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Predictors of Screening and Referral Practices for Autism among Canadian Family Physicians

by

Andrea N. Berenstein

A Dissertation

Submitted to the Faculty of Graduate Studies

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

2012

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Abstract

The present research study investigated screening and referral practices for Autism Spectrum Disorders (ASDs) among a group of Canadian primary care physicians. The purposes of the study were to compare physicians' reported practices with published best practice guidelines, to explore whether demographic and attitudinal factors predict physicians' behaviour, and to investigate gender and age differences in ASD-related attitudes. A random sample of General Practitioners (GPs) within the province of Ontario and a subsample of Ontario medical school students were surveyed. Participants included 126 GPs and 65 students (65 males and 126 females between the ages of 25 and 79). GPs completed a questionnaire examining their screening and referral practices for ASDs, perceived barriers to conducting screening and referral activities, and ASD-related beliefs and attitudes. Students completed an abbreviated questionnaire examining their beliefs and attitudes. Slightly less than half of the physician sample endorsed using some type of formal screening measure in conjunction with informal methods. Consistent with previous research findings, female physicians reported a significantly higher rate of using formal screening tools than did male physicians. With respect to perceived barriers to screening and referral, the top rated barriers reported by participants were insufficient time to screen, a lack of familiarity with available screening tools, and long waitlists to access referral services. In addition, physician attitudes were found to significantly predict reported screening and referral behaviour, independent of physician gender and age. Specifically, GPs with more favourable attitudes towards early identification and GPs with stronger feelings of self-efficacy in identifying and screening for ASDs reported that they would conduct a greater number of best practice activities. Last, the

study found specific ASD-related attitudes that differ between male and female physicians and between physicians and medical school students. Female GPs demonstrated more favourable attitudes toward early identification and greater self-efficacy beliefs than did male GPs. In addition, students demonstrated greater self-efficacy beliefs and more positive attitudes towards their educational training and available community resources than did practicing physicians. Clinical implications and recommendations for improving physicians' ASD-related practices are provided. Study limitations and suggestions for future research are also discussed.

Acknowledgements

I would like to begin by thanking my graduate supervisor, Dr. Marcia Gragg, for encouraging my interest in ASD research. Your passion for research and clinical work in this area has been contagious. My committee members - Dr. Sylvia Voelker, Dr. Cory Saunders, and Dr. Irene Carter – have provided insightful feedback and sound advice on the research presented in the following pages. I also want to express my appreciation to the physicians and medical school students who participated in this study. I appreciate your time and valuable insights.

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I am extremely grateful for the support provided to me by my family. To my parents, thank you for always being so proud and never doubting my abilities. To my in-laws and siblings, thank you for your enduring enthusiasm and encouragement. To my husband, Michael, thank you for your constant love, patience, and strength. You are my best friend and my most enthusiastic cheerleader. It has been a long road to get here and you have been with me every step of the way. Last, I dedicate this to my son, Nathan, who brings me such great joy every day. The completion of this dissertation and my Ph.D. will always be connected in a special way to your arrival.

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CHAPTER I

Introduction

Overview

Autism is the second most common developmental disability affecting children today, after intellectual disability (Centers for Disease Control and Prevention [CDC], 2009). According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), autism is currently understood to involve a triad of symptoms: (a) impairments in social interaction; (b) impairments in verbal and nonverbal communication; and (c) restricted, repetitive, and stereotyped patterns of behaviour, interests, and activities (American Psychiatric Association [APA], 2000). The term "Autism Spectrum Disorder" (ASD) is now commonly used to represent autism and the two other disorders that share these clinical characteristics: Asperger's Disorder and Pervasive Developmental Disorder - Not Otherwise Specified (CDC, 2009). For decades, ASDs were considered relatively rare with an occurrence rate of 4 to 5 per 10,000 individuals (APA, 2000). However, research now suggests that the number of children diagnosed with ASDs has increased dramatically. Recent prevalence estimates indicate an average rate of 9 per 1,000 children in the United States, which translates to 1 in 110 children (CDC, 2009). Thus, whether due to changes in diagnostic criteria, greater public and professional awareness, or a genuine increase in the prevalence of the disorder, primary care physicians are seeing increasing numbers of children with ASDs in their practices.

Despite considerable evidence of the importance of early identification and early intervention (e.g., Harris & Handleman, 2000; Turner, Stone, Pozdol, & Coonrod, 2006) and the existence of identifiable markers of ASDs in very young children (e.g., Bryson et

al., 2007; Rogers, 2009), early identification is not the norm. Although the vast majority of parents become concerned about their children's development before two years of age (e.g., Siklos & Kerns, 2007), research indicates that the majority of children are not being diagnosed until after four years of age (e.g., Siklos & Kerns, 2007; Shattuck et al., 2009). Thus, many parents are experiencing considerable delays in the search for a diagnosis. Parent accounts of this process indicate frustrations about being given inappropriate reassurances by their family physicians/general practitioners (GPs) that there was nothing to worry about, as well as difficulties persuading GPs of the need for a specialist diagnostic assessment (e.g., Hutton & Caron, 2005; Nachshen, 2008).

In order to promote earlier identification of ASDs in primary care, best practice guidelines have been published in the United States and Canada to help physicians identify children with ASDs (Johnson & Myers, 2007; Nachshen, 2008). These guidelines call for ongoing developmental surveillance of all children, targeted screening of at-risk children using formal screening tools, and immediate referral to diagnostic and intervention services. Yet, the current evidence examining physicians' screening and referral behaviours suggests that a substantial number of physicians are not using formal screening tools to screen for general developmental delays or ASDs and are not generally following best practice guidelines (e.g., Sices, Feudtner, McLaughlin, Drotar, & Williams, 2003; Dosreis, Weiner, Johnson, & Newschaffer, 2006; Zeiger, 2008). In addition, research indicates that certain practical barriers (e.g., time and knowledge), demographic characteristics (e.g., gender and age), and beliefs and attitudes may influence a physician's ability or decision to use formal screening tools (e.g., Kennedy, Regehr, Rosenfield, Roberts, & Lingard, 2004; Dosreis et al., 2006; Thind, Feightner,

Stewart, Thorpe, & Burt, 2008). For instance, studies have consistently reported that female physicians and younger physicians exhibit higher rates of using formal screening tools and provide more general preventive services than do male or older physicians (e.g., Dosreis et al., 2006; Thind et al., 2008; Ramirez, Wildes, Napoles-Springer, Perez-Stable, Talavera & Rios, 2009). Yet, reasons for these demographic differences are currently speculative or unknown. Several theoretical models, including the Health Belief Model (Rosenstock, 1974), have attempted to explain why physicians may or may not conduct particular health behaviours (e.g., using formal screening tools) by proposing that attitudes play a critical role in their decision-making process.

The present research study investigated screening and referral behaviours for ASDs among a group of Canadian primary care physicians. GPs' reported practices were examined and compared to recent best practice guidelines. In addition, the current study explored whether demographic and attitudinal factors predicted physicians' behaviours. Finally, in order to better understand reported gender and age differences in screening rates and overall preventive health practices, the present study aimed to extend existing literature by investigating gender and age differences in physicians' ASD-related attitudes.

Importance of Early Identification

Over the past decade, there has been mounting evidence indicating that children with ASDs who receive diagnoses earlier and who begin interventions at younger ages have better outcomes than those who are diagnosed or enrolled in interventions at older ages. For instance, Turner and colleagues (2006) demonstrated that earlier ages at diagnosis significantly predicted better outcomes at age nine among a sample of children

diagnosed with ASDs. Specifically, the majority of children who received diagnoses before 30 months were in the higher outcome group at age 9 (i.e., average or above average cognitive and language skills), whereas the majority of children who were diagnosed over 30 months of age were in the lower outcome group at age 9. In addition, Harris and Handleman (2000) found a significant relationship between age at time of admission into an intervention program and later educational placement. Children who enrolled in an intervention program before 48 months of age were significantly more likely to be in an inclusive, regular education classroom than were those children who enrolled after that age. There was also a significant correlation between age at intake and IQ when the children left the program, such that children with younger ages at intake had higher IQs at discharge than those who entered the program at older ages. Recent studies continue to show that the younger the child at the start of early intervention the greater the cognitive gains (e.g., Ben Itzchak & Zachor, 2011). Thus, research suggests that earlier diagnosis and subsequent earlier enrolment in interventions may lead to more positive developmental outcomes for children with ASDs. In general, recommendations based on the research literature suggest that the optimal age for the commencement of early intervention is before age 5, with even greater gains before age 3 ½ (Perry & Condillac, 2003).

An early intervention known as "intensive behavioural intervention" (IBI) is considered the most effective treatment method for ASDs and has the best documented outcome data as compared with other treatments (e.g., Howard, Sparkman, Cohen, Green & Stanislaw, 2005; Remington et al., 2007; Howlin, Magiati, & Charman, 2009; Eldevik et al., 2009). Since the 1980s, outcome studies have demonstrated substantial success

with this type of program. Specifically, in comparison to control groups (i.e., treatment as usual, eclectic interventions, or parent-directed treatments), children in IBI programs are reported to make significant gains on standardized tests of nonverbal IQ, language, and adaptive functioning (e.g., Lovaas, 1987; Smith, Groen, & Wynn, 2000; Sallows & Graupner, 2005; Howard et al., 2005; Remington et al., 2007). Since eligibility for participation in early intervention programs, such as IBI, is typically limited to children who have a formal diagnosis (Ontario Ministry of Children and Youth Services, 2010), early identification is essential.

Early identification is also important because any delay in the diagnostic process can increase parental distress. Parents have reported significant stress, frustration, and confusion related to difficulties in obtaining a diagnosis (e.g., Schall, 2000; Hutton & Caron, 2005; Goin-Kochel, Mackintosh, & Myers, 2006; Osborne & Reed, 2008). The period prior to a diagnosis is often characterized by confusion as to the cause of the child's behaviour, feelings of self-blame, and severe stresses on family relationships (Schall, 2000; Osborne & Reed, 2008). In addition, studies have consistently indicated that the earlier the age at which a diagnosis is made, the greater the degree of parental satisfaction with the diagnostic process (e.g., Goin-Kochel et al., 2006; Renty & Roeyers, 2006). Therefore, earlier identification can help to curtail a lengthy diagnostic process and mitigate some of the stress and dissatisfaction that families experience.

As a result of this type of research evidence, early identification is viewed as a critical component in the assessment and treatment of children with ASDs (Johnson & Myers, 2007; Nachshen, 2008). Any delay in diagnosis could prevent some children from receiving the benefits of early intervention and may increase parental distress. As

such, there is a pressing need to identify children with ASDs as early as possible.

Feasibility of Early Identification

Evidence regarding the feasibility of early identification has been accumulating, demonstrating that signs of ASDs can be detected accurately in young children and that early diagnosis stands the test of time. In the past, researchers examined early indicators of ASDs using early home movies (e.g., Osterling & Dawson, 1994), retrospective questionnaires (e.g., Gillberg et al., 1990), and parent-completed screening instruments (e.g., Baron-Cohen, Cox, Baird, Swetten, & Nightingale, 1996). The newest approach to examining the earliest signs of ASDs involves prospective longitudinal infant sibling studies. These studies follow the course of development of infant siblings of children with ASDs who are at increased risk for the disorder compared with infants in the general population (e.g., Zwaigenbaum et al., 2005; Landa & Garrett-Mayer, 2006; Yirmiya et al., 2006; Bryson et al., 2007; Cassel et al., 2007; Rogers, 2009; Ozonoff et al., 2010).

Overall, these studies have shown that children who are later diagnosed with ASDs exhibit symptoms as early as 6 months of age, but more consistently around 12 months. The early symptoms that are typically reported include a lack of the following social and communicative behaviours: responding to name being called, eye contact, protodeclarative pointing (i.e., pointing to an object in order to direct another person's attention), gaze monitoring (i.e., turning to look in the same direction in which the adult is looking), and pretend play (Gillberg et al., 1990; Osterling & Dawson, 1994; Baron-Cohen et al., 1996). In addition, the infant sibling studies have demonstrated that, by 12 months of age, siblings who are later diagnosed with ASDs may be distinguished from typically developing siblings and controls on the basis of marked abnormalities in: (a)

visual attention (e.g., poor eye contact, visual tracking, and visual attention), (b) social responses (e.g., reduced social smiling, social interest, and affect), (c) use of play materials (e.g., lack of imitation), and (d) sensory-oriented behaviours (e.g., Zwaigenbaum et al., 2005; Landa & Garrett-Mayer, 2006; Yirmiya et al., 2006; Bryson et al., 2007; Cassel et al., 2007; Rogers, 2009; Ozonoff et al., 2010). Siblings with ASDs are also distinguished by a distinct temperament profile characterized by marked irritability, extreme distress reactions, a tendency to fixate on particular objects in the environment, decreased expression of positive affect, and difficulties with self-regulation. Thus, research indicates that there are identifiable behavioural markers that can reliably distinguish young children with ASDs from typically developing children.

The reliability and stability of early diagnosis has also been established. A number of studies have investigated the stability of early diagnosis by assessing children for ASDs around 2 years of age and reassessing them years later (e.g., Lord, 1995; Stone et al., 1999; Moore & Goodson, 2003; Eaves & Ho, 2004; Turner et al., 2006; Kleinman et al., 2008; Chawarska, Klin, Paul, Macari, & Volkmar, 2009; Ben Itzchak & Zachor, 2009). The consensus from these studies is that an ASD diagnosis at age 2 is reasonably stable over time and associated with the same diagnosis at 3 years of age and older. For example, Kleinman and colleagues (2008) found that 80% of a sample of children receiving a diagnosis of ASD around age 2 also received a diagnosis of ASD around age 4. Similarly, in a longer-term study, 88% of a sample of children with an ASD diagnosis at age 2 retained an ASD diagnosis at age 9 (Turner et al., 2006). Furthermore, research indicates that a diagnosis can be made reliably at 2 years of age by experienced clinicians (Stone et al., 1999; Moore & Goodson, 2003; van Daalen et al., 2009). However,

diagnostic stability and reliability is somewhat higher for the broader category of ASDs than for a specific diagnosis on the spectrum (Stone et al., 1999; Moore & Goodson, 2003; Chawarska et al., 2009; Ben Itzchak & Zachor, 2009). In other words, children who are diagnosed with an ASD generally stay on the spectrum, but their specific diagnosis (e.g., Autism versus Asperger's Disorder) may change.

Taken together, these results suggest that: (a) deficits in social-communication behaviours and a distinct temperament profile appear to be the most prevalent behavioural signs of ASDs in young children and are identifiable beginning at around 12 months of age, and (b) an ASD diagnosis at age 2 is considered to be stable over time. This research confirms that early identification is achievable and increasingly reliable.

The Diagnostic Experience

Despite the above evidence regarding the importance and feasibility of early identification, most children with ASDs are not being identified at an early age. Research examining the diagnostic process indicates that parents become aware of developmental problems well before receiving a diagnosis, with first concerns generally emerging between a child's 1st and 2nd birthday (e.g., Howlin & Moore, 1997; De Giacomo & Fombonne, 1998; Siklos & Kerns, 2007; Twyman, Maxim, Leet & Ultmann, 2009). Speech problems and delays in language development are the symptoms that initially cause parents the most concern, with other commonly noted concerns involving abnormal social development and general behaviour problems (e.g., Howlin & Moore, 1997; De Giacomo & Fombonne, 1998; Siklos & Kerns, 2007; Osborne & Reed, 2008).

Once parents become concerned, evidence suggests that the time and effort required to obtain a diagnosis is considerable. Parents report first seeking professional

help within a few months of acknowledging that there are developmental concerns, most often when children are between 20 and 28 months of age (e.g., Howlin & Moore, 1997; De Giacomo & Fombonne, 1998; Siklos & Kerns, 2007). A GP is often the first professional with whom parents share their concerns (De Giacomo & Fombonne, 1998; Renty & Roeyers, 2006; Osborne & Reed, 2008). Many parents describe having to fight to have their concerns noted by their physicians (e.g., Howlin & Moore, 1997; Siklos & Kerns, 2007; Nachshen, 2008). They report that common responses to their first concerns include minimizations, dismissals, and inappropriate reassurances, such as being told they are overanxious parents or being encouraged to wait for their children to grow out of their problems (Schall, 2000; Hutton & Caron, 2005; Nachshen, 2008). For instance, in one of the earliest surveys examining the diagnostic process, 35% of a sample of parents with children with ASDs was initially told that there was no cause for concern or that no immediate action was needed (Howlin & Moore, 1997). Parents have also expressed the view that their GPs did not have a sufficient understanding of ASDs and were not equipped to deal with their initial concerns or perform adequate follow-up action (Nachshen, 2008). Furthermore, parents have noted that their GPs were often reluctant to make referrals for specialist assessments and, therefore, they had to exert considerable pressure on the GPs in order to obtain the referrals (Nachshen, 2008). Thus, although parents often recognize symptoms early, lengthy delays are experienced before they finally receive a diagnosis.

In Howlin and Moore's (1997) well-known survey of 1295 families with children with ASDs in the UK, the age at which a final diagnosis was obtained was, on average, 6.11 years. The average time interval between first seeking professional help and

receiving a diagnosis was 3.81 years. More recently, Goin-Kochel and colleagues' (2006) survey of 494 parents in the U.S. found that the average age at diagnosis was 4.5 years. Parents in their study reported visiting, on average, between four and five clinicians before obtaining the diagnosis. In another recent study involving interviews of 56 parents in Canada, the average age of diagnosis was 5 years (Siklos & Kerns, 2007). Diagnoses were not made until 2.8 years after parents first sought help and until an average of 4.46 professionals were consulted. The most recent U.S. population-based surveillance study found that the median age of diagnosis was 5.7 years (Shattuck et al., 2009). Overall, these and other research studies indicate that the average age at diagnosis ranges from 4.5 to 6 years (Wiggins, Baio, & Rice, 2006; Renty & Roeyers, 2006; Goin-Kochel et al., 2006; Rhoades, Scarpa & Salley, 2007; Siklos & Kerns, 2007). Thus, despite some variability across different studies and different regions, the evidence consistently suggests a large gap between the age at which children can be identified and when they actually are identified.

As mentioned earlier, parental satisfaction with the diagnostic process is affected by the age at which their children are diagnosed and the length of time they have to wait before obtaining a diagnosis (Howlin & Moore, 1997; Renty & Roeyers, 2006; Goin-Kochel et al., 2006; Keenan, Dillenburger, Doherty, Byrne, & Gallagher, 2010). Specifically, these studies indicate that parents whose children receive diagnoses at earlier ages, who visit fewer clinicians, and who have to wait less than a year between first concerns and receiving a final diagnosis are likely to report greater satisfaction with the diagnostic process. Conversely, the later the age of diagnosis, the longer the wait, and the more professionals that families see, the more negatively parents view the

experience (Howlin & Moore, 1997; Renty & Roeyers, 2006; Goin-Kochel et al., 2006).

Even after receiving the diagnosis, parents continue to experience additional difficulties. Several studies have shown that a high proportion of parents do not receive sufficient information about ASDs when the diagnosis is provided (Renty & Roeyers, 2006; Osborne & Reed, 2008; Keenan et al., 2010). Many parents in these studies reported that they were not given any help, support, or advice about the nature of ASDs or information about community services, interventions, educational programs, or financial entitlements.

It is evident that the process of obtaining a diagnosis for children with ASDs is filled with delays and frustrations, partly due to physicians' overlooking or discrediting parents' concerns, watchful waiting, and/or being slow to refer for appropriate services. The current average age of diagnosis is recognized as being too high and the delay between parents' first professional consultation and the final diagnosis is considered unacceptably long, causing stress for families and creating delays in access to services (Nachshen, 2008). It is, therefore, important that physicians identify and refer children suspected of ASDs more appropriately and speedily.

Best Practice Guidelines

In 1999, a panel of experts from the major medical and professional societies reached a consensus regarding evidence-based guidelines for the identification and assessment of ASDs (Filipek et al., 2000). These guidelines have been adopted by at least 12 organizations, including the American Academy of Neurology and the Child Neurology Society (Filipek et al., 2000), American Academy of Pediatrics (AAP, 2001), and American Academy of Child and Adolescent Psychiatry (Volkmar, Cook, Pomeroy,

Realmuto, & Tanguay, 1999). A major revision to these guidelines was published by the AAP in November 2007 (Johnson & Myers, 2007). Following, in April 2008, Canadian best practice guidelines were published by the Miriam Foundation (Nachshen, 2008). Created by a panel of researchers, clinicians, and parents, the Miriam Foundation provides ASD-specific surveillance, screening, and referral practice guidelines to facilitate the identification process.

Both the U.S. and Canadian guidelines recommend that physicians adopt a two-stage early identification strategy (Johnson & Myers, 2007; Nachshen, 2008). The first stage consists of ongoing developmental surveillance to identify children who may be at risk for ASDs. According to the guidelines, developmental surveillance should include the following components: obtaining a family history of ASDs, monitoring attainment of developmental milestones, eliciting parental concerns, making informed observations, and identifying the presence of risk and protective factors. The guidelines recommend that physicians monitor all areas of development at each visit and be especially vigilant when there are deficits in communication and social skill development. Furthermore, failure to meet any of the following developmental milestones is considered a "red flag" of ASDs and should prompt immediate further evaluation (Nachshen, 2008):

> Diminished, atypical or no babbling by 12 months; diminished, atypical, or no gesturing (e.g., pointing, waving bye-bye) by 12 months; lack of response to name by 12 months; no single words by 16 months; diminished, atypical, or no two-word spontaneous phrases (excluding echolalia or repetitive speech) by 24 months; loss of any language or social skills at any age; lack of joint attention (p. 22)

In addition, as part of the developmental surveillance process, the guidelines strongly recommend that physicians view parents as reliable sources of information and address their concerns immediately (Johnson & Myers, 2007; Nachshen, 2008). Therefore, if a parent reports developmental concerns, particularly related to communication or social behaviours, the physician should conduct an assessment and/or make a referral without delay. There is a strong recommendation against the "wait-and-see" approach, regardless of the child's age. On the other hand, the guidelines note that a lack of parental concern should not rule out the possibility of an unnoticed delay if signs and symptoms are noted by the physician.

The second stage of the early identification strategy consists of the administration of ASD-specific screening tools (Johnson & Myers, 2007; Nachshen, 2008). The one area in which the U.S. and Canadian guidelines diverge is with respect to universal screening, which involves screening an entire population regardless of risk status. The U.S. guidelines (Johnson & Myers, 2007) recommend universal screening on all children with standardized ASD-specific screening tools at the 18- and 24-month visits regardless of whether concerns or risks have been identified. In contrast, the Canadian guidelines explicitly note that Canada's publicly-funded universal healthcare system would be unduly taxed by children who score false positives on universal screens, leading to unnecessary assessments and excessively long waiting lists to access referral services (Nachshen, 2008). Therefore, the Canadian guidelines do not recommend universal screening until screening tools with higher sensitivity and specificity are demonstrated in the literature.

Both sets of guidelines agree that physicians should perform targeted screening with formal standardized measures on children considered high-risk for ASDs (Johnson & Myers, 2007; Nachshen, 2008). Specifically, children should be formally screened whenever: (1) parents express developmental concerns, (2) physicians note missed milestones or signs and symptoms of ASDs, and/or (3) children have a sibling with an ASD or other developmental disability. ASD-specific screening tools are classified as "level 1" or "level 2" screening tools (Robins, 2008). Level 1 screening tools are used to identify children at risk for ASDs in the general population and, therefore, are most likely to be used by primary care physicians (Robins, 2008). Three ASD-specific level 1 screening tools that are currently recommended by experts (Johnson & Myers, 2007; Nachshen, 2008) for use among children over 18 months of age are: the Checklist for Autism in Toddlers (CHAT; Baron-Cohen, Allen & Gillberg, 1992), the Modified Checklist for Autism in Toddlers (M-CHAT, Robins, Fein, Barton, & Green, 2001), and the Pervasive Developmental Disorders Screening Test, Second Edition (PDDST-II; Siegel, 2004). In addition, a revised version of the original CHAT, known as the Quantitative Checklist for Autism in Toddlers (Q-CHAT) was recently published and research is currently examining its clinical validity (Allison et al., 2008). These screening tools are primarily based on observations and simple testing (e.g., calling the child's name to see if he or she responds) and/or a parent report checklist. Because there are currently no validated ASD-specific screening tools designed for children younger than 18 months old, it is recommended that physicians use general developmental screening tools with this younger age group (Johnson & Myers, 2007).

There are several benefits to the use of formal screening tools. First, GPs may lack the clinical experience needed to identify the variations and subtle symptoms of ASDs. Thus, formal screening may aid physicians who lack the confidence and skills to identify early symptoms. Secondly, research has shown that although significant numbers of parents have concerns about how their children are developing, if they are not asked directly they do not always express these concerns spontaneously (e.g., King & Glascoe, 2003; Ellingson, Briggs-Gowan, Carter, & Horwitz, 2004). For example, Ellingson and colleagues (2004) found that less than 20% of the parents in their study who reported behavioural problems in their toddlers shared their concerns with a service provider. The use of formal screening tools with targeted ASD questions may help to elicit such parental concerns. Additionally, there are times when the physician is concerned about a child's development when the parent is not (e.g., Glascoe, 2000). In such instances, positive screening results may increase the likelihood that parents will be convinced that the concerns being identified are worth further investigation. Last, while the reliability, validity, and accuracy of clinical judgement is not known, formal screening tools have known rates of detection and are generally presumed to be more effective than GPs' clinical judgement in assessing developmental problems (Nachshen, 2008; Robins, 2008). Even informal checklists, such as lists of milestones commonly used by physicians, are considered to lack the criteria needed for determining what constitutes abnormal versus typical development (Brothers, Glascoe, & Robertshaw, 2008). In fact, the current heavy reliance on informal screening methods may have contributed to the finding that fewer than 30% of children with developmental disabilities are identified before school entrance (King & Glascoe, 2003; Council on Children with

Disabilities, 2006).

Several limitations to the routine use of formal screening tools have also been suggested. First, it would require time of already busy physicians, who may be unable or unwilling to fit them into the limited time available for a patient visit (Dumont-Matheiu & Fein, 2005). In fact, some American physicians have expressed concerns about being adequately reimbursed for the extra time and extra case management services that would be involved (Elliot, 2007). Secondly, physicians may hesitate to routinely use a screening tool due to concerns that raising the possibility of an ASD and the mere administration of these tools may be anxiety-provoking for some parents (Kennedy, Regehr, Rosenfield, Roberts, & Lingard, 2004; Dumont-Matheiu & Fein, 2005). A question also arises as to how to select the most appropriate measure from the extensive list of available screening tools, as there is no current agreement on the best tools and not all tools may be appropriate for all situations (Dumont-Matheiu & Fein, 2005; Robins, 2008). In addition, further research is still needed to develop more reliable and valid screening tools for ASDs with adequate sensitivity and specificity (Nachshen, 2008). Despite these limitations, the use of formal screening tools is strongly encouraged in order to increase the likelihood of identifying children who may have ASDs.

Finally, according to both sets of best practice guidelines, the determination that a child is at high-risk for an ASD, based on developmental surveillance by the physician, family history, parent report and/or a positive screening result, should result in immediate referrals for assessments and services (Johnson & Myers, 2007; Nachshen, 2008). Both guidelines recognize that families may experience long delays in waiting for a specialist appointment to confirm or rule out an ASD diagnosis. Thus, in order to expedite

treatment services, the guidelines explicitly state that physicians should refer immediately and not take a wait-and-see approach. Physicians should also not wait for a definitive diagnosis of an ASD to refer for early intervention services. "If unsure, pediatricians and GPs should over- rather than under-refer" (Nachshen, 2008, p. 37). Specifically, at-risk children should be referred for: (a) a comprehensive ASD evaluation by a specialist or, preferably, an interdisciplinary team of specialists led by a psychologist or physician; (b) an early intervention program or special education services; (c) an audiology assessment; and, (d) a speech-language assessment. Last, physicians should provide parents with education about ASDs and a list of available community resources.

Physicians' Current Screening and Referral Practices

Past studies that have examined screening practices among primary care physicians have largely focused on general developmental screening. In 2003, developmental surveillance and screening practices were examined among 758 paediatricians and GPs in the United States (Sices et al., 2003). Approximately half of the physicians (i.e., 47% of paediatricians and 46% of GPs) endorsed using a formal developmental screening tool as part of their routine practice with children ages 1 to 3 years. The female GPs were twice as likely as male GPs to report using a formal screening tool. This gender difference in screening practices has been well established in the medical literature (e.g., Henderson & Weisman, 2001; Roter, Hall, & Aoki, 2002; Legato, 2004; Thind et al., 2008). The majority of physicians (> 85%) in the Sices study reported using informal screening methods, such as using a list of developmental milestones and prompting parents for specific developmental concerns. However, less than 15% of physicians agreed that eliciting parental concerns is a good substitute for

formal developmental screening. The authors suggest that this finding indicates a likely perception gap: although physicians generally prompt parents for developmental concerns, they may not place enough value on the information obtained. Physicians may not be aware of data (e.g., Glascoe, 2000) indicating that assessing the presence of specific parental concerns is an effective means of identifying actual developmental delays. Also of note, the most frequently endorsed screening tool in the Sices study was the Denver-II, a time-consuming measure now considered to have questionable validity (Hamilton, 2006). Newer, validated and potentially timesaving parent-completed questionnaires, such as the Ages and Stages Questionnaire, were used by less than 15% of physicians in the sample (Sices et al., 2003).

Despite efforts to improve developmental screening in primary care practice, studies continue to demonstrate moderate to low screening rates. In another survey of 894 paediatricians in the United States, the majority (71%) reported relying on clinical judgment alone to monitor and detect developmental problems among children under age 3 (Sand, Silverstein, Glascoe, Gupta, Tonniges, & O'Connor, 2005). In comparison, only 23% of paediatricians in that sample reported consistently using a formal screening instrument. Again, the most commonly used instrument was the Denver-II. These findings suggest that formal developmental screening is not being routinely conducted in primary care practice. In fact, another study found that a substantial proportion of parents with children 10 to 35 months of age did not recall their children ever being developmentally assessed, suggesting that either physicians are not providing these developmental assessments or parents are not aware of them when they occur (Halfon et al., 2004).

Limited information is available about physicians' screening and referral practices specifically for ASDs. In one of the two known studies to date, a survey was conducted in the United States among 471 paediatricians (Dosreis et al., 2006). The results indicate that while the majority of paediatricians (82%) reported routinely using formal screening tools to screen for developmental delays, only 8% of them indicated regularly using formal screening tools to screen for ASDs. A gender difference in screening rates was again found in this study, with female paediatricians being more likely than males to routinely administer general developmental screening tools. In addition, Dosreis and colleagues (2006) found inconsistent referral practices that varied with patient age. The likelihood of paediatricians referring a child for a specialist assessment increased significantly with the child's age. Whereas only 55% of the physicians said they would refer children younger than 2 years of age, 74% reported referrals for children aged 2 to 3, and 80% for children aged 4 to 5. Conversely, referrals to early intervention and/or special education programs decreased with a child's increasing age. Forty-eight percent of the paediatricians said they would refer children younger than 2 years to these programs, compared with 40% for 2- to 3-year-olds and 29% for 4- to 5-year-olds. Notably, the proportion of paediatricians in that sample that indicated they would be inclined to take the wait-and-see approach if they suspected an ASD was greatest for children aged 2 years or younger.

In the second known study, a sample of 257 paediatricians in the U.S. was surveyed about their screening practices for ASDs (Zeiger, 2008). Similar to the above study, physicians were more likely to report conducting formal screenings for general developmental delays than for ASDs. Specifically, nearly 70% of the sample reported

using a formal screening tool for general developmental screening, whereas only 42% reported routinely using formal screening tools to screen for ASDs. Once again, female paediatricians were significantly more likely than were males to report the routine use of formal screening tools during general developmental screening. Moreover, the female physicians were nearly three times more likely than were the males to refer a child presenting with "red flag" symptoms to a specialist. In addition, the majority of respondents indicated that they were unfamiliar with the AAP best practice guidelines, and nearly half reported that their medical education and training was "below average" or "nonexistent" in terms of how well it prepared them to conduct screenings for ASDs.

Although primary care practitioners are urged to screen regularly, to use formal screening tools, and to refer children promptly, these studies indicate that physicians are not consistently carrying out these widely supported recommendations. Rather, research suggests that many physicians rely solely on informal approaches and clinical judgment to screen children and there is a tendency for physicians to monitor rather than screen or refer children under 2 years of age. These clinical practices may be contributing to the under-identification or delayed identification of children with ASDs.

Factors Influencing Physicians' Screening and Referral Practices

Barriers. A survey of 794 members of the American Academy of Pediatrics identified several relevant barriers to the use of formal developmental screening tools in primary care practice (Halfon, Hochstein, Sareen, O'Connor, Inkelas, & Olson, 2001). The primary barrier was insufficient time, endorsed by 80% of the sample, since many of the available physician-administered tools can consume a large part of the medical visit. Other barriers included inadequate reimbursement (55%), a lack of non-physician staff to

conduct the screening (51%), a lack of available developmental diagnostic and treatment services (34%), a lack of training (28%), unfamiliarity with screening tools (24%), and a lack of referral programs (19%). These barriers to the use of developmental screening tools have also been reported in other recent surveys (Sand et al., 2005; Dosreis et al., 2006; Nachshen, 2008).

Similarly, Dosreis and colleagues (2006) found that the most common reasons why paediatricians did not routinely use ASD-specific screening tools included a lack of familiarity with ASD screening tools (62%), a preference to refer children to specialists rather than conduct the screenings themselves (47%), and insufficient time to screen for ASDs (32%). Reported barriers to the referral of suspected cases of ASDs included a lack of knowledge of referral services, a lack of access to referral services, and a lack of available services within the community (Woods & Wetherby, 2003).

Demographics. Studies that have sought to explain physician behaviour have typically explored the role of two main physician characteristics - gender and age. In the medical literature, surveys of physicians have consistently indicated that female physicians are more prevention-oriented than their male colleagues. Specifically, female physicians typically provide more screening, counselling, and education than do male physicians (e.g., Henderson & Weisman, 2001; Thind et al., 2008; Ramirez, Wildes, Napoles-Springer, Perez-Stable, Talavera & Rios, 2009). For example, a number of studies have reported that female physicians conduct more breast examinations, mammograms, and Papanicolaou tests (i.e., Pap smears) compared to male physicians (e.g., Henderson & Weisman, 2001; Thind et al., 2008; Ramirez et al., 2009). Indeed, a recent survey of 731 GPs within Ontario found that female physicians were significantly

more likely than were male physicians to report providing recommended preventive services to patients (Thind et al., 2008). Yet, the mechanisms through which physician gender relates to screening and other preventive behaviour are not well known.

Research comparing the practice styles of male and female physicians has identified several differences in clinical behaviours, suggesting that female physicians may simply be more prevention-oriented than their male colleagues. Female physicians hold longer patient visits and spend significantly more time with their patients in comparison to male physicians (Franks & Bertakis, 2003; Roter, Hall, & Aoki, 2002; Roter & Hall, 2004). Moreover, female physicians spend a significantly greater proportion of the visit engaged in preventive services and counselling, whereas male physicians spend more time engaged in technical behaviours, such as history taking and physical examinations (Bertakis, Franks, & Azari, 2003; Bertakis, 2009). Female physicians have also been found to make more follow-up recommendations, more referrals to other physicians, and provide more psychosocial support (Franks & Bertakis, 2003; Bertakis, 2009). While some studies have focused on the interaction between physician and patient gender, research generally suggests that gender-concordant physician-patient pairs show no additional preventive benefit beyond that of having a female physician (Henderson & Weisman, 2001).

Differences in the way male and female physicians communicate with their patients have also been documented. Female physicians are more attentive and nondirective, encourage their patients to ask questions and speak without interruption, are more comfortable discussing sensitive issues, and are more likely to communicate with patients about psychosocial issues (e.g., Roter, Hall, & Aoki, 2002; Ramirez et al., 2009).

Other studies that have evaluated doctor-patient encounters provides evidence that female physicians talk more than male physicians, elicit more talk from patients, ask more questions, partake in more collaborative exchanges, and provide more information (e.g., Roter & Hall, 2004). Therefore, gender differences in communication and interactional skills may further explain differences in the provision of screening and preventive services. In addition, female physicians are thought to have more favourable attitudes and beliefs regarding preventive health care in general. For example, Ramirez and colleagues (2009) found that female physicians are more likely than are male physicians to believe that mammograms are effective and more likely to feel responsible for their patients' screening follow-through. Overall, further empirical research examining gender differences in health attitudes and beliefs is needed.

With respect to age, compared with older physicians, younger physicians have a greater tendency to incorporate preventive care into their practice and to agree more with evidence-based guidelines (e.g., Halpern-Felsher et al., 2000). This age finding was confirmed in Thind and colleague's (2008) survey of Ontario physicians. However, younger physicians are more likely to be women (Canadian Institute for Health Information [CIHI], 2008). In fact, between 2004 and 2008, the number of women physicians in Canada grew by about 16%, with women now making up over half of family medicine physicians and over half (i.e., 53.7%) of physicians under 34 years of age (CIHI, 2008). Therefore, it is unclear to what extent age and gender are independent predictors of physician behaviour.

Attitudes. Beyond these practical barriers and demographic factors, physicians' beliefs and attitudes may also influence their screening and referral behaviours. While

this has not been previously examined with respect to ASDs, studies in the medical literature have demonstrated that the decision to provide formal medical screening can be influenced by physicians' attitudes. For example, in the cancer screening literature, a positive attitude towards cancer screening and the belief that screening tests are beneficial has been found to be a significant predictor of discussing screening with patients and ordering or performing screening tests (e.g., Voss & Schectman, 2001; Dunn, Shridharani, Lou, Bernstein, & Horowitz, 2001; Tudiver et al., 2002). Similarly, in the alcohol abuse screening literature, physicians who hold more positive beliefs about the importance of alcohol abuse prevention, who approve of alcohol screening at earlier ages among adolescents, and who feel more comfortable with their alcohol-management skills exhibit higher rates of alcohol abuse screening with their adolescent patients (Marcell, Halpern-Fisher, Coriell, & Millstein, 2002).

There is scant evidence of physicians' attitudes related to developmental or ASD screening. In the Sices and colleagues (2003) study described earlier, the researchers explored paediatricians' and GPs' attitudes related to developmental screening, and tested whether reported referral rates in response to clinical vignettes would vary depending on the physicians' attitudes. Most physicians in the sample agreed with the statement, "Early intervention services for young children with developmental delays are effective." Those physicians who agreed with this statement reported a higher likelihood of referral to such services in response to the clinical vignettes. In addition, physicians who agreed with the statement, "I have the clinical expertise to identify most children with developmental delays in my practice without the use of a formal screening instrument" were significantly less likely to report using a formal screening tool than were physicians

who disagreed with the statement. Finally, physicians who agreed with the statement, "There are sufficient resources in my community to provide services to children with developmental delays" were more likely to indicate that they would provide referrals to early intervention services.

A Canadian study exploring the gap between physician knowledge and behaviour has also revealed the importance of physician attitudes. After providing an educational intervention about ASDs to family medicine residents, a group of Canadian researchers evaluated the physicians' actions through clinical encounters with standardized patients and explored their decision-making process using semistructured interviews (Kennedy, Regehr, Rosenfield, Roberts, & Lingard, 2004). The researchers found that physicians' attitudes were used to justify their choice of clinical action (i.e., whether they identified signs of ASDs, discussed these concerns with the patients, and initiated a referral for a diagnostic assessment). Specifically, physicians who felt a sense of urgency to act quickly in order to access early intervention and physicians who felt more confident that there were signs of an ASD that warranted further assessment were more likely to conduct the appropriate clinical actions. For example, one participant noted, "You want to act as soon as you can... the more you supposedly get of intervention, at the youngest age possible, the prognosis is best for the future. So I don't think this is something you could sit on" (Kennedy et al., 2004, p. 391). On the other hand, physicians who felt less knowledgeable about ASDs and who felt that the patient would not be receptive to hearing that there could be a problem were less likely to discuss the possibility of an ASD diagnosis with their patients. As another participant stated, "I think if you're less sure that there's something going on, then you're less likely to… do something about it. We'll just

wait and see" (Kennedy et al., 2004, p. 391). Thus, there is accumulating evidence to suggest that physicians' attitudes and beliefs may play an important role in their decision-making of whether or not to carry out specific screening and referral actions.

Theoretical Considerations

Several theoretical models propose that attitudes can influence health-related behaviours and medical decision-making. Among these, the most widely used theoretical framework is the Health Belief Model (HBM; Rosenstock, 1974; Janz & Becker, 1984). The HBM has been examined within the context of a variety of health problems, including cancer, heart disease, and diabetes (Janz & Becker, 1984). The model was originally developed to explain health behaviours, such as why people did not participate in public health programs (Rosenstock, 1974; Janz & Becker, 1984). It has more commonly been used to describe patient behaviours, but is now also used in reference to physicians' beliefs and practices (Galenter & Patel, 2005). The HBM has also been used to guide the design of interventions to enhance compliance with health behaviours and preventive procedures (Janz, Champion, & Strecher, 2002; Patel, 2007).

The HBM is derived from a well-established body of psychological and behavioural theories (Rosenstock, 1974). It extends the idea of associating health behaviors with demographic factors, such as gender, and emphasizes the role of personal beliefs and attitudes (Rosenstock, 1974; Janz & Becker, 1984). In general, the model states that the likelihood of performing a health behaviour depends mainly on beliefs about the health concern and through subjective weighing of the costs and benefits of the action (Rosenstock, 1974; Janz & Becker, 1984). The model consists of a number of elements, as depicted in Figure 1 (Rosenstock, 1974; Janz & Becker, 1984). The first

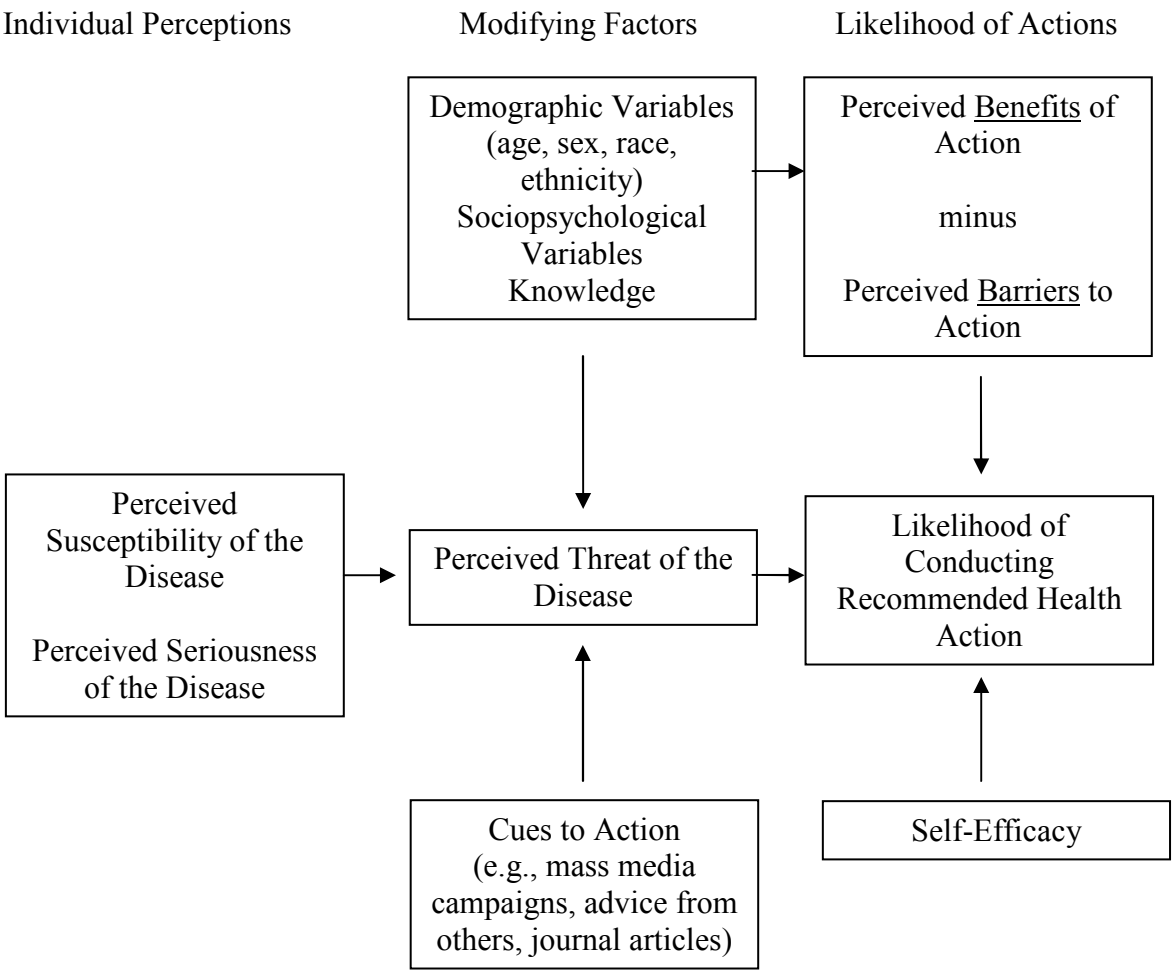

Figure 1. The components of the Health Belief Model.

element is “perceived susceptibility”, which involves judgment of the risk of the condition (e.g., “What are the chances of a child having autism?”). The second element is “perceived seriousness,” which involves judgment of the severity of the condition or of leaving it untreated (e.g., “What are the clinical consequences of having autism?”). According to Rosenstock (1974), the combination of perceived susceptibility and seriousness is termed “perceived threat.” The perceived threat creates a pressure to act, but does not determine how a person *will* act. Rather, how the person will act is influenced by the balance between perceived benefits and barriers to a course of action. Thus, the third element, “perceived benefits,” includes judgment about whether a proposed action will be effective and will have benefits (e.g., “Are formal screening tools an effective method for identifying autism?” “Will identifying autism help the child?”). Again, it is an individual’s beliefs, rather than factual evidence, that are considered influential. The fourth element, “perceived barriers,” includes judgment about the perceived costs of and barriers to an action (e.g., “Will discussing developmental problems cause parents pain or embarrassment?”). The last element in the HBM is the “stimulus or cue to action” – an external or internal cue that triggers action (Rosenstock, 1974; Janz & Becker, 1984; Janz et al., 2002). For example, cues that could trigger physicians’ behaviours related to screening and referral could include a mass media campaign about ASDs, an informational article about ASDs and/or screening, reminders from professional societies to use formal screening tools, and having a relative with an ASD. Finally, following Bandura’s development of Social Learning/Social Cognitive theory (Bandura, 1977, 1986), self-efficacy was added to the HBM, which involves a person’s sense of confidence that he or she can successfully execute a specific behaviour

to produce the desired outcome (Janz & Becker, 1984; e.g., "Am I competent enough to conduct a screening for autism?"). In addition to these five elements, the HBM also suggests that diverse demographic, psychosocial, and psychological variables may affect individuals' perceptions and thereby indirectly influence their behaviour (Rosenstock, 1974; Janz & Becker, 1984).

Other theoretical models that have been adapted to describe clinical decision-making and that focus on the importance of beliefs and attitudes include the Theory of Reasoned Action and, as mentioned above, Social Cognitive Theory (Galenter & Patel, 2005). The Theory of Reasoned Action (Ajzen & Fishbein, 1980) states that a behaviour is determined by both attitudinal influences (i.e., beliefs about the advantages and disadvantages of a given behaviour) and by normative influences (i.e., perceptions of what others think the individual should do). Similarly, Social Cognitive Theory (Bandura, 1986) suggests that behaviours are determined by a combination of beliefs about how one's own behaviour will influence outcomes (i.e., outcome expectancies), beliefs about one's competency to perform a behaviour (i.e., self-efficacy), and beliefs about the incentives involved in performing a behaviour. Overall, the basic elements of these theoretical models are quite similar. The models all suggest that the decision to conduct a clinical behaviour, such as using a formal screening tool, can be influenced by relevant beliefs and attitudes.

The HBM was chosen as the theoretical framework for the present study due to the sustained empirical support it has received in explaining physician behaviour with regards to performing a specific intervention (e.g., Wexler, Elton, Taylor, Pleister, & Feldman, 2009; Tanner-Smith & Brown, 2010; Leiferman, Dauber, Scott, Heisler, &

Paulson, 2010). These studies have demonstrated strong support for the perceived benefits and barriers and self-efficacy constructs. In addition, studies that have designed interventions to increase physicians' screening rates concluded that interventions that incorporated the HBM variables were more effective (e.g., Janz et al., 2002; Patel, 2007).

The HBM is also appropriate for this study because of its focus on factors that have already been shown to be associated with physicians' general screening practices – that is, individual perceptions of barriers to action (e.g., limited time) and socio-demographic variables (e.g., gender and age) which may directly influence individual perceptions. The other theories described above, in contrast, do not emphasize the importance of assessing the direct influence of demographic factors. As such, the HBM may be particularly useful in describing, or explaining, physicians' screening and referral behaviours for ASDs. For example, according to the HBM, it could be theorized that physicians who believe that it is not possible to identify ASDs at a young age might be less likely to discuss developmental concerns with parents, conduct a formal screening, or refer a child for a formal evaluation or to an early intervention program. Furthermore, as suggested by the HBM, attitudes may help to explain reported gender and age differences in screening rates. For instance, it is possible that female physicians and younger physicians perceive more benefits and fewer barriers to conducting recommended clinical actions than do male or older physicians.

Limitations of Past Research

Previous studies that have examined physicians' screening and referral behaviours for general developmental delays and ASDs are limited for several reasons. First, the majority of studies were conducted in the United States. Thus, the surveys were

conducted in the context of the privatized American healthcare system, which is considerably different from the universal health care system in Canada. As an example, available data indicate much longer wait times in Canada than in the United States to access diagnostic specialists and treatment services in general (O'Neill & O'Neill, 2007), which could reasonably affect physicians' referral practices. Secondly, past studies have generally focused on paediatricians to the exclusion of general practitioners. In Canada, there is a serious shortage of paediatricians (CIHI, 2008). For instance, in Ontario, there are over 11,000 GPs whereas there are approximately 900 general paediatricians (CIHI, 2008). Thus, it is much more common in Canada for GPs to provide primary care to families, particularly outside of major urban areas where the number of paediatricians is limited. Furthermore, because of the differences in training among paediatricians and GPs, their clinical practices may vary greatly. A paediatrician trains exclusively in children's care for 4 to 8 years, on average (Ontario Medical Association Section on Pediatrics, 2009). In contrast, GPs train for both adult and children's care over 2 to 3 years (Ontario Medical Association Section on Pediatrics, 2009). Thus, training and clinical experience with childhood disorders, such as ASDs, is likely more limited among GPs. For these reasons, the results of past research cannot be assumed to generalize to GPs practicing within Canada.

Another limitation of past studies is that they have generally focused on physicians' screening practices for general developmental delays, without obtaining specific information on practices for ASDs. To date, only two known studies have explored physicians' screening and referral practices specifically for ASDs (Dosreis et al., 2006; Zeiger, 2008). However, both studies were conducted in the United States, had

samples that consisted solely of paediatricians, and focused on physicians in large metropolitan cities. Thus, for the reasons described above, the results may not generalize to Canadian physicians.

Additionally, a major limitation of the current literature base is a lack of research exploring physicians' attitudes related to ASDs. At present, there are no known studies in the ASD literature that have explored physicians' attitudes and the influence that these attitudes may have on physicians' clinical behaviours. Thus, despite known theoretical models that emphasize the influential role of attitudes in medical decision-making, studies have yet to examine attitudes as an explanatory factor for why many physicians do not generally follow through with recommended guidelines. Furthermore, despite studies pointing to a gender and age difference in physicians' screening and preventive behaviours (e.g., Sices et al., 2003; Dosreis et al., 2006; Thind et al., 2008), there is little known about why these demographic differences occur. Examining attitudinal differences between male and female physicians, and younger medical school students versus older practicing physicians, may provide a plausible explanation. Do female physicians rely more on formal screening tools because they are less confident than male physicians in their ability to identify ASDs? Which gender perceives more barriers to formal ASD screening? Do medical school students feel more prepared than do physicians to identify children with ASDs due to their recent educational training? The current study addresses these questions.

Rationale of the Present Study

Family physicians in Canada are often the only professionals who interact with children before preschool. Therefore, they are in the best position to recognize the early

signs of ASDs, screen for ASDs, and make referrals to appropriate specialists and services. While Canadian best practice guidelines have been established in order to promote earlier identification by physicians, there is little evidence about actual screening and referral practices for ASDs in primary care within Canada. Furthermore, there is little known about physicians' attitudes related to ASDs, whether these attitudes predict physician behaviour, and whether attitudes vary depending on physician characteristics such as gender and age. Therefore, to address these research questions, the current study surveyed a random sample of Canadian GPs within the province of Ontario. A subsample of medical school students was also surveyed.

The purpose of the present study was five-fold: (a) to examine current trends in the screening, referral, and management of ASDs within the Canadian primary care setting; (b) to compare physicians' reported practices to best practice guidelines; (c) to explore physicians' and medical school students' attitudes and beliefs related to ASDs and ASD screening; (d) to identify whether demographic and attitudinal factors predict whether physicians report conducting recommended screening and referral actions; and (e) to investigate whether ASD-related attitudes vary depending on physician gender and years in practice.

It is believed that the results of the present study will increase our understanding of current ASD screening and referral practices among family physicians in Canada, help us to understand the barriers preventing recommended screening and referral actions from taking place, and identify physician training needs. Furthermore, the findings may contribute to the medical and ASD literature by lending support to theoretical models, such as the HBM, and providing a potential explanation for the widely-reported gender

and age differences in physician screening and referral behaviour. This information can be used in future ASD education and screening initiatives aimed at improving physicians' ability to identify and diagnose children with ASDs, thereby increasing the chances that an effective early identification strategy becomes integrated into primary care practice.

Research Questions and Hypotheses

Screening Practices. What methods are Canadian GPs using to screen children for ASDs, and what proportion of GPs report using formal methods of screening? What demographic and practice characteristics are associated with the use of formal screening tools?

Hypothesis 1. It was expected that the majority of GPs would report using informal methods, rather than formal screening tools, to screen children for ASDs. This hypothesis was based on previous research findings showing that fewer than 50% of physicians in the U.S. report using formal screening tools (Sices et al., 2003; Sand et al., 2005), particularly for ASDs (Dosreis et al., 2006; Zeiger, 2008).

Hypothesis 2. Female physicians were expected to report significantly higher rates of using formal screening tools than were male physicians. This hypothesis was based on research indicating that female physicians are more likely to routinely use formal screening tools for autism, developmental delays, and other disorders/diseases than are male physicians (e.g., Sices et al., 2003; Dosreis et al., 2006; Zeiger, 2008). No other associations between the use of formal screening tools and demographic or practice characteristics have been consistently demonstrated. Thus, associations with other demographic and practice characteristics were examined for exploratory purposes.

Referral Practices. What demographic and practice characteristics are

associated with physicians' conducting ASD evaluations themselves versus referring suspected cases to specialists? Does the tendency to take a wait-and-see approach depend on the age of a child?

Hypothesis 3. It was hypothesized that physicians practicing in non-metropolitan regions would be significantly more likely than those practicing in metropolitan areas to report that they would perform ASD evaluations themselves. This was an exploratory research question that was based on data indicating a relative paucity of diagnostic specialists and services in non-urban Canadian regions (CIHI, 2008). Thus, physicians practicing outside of major urban centers may be more inclined to perform diagnostic evaluations out of necessity due to the lack of local services. Associations between referral practices and other demographic and practice characteristics were also examined for exploratory purposes.

Hypothesis 4. It was hypothesized that physicians would be significantly more likely to report that they would take a wait-and-see approach with children under the age of two in comparison to children over the age of two. This hypothesis was based on research showing that physicians are more likely to refer children suspected of ASDs as they get older, and more likely to take the wait-and-see approach with children aged 2 years or younger (Dosreis et al., 2006).

Concordance with Best Practice Guidelines. How do Canadian physicians' screening and referral behaviours for ASDs compare with Canadian best practice guidelines?

Hypothesis 5. It was expected that physicians' reported practices would have a low to moderate concordance (i.e., under 50% agreement) with Canadian best practice

guidelines. Although this was an exploratory research question which has not been previously examined, available evidence indicates that physicians within the U.S. do not generally follow recommended screening and referral guidelines (e.g., Sices et al., 2003, Sand et al., 2005; Dosreis et al., 2006; Zeiger, 2008).

Barriers to Screening and Referral. What do Canadian physicians identify as barriers to screening and referral?

Hypothesis 6. It was expected that insufficient time to screen would be identified as the most common barrier to using formal screening tools during medical visits. This hypothesis was based on the results of previous physician surveys that rate lack of time as the top barrier to formal screening (Halfon et al., 2001; Sand et al., 2005; Dosreis et al., 2006; Nachshen, 2008).

Hypothesis 7. It was expected that long waiting lists would be identified as the most common barrier to referring children to community specialists. This hypothesis was based on data indicating markedly long waiting lists to access specialists and services within Canada (e.g., O'Neill & O'Neill, 2007).

Hypothesis 8. It was expected that physicians practicing in non-metropolitan regions would be more likely than those practicing in metropolitan areas to identify a lack of community specialists as a major barrier to referring children. This hypothesis was based on prior research identifying a lack of available diagnostic and treatment services as a barrier to referrals (Halfon et al., 2001; Woods & Wetherby, 2003), as well as data indicating the relative paucity of specialists and services in non-urban Canadian regions (CIHI, 2008).

Beliefs and Attitudes. Do physicians' beliefs and attitudes predict the extent to

which they follow recommended screening and referral actions, beyond the influence of relevant demographic or practice characteristics such as gender? Do male and female physicians vary in their attitudes? Do practicing physicians and medical school students differ in their attitudes?

Hypothesis 9. It was expected that physicians' attitudes would significantly predict their reported screening and referral actions, with stronger or more favourable attitudes predicting a higher correspondence rate between reported and recommended best practice actions. The attitudes that were examined included beliefs regarding: (a) the perceived threat (i.e., susceptibility and seriousness) of ASDs; (b) the perceived benefits of early identification, early intervention, screening, and referral; (c) the perceived barriers to early identification, screening, and referral; and, (d) self-efficacy in identifying and managing children suspected of ASDs. This hypothesis was exploratory and has not been previously examined in the published literature. The hypothesis is based on medical literature research demonstrating that physicians' beliefs and attitudes can influence their clinical actions with regards to screening and assessments (e.g., Sices et al., 2003; Kennedy et al., 2004). This hypothesis is also based on theoretical models that outline these specific attitudes as being influential determinants of physician behaviour (Rosenstock, 1974; Ajzen & Fishbein, 1980; Bandura, 1986).

Hypothesis 10. It was expected that male and female physicians would report significantly differing attitudes towards the factors described in Hypothesis 9. This general hypothesis was based on research demonstrating gender differences in screening and preventive behaviour (e.g., Sices et al., 2003; Dosreis et al., 2006; Thind et al., 2008) and theoretical models which suggest that attitudinal differences could potentially

account for this finding (Rosenstock, 1974; Ajzen & Fishbein, 1980; Bandura, 1986). No specific hypotheses about the direction of attitudinal group differences were proposed given the limited amount of research in this area.

Hypothesis 11. It was expected that currently practicing physicians and medical school students would report significantly differing attitudes. This general hypothesis was based on research demonstrating age differences in screening and preventive behaviour (e.g., Halpern-Felsher et al., 2000; Thind et al., 2008), and theoretical models which suggest that attitudinal differences could potentially account for this finding (Rosenstock, 1974; Ajzen & Fishbein, 1980; Bandura, 1986). As age differences in ASD attitudes have not been previously examined in the published literature, this research question was exploratory and specific hypotheses about the direction of attitudinal group differences were not proposed.

CHAPTER II

Method

Participants

Overall Sample Characteristics. A total of 211 adults participated in this study, consisting of 146 physicians and 65 medical school students. Because these groups were naturally formed, random assignment to groups was not possible. Twenty participants in the physician sample were excluded from the final sample because they indicated that they no longer see children in their practice (n = 6) or because they returned incomplete questionnaires (n = 14). Thus, the final sample consisted of 126 physicians and 65 medical school students. In the overall sample, the majority of participants were female (66%) and from Toronto (42%). They ranged in age from 25 to 79 years (M = 42.28, SD = 15.33). Further demographic information for each of the groups is described below.

Physicians. The physician sample consisted of 126 family medicine/general practitioners (GPs). The sample was restricted to GPs as they routinely provide primary care services to children aged 3 years and younger. In order to gain a depiction of GPs' screening practices in one region of Canada, participation was restricted to GPs in the province of Ontario. All GPs in Ontario must be members of the College of Physicians & Surgeons of Ontario (CPSO) in order to practice medicine in this province (CPSO, n.d.). Therefore, only GPs that were registered with the CPSO as currently practicing within Ontario were eligible to participate. As seen in Table 1, the majority of physicians in this sample were female (67%), working within private practice settings (90%), from metropolitan regions (80%), and they were primarily from Toronto (51%). Physicians ranged in age from 28 to 79 years (M = 50.35, SD = 12.61) and had been in practice from

Table 1

Demographic and Practice Characteristics of the Physician Sample (n = 126)

Characteristic	*n* (%)	Mean (SD)
Gender		
Male	42 (33)	
Female	84 (67)	
Age		50.35 (12.61)
Practice Setting[a]		
Private Practice	113 (90)	
Hospital	6 (5)	
Community Clinic	12 (10)	
Other	4 (3)	
Region in Ontario		
Toronto	64 (51)	
Southwest	6 (5)	
North	7 (6)	
East	18 (14)	
Central West	13 (10)	
Central South	11 (9)	
Central East	7 (6)	
Metropolitan Region	101 (80)	
Non-Metropolitan Region	25 (20)	
Years in Practice		22.29 (13.74)
Full-Time Work	91 (72)	
Males	37 (88)	
Females	54 (64)	
Part-Time Work	35 (28)	
Males	5 (12)	
Females	30 (36)	
Do you have any children?		
Yes	113 (90)	
No	12 (10)	

[a]Several participants indicated that they practice in more than one practice setting.

Table 1 (Cont'd)

Demographic and Practice Characteristics of the Physician Sample (n = 126)

Characteristic	*n* (%)	Mean (SD)
Do you have a family member or friend with a developmental disability?		
Yes	60 (48)	
No	65 (52)	
Number of patients in practice		
< 500	12 (10)	
501 – 1000	22 (18)	
1001 – 2000	65 (52)	
2001 – 3000	16 (13)	
> 3000	8 (6)	
Percentage of patients ≤ age 3		
< 10	78 (62)	
10 - 30	44 (35)	
31 - 60	1 (1)	
Accompanying person is a mother		
< 25%	1 (1)	
25 – 49%	2 (2)	
50 – 75%	31 (25)	
> 75%	88 (70)	
Accompanying person is a father		
< 25%	85 (68)	
25 – 49%	34 (27)	
50 – 75%	3 (2)	
Accompanying person is both parents		
< 25%	83 (66)	
25 – 49%	35 (28)	
50 – 75%	4 (3)	
Number of children diagnosed with autism seen in past year		
0	28 (22)	
1 – 5	89 (71)	
6 – 10	8 (6)	

1 to 52 years (M = 22.29, SD = 13.74).

Medical Students. The student sample consisted of 65 students currently in their final year of medical school. The sample was restricted to students currently attending any of the six major medical schools within Ontario, including the University of Toronto, University of Western Ontario, Queen's University, McMaster University, University of Ottawa, or Northern Ontario School of Medicine. As seen in Table 2, the majority of students in this sample were female (65%) and were attending McMaster University (31%) or the University of Toronto (26%). They ranged in age from 25 to 31 years of age (M = 26.38, SD = 1.44).

Response Rate. As a precursor to developing the methodology for this study, ten GPs were surveyed about factors that would increase the likelihood of their participation in a study. The group consisted of 3 males and 7 females, between the ages of 35 to 70, working in a busy family practice located in downtown Toronto. Their feedback regarding preferences for mode of study (i.e., mail, internet, or phone), duration of study, and incentive for participation is presented in Appendix A. Specifically, the majority of physicians in this group indicated that they would prefer a mail survey of up to 15 minutes duration and incentives such as a large monetary lottery, an informational article on ASDs, and an ASD screening instrument. These results were incorporated into the planned methodology of the current study with the goal of maximizing the response rate.

Dillman's (2000) Tailored Design Method (TDM) for survey research was also used in the present study. The TDM is a set of techniques designed to increase survey response rates. It includes using a set of timed and personalized mailings (i.e., a pre-notice letter, a survey mailing, a thank you/reminder letter, and a second survey mailing).

Table 2

Demographic Characteristics of the Student Sample (n = 65)

Characteristic	*n* (%)	Mean (SD)
Gender		
Male	23 (35)	
Female	42 (65)	
Age		26.38 (1.44)
Medical School		
University of Toronto	17 (26)	
University of Western Ontario	13 (20)	
Northern University	0 (0)	
University of Ottawa	4 (6)	
Queen's University	11 (17)	
McMaster University	20 (31)	

The TDM has a significantly higher response rate compared with many other mailing procedures (Dillman, 2000). Other known strategies for increasing survey response rates were also used, including: (a) personalized correspondence; (b) university sponsorship; (c) placing questions which address the most salient topic at the beginning of the survey and placing demographic questions at the end; (d) the use of a real stamp on return envelopes; (e) the use of incentives, particularly of a monetary nature; and, (f) a mixed-mode design (Dillman, 2000; Kanso, 2000; Beebe, Locke, Barnes, Davern, & Anderson, 2007).

Despite use of the mixed-mode design, the majority of physicians responded by mail. Specifically, of the 146 physicians who responded to the survey, 133 (91%) responded by mail whereas only 13 (9%) responded online. The response rate increased following each point of contact. Nineteen physicians (i.e., 5%) responded after the first survey mailing was sent. Another 28 physicians (i.e., 7%) responded following the thank-you/reminder fax. The remaining 99 participants (i.e., 25%) responded after the second survey mailing. Thus, the overall response rate in the physician sample was 37%. This response rate is somewhat lower than mean response rates typically reported in traditional mail-based surveys, which in the past have ranged from 58 to 63%, but is not unusual for surveys targeting physicians (Cummings, Savitz & Konrad, 2001; Cull, O'Conner, Sharp, & Tang, 2005). In fact, the last three previous national physician surveys in Canada reported similarly low response rates among Ontario family physicians of 40.2% and 32.9% in the 2004 and 2007 surveys, respectively, and an even lower response rate of 19.4% in the recent 2010 survey (College of Family Physicians of Canada, 2005, 2008, 2011). Because the student sample was recruited through online

forums, the exact response rate for this sample is difficult to determine. However, of the 189 students who viewed the recruitment posting in each online forum, 65 of them participant in the survey, suggesting an estimated response rate of 34%.

Power Analysis. Cohen's (1992) formula was used a priori to determine the number of participants required for the planned analyses at an alpha level of .05. For the chi-square analyses with 1 and 2 degrees of freedom, a physician sample size of 87 and 107, respectively, was needed to detect a medium effect size. For the planned multiple regression analysis with up to 6 predictor variables, a physician sample size of 97 was needed. For the planned analyses of variance comparing male and female physicians, and students and physicians, 64 participants in each group were needed. Given the known difficulties in recruiting physicians for research, a sample of 400 physicians was recruited to yield enough participants. Thus, the final sample sizes in the current study (i.e., 126 physicians and 65 students) exceeded the numbers needed to detect a medium effect size at an alpha level of .05 and approached the numbers needed to detect significant results at a more conservative alpha level.

Sampling Procedure. In order to maximize the representativeness of the sample, a stratified random-sample design was used. The stratification system was based on census data from the Active Physicians in Ontario registry (Ontario Physicians Human Resources Data Centre [OPHRDC], 2007). This registry indicates the number of GPs in each region and census subdivision within Ontario. Using these data, the sample was stratified by: (a) region, (b) metropolitan versus non-metropolitan practice locations, and (c) gender. The goal in using this stratification system was to gain a representative sample of male and female GPs from a variety of settings across Ontario, including high

and low population regions where many or few diagnostic and treatment services are available.

A total of 10,706 Ontario GPs were listed in the last registry census that was published prior to conducting the survey (OPHRDC, 2007). Of these, 400 GPs were proportionally selected from each of seven regions across Ontario, as delineated by the OPHRDC registry: Central East, Central South, Central West, East, North, Southwest, and Toronto. Thus, the number of GPs selected from each region reflected the actual distribution of GPs across Ontario (e.g., a higher percentage from Toronto, a lower percentage from the North). Furthermore, within each of these regions, participants were proportionally selected from metropolitan and non-metropolitan areas. Statistics Canada (2006) defines metropolitan areas as cities with an urban core population of 100,000 or greater, leaving lower population areas to be defined as non-metropolitan. Population statistics were obtained from the 2006 census (Statistics Canada, 2007). Table 3 shows the number of GPs that were recruited in each stratum using this method. For example, 28 GPs were randomly selected from metropolitan areas in the Central East region (e.g., Barrie) and 31 GPs from non-metropolitan areas in the Central East region (e.g., Orillia). The sample was further stratified by gender. The actual proportion of GPs within Ontario is 68% male and 32% female (Canadian Medical Association, 2008). However, in order to ensure that a sufficient number of both genders participated, equal numbers of males and females were recruited (i.e., 200 males, 200 females). Table 3 shows the actual number of GPs in each stratum that participated in the current study. Despite the equal proportion of female and male physicians recruited for this study (50%), the response rate for the female physicians (42%) was double that of the male physicians (21%). The

Table 3

The Number of Male and Female Physicians That Were Recruited and That Participated From Each Region and Metropolitan or Non-Metropolitan Area Within Ontario

Stratum	Number of Physicians Recruited	Number of Physicians that Participated
Toronto	102	64
Metropolitan	102	64
Male	51	24
Female	51	40
Non-Metropolitan	0	0
Male	0	0
Female	0	0
South West	42	6
Metropolitan	22	4
Male	11	1
Female	11	3
Non-Metropolitan	20	2
Male	10	0
Female	10	2
North	32	7
Metropolitan	10	2
Male	5	1
Female	5	1
Non-Metropolitan	22	5
Male	11	1
Female	11	4
East	66	18
Metropolitan	45	12
Male	22	3
Female	23	9
Non-Metropolitan	21	6
Male	11	3
Female	10	3
Central West	66	13
Metropolitan	51	11
Male	25	2
Female	26	9
Non-Metropolitan	15	2
Male	8	1
Female	7	1

Table 3 (cont'd)

The Number of Male and Female Physicians That Were Recruited and That Participated From Each Region and Metropolitan or Non-Metropolitan Area Within Ontario

Stratum	Number of Physicians Recruited	Number of Physicians that Participated
Central South	33	11
Metropolitan	20	5
Male	10	2
Female	0	3
Non-Metropolitan	13	6
Male	6	3
Female	7	3
Central East	59	7
Metropolitan	28	3
Male	14	0
Female	14	3
Non-Metropolitan	31	4
Male	16	1
Female	15	3

response rate for participants recruited from each region is as follows: Toronto (63%), South West (14%), North (22%), East (27%), Central West (20%), Central South (33%), and Central East (12%). For the medical student subsample, no stratification criterion was used. All fourth year students at Ontario medical schools were considered eligible to participate.

Recruitment. The CPSO website publicly lists contact information (i.e., names, practice addresses, telephone and fax numbers) for every registered physician within Ontario (CPSO, n.d.). The database allows searching by city or town, and search results present a listing of physicians in a random order. Thus, using the stratification system described above, the sample of 400 GPs from across Ontario was selected from the website and invited to participate in the study. An additional 32 participants were recruited through in-person visits at large family practices within Toronto.

For the medical student subsample, students were recruited from the six major medical schools across Ontario: University of Toronto, University of Western Ontario, McMaster University, Queen's University, University of Ottawa, and Northern Ontario School of Medicine. Students were recruited through medical student forums on the Internet (Canadian Premed and Medical Schools, n.d.; Student Doctor Network Forums, n.d.).

Comparison of Respondents with Non-Respondents. To analyze for potential differences between respondents and non-respondents, a series of bivariate chi-square analyses were conducted to test for significant associations between response status and the variables used for stratification. Significant associations were found between the respondents and non-respondents with respect to their gender (χ^2 (1) = 16.80, $p < .001$, Φ

= -.21), region (χ^2 (6) = 88.10, $p < .001$, $\Phi = .47$), and urbanization of practice region (χ^2 (1) = 5.37, $p < .005$, $\Phi = .12$). Specifically, respondents were significantly more likely than were non-respondents to be female and from Toronto, whereas non-respondents were more likely to be from Central West or Central East regions and from rural regions in general. Characteristics of respondents and non-respondents are provided in Table 4.

Incentive to Participate. All participants who completed the survey were entered into a draw whereby one participant was chosen at random to receive $250. Two informational incentives were also offered to participants who completed the survey. The first incentive was an issue of a newsletter published by the Canadian Autism Intervention Research Network (CAIRN; Cecil, 2005). The newsletter contains information for family physicians on early screening and referral procedures for ASDs. Permission to distribute the newsletter for the current study was obtained from the editor (see Appendix B). Secondly, participants were offered a copy of The Modified Checklist for Autism in Toddlers (M-CHAT; Robins, Fein, Barton, & Green, 2001; Robins, n.d.). The M-CHAT is a screening instrument for detecting ASDs at two years of age. Permission to distribute the M-CHAT and scoring instrument was provided by the first author (see Appendix C).

Measures

A five-page questionnaire was developed for the current study (see Appendix D). The questionnaire was devised to elicit information in six areas: (a) screening and referral practices for ASDs, (b) knowledge of the early signs of ASDs, (c) perceived barriers to conducting screening and referral activities, (d) beliefs and attitudes, and (e) demographic and practice characteristics. Existing surveys of physicians' screening and referral

Table 4

Demographic Characteristics of Respondents and Non-Respondents

Characteristic	Respondents *n* = 146 (%)	Non-Respondents *n* = 254 (%)
Gender		
Male	54 (37)	148 (58)
Female	92 (63)	106 (42)
Region		
Toronto	78 (53)	30 (12)
Southwest	12 (8)	35 (14)
North	7 (5)	25 (10)
East	18 (12)	43 (17)
Central West	13 (9)	53 (21)
Central South	11 (8)	19 (7)
Central East	7 (5)	49 (19)
Urbanization of Region		
Metropolitan	109 (75)	161 (63)
Non-Metropolitan	37 (25)	93 (37)

behaviours for various disorders were first examined (Sices et al., 2003; Sand et al., 2005; Dosreis et al., 2006; Zeiger, 2008) in order to gain a sense of relevant questions that have been previously examined. Similar types of questions and items specific to ASDs were then developed to fit the needs of the current study. Pertinent screening and referral questions were constructed to closely reflect the content and language contained within the Canadian best practice guidelines (Nachshen, 2008). In addition, the attitudes and beliefs scale was constructed to closely reflect the elements contained within the Health Belief Model (Rosenstock, 1974). Unless otherwise specified, questions provided a list of response items and respondents were instructed to either check one or check as many items as apply. Open spaces were also provided on most questions to allow respondents to write in additional items. In order to ensure that questions were clear and that response choices were appropriate for Ontario GPs, two GPs in Toronto who were known to the researcher and who were not part of the study sample were asked to review the questionnaire. Their feedback was used to revise the questionnaire for content and clarity.

Screening and Referral Practices. Physicians' screening and referral practices for ASDs were first examined. Question A assessed the methods that participants commonly used to screen their patients for ASDs. Items 1 to 5 described informal methods of screening (e.g., "I ask parents about developmental concerns"). Items 6 to 9 described formal methods of screening (e.g., "I use a physician-administered autism-specific screening tool"). Next, question B examined which formal screening tools participants used, if any, from a list of commonly used and recommended tools (Council on Children with Disabilities, 2006). Items 2 to 7 referred to general developmental

screening tools (e.g., "Ages and Stages Questionnaire"). Items 8 to 11 referred to ASD-specific screening tools (e.g., "Checklist for Autism in Toddlers"). Following, question C assessed the likelihood of participants using an ASD-specific screening tool in recommended situations. Each item was rated on a 4-point Likert scale ranging from "very unlikely" (1) to "very likely" (4). Items 1 and 2 referred to universal screening at the 18-month and 24-month well-child visits, which is endorsed by the AAP (Johnson & Myers, 2007). Items 3 through 5 described the situations in which both the American and Canadian guidelines recommend an ASD-specific screening (e.g., "When a child has a sibling with autism or other developmental disability").

The next three questions examined physicians' referral practices. Question D assessed whether participants refer children to a specialist for an ASD evaluation, perform the evaluation themselves, or whether they do both. Questions E and F assessed, respectively, the specialists to whom physicians commonly refer suspected cases (e.g., "child psychologist") and the average waiting time for a patient to see a referral source in past referrals (ranging from less than 1 month to over 12 months).

In order to assess the extent to which physicians' current screening and referral behaviours correspond with best practice guidelines (Nachshen, 2008), a clinical scenario of a probable ASD case was used in question G. Physicians' responses to clinical vignettes have been validated as a method to obtain information about how physicians practice, with responses comparing favourably to reports provided by patients immediately after a physician encounter (Peabody, Luck, Glassman, Dresselhaus, & Lee, 2000; Veloski, Tai, Evans, & Nash, 2005). The scenario in question G described a child, over the age of 2, whose mother reports social-communication concerns. Three red flags

for ASDs were presented in this scenario (i.e., lack of response to name, no 2-word spontaneous phrases by 24 months, and lack of joint attention). The question asked participants to rate the likelihood of performing a series of screening and referral activities in response to the scenario presented. Each item was rated on a 4-point Likert scale ranging from "very unlikely" (1) to "very likely" (4). Item 2 and items 4 through 9 described the recommended actions given this scenario (e.g., "Use a formal autism-specific screening tool"). Item 1 (i.e., "Wait and see how symptoms progress") is not a recommended action. Item 3 (i.e., "Use a formal general developmental screening tool) was included to provide an option to participants who use general developmental rather than ASD-specific screening tools. Thus, seven of the nine items are recommended best practice actions (Nachshen, 2008). To summarize physicians' actions in response to the clinical scenario, the number of recommended activities that participants indicated they were "likely" or "very likely" to conduct was calculated on a scale ranging from 0 to 7. Thus, a higher number on this scale indicates a higher correspondence with best practice guidelines. Finally, as a follow-up question using the same 4-point Likert scale, question H assessed the likelihood of participants endorsing the wait-and-see approach if the child in the previous scenario was under 2 years of age.

Knowledge of the Early Signs of ASDs. Question I assessed physicians' knowledge of the red flags of ASDs. These seven symptoms were included as items 2, 3, 6, 8, 11, 13, and 14 (e.g., "No babbling by 12 months"). The other seven response items acted as distracters. These distracter items described symptoms that can be early indicators of ASDs but that, when presented in isolation, do not generally require immediate evaluation (e.g., "Lack of imitation") (Bryson, Zwaigenbaum, & Roberts,

2004). Participants were asked to identify which of these symptoms are absolute indications that a child should be evaluated for an ASD. A check to each red flag symptom was classified as correct. Thus, a knowledge score was derived by summing the number of correct responses on a scale from 0 to 7, with a higher number indicating a stronger knowledge of the red flags of ASDs.

Barriers to Screening and Referral. The next two questions explored physicians' perceived barriers to conducting screening and referral activities. Question J provided a list of 10 potential barriers related to the use of formal screening tools (e.g., "Insufficient time to screen"). Question K provided a list of 5 potential barriers related to referring suspected cases of ASDs to community specialists (e.g., "Lack of specialists in the area"). Participants were asked to identify which items were obstacles within their practice.

Beliefs and Attitudes. Question L examined physicians' beliefs and attitudes related to ASDs. The items that comprised this scale were specifically constructed to correspond with the elements within the Health Belief Model (Rosenstock, 1974), as shown in Figure 2. Specifically, the statements asked about attitudes towards: (a) the perceived threat of ASDs (items 1 through 4); (b) the perceived benefits of early identification, early intervention, use of formal screening tools and referrals (items 5 through 10); (c) the perceived costs of, or barriers to, early identification, discussing developmental problems with parents, and the use of referrals (items 11 through 15); and, (d) self-efficacy beliefs related to identifying and managing patients with ASDs (items 16 to 20). Participants were asked to indicate their level of agreement with each positively worded statement. An example of a statement was, "It is important to identify children

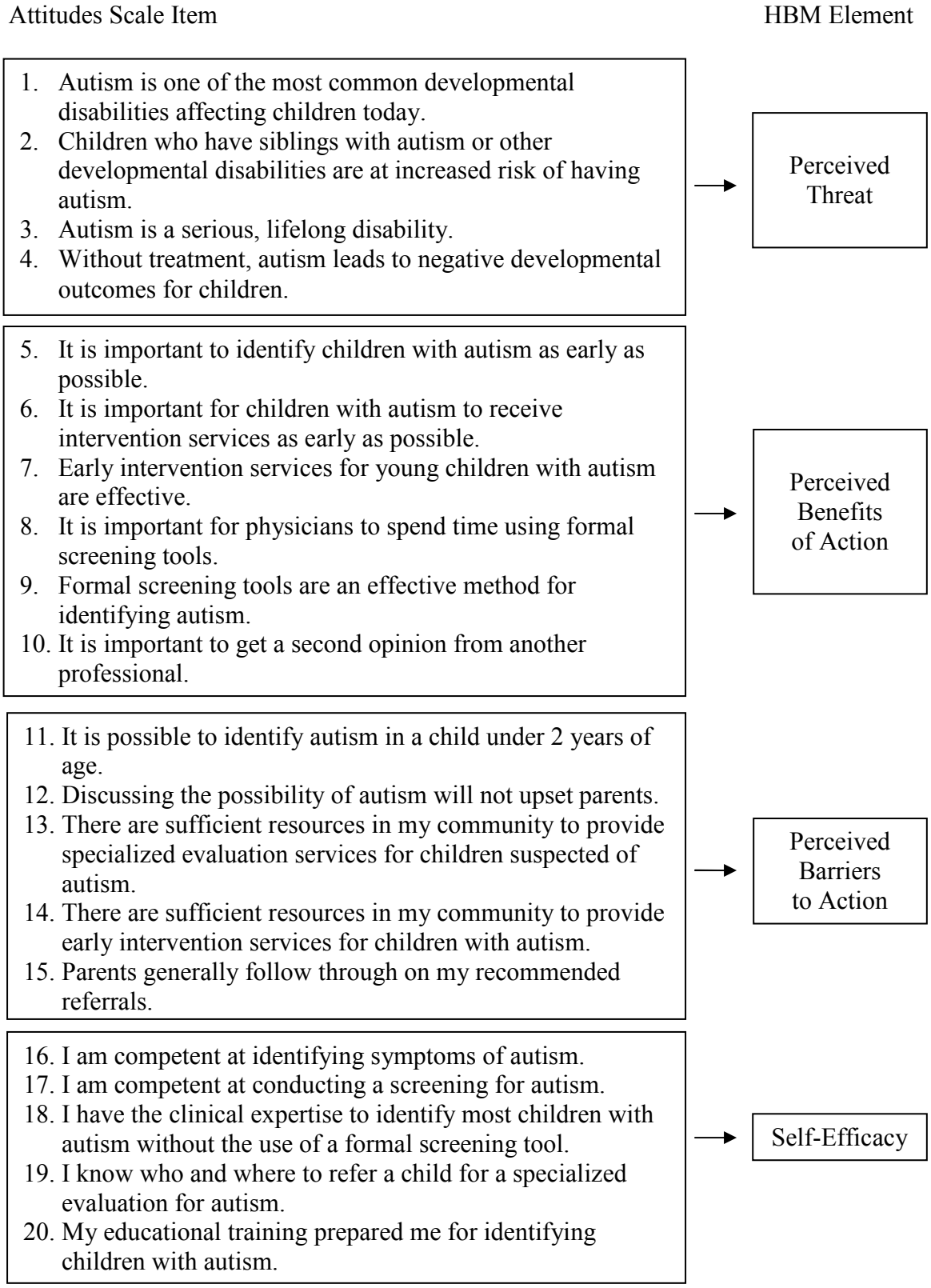

Figure 2. The attitudes scale items and corresponding Health Belief Model elements.

with autism as early as possible." Each item was rated on a five-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5).

Demographic and Practice Characteristics. Participants were asked about pertinent demographic and practice characteristics. Items regarding age, location of practice, and years in practice were asked in an open format. Items regarding gender, practice setting, personal and patient characteristics, and training and clinical experience related to ASDs were asked in a closed-choice format. In addition, participants were asked whether they had read and whether they follow any published best practice guidelines for the screening, assessment, and diagnosis of ASDs in young children.

Participants' Views. Finally, to explore what participants consider to be barriers to the early identification of children with ASDs, they were asked the following open-ended question: "What do you see as the major obstacle to identifying children with autism in the primary care setting?"

Medical Student Measure. The medical student sample was given an abbreviated measure that included the attitudes and beliefs questionnaire and relevant demographic questions (see Appendix E).

Procedures

Once the sample of 400 GPs was selected, potential participants were faxed a personalized pre-notice letter, on University of Windsor letterhead, to their offices (see Appendix F). The purpose of this letter was to alert participants that a survey would be arriving shortly for them to complete and to request their cooperation. Faxes were used because Dillman (2000) suggests that varied methods of contact are more effective than using mail only, and the CPSO provides fax numbers, but not email addresses, for all

Ontario physicians. Three days after the pre-notice letters were sent, a survey package was mailed to participants. The package included a personalized cover letter (see Appendix G), a letter of information (see Appendix H), a questionnaire, a draw entry ballot form (see Appendix I), and a stamped, addressed return envelope. The cover letter invited the physicians to participate in the study. It briefly indicated the purpose and importance of the study, as well as the procedure and incentives involved. More extensive information was presented in the letter of information.

Participants were given the option of completing the study by either of two methods: (a) filling out the paper questionnaire and mailing it in the return envelope, or (b) completing the questionnaire on the Internet. The cover letter and letter of information indicated an Internet web address (www.uwindsor.ca/autismstudy) where participants could access the questionnaire online, as well as a password to use to ensure that only invited physicians participated. In order to ensure anonymity and confidentiality, the questionnaire did not ask participants for identifying information. Consent to participate was assumed upon completion of the questionnaire, whether returned by mail or submitted online. Participation was estimated to take approximately 15 to 20 minutes.

In order to track responders and non-responders for follow-up mailings, participants were instructed to return by mail, or to complete online, the draw entry ballot form with their identification information. The forms were kept separate from their completed surveys, enabling the identification of respondents but not their responses. On this form, participants indicated their interest in being included in the lottery and receiving the informational incentives. The purpose of sending the informational

incentives after completion of the questionnaires, rather than with the mailings, was to ensure that the information provided within them did not affect participants' responses.

One week after the initial mailing, a thank you/reminder letter (see Appendix J) was faxed to all participants to thank those who had responded and to remind the non-responders to complete and return the questionnaire. Finally, three weeks after mailing the original questionnaire, a second package was mailed to non-respondents including a new cover letter (see Appendix K) and another questionnaire. As suggested by Dillman (2000), a more urgent tone was used in the second cover letter in an attempt to persuade non-respondents to complete and return the survey.

For the medical student sample, a recruitment letter was posted on two medical student online forums (see Appendix L). The online letter invited students from the six medical schools across Ontario to participate by completing the questionnaire online. Similar to the physician sample, students had access to the letter of information and draw entry ballot form on the website. At the close of the study, feedback and information about the results of the study may be obtained through the study website.

CHAPTER III

Results

Analysis Plan

Prior to the analyses, the data were screened in accordance with standard procedures as recommended by Tabachnick and Fidell (2001). A preliminary analysis of the relationship between the demographic and key study variables was performed using bivariate correlational analyses (see Table 5). For Hypotheses 1 through 8, descriptive statistics (i.e., frequencies and percentage counts) were calculated to examine physicians' current screening and referral practices. Paired samples *t*-tests were performed for Hypotheses 1, 4, and 5 to compare physicians' mean responses on items related to their use of formal versus informal screening methods, likelihood of taking a wait-and-see approach with children under versus older than age two, and knowledge of red flag symptoms versus distracter items. In addition, chi-square analyses were conducted for Hypotheses 2, 3, 6, 7, and 8 to look for significant associations between screening and referral behaviour and relevant demographic and practice characteristics. For Hypothesis 9, a principal components analysis with Varimax rotation was used to reduce the number of items on the attitudes scale to a smaller number of general factors for use in the multiple regression analyses. To determine the internal consistency and reliability of each resulting factor, Cronbach's coefficient alpha was computed. Hierarchical multiple regression analyses were then used to evaluate attitudinal predictors of best practice behaviour after adjusting for key demographic variables (i.e., gender and age). A regression analysis was completed for the overall sample and separately for male physicians and female physicians. Finally, for Hypotheses 10 and 11, analyses of

Table 5

Correlations Between the Demographic and Key Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Gender (Male = 0, Female = 1)	1												
2. Age	-.40**	1											
3. Region (Metropolitan = 0, Rural = 1)	-.03	-.12	1										
4. Years in practice	-.40**	.95**	-.11	1					.				
5. Employment status (Full-Time = 0, Part-Time = 1)	.25**	-.10	-.09	-.10	1								
6. Has children[a]	.12	-.29**	-.16	-.28**	-.02	1							
7. Has family/friend with developmental disability[a]	-.03	-.20*	.12	-.24**	-.01	.20*	1						
8. Has read best practice guidelines[a]	-.08	.04	.19*	.02	-.08	.06	-.12	1					
9. Best practice score	.26**	-.25**	-.08	-.25**	.16	.13	.08	-.13	1				
10. Attitudes toward early identification	.23*	-.19*	.00	-.13	.06	.05	-.06	-.13	.22*	1			
11. Self-efficacy attitudes	.32**	-.37**	-.15	-.38**	.10	-.03	.01	-.44**	.52**	.00	1		
12. Attitudes toward referrals	-.25**	-.01	-.13	.04	-.06	.17	.21*	-.09	.04	.00	.00	1	
13. Attitudes toward formal Screening	-.14	.01	.02	-.00	-.04	-.01	.25**	-.14	.13	.00	.00	.00	1

[a]Yes = 0, No = 1

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

variance and covariance were used to compare responses on the attitude items between male and female physicians, and also between physicians and medical school students. An alpha level of .05 was used for all tests, unless otherwise indicated. All analyses were conducted using SPSS 17.0 (SPSS Inc., Chicago, IL).

Screening Practices

Hypothesis 1. It was expected that the majority of GPs would report using informal methods, rather than formal screening tools, to screen children for ASDs.

In order to assess the methods that GPs use to screen children for ASDs and the proportion that use formal versus informal methods of screening, frequencies, percentage counts, and a paired samples *t*-test were calculated for survey questions pertaining to screening practices. Hypothesis 1 was not supported. A paired samples t-test demonstrated that the mean percentage of physicians that endorsed informal methods of screening was not significantly higher than the mean percentage that endorsed formal methods, $t(125) = .53$, $p > 0.5$. Rather, the sample was fairly split with a slight favour in the expected direction. Specifically, just over half of the sample (i.e., 52%) indicated that they used informal methods of screening only, whereas 48% of participants endorsed using a combination of informal methods and formal screening tools to screen for ASDs.

With respect to informal methods of screening, the majority of physicians in the sample indicated that they ask about attainment of typical developmental milestones (95%), ask parents about developmental concerns (91%), use clinical judgment (80%), and engage children in social and communicative interactions during their visit (76%). Only 37% of the sample endorsed obtaining a family history of ASDs. With respect to formal methods of screening, physicians in this sample typically used general

developmental screening tools that were either physician-administered (28%) or parent-completed (21%). These included the Denver Developmental Screening Test (13%; Frankenburg, Dodds, Archer, Shapiro, & Bresnick, 1992), Rourke Baby Record (6%; Rourke, Leduc, Rourke & Constantin, 2006), Nippissing District Developmental Screen (6%; Dahinten & Ford, 2004), Ages and Stages Questionnaire (5%; Squires, Bricker, & Potter, 1997), Child Development Inventory (2%; Doig, Macias, Saylor, Craver, & Ingram, 1999), and Parents' Evaluation of Developmental Status (2%; Brothers et al., 2008). In contrast, less than 10% of physicians endorsed using ASD-specific screening tools that were either physician-administered (6%) or parent-completed (2%), such as the Checklist for Autism in Toddlers (5%; Baron-Cohen et al., 1992) or the M-CHAT (2%; Robins et al., 2001).

When participants were asked whether they would use an ASD-specific screening tool in response to various scenarios (Question C), the majority of participants indicated that they were likely or very likely to use one whenever they noted or observed signs and symptoms related to autism (75%), whenever a parent expressed developmental concerns related to autism (79%), or when a child has a sibling with autism or other developmental disability (68%). Approximately one third of the sample indicated that they would be likely to use an ASD-specific screening tool at either the 18 month (29%) or 24 month (29%) well-child visit.

Hypothesis 2. Female physicians were expected to report significantly higher rates of using formal screening tools than male physicians. Associations with other demographic and practice characteristics were examined for exploratory purposes.

In order to explore whether any demographic and practice characteristics were

associated with using a formal screening tool, a series of bivariate chi-square analyses were conducted using SPSS Crosstabs. For descriptive purposes, several of the relevant demographic and practice questions in the survey provided either open or multiple response items. In order to provide a more meaningful summary of these data and to avoid potential problems of small cell sizes for analysis, response items were first collapsed into three or fewer meaningful nominal categories (Gardner, 2001). Thus, age was systematically collapsed into two categories of equal size by dividing the sample into the half with younger ages (i.e., aged 50 or under) and the half with older ages (i.e., aged 51 or older). Region of practice was categorized as metropolitan or non-metropolitan, based on population census data of the city or town in which physicians indicated practicing. Similar to age, years in practice was collapsed into two categories of equal size by dividing the sample into the half with fewer years in practice (i.e., 22 or fewer) and the half with more years in practice (i.e., 23 or more). Responses related to professional academic training and clinical experience were also collapsed into fewer categories. None of the participants in the sample endorsed having "extensive" training or experience and only 3 participants endorsed having "considerable" training or experience. Therefore, responses were collapsed into three categories: none, very little, and some (some/considerable). Last, use of a formal screening tool was categorized as either "yes" or "no" based on whether participants endorsed using a formal screening tool in Question A.

The Pearson Chi Square statistic was used to test for significant associations between using a formal screening tool and demographic and practice variables. Because a significant association was hypothesized for gender only, an alpha level of .01 was used

for the other exploratory analyses to control the Type 1 error rate, as recommended by Gardner (2001). The majority of analyses involved 2x2 tables. When a significant association was found for tables larger than 2x2, a post hoc interpretation was conducted by examining the cells for relatively large positive or negative residuals and by examining specific contrasts when appropriate (i.e., extracting 2x2 tables or collapsing categories to form a 2x2 table; Gardner, 2001). In addition, Cochran's (1952) rule was applied to ensure that the chi-square analyses were meaningful. This rule was satisfied; all expected values were greater than 1 and no more than 20% of the cells in any analysis had expected values less than 5. A summary of the results, including chi-square statistics, significance levels, and effect sizes, is presented in Table 6.

Hypothesis 2 was supported. There was a significant association between gender and the use of formal screening tools, χ^2 (1) = 7.02, $p < .01$. Specifically, physicians who endorsed the use of such tools were more likely to be female than male (78% versus 22%). In addition, there was a significant association between age and using formal screening tools, χ^2 (1) = 7.44, $p < .01$. Physicians who formally screened were more likely to be aged 50 or younger than older (67% versus 33%). There was also a significant association between years in practice and using formal screening tools, χ^2 (1) = 10.31, $p < .01$. Formal screeners were more likely to have 22 or fewer years in practice than more years in practice (65% versus 35%).

Other significant associations were also found. The association between using formal screening tools and professional academic training was significant, χ^2 (2) = 12.68, $p < .01$. Physicians who endorsed the use of formal screening tools were more likely to have little or some professional academic training related to ASDs than none (47% and

Table 6

Summary of Chi-Square Associations Between Use of Formal Screening Tools and Demographic and Practice Characteristics Among Physicians

	Use of formal screening tools (Endorsed / Not Endorsed)			
Variable	Pearson $\chi 2$	df	*p*	Phi / Cramer's V
Gender (Male / Female)	7.02	1	.008**	-.24
Age (≤ 50 / > 50)	7.44	1	.006**	.24
Region of practice (Metropolitan / Rural)	.24	1	.624	-.04
Years in practice (≤ 22 / > 22)	10.31	1	.001**	.29
Work hours (Full-time / Part-time)	4.51	1	.034*	-.19
Has children (Yes / No)	.03	1	.862	-.02
Has a family member or friend with a developmental disability (Yes / No)	2.67	1	.103	-.15
Number of patients (≤1000 / 1001-2000 / >2000)	7.58	2	.023*	.25
Percentage of patients aged 3 or younger (< 10% / ≥ 10%)	10.18	1	.001**	-.28
Number of patients with ASDs seen in past year (0 / ≥ 1)	.02	1	.886	-.01
Professional Academic Training (None / Very Little / Some)	12.68	2	.002**	.32
Professional Clinical Experience (None / Very Little / Some)	3.26	2	.196	.16
Read best practice guidelines (Yes / No)	18.80	1	.000***	.39
Follow best practice guidelines (Yes / No)	24.45	1	.000***	.44

*$p < .05$. ** $p < .01$. *** $p < .001$.

40% versus 13%). In addition, significant associations were found between using formal screening tools and reading published best practice guidelines, χ^2 (1) = 18.80, $p < .001$, as well as following best practice guidelines, χ^2 (1) = 24.45, $p < .001$. Specifically, participants who have read best practice guidelines were more likely to use formal screening tools than to not use them (74% versus 26%). Similarly, physicians who follow best practice guidelines were more likely to formally screen than to not screen (95% versus 5%). Last, physicians who indicated that greater than 10% of their patients were aged 3 or younger were more likely to endorse using formal screening tools than were physicians who had a lower percentage of young patients [67% versus 33%; χ^2 (1) = 10.18, $p < .01$]. The remaining chi-square analyses comparing use of formal screening tools with region of practice, amount of professional clinical experience, and other demographic and practice characteristics were not significant at an alpha level of .01.

Referral Practices

Hypothesis 3. It was hypothesized that physicians practicing in non-metropolitan regions would be significantly more likely than those practicing in metropolitan areas to report that they would perform ASD evaluations themselves. Associations with other demographic and practice characteristics were also examined for exploratory purposes.

In order to test whether any demographic and practice characteristics were associated with conducting ASD evaluations, a series of bivariate chi-square analyses were conducted using SPSS Crosstabs. The demographic and practice characteristics were categorized as described in Hypothesis 2. It is important to note that none of the physicians in this sample indicated that they performed ASD evaluations without also

referring. Rather, 82% of the sample indicated that they refer suspected cases for a specialist assessment whereas only 18% of the sample endorsed both performing an evaluation and referring. Therefore, referral practices were categorized as either referring to a specialist or conducting both an evaluation and referral. Similar to Hypothesis 2, the Pearson Chi Square statistic was used to test for significant associations between variables at an alpha level of .01, and post hoc interpretations were conducted where appropriate. A summary of the results, including chi-square statistics, significance levels, and effect sizes, is presented in Table 7. Hypothesis 3 was not supported. The association between region of practice and referral practices was not significant, χ^2 (1) = 0.82, $p > .05$. Physicians from rural practice regions were not more likely to conduct an evaluation and make a referral than were physicians from metropolitan practice regions (12% versus 20%). The majority of both groups indicated that they would make referrals only.

Other associations were found to be significant. There was a significant association between referral practices and following best practice guidelines, χ^2 (1) = 18.00, $p < .001$. Specifically, participants who refer only, without conducting an evaluation, were more likely to *not* follow best practice guidelines than to follow them (89% versus 11%). Last, there was a significant association between referral practices and number of patients, χ^2 (2) = 9.54, $p < .01$. Specifically, participants who both evaluate and refer were more likely to have fewer than 1000 patients in their practice than a greater number (i.e., 1001-2000 or greater than 2000; 52% versus 30% and 17%). Chi-square analyses comparing referral practices with gender, age, years in practice, amount of professional academic training or clinical experience, and other demographic and

Table 7

Summary of Chi-Square Associations Between Referral Practices and Demographic and Practice Characteristics Among Physicians

	Referral Practices (I refer / I refer and perform an evaluation)			
Variable	Pearson $\chi 2$	df	*p*	Phi / Cramer's V
Gender (Male / Female)	.11	1	.744	.03
Age (≤ 50 / > 50)	.43	1	.513	.06
Region of practice (Metropolitan / Rural)	.82	1	.366	-.08
Years in practice (≤ 22 / > 22)	.05	1	.818	.02
Work hours (Full-time / Part-time)	1.81	1	.179	.12
Has children (Yes / No)	2.02	1	.155	.13
Has a family member or friend with a developmental disability (Yes / No)	3.33	1	.068	.16
Number of patients (≤1000 / 1001-2000 / >2000)	9.54	2	.008**	.28
Percentage of patients aged 3 or younger (< 10% / ≥ 10%)	.34	1	.559	-.05
Number of patients with ASDs seen in past year (0 / ≥ 1)	1.37	1	.242	.10
Professional Academic Training (None / Very Little / Some)	7.80	2	.019*	.25
Professional Clinical Experience (None / Very Little / Some)	.51	2	.776	.06
Read best practice guidelines (Yes / No)	4.08	1	.043*	-.18
Follow best practice guidelines (Yes / No)	18.00	1	.000***	-.38

*$p < .05$. ** $p < .01$. *** $p < .001$.

practice characteristics were not significant at the required alpha level.

Figure 3 depicts the specialists to whom participants refer, which commonly include paediatricians (91%), multidisciplinary teams of specialists (26%), speech-language pathologists (23%), child psychiatrists (19%), and child psychologists (18%). The majority of participants (i.e., 67%) reported that the average waiting time for a child to see a referral source in past referrals was between one and six months. The percentage of participants that indicated average waiting times of less than one month or between 7 to 12 months was 14% and 13%, respectively. Few participants (2%) indicated that a child had to wait more than twelve months to see a referral source.

Hypothesis 4. It was hypothesized that physicians would be significantly more likely to report that they would take a wait-and-see approach with children under the age of two in comparison to children over the age of two.

In order to test whether the likelihood of physicians taking a wait-and-see approach varies based on the age of a child, a paired samples *t*-test was performed. Participants' responses to the clinical vignette describing a 26-month old child (item G1) and their responses to the follow-up question describing an 18-month old child (item H) were compared for this analysis. Hypothesis 4 was supported, $t(125) = -12.73$, $p = .000$, Cohen's $d = -1.16$. Physicians were significantly more likely to indicate that they would "wait and see how symptoms progress" with a child who was under age two ($M = 2.47$, $SD = .84$; $Mdn = 3.00$, Mode = 3) in comparison to a child who was over age two ($M = 1.61$, $SD = .63$; $Mdn = 2.00$, Mode = 1). Given the ordinal nature of these items, the results were checked with the corresponding non-parametric version of the paired *t*-test, the Wilcoxon Signed-Rank Test. This test was similarly significant ($Z = -8.40$, $p = .000$),

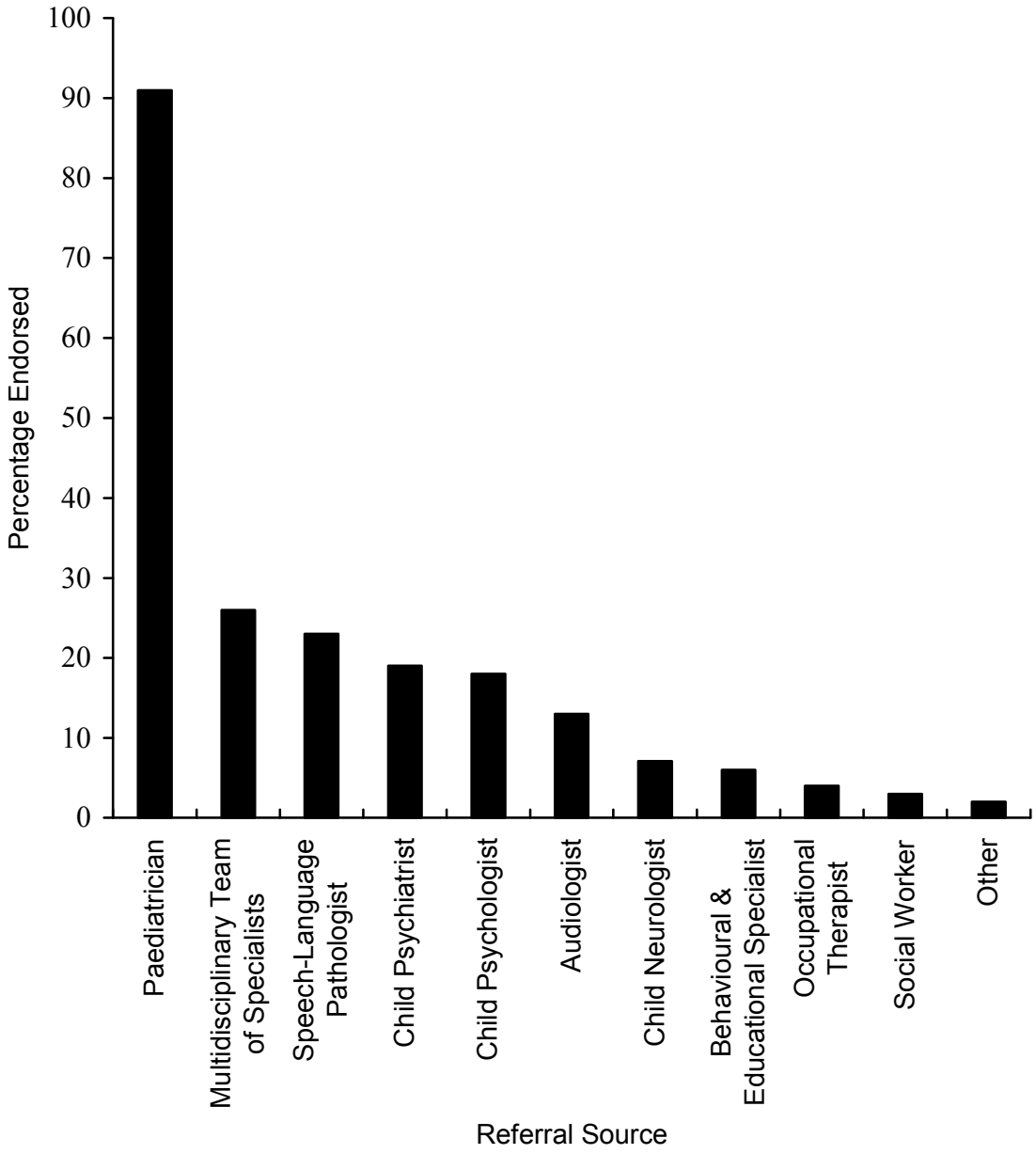

Figure 3. The percentage of physicians that endorsed referring children to each type of referral source.

providing further support for these results.

Concordance with Best Practice Guidelines

Hypothesis 5. It was expected that physicians' reported practices would have a low to moderate concordance (i.e., under 50% agreement) with Canadian best practice guidelines.

To assess the extent to which GPs' reported screening and referral behaviours compared with best practice guidelines, responses to the clinical vignette were examined using descriptive statistics. Table 8 shows the percentage of physicians that endorsed being very unlikely, unlikely, likely, or very likely to conduct each assessment activity in response to the clinical vignette. The majority of physicians endorsed being likely or very likely to conduct an informal screening (93%), to use a general developmental screening tool (69%), and to make referrals for an autism evaluation (69%), a speech-language assessment (79%), or for audiological testing (87%). In contrast, a minority of participants endorsed being likely or very likely to use an ASD-specific screening tool (37%), provide education about ASDs (26%), or refer for early intervention (47%).

Figure 4 shows the number of physicians that endorsed being likely or very likely to conduct 1 through 7 of the recommended activities. Only 8% of physicians endorsed the one non-recommended activity in this clinical vignette (i.e., wait and see how symptoms progress), whereas the majority of the sample indicated that they would conduct three to five of the recommended activities. Overall, participants indicated that they would conduct a mean number of 4.35 out of the 7 recommended activities. Therefore, Hypothesis 5 was not supported. More specifically, there was a fairly high concordance rate of 62% between reported and recommended screening and referral

Table 8

Percentage of Physicians That Endorsed Being Very Unlikely, Unlikely, Likely, or Very Likely to Conduct an Assessment Activity in Response to a Clinical Vignette

	% Endorsed			
Item	Very Unlikely	Unlikely	Likely	Very Likely
Conduct an informal screening (e.g., further probing of social-communication skills)[a]	2	5	39	54
Immediately refer Brian for audiological testing[a]	4	9	39	48
Immediately refer Brian for a speech-language assessment[a]	8	13	48	31
Immediately refer Brian for a comprehensive autism evaluation by a specialist[a]	5	26	40	29
Use a formal general developmental screening tool	14	17	40	29
Immediately refer Brian to an early intervention program[a]	17	36	30	17
Use a formal autism-specific screening tool[a]	30	33	25	12
Provide education about autism and a list of available community resources[a]	27	47	24	2
Wait and see how symptoms progress	47	45	8	0
If Brian was 18-months-old, how likely would you be to wait and see how symptoms progress	14	33	45	8

[a] Recommended best practice activity.

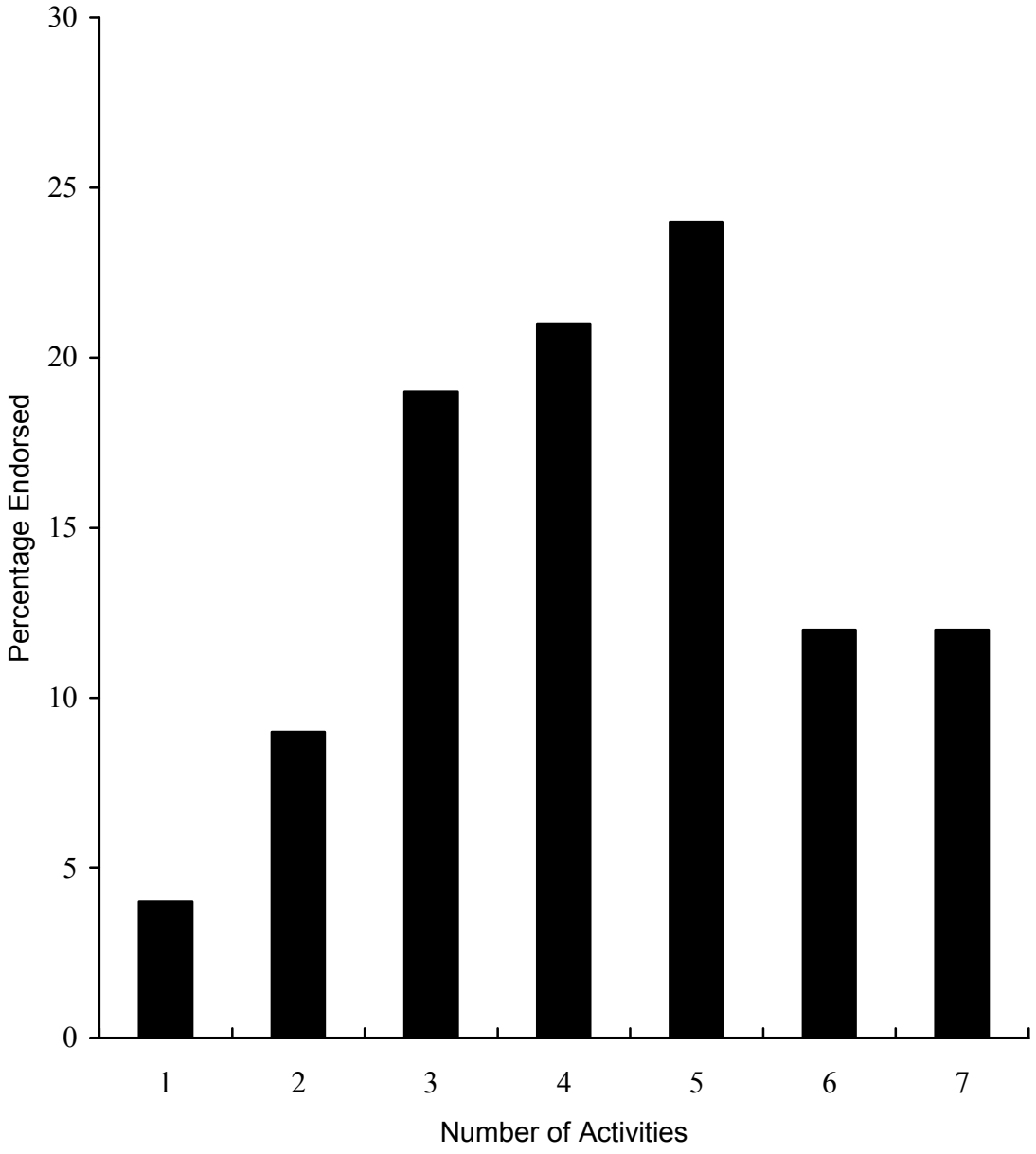

Figure 4. The percentage of physicians that endorsed being likely or very likely to conduct 1 through 7 of the recommended assessment activities in response to a clinical vignette.

practices. When a more liberal criterion was used to include physicians who were likely to use a general developmental rather than ASD-specific screening tool, the mean number of endorsed activities increased slightly to 4.67, indicating an even higher concordance rate of 67%.

To further assess participants' knowledge of best practice guidelines, their ability to identify the "red flags" of ASDs was explored by examining frequencies and percentage counts to Question I. Overall, participants correctly identified a mean number of 4.31 out of the 7 red flag symptoms, for a total mean knowledge score of 62%. The majority of physicians correctly identified the following red flag symptoms: lack of response to name by 12 months (64%), no babbling by 12 months (65%), no gesturing by 12 months (65%), no single words by 16 months (71%), no 2-word spontaneous phrases by 24 months (68%), and any loss of any language or social skills at any age (78%). In contrast, only 20% of physicians in the sample correctly identified "lack of joint attention" as an indication that a child should be evaluated for autism.

An examination of responses to the seven filler items revealed that many participants also endorsed these other symptoms as indications that a child should receive further evaluation: lack of warm, joyful expressions (52.4%), lack of appropriate eye gaze (67.5%); lack of coordination of nonverbal communication (31.7%); lack of attention-seeking behaviours (45.2%); lack of imitation (48.4%); repetitive movements or posturing of body, arms, hands, or fingers (66.7%); and, solitary or unusual play patterns (69.8%). The results of a paired samples *t*-test indicates that mean endorsement of the red flag items was significantly higher than the mean endorsement of the filler items, $t(125) = 3.21$, $p = .002$, Cohen's $d = 0.25$. In other words, physicians were significantly

more likely to endorse the seven red flag symptoms as absolute indications that a child should be evaluated for an ASD ($M = 4.31$, $SD = 1.77$) in comparison to the seven filler items ($M = 3.82$, $SD = 2.10$). Notably, "lack of joint attention" had the lowest mean endorsement of all fourteen symptoms listed in Question I.

Barriers to Screening and Referral

Hypothesis 6. It was expected that insufficient time to screen would be identified as the most common barrier to using formal screening tools during medical visits.

To investigate perceived barriers to the use of formal screening tools, frequencies and percentage counts for the barriers endorsed in Question J were examined. As seen in Table 9, Hypothesis 6 was supported. The most commonly reported barrier to using formal screening tools was insufficient time to screen, endorsed by 79% of physicians in the sample. The same percentage of physicians also rated lack of familiarity with available screening tools as a top barrier. Other commonly endorsed barriers included unclear recommendations regarding appropriate screening practices for autism (52%), lack of access to screening tools (47%), and lack of confidence in identifying autism (47%).

In order to explore whether any endorsed barriers were associated with using or not using formal screening tools, a series of bivariate chi-square analyses were conducted using SPSS Crosstabs. Only one barrier, lack of familiarity with available screening tools, was significantly associated with the use of formal screening tools, χ^2 (1) = 14.43, $p < .001$, $\Phi = .34$. Physicians who do not formally screen were more likely than formal screeners to endorse a lack of familiarity as a barrier to screening (92% versus 65%).

Table 9

Percentage of Physicians That Endorsed Barriers to Screening

Barrier	% Endorsed
Insufficient time to screen	79
High costs of using screening tools	8
Lack of familiarity with available screening tools	79
Lack of access to screening tools	47
Lack of confidence in screening tools	25
Lack of confidence in using screening tools	40
Lack of knowledge about autism	38
Lack of confidence in identifying autism	47
Unclear recommendations regarding appropriate screening practices for autism	52
Other issues have greater priority	3

Additional chi-square analyses were conducted to explore whether any endorsed barriers were associated with gender. Male physicians were significantly more likely to endorse a lack of confidence in identifying autism as a barrier in comparison to female physicians [64% versus 38%; χ^2 (1) = 7.71, $p < .01$, $\Phi = -.25$]. In addition, physicians who endorsed unclear recommendations regarding appropriate screening practices as a barrier were significantly more likely to be female than male [80% versus 29%; χ^2 (1) = 10.74, $p < .01$, $\Phi = .29$]. No other significant associations with gender were found.

Hypothesis 7. It was expected that long waiting lists would be identified as the most common barrier to referring children to community specialists.

To investigate perceived barriers to making referrals to community specialists, frequencies and percentage counts for the barriers endorsed in Question K were examined. Hypothesis 7 was supported. As seen in Table 10, the most commonly reported barrier to making referrals was indeed long waiting lists, endorsed by 64% of participants. Physicians also endorsed lack of familiarity with available referral sources (44%) and lack of specialists in the area (41%) as major barriers to referrals.

In order to explore whether any endorsed barriers were associated with referral practices, a series of bivariate chi-square analyses were conducted using SPSS Crosstabs. No significant associations were found. Additional chi-square analyses were conducted to explore whether any endorsed barriers were associated with gender. Physicians who endorsed long waiting lists as a barrier were significantly more likely to be female than male [81% versus 19%; χ^2 (1) = 20.97, $p < .001$, $\Phi = .41$]. No other significant associations with gender were found.

Table 10

Percentage of Physicians That Endorsed Barriers to Referral

Barrier	% Endorsed
Lack of familiarity with available referral sources	44
Lack of specialists in the area	41
Long waiting lists	64
Referral sources are not useful or helpful	6
Difficulties with the referral system	25

Hypothesis 8. It was expected that physicians practicing in non-metropolitan regions would be more likely than those practicing in metropolitan areas to identify a lack of community specialists as a major barrier to referring children.

In order to examine whether there was an association between the urbanization of practice region and identifying a lack of community specialists as a barrier to referrals, a bivariate chi-square analysis was performed using SPSS Crosstabs. Hypothesis 8 was not supported. Although physicians in non-metropolitan regions were more likely than physicians in metropolitan regions to endorse a lack of community specialists as a barrier to referrals (56% versus 38%), the association was not significant, χ^2 (1) = 2.79, $p > .05$, $\Phi = .15$. In addition, there were no significant associations between practice region and any other endorsed barriers to screening and referrals.

Beliefs and Attitudes

Hypothesis 9. It was expected that physicians' attitudes would significantly predict their reported screening and referral actions, with stronger or more favourable attitudes predicting a higher correspondence rate between reported and recommended best practice actions.

Principal Components Analysis. Prior to conducting the multiple regression analyses, an exploratory principal components analysis was performed to evaluate the factor structure of the attitudes scale (Question L) and determine whether the combined item pool could be summarized by a smaller set of factors. This analysis was undertaken to ensure that there was sufficient power for the regression analyses and to reduce the risk of spurious findings (Tabachnick & Fidell, 2001). Initial analyses were conducted on the original pool of 20 items. First, frequency distributions and mean and median scores

were examined. Descriptive statistics for each item are presented in Table 11. Next, corrected item-total correlations were calculated to identify items that did not correlate appropriately with the hypothesized subscales. The corrected item-total correlations fell below the recommended value of 0.25 on six items: 1, 2, 10, 11, 12, and 19. A preliminary factor analysis was then performed to identify items without clear factor adherence. This analysis did not reveal any items that loaded independently of the other factors. Therefore, the six items with low item-total correlations were eliminated from further analyses.

An exploratory principal components analysis was performed on the remaining 14 items. Prior to the analysis, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Barlett's test of sphericity were conducted to determine the factorability of the scale. The KMO value of 0.67 exceeded the recommended value of 0.5 (Kaiser, 1974), indicating that the correlation matrix had sufficient structure to result in a factorable solution. In addition, Bartlett's test of sphericity was significant ($p < .001$), indicating that the correlation matrix was significantly different from an identity matrix. Therefore, it was considered appropriate to proceed with the principal components analysis.

A standard approach to conducting a principal components analysis was followed (Tabachnick & Fidell, 2001; Gardner, 2001). First, a Varimax (orthogonal) rotation was applied to increase interpretability of the factors. An orthogonal rotation was chosen in order to generate a set of uncorrelated factors for use as predictor variables in the multiple regression analyses. Next, the eigenvalue-one criterion (Kaiser, 1960) combined with the Scree Test (Cattell, 1966) were used to determine the number of factors that

Table 11

Descriptive Statistics for Individual Attitude Items in the Physicians Sample

Attitude Item	Mean (SD)	Median	Min	Max
1. Autism is one of the most common developmental disabilities affecting children today.	3.60 (0.80)	4	2	5
2. Children who have siblings with autism or other developmental disabilities are at increased risk of having autism.	4.04 (0.59)	4	3	5
3. Autism is a serious, lifelong disability.	4.48 (0.64)	5	3	5
4. Without treatment, autism leads to negative developmental outcomes for children.	4.60 (0.49)	5	4	5
5. It is important to identify children with autism as early as possible.	4.58 (0.61)	5	3	5
6. It is important for children with autism to receive intervention services as early as possible.	4.58 (0.57)	5	3	5
7. Early intervention services for young children with autism are effective.	4.18 (0.74)	4	3	5
8. It is important for physicians to spend time using formal screening tools.	3.54 (0.76)	3	2	5
9. Formal screening tools are an effective method for identifying autism.	3.77 (0.66)	4	2	5
10. It is important to get a second opinion from another professional.	4.46 (0.60)	5	3	5
11. It is possible to identify autism in a child under 2 years of age.	3.69 (0.87)	4	2	5
12. Discussing the possibility of autism will not upset parents.	2.03 (1.07)	2	1	5

Table 11 (Continued)

Attitude Item	Mean (SD)	Median	Min	Max
13. There are sufficient resources in my community to provide specialized evaluation services for children suspected of autism.	2.39 (1.04)	2	1	4
14. There are sufficient resources in my community to provide early intervention services for children with autism.	2.30 (0.96)	2	1	4
15. Parents generally follow through on my recommended referrals.	3.96 (0.77)	4	2	5
16. I am competent at identifying symptoms of autism.	2.94 (0.95)	3	1	5
17. I am competent at conducting a screening for autism.	2.48 (0.94)	2	1	4
18. I have the clinical expertise to identify most children with autism without the use of a formal screening tool.	2.29 (0.93)	2	1	4
19. I know how and where to refer a child for a specialized evaluation for autism.	3.20 (1.05)	3	1	5
20. My educational training prepared me for identifying children with autism.	2.11 (1.07)	2	1	5

should be extracted. The scree plot suggested a large visual break before the third factor and another smaller break before the sixth factor. Five factors had eigenvalues greater than 1.00, accounting for 75% of the variance in the scale. The first and second factor each accounted for 22% of the variance. The third, fourth, and fifth factors accounted for an additional 12, 11 and 8% of the variance. Subsequent factors independently accounted for progressively lower percentages of variance. Therefore, a five-factor solution was chosen.

The next step involved interpreting the rotated solution by identifying which items loaded on each factor and considering the conceptual meaning of the items that loaded highly on a factor. The traditional criterion of 0.32 or greater was used to determine loadings that should be retained for interpretation (Tabachnick & Fidell, 2001; Gardner, 2001). The majority of items loaded uniquely on one of the five factors. In cases for which items cross-loaded, the item was located on the factor with the higher loading. The pattern of loadings from the rotated component matrix for each of the five factors is presented in Table 12. Comrey and Lee (1992) suggest that loadings in excess of .71 are considered excellent, .63 very good, .55 good, .45 fair, and .32 poor. As shown in Table 12, all factors had items loading greater than .60 and the majority of factor items had excellent loadings with values greater than 0.8.

The first factor, with an eigenvalue of 3.13 and accounting for 22% of the variance, was defined by items 5, 6, and 7. An example of an item is, “It is important to identify children with autism as early as possible.” As these items related to the benefits of early identification and intervention, Factor 1 was labelled “attitudes toward early identification.” The second factor, with an eigenvalue of 3.02 and accounting for 22% of

Table 12

Rotated Component Matrix of the Attitudes Scale

Item	Standardized Regression Coefficients				
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
3. Autism is a serious, lifelong disability.	-.184	-.085	.076	-.144	**.867**
4. Without treatment, autism leads to negative developmental outcomes for children.	.428	-.163	-.235	.140	**.679**
5. It is important to identify children with autism as early as possible.	**.920**	.095	-.008	.053	.070
6. It is important for children with autism to receive intervention services as early as possible.	**.920**	.093	-.106	-.017	.043
7. Early intervention services for young children with autism are effective.	**.744**	-.095	-.029	.374	-.139
8. It is important for physicians to spend time using formal screening tools.	.269	.134	-.183	**.823**	-.047
9. Formal screening tools are an effective method for identifying autism.	.013	.061	.116	**.886**	-.018
13. There are sufficient resources in my community to provide specialized evaluation services for children suspected of autism.	-.136	.058	**.877**	-.010	-.040
14. There are sufficient resources in my community to provide early intervention services for children with autism.	-.144	.071	**.870**	.077	-.154
15. Parents generally follow through on my recommended referrals.	.227	.293	**.655**	-.157	.253
16. I am competent at identifying symptoms of autism.	-.041	**.824**	.073	-.086	-.090
17. I am competent at conducting a screening for autism.	-.084	**.815**	.005	.289	-.157
18. I have the clinical expertise to identify most children with autism without the use of a formal screening tool.	.067	**.814**	.118	-.086	-.050
20. My educational training prepared me for identifying children with autism.	.142	**.610**	.122	.181	.056

the variance, was defined by items 16, 17, 18, and 20. For example, item 16 is "I am competent at identifying symptoms of autism." Because these items related to feelings of competence at identifying and screening for ASDs, Factor 2 was labelled "self-efficacy attitudes." The third factor, with an eigenvalue of 1.74 and accounting for 12% of the variance, was labelled "attitudes toward referrals." Items 13, 14, and 15, which related to community resources and referrals, loaded primarily on this factor. An item example is "There are sufficient resources in my community to provide early intervention services for children with autism." The fourth factor, with an eigenvalue of 1.50 and accounting for 11% of the variance, was defined by items 8 and 9, which related to the benefits of formal screening tools. An example includes, "Formal screening tools are an effective method for identifying autism." Factor 4 was therefore labelled "attitudes toward formal screening." The final factor, labelled "perceived severity" was defined by items 3 and 4, with an eigenvalue of 1.12 and accounting for 8% of the variance. These two items related to the outcomes of ASDs, such as "Autism is a serious, lifelong disability."

Next, corrected item-total correlations for each factor were examined again to reveal correlations greater than the recommended value of 0.40 for most items. Specifically, item-total correlations ranged from 0.61 to 0.80 for Factor 1, from 0.47 to 0.66 for Factor 2, from 0.43 to 0.70 for Factor 3, 0.61 for the two items on Factor 4, and 0.32 for the two items on Factor 5. Therefore, with the exception of Factor 5, item-total correlations were reasonably strong in demonstrating reliability and showing that items on the same factor were measuring the same construct.

Cronbach's alpha was computed to determine the internal consistency of the attitudes scale and subscales. Scales with an alpha greater than 0.70 were considered to

have an acceptable level of internal consistency (deVaus, 1991; George & Mallery, 2003). Cronbach's alpha was considered acceptable for Factors 1 through 4: 0.85 for Factor 1 (attitudes toward early identification), 0.78 for Factor 2 (self-efficacy attitudes), 0.76 for Factor 3 (attitudes toward referrals), and 0.75 for Factor 4 (attitudes toward formal screening). Cronbach's alpha was found to be poor (i.e., 0.47) for Factor 5 (perceived severity). In addition, Cronbach's alpha for the overall scale with 14 items was 0.66, and this increased to 0.71 when Factor 5 items were removed. Given the poor reliability of Factor 5, it was not used in any further analyses.

Finally, using the same criteria as above, additional analyses were conducted using different extraction and oblique rotation methods. Each analysis yielded some differences in factor loadings, but the underlying factor structure did not differ from the factor solution obtained with the principal components analysis with Varimax rotation. Therefore, the original factor solution was retained. Participants' responses were then converted into *z*-scores for each of the four factors using the regression approach in SPSS Factor. These final factor *z*-scores were used as the predictor variables in the multiple regression analyses.

Hierarchical Regression Analyses. As the main test of Hypothesis 9, a series of hierarchical multiple regression analyses were performed to assess whether physicians' attitudes predicted their best practice behaviour. The dependent variable, best practice behaviour, was defined by the total number of best practice actions that participants indicated they were likely or very likely to conduct based on the clinical vignette, ranging from 0 to 7. The predictor variables included participants' z-scores on the four attitudinal factors. In addition, because previous empirical research has demonstrated the influence

of physician gender and age on screening and preventive behaviour, these two demographic variables were also included as predictor variables. A correlation matrix examining the correlations between the dependent variable and the predictor variables is presented in Table 13. As shown, there was indeed a significant correlation between best practice behaviour and gender ($r = .26$, $p < .01$) as well as age ($r = -.25$, $p < .01$).

A hierarchical regression method was chosen in order to assess the unique contribution of attitudes on best practice behaviour after controlling for the influence of pertinent demographic variables. Therefore, gender and age were entered in Step 1 of the analysis. The four attitude factors were then entered in Step 2. In addition to the complete sample, separate hierarchical regression analyses were performed for males only and females only in order to assess whether attitudes predict behaviours differently among male and female physicians. Prior to conducting the analyses, the correlations among the variables were examined. In addition, tolerance values and variance inflation (VIF) values were inspected to assess multicollinearity. In each case, the tolerance values for each variable were greater than 0.1 and the VIF values were below 10. Therefore, there were no multicollinearity problems and it was considered appropriate to proceed with the analyses.

Table 14 presents a summary of the results. For the complete sample, model 1 of the analysis was significant, accounting for 9.4% of the total variance in best practice scores, $R = .307$, $R^2 = .094$, $F(2, 125) = 6.40$, $p < .01$, Cohen's $f^2 = .10$. Gender was a statistically significant predictor ($\beta = .188$, $p < .05$), but age was not ($\beta = -.179$, *ns*). Model 2 included the four attitudinal variables, along with the two demographic variables from Model 1. Overall, Model 2 accounted for 34% of the variance in best practice

Table 13

Correlations Between Physicians' Best Practice Score and the Predictor Variables in the Multiple Regression Analyses

Variable	1	2	3	4	5	6	7
1. Best practice score		.26**	-.25**	.22*	.52**	.04	.13
2. Gender			-.40**	.23*	.32**	-.25**	-.14
3. Age				-.19*	-.37**	-.01	.01
4. Factor 1					.00	.00	.00
5. Factor 2						.00	.00
6. Factor 3							.00
7. Factor 4							

*$p < .05$. ** $p < .01$. *** $p < .001$.

Table 14

Hierarchical Multiple Regression Analyses of Best Practice Scores With Attitudes, Gender, and Age as Predictor Variables

Model	*B*	SE *B*	β	*t*	*p*
Complete Sample					
Step 1					
Gender	.64	.32	.19	2.00	.048*
Age	-.02	.01	-.18	-1.9	.058
Step 2[a]					
Gender	.32	.30	.10	1.06	.289
Age	.00	.01	.00	.02	.988
Factor 1 (early identification)	.32	.12	.20	2.58	.011*
Factor 2 (self-efficacy)	.79	.13	.49	5.94	.000***
Factor 3 (referral)	.11	.13	.07	.86	.389
Factor 4 (formal screening)	.23	.12	.14	1.89	.061
Males Only					
Step 1					
Age	.00	.02	.01	.07	.946
Step 2[b]					
Age	.02	.02	.11	.71	.483
Factor 1 (early identification)	.59	.21	.40	2.81	.008**
Factor 2 (self-efficacy)	.57	.23	.40	2.48	.018*
Factor 3 (referral)	.17	.27	.10	.64	.529
Factor 4 (formal screening)	.03	.22	.02	.14	.889
Females Only					
Step 1					
Age	-.04	.01	-.27	-2.49	.015*
Step 2[c]					
Age	-.01	.01	-.06	-.56	.578
Factor 1 (early identification)	.11	.15	.07	.74	.463
Factor 2 (self-efficacy)	.99	.17	.55	5.85	.000***
Factor 3 (referral)	.15	.14	.10	1.06	.295
Factor 4 (formal screening)	.34	.14	.21	2.39	.020*

[a] $R = .586$, $R^2 = .343$, Adjusted $R^2 = .310$, $\Delta R^2 = .249$, $\Delta F = 11.29$.
[b] $R = .553$, $R^2 = .306$, Adjusted $R^2 = .209$, $\Delta R^2 = .306$, $\Delta F = 3.97$.
[c] $R = .618$, $R^2 = .381$, Adjusted $R^2 = .382$, $\Delta R^2 = .312$, $\Delta F = 9.83$.
*$p < .05$. ** $p < .01$. *** $p < .001$.

scores, a significant increase from Model 1, $R = .586$, $R^2 = .343$, $F(6, 125) = 10.37$, $p < .001$, Cohen's $f^2 = .52$. Therefore, these results support Hypothesis 9, confirming that attitudes account for significant variance in best practice behaviour even after controlling for gender and age. Specifically, attitudes toward early identification ($\beta = .200$, $p < .05$) and self-efficacy ($\beta = .489$, $p < .001$) were significant predictors of best practice behaviour over and above gender and age. Attitudes toward referrals ($\beta = .067$, *ns*) and formal screening ($\beta = .142$, *ns*) were not significant predictors. Examination of the beta coefficients for these variables indicates that respondents with stronger feelings of self-efficacy and more favourable attitudes towards early identification had a higher best practice score. Model 2 also shows that the relationship of gender ($\beta = .095$, *ns*) with best practice scores is eliminated when the attitudinal variables are entered into the model, suggesting that best practice behaviour is better explained by attitudes than by demographic factors.

In the analysis of male-only respondents, Model 1 with age was not significant, $R = .011$, $R^2 = .000$, $F(1, 41) = .005$, *ns*. Subsequent entry of the attitude factors in the second step added significantly to the prediction of best practice scores, $R = .553$, $R^2 = .306$, $F(5, 41) = 3.17$, $p < .05$, Cohen's $f^2 = .44$, and accounted for 30.6% of the variance. Similar to the complete sample, at no time was age a significant predictor of best practice scores among male physicians. Favourable attitudes regarding early identification ($\beta = .397$, $p < .01$) and self-efficacy ($\beta = .403$, $p < .05$) were again strong predictors of best practice scores among male physicians. Attitudes toward referrals and formal screening were not shown to be significant. These results suggest that male physician attitudes related to early identification and self-efficacy are significant predictors of their best

practice behaviour after controlling for the influence of age.

The results of the hierarchical regression for female-only respondents highlighted somewhat different results. Model 1 was statistically significant, R =.265, R^2 = .070, $F(1, 83) = 6.19$, $p < .05$, Cohen's $f^2 = .08$, accounting for 7.0% of the variance and demonstrating that age was a significant predictor ($\beta = -.265$, $p < .05$) of best practice scores among female physicians. Model 2 was similarly significant, R =.618, R^2 = .382, $F(5, 83) = 9.64$, $p < .001$, Cohen's $f^2 = .62$, and accounted for 38.2% of the variance. The effect of age ($\beta = -.055$, *ns*) disappears in Model 2, but self-efficacy attitudes ($\beta = .551$, $p < .001$) are again a strong predictor of best practice scores. In addition, attitudes toward formal screening was a significant predictor ($\beta = .214$, $p < .05$), while attitudes