to engage in the process of diagnosis and to diagnose a written
case based on informant report. In part, the nature of the task in the current study is reflective of "real life" in that practitioners frequently and typically receive substantial information from parent or guardian reports, in vernacular which would be similar to that expressed in the created case vignettes. However, it must be noted that many practitioners rightly engage in other processes prior to making a diagnosis (e.g., interview the child in question, gather completed behavioural questionnaires etc.). As a result, this raises the possibility that the nature of the task in the current study was artificial in some sense and that practitioners were encouraged, because they were asked, to make a diagnosis which they may not have made under similar circumstances (i.e., based solely on informant report) in "real life". In fact, a number of the refusals to diagnose cases explicitly expressed that there was insufficient information to make a diagnosis.

However, while the task was admittedly somewhat removed from reality, it is also of note that, in contrast to those who refused to make a diagnosis, many practitioners stated no objection to providing a diagnosis for the case. In addition, the reported high certainty levels (see Table 11) of many practitioners suggest that informant report is viewed as a very credible source of information upon which diagnosis can be based. Also of note, the reported appointment lengths of many practitioners suggest that in "real life", they may not devote much more time towards making a diagnosis than that given during the survey.

**Conditional Probability Indices.** The use of conditional probability indices as a measure of accuracy in this study clearly raises some issues, especially given that "there are no adequate procedures for drawing statistical inferences regarding relative
magnitudes" (Waldman and Lilienfeld, 1991, p. 734). Thus, while the current study indicates comparisons of probability indices and uses terms such as "higher" and "lower", these are descriptive as opposed to being indications of the strength of differences. While the lack of possibility for statistical inferencing is not typically preferred for psychological studies, it must also be noted that the current study was limited in defining and comparing the data in other ways (e.g., logit analysis, analysis of variance) due to the low response rate. Moreover, a model for using conditional probabilities in the manner depicted in the current study has been provided by other studies such as those conducted by Milich et. al, 1987, Laurent et. al. 1993, and Waldman et. al., 1991. Despite the limitations of using conditional probabilities, it is noted that the current study was able to suggest and to provide a description of possible relationships which may stimulate other research ideas that can build upon these findings, possibly using more sophisticated techniques when they become available.

Future Directions

Both the results and the aforementioned limitations of the current study suggest possibilities for future research. Again, these possibilities can be considered in the context of response rate, vignette variations, and nature of the task issues. Several additional possibilities which do not fit into these domains, are also presented.

Response Rate. As noted, the relatively low response rate of the current study suggests that future studies use all possible mechanisms for encouraging increased participant response. Firstly, considering how to increase researcher status or how to increase participation even in cases of "lower status" researchers may be important in
increasing participation rate. For example, researchers could try to seek written endorsements of the study by credible associations/agencies (e.g., APA, CPA, OPA, hospitals) to add to the survey package, or could offer incentives. Secondly, while almost all of the recommendations for survey research were used in the current study, the noted exception of repeat reminders to participants, suggests that it may behoove future survey researchers to sample a smaller number of participants, allowing for repeated reminder mail-outs, and improving response rate.

That said, the response rate of this study also addresses a possible need for more research into nonrespondents themselves and increased exploration as to the distinctions between this group and respondents and the reasons as to why individuals do not respond to surveys. The population in this study for example, should have been somewhat "primed" to respond to the survey, given that many of them have likely engaged in research themselves, that they understand the challenges and frustrations involved, and that they presumably should relate to and empathize with the researcher. The lack of response in even this case, suggests that there are significant contributors to nonresponding which merit further consideration and study in order to improve future survey research in general.

**Vignette Variations.** A primary concern related to the creation of the vignettes used in the study clearly focuses on issues regarding the category of ADHD and the DSM-IV itself. Several recommendations are suggested related to both further or improved study in this area as well as possible improvements for ADHD diagnosis in general.

Clearly, there was a discrepancy between the researcher's and a majority of the
practitioners' interpretations of the statements used to reflect symptoms for the subthreshold, Non-ADHD case. While several other explanations of this are possible and have been addressed, it must still be considered that the discrepancy could reflect problems in the operationalization of symptoms and in the vignette creation itself. If the results of this study were considered to be pilot data, a revisitation, and thus revisions, of this vignette might be beneficial in order to ensure a possibly "better" non-ADHD representation.

However, if the contention that the operationalization of the symptoms was not itself overwhelmingly problematic, but more reflective of problems with the DSM-IV, other recommendations are proposed. Some study of the effect of particular symptoms as well as the particular terms used to portray symptoms to practitioners might be interesting. For example, how exactly do changes in the sensitivity and specificity of symptoms influence diagnosis? Does the language or the particular terms used in the vignettes (e.g., "agitated", "inattentive", "easily distracted") encourage practitioners towards an ADHD diagnosis? The answers to such questions should serve to further increase understanding of the diagnosis of this disorder. Study of factors influencing ratings and diagnosis would be beneficial in highlighting possible mechanisms behind rater bias. It may be also beneficial to examine how other Non-ADHD presentations, besides the one portrayed, might affect diagnosis, particularly given that there did not appear to be much of a distinction between ADHD subtypes in terms of general diagnostic accuracy. For example, would differences occur when using learning disorder, anxiety disorder, or disruptive disorder presentations as opposed to Major Depressive Disorder?
More generally, although still mindful of the need for caution regarding its results, the study implies that symptom overlap across categories in the DSM-IV likely needs to be better addressed in order to reduce diagnostic confusion and increase accuracy in subthreshold ADHD cases. Further examination and education regarding probabilities indices (e.g. sensitivity versus positive predictive power) may also be useful. It would also seem that a more focused effort towards representing how disorders present in childhood would be beneficial. Results related to subtype accuracy also indicate a possible need to revisit the 3 subtype model of ADHD which is advocated in the DSM-IV.

**Nature of the Task.** While it is argued that the nature of the task in the current study is somewhat reflective of “real life” case presentation and diagnosis, it is possible that future studies could extend its findings by minimizing the artificiality of the task even further. Possible suggestions include using in vivo or videotaped presentations as opposed to written case vignettes. For example, videotaped cases, which could include both footage of the child in question as well as an informant report, could be introduced to a sample of practitioners with direction to provide diagnoses (as well as asking for additional information such as in the case survey questionnaire in this study).

Video taping has been used in two related studies which have considered teacher ratings of ADHD (e.g., Abikoff, Courtney, Pelham, and Koplewicz, 1993; Stevens, Quitter, and Abikoff, 1998). According to descriptions of the methods used in these studies, 10 minute video clips were created using child actors who were hired to follow prepared scripts that varied as to type and frequency of inappropriate child behaviours
(i.e., while the activity of the child in each video was the same, three child presentations - “normal”, ADHD, ODD -were prepared; tapes were also piloted to ensure that validity). Teachers were recruited to watch the tapes, and in a group format with standardized instructions, were asked to complete questionnaires related to the presentations that they viewed.

While several strengths are apparent with respect to these studies (i.e., realistic presentation, increased control, ease of administration) significant barriers are noted. Firstly, a substantial degree of external funding seemed necessary in order to hire, train, and reimburse actors, to create video materials and presentation scripts (funding support was noted for the aforementioned studies but was not available for the current study). Constraints related to accessing practitioners would also likely present difficulties. In addition, artificiality or unrepresentativeness of the task could also be argued with the videotaped presentation if practitioners were aware that the case was created as opposed to completely “true”. Moreover given that informant report is the manner in which cases are presented to practitioners.

Additional Possibilities. It is noted that further extensions of the current study could also include the addition of child psychiatrists, who are also regulated to be able to make diagnoses in Ontario, to the list of participants in order to ascertain how this group may relate to the diagnosis of ADHD in children (however, it should be noted that the sampling of child psychiatrists in Ontario may be challenged by their small numbers). In addition, while the current study was limited to Ontario practitioners, future endeavors could also include the exploration of diagnosis in other provinces, Canada as a whole,
and other countries such as the United States. (Clearly a significant undertaking in terms of sampling and constraints related to the differing regulations for diagnosis in different areas.)

**Concluding Remarks**

Attention Deficit/Hyperactivity Disorder (ADHD) is unequivocally one of the most frequently diagnosed childhood psychiatric disorders and it has been associated with a variety of risks and costs (e.g., Barkley, 1990, 1997, 1998, 2000; Biederman et. al., 1991; Halperin, Newcorn, Matier, Sharma, McKay, and Schwartz, 1993; Pelham et. al., 1998; Shaywitz, Fletcher, and Shaywitz, 1995; Szatmari, Offord, and Boyle, 1989). Despite the obvious importance of its diagnosis that is implied by these facts, issues of diagnosis have typically been minimized. Consequently, it was the goal of the current study to provide a comprehensive assessment of ADHD diagnosis and an examination of three factors, *professional group, behavioural/symptom information,* and *gender of the child depicted,* which may relate to diagnostic accuracy.

Overall, the results of the current study suggested that practitioners tended to diagnose ADHD when symptom information indicated that such a diagnosis was warranted; however, they also tended to diagnose ADHD in the non-ADHD case, for which such a diagnosis was inappropriate. Results also indicated that diagnostic accuracy, as defined by various conditional probability indices, differed depending on the profession of the practitioner making the diagnosis, behaviour/symptom information, and gender information of a case.

While admittedly, as in the case of studying most clinical phenomena, challenges
towards testing expectations were evident, the study was able to offer results which
further contribute to understanding the diagnosis of ADHD and which suggest further
areas of inquiry and improvement. It is hoped that continued investigations will serve to
highlight the most useful ways of understanding and accurately diagnosing ADHD
leading to improved outcomes for children, families, and science.
APPENDIX A

DSM-IV Diagnostic Criteria for Attention-Deficit/Hyperactivity Disorder

A. Either (1) or (2):

(1) six (or more) of the following symptoms of inattention have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

Inattention

(a) often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities
(b) often has difficulty sustaining attention in tasks or play activities
(c) often does not seem to listen when spoken to directly
(d) often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behaviour or failure to understand instructions
(e) often has difficulty organizing tasks and activities
(f) often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)
(g) often loses things necessary or tasks or activities (e.g., toys, school assignments, pencils, books, or tools)
(h) is often easily distracted by extraneous stimuli
(i) is often forgetful in daily activities

(2) six (or more) of the following symptoms of hyperactivity-impulsivity have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

Hyperactivity

(a) often fidgets with hands or feet or squirms in seat
(b) often leaves seat in classroom or in other situations in which remaining seated is expected
(c) often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness
(d) often has difficulty playing or engaging in leisure activities quietly
(e) is often “on the go” or acts as if “driven by a motor”
(f) often talks excessively

Impulsivity

(g) often blurts out answers before questions have been completed
(h) often has difficulty awaiting turn
(i) often interrupts or intrudes on others (e.g., butts into conversations or games)

B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years.

C. Some impairment from the symptoms is present in two or more settings (e.g., school [or work] and at home.)
D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.

E. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

*Code based on type:*

314.01 Attention-Deficit/Hyperactivity Disorder, Combined Type:
if both Criteria A1 and A2 are met for the past 6 months

314.00 Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type:
if Criterion A1 is met but Criterion A2 is not met for the past 6 months

314.01 Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive-Impulsive Type: if Criterion A2 is met but Criterion A1 is not met for the past 6 months
APPENDIX B

Demographic Information Form

Please complete the following by filling in the blank or by checking the appropriate response:

1. Age: _________ Sex: M ___ F ___

2a). Highest Academic degree(s) attained: __________________________
   (e.g., M.A., M.Sc., Ph.D., M.D.,)

3a). Number of years of training post secondary _________

b). Year of graduation/completion of training: _________

c). Geographical location of training:
   Canada (Ontario) _________
   Canada (province outside of Ontario) _________
   United States _________ Specify state __________________________
   Europe _________ Specify country __________________________
   Other _________ Specify __________________________

4). Current practice setting:
   (Please check all that apply but please circle primary setting)
   Hospital ______ Private Practice ______ Mental Health facility ______ University ______ Other ______
   (Specify): _________

5). Number of years in practice: _________

6). Geographical location of current practice:
   a). Urban _______ b). NorthWestern Ontario
      Rural _______ NorthEastern Ontario
      _______ SouthWestern Ontario
      _______ SouthEastern Ontario

7a). Proportion of practice focused on children/adolescents _________

b). Average number of children and adolescents seen daily: Children ______ Adolescents ______

c). Average length of appointment with children/adolescents: _________
8a). Using the first 4 columns of the following chart, please indicate your degree of familiarity with each of the following childhood disorders/conditions by checking the appropriate category for each. Please check only one category per disorder.

b). In the last column of the chart, please indicate the number of workshops/continuing educational experiences attended since graduation/completion of training for each of the categories.

<table>
<thead>
<tr>
<th>Disorder/Condition</th>
<th>Very familiar</th>
<th>Familiar</th>
<th>Somewhat familiar</th>
<th>Unfamiliar</th>
<th>Number of Workshops and Continuing Education</th>
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<tr>
<td>1. Mental Retardation</td>
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<td>2. Learning Disorders</td>
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<td>3. Attention-Deficit/ Hyperactivity Disorder</td>
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<td>4. Oppositional Defiant Disorder</td>
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<td>5. Conduct Disorder</td>
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<td>6. Major Depressive Disorder</td>
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<td>7. Posttraumatic Stress Disorder</td>
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<td>8. Generalized Anxiety Disorder</td>
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<td>9. Asthma</td>
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<td>10. Allergies</td>
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APPENDIX C

Case Vignettes

Vignette 1m: Combined Hyperactive/Impulsive and Inattentive symptoms and Male target figure

Vignette 2m: Predominately Hyperactive/Impulsive and Male target figure

Vignette 3m: Predominately Inattentive and Male target figure

Vignette 4m: Non-hyperactive/impulsive and inattentive symptoms and Male target figure

Vignette 1f: Combined Hyperactive/Impulsive and Inattentive symptoms and Female target figure

Vignette 2f: Predominately Hyperactive/Impulsive and Female target figure

Vignette 3f: Predominately Inattentive and Female target figure

Vignette 4f: Non-hyperactive/impulsive and inattentive symptoms and Female target figure

The specific statements used to portray the DSM-IV criteria for both the Inattentive set (i.e., A1) and the Hyperactive/Impulsive set (i.e., A2) are presented in the texts of Vignettes 1, 2, 3, and 4 (Male versions) which follow. The reader is advised that each statement reflective of ADHD is underlined and is preceded by a number (1 or 2) and letter (a to i) which corresponds to the criteria for ADHD listed in Appendix A. Statements which are reflective of symptoms of other disorders are underlined and marked with *. 
Vignette 1m: Combined Hyperactive/Impulsive and Inattentive symptoms and Male target figure

Chris, age 9, was referred at the request of his parents because of concerns regarding his behaviour. Chris’ parents describe him as a difficult child who is agitated and inattentive. They suggest that he is (2e) energetic and always “on the go”. Chris constantly races around the house and yard, never seeming to tire and always looking for something “new” to get into. He has (1b) difficulty maintaining his attention on a single activity for any length of time and quickly shifts from one thing to another. Even when seated, Chris seems as if he has (2a) “ants in his pants” and is constantly fidgeting and squirming. As a result of this high energy and activity, Chris often has to miss out on family activities and outings such as shopping or going to movies because he is so unmanageable and disruptive to others. Chris is also frequently “in trouble” because of his unruly active behaviour. For example, recently, Chris was grounded for destroying a plant trellis when he attempted to (2c) climb up the side wall of the house.

Chris’ parents also describe him as “lazy”. He frequently seems to (1f) avoid “unpleasant” tasks such as his chores or homework, constantly (1d) needing to be reminded and goaded into completing them. The (1h) slightest noise or occurrence easily distracts him and he soon forgets what it is that he is supposed to be doing. Chris is also (1e) very disorganized. His parents report that when Chris does manage to complete things, it is usually a (1a) “sloppy careless job” because he just doesn’t give enough attention or effort to the task at hand. In addition, Chris is not popular with other children in the neighbourhood. He has significant problems participating in games and activities. He has extreme (2h, i) difficulty waiting his turn and often butts in on the other children. As a result, many of his interactions with peers end up in “squabbles” and most of the kids in the neighbourhood now avoid him.

According to parent report, Chris has been a “challenging” child since he was a toddler, although his problem behaviours seem to be worsening considerably. Although psychological testing suggests average cognitive functioning and academic functioning which is only slightly below the expected level, Chris struggles at school because of his behaviour and “attitude”. Chris cannot seem to follow the rules of the classroom. He is (2b) hardly ever in his seat and frequently wanders around the room disturbing others. He is constantly “off task” and requires continual monitoring and prompting. He is frequently “in trouble” for his failure to behave appropriately and has been suspended over the past school year.
Vignette 2m: Predominately Hyperactive/Impulsive and Male target figure

Chris, age 9, was referred at the request of his parents because of concerns regarding his behaviour. Chris' parents describe him as a difficult child who is agitated and wild. They suggest that he is (2e) energetic and always "on the go". Chris constantly races around the house and yard, never seeming to tire and always looking for something "new" to get into. Even when seated, Chris seems as if he has (2a) "ants in his pants" and is constantly fidgeting and squirming. As a result of this high energy and activity, Chris often has to miss out on family activities and outings such as shopping or going to movies because he is so unmanageable and disruptive to others. Chris is also frequently "in trouble" because of his unruly active behaviour. For example, recently, Chris was grounded for destroying a plant trellis when he attempted to (2c) climb up the side wall of the house.

Chris' parents also describe him as "lazy". They complain that he frequently disregards adult requests or directives* to help around the house or complete his schoolwork. The (1h) slightest noise or occurrence easily distracts him from his chores or homework. Chris also frequently makes physical complaints* such as claiming to have a headache or upset stomach. His parents feel that he often tries to use these complaints to "get out of" his responsibilities. In addition, Chris is not popular with other children in the neighbourhood. He is often irritable*, frequently loses his temper*, and often tries to annoy* the other children. As a result, he has significant problems participating in games and activities. He has extreme (2h, i) difficulty waiting his turn and often butts in on the other children. As a result, many of his interactions with peers end up in "squabbles" and most of the kids in the neighbourhood now avoid him.

According to parent report, Chris has been a "challenging" child since he was a toddler, although his problem behaviours seem to be worsening considerably. Although psychological testing suggests average cognitive functioning and academic functioning which is only slightly below the expected level, Chris struggles at school because of his behaviour and "attitude". Chris does not follow the rules of the classroom. He is (2b) hardly ever in his seat and frequently wanders around the room disturbing others. He is frequently "in trouble" for his failure to behave appropriately and has been suspended over the past school year.
Vignette 3m: Predominately Inattentive and Male target figure

Chris, age 9, was referred at the request of his parents because of concerns regarding his behaviour. Chris’ parents describe him as a difficult child who is inattentive and “scatterbrained”. They suggest that he has (1b) difficulty maintaining his attention on a single activity for any length of time and shifts from one thing to another. The (1h) slightest noise or occurrence easily distracts him and he soon forgets what it is that he is supposed to be doing. Chris is also (1e) very disorganized and unmotivated to do his best. His parents report that when Chris undertakes and manages to complete a task, it is usually a (1a) “sloppy careless job” because he just doesn’t pay enough attention or effort to the task at hand. They describe that it seems that no matter what he is doing, he seems preoccupied and is (2a) constantly fidgeting and squirming. In fact, his parents describe that it is “next to impossible” to keep Chris on track. As a result, Chris is frequently “in trouble” and often misses out on family activities and outings because he is being punished for his transgressions. For example, recently, Chris was not permitted to join the family for a trip to the movies because he had been grounded for persistently neglecting to complete his chores around the house.

Chris’ parents also describe him as “lazy”. Chris frequently seems to (1f) avoid “unpleasant” tasks such as his chores or homework, (1d) constantly needing to be reminded and goaded into completing them. His parents complain that he frequently refuses to comply with adult requests and directives* to help around the house or complete his homework. Chris also frequently makes physical complaints* such as claiming to have a headache or upset stomach. His parents feel that he often tries to use these complaints to “get out of” his responsibilities. In addition, Chris is not popular with other children in the neighbourhood. He is often irritable*, frequently loses his temper*, and often tries to annoy* the other children. He has significant problems participating in games and activities. He has extreme difficulty following rules and staying involved in the activity. As a result, many of his interactions with peers end up in “squabbles” and most of the kids in the neighbourhood now avoid him.

According to parent report, Chris has been a “challenging” child since he was a toddler, although his problem behaviours seem to be worsening considerably. Although psychological testing suggests average cognitive functioning and academic functioning which is only slightly below the expected level, Chris struggles at school because of his behaviour and “attitude”. Chris cannot seem to follow the rules of the classroom. He is constantly “off task” and requires continual monitoring and prompting. He is frequently “in trouble” for his failure to behave appropriately and has been suspended over the past school year.
Vignette 4m: Non-hyperactive/impulsive and inattentive symptoms and Male target figure

Chris, age 9, was referred at the request of his parents because of concerns regarding his behaviour. Chris’ parents describe him as a difficult child who is agitated and inattentive. He has significant difficulty concentrating* and focusing on most tasks and activities. They describe that no matter what he is doing, he seems preoccupied and is (2a) constantly fidgeting and squirming*. In fact, his parents describe that it is “next to impossible” to keep Chris on track. In addition, Chris’ parents also suggest that Chris is frequently irritable* and has little interest in most activities*. He often states that he dislikes himself and that he feels “like a loser”*. As a result of many of these behaviours, Chris is frequently “in trouble” and often misses out on family activities and outings because he is being punished for his transgressions. For example, recently, Chris was not permitted to join the family for a trip to the movies because he had been grounded for persistently neglecting to complete his chores around the house.

Chris’ parents also describe him as “lazy”. The slightest noise or occurrence easily distracts him from his chores or homework. His parents complain that he frequently refuses to comply with adult requests and directives* to help around the house or complete his homework. Chris also frequently makes physical complaints* such as claiming to have a headache or upset stomach. His parents feel that he often tries to use these complaints to “get out of” his responsibilities. In addition, Chris is not popular with other children in the neighbourhood. He is constantly irritable and often tries to annoy* the other children. He has significant difficulty participating in games and activities. Although Chris is underweight for his age*, he often initiates physical confrontations* with his peers. As a result of these behaviours, most of the kids in the neighbourhood now avoid him.

According to parent report, Chris has been a “challenging” child since he was a toddler, although his problem behaviours seem to be worsening considerably. Although psychological testing suggests average cognitive functioning and academic functioning which is only slightly below the expected level, Chris struggles at school because of his behaviour and “attitude”. Chris does not follow the rules of the classroom. He is frequently “in trouble” for his failure to behave appropriately and has been suspended over the past school year.
Vignette 1f: Combined Hyperactive/Impulsive and Inattentive symptoms and Female target figure

Chris, age 9, was referred at the request of her parents because of concerns regarding her behaviour. Chris' parents describe her as a difficult child who is agitated and inattentive. They suggest that she is energetic and always “on the go”. Chris constantly races around the house and yard, never seeming to tire and always looking for something “new” to get into. She has difficulty maintaining her attention on a single activity for any length of time and quickly shifts from one thing to another. Even when seated, Chris seems as if she has “ants in her pants” and is constantly fidgeting and squirming. As a result of this high energy and activity, Chris often has to miss out on family activities and outings such as shopping or going to movies because she is so unmanageable and disruptive to others. Chris is also frequently “in trouble” because of her unruly active behaviour. For example, recently, Chris was grounded for destroying a plant trellis when she attempted to climb up the side wall of the house.

Chris' parents also describe her as “lazy”. She frequently seems to avoid “unpleasant” tasks such as her chores or homework, constantly needing to be reminded and goaded into completing them. The slightest noise or occurrence easily distracts her and she soon forgets what it is that she is supposed to be doing. Chris is also very disorganized. Her parents report that when Chris does manage to complete things, it is usually a “sloppy careless job” because she just doesn’t give enough attention or effort to the task at hand. In addition, Chris is not popular with other children in the neighbourhood. She has significant problems participating in games and activities. She has extreme difficulty waiting her turn and often butts in on the other children. As a result, many of her interactions with peers end up in “squabbles” and most of the kids in the neighbourhood now avoid her.

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Vignette 2f: Predominately Hyperactive/Impulsive and Female target figure

Chris, age 9, was referred at the request of her parents because of concerns regarding her behaviour. Chris' parents describe her as a difficult child who is agitated and wild. They suggest that she is energetic and always “on the go”. Chris constantly races around the house and yard, never seeming to tire and always looking for something “new” to get into. Even when seated, Chris seems as if she has “ants in her pants” and is constantly fidgeting and squirming. As a result of this high energy and activity, Chris often has to miss out on family activities and outings such as shopping or going to movies because she is so unmanageable and disruptive to others. Chris is also frequently “in trouble” because of her unruly active behaviour. For example, recently, Chris was grounded for destroying a plant trellis when she attempted to climb up the side wall of the house.

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Vignette 3f: Predominately Inattentive and Female target figure

Chris, age 9, was referred at the request of her parents because of concerns regarding her behaviour. Chris' parents describe her as a difficult child who is inattentive and "scatterbrained". They suggest that she has difficulty maintaining her attention on a single activity for any length of time and shifts from one thing to another. The slightest noise or occurrence easily distracts her and she soon forgets what it is that she is supposed to be doing. Chris is also very disorganized and unmotivated to do her best. Her parents report that when Chris undertakes and manages to complete a task, it is usually a "sloppy careless job" because she just doesn't pay enough attention or effort to the task at hand. They describe that it seems that no matter what she is doing, she seems preoccupied and is constantly fidgeting and squirming. In fact, her parents describe that it is "next to impossible" to keep Chris on track. As a result, Chris is frequently "in trouble" and often misses out on family activities and outings because she is being punished for her transgressions. For example, recently, Chris was not permitted to join the family for a trip to the movies because she had been grounded for persistently neglecting to complete her chores around the house.

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Vignette 4f: Non-hyperactive/impulsive and inattentive symptoms and Female target figure

Chris, age 9, was referred at the request of her parents because of concerns regarding her behaviour. Chris' parents describe her as a difficult child who is agitated and inattentive. She has significant difficulty concentrating and focusing on most tasks and activities. They describe that no matter what she is doing, she seems preoccupied and is constantly fidgeting and squirming. In fact, her parents describe that it is "next to impossible" to keep Chris on track. In addition, Chris' parents also suggest that Chris is frequently irritable and has little interest in most activities. She often states that she dislikes herself and that she feels "like a loser". As a result of many of these behaviours, Chris is frequently "in trouble" and often misses out on family activities and outings because she is being punished for her transgressions. For example, recently, Chris was not permitted to join the family for a trip to the movies because she had been grounded for persistently neglecting to complete her chores around the house.

Chris' parents also describe her as "lazy". The slightest noise or occurrence easily distracts her from her chores or homework. Her parents complain that she frequently refuses to comply with adult requests and directives to help around the house or complete her homework. Chris also frequently makes physical complaints such as claiming to have a headache or upset stomach. Her parents feel that she often tries to use these complaints to "get out of" her responsibilities. In addition, Chris is not popular with other children in the neighbourhood. She is constantly irritable and often tries to annoy the other children. She has significant difficulty participating in games and activities. Although Chris is underweight for her age, she often initiates physical confrontations with her peers. As a result of these behaviours, most of the kids in the neighbourhood now avoid her.

According to parent report, Chris has been a "challenging" child since she was a toddler, although her problem behaviours seem to be worsening considerably. Although psychological testing suggests average cognitive functioning and academic functioning which is only slightly below the expected level, Chris struggles at school because of her behaviour and "attitude". Chris does not follow the rules of the classroom. She is frequently "in trouble" for her failure to behave appropriately and has been suspended over the past school year.
APPENDIX D

CASE STUDY QUESTIONNAIRE

INSTRUCTIONS: Please read the attached case description and respond to the questions which follow:

Case Vignette

1a. Please indicate a single PRIMARY hypothesized diagnosis for the child presented in this case:

1b. Please provide a rationale for this diagnosis:

1c. Please indicate your degree of certainty of the primary diagnosis by checking the appropriate category:

- very certain
- certain
- somewhat certain
- uncertain

1d. Please provide a rationale for this certainty level:
2a. Please indicate any additional hypothesized diagnoses. For each, indicate whether it is a coexisting disorder (i.e., comorbid) or an alternate disorder which needs to be ruled out (i.e., differential diagnosis) by checking the appropriate response.

1. ______________________ coexisting _____ alternate _____
2. ______________________ coexisting _____ alternate _____
3. ______________________ coexisting _____ alternate _____

2b. Please provide a rationale for any/each secondary diagnosis:

3. Please indicate the steps, if any, that you would take to confirm the PRIMARY diagnosis and rule out alternate diagnoses:

4. Please indicate the treatment you would recommend to the family:

5. Further comments:

Please return this questionnaire along with the demographic information form in the return envelope provided.

Thank you for your participation.
APPENDIX E

Cover Letter

Dear Practitioner,

As child referrals continue to rise, assessing, treating, and managing childhood disorders has become increasingly important to medical and mental health professionals, such as yourself. Unfortunately, our understanding of these processes is limited at present. As a result, we may be missing valuable information which may facilitate the assessment, treatment, and management of childhood disorders and thus actually simplify your work.

Please accept this request to participate in a study which examines these processes with respect to childhood disorders/conditions. The study consists of reading a case study, completing two brief questionnaires, and returning these items in the provided envelope. It is expected that this research will serve to assist in the assessment, treatment, and management of childhood disorders.

If you have any questions, please do not hesitate to contact me. I sincerely appreciate your time and consideration in participating in this research.

Shelley Wilkin, M.A.
Doctoral Student, Clinical Psychology
(519) 787-3247
E-mail: wilkin@server.uwindsor.ca
APPENDIX F

CONSENT FORM FOR PARTICIPATION IN RESEARCH

PURPOSE: The intent of the present study is to examine the assessment/treatment/management process with respect to childhood disorders/conditions.

PROCEDURE: For the purposes of the present study, you will be asked to read a case study and complete two questionnaires, one which asks you to make a diagnosis and answer questions related to the case, and the other which asks for some basic demographic information. You are asked to return these two questionnaires along with your signed consent in the return envelope provided. Please retain the top portion of the consent form for your records.

PARTICIPANT RIGHTS: All of your responses will remain confidential. Names will be separated from the data and will not be recorded on the questionnaires; rather participants will be assigned numbers. All data will be filed and analyzed by numerical code. Please note that although responding to all of the questions would be beneficial to the study, you do not have to answer any questions that you do not want to. As a participant, you are free to contact the researcher to ask questions during and after the study. Participants will be mailed a summary of the study findings following completion of the study.

This study has been reviewed by the Psychology Department Ethics Committee. Any questions or concerns can be directed to the principal investigator, S. Wilkin, or her supervisor, Dr. R. Orr. Any further ethical concerns may be addressed to Dr. D. Shore, Chair, Ethics Committee (519-253-4232).

RESEARCHER: Shelley Wilkin, M.A. (519) 787-3247
Department of Psychology E-mail: wilkin@server.uwindsor.ca
University of Windsor

SUPERVISOR: Robert Orr, Ph.D. (519) 253-4232 ext. 2026
Department of Psychology E-mail: rorr@uwindsor.ca
University of Windsor

<------------------->

To indicate that you have understood and received a copy of the consent form, that you are aware of the opportunity and means of asking questions, and that you voluntarily consent to participate in the study conducted by S. Wilkin, please sign and date the bottom portion of this form and return along with the questionnaires in the envelope provided. Please retain the top portion of the consent form for your records.

Participant Name

Date
APPENDIX G

Recommendations (abbreviated) for survey research (Neuman, 1997)

1. Address materials to a specific individual, not occupant, and send by first class mail.

2. Include a carefully written cover letter on letterhead. Request cooperation, guarantee confidentiality, explain purpose of the research, give researcher’s name and contact numbers.

3. Include a pre-paid addressed return envelope.

4. Ensure a neat, attractive layout of materials and reasonable length.

5. Ensure materials are professionally printed, easy to read, with clear instructions.

6. Provide 2 follow-up reminders.

7. Do not send materials during holiday periods.
REFERENCES


University of Western, Faculty of Medicine and Dentistry. (2001). Undergraduate curriculum.

University of Western, Faculty of Graduate studies. (2001). Clinical Psychology: Graduate curriculum.


VITA AUCTORIS

NAME: Shelley Wilkin Bloch

PLACE OF BIRTH: Fergus, Ontario

YEAR OF BIRTH: 1970

EDUCATION: Centre Wellington District Highschool, Fergus 1984-1989


University of Windsor, Windsor, Ontario 1994 - 1996, M.A., Clinical Psychology

University of Windsor, Windsor, Ontario 1994 - 1996, Ph.D., Clinical Psychology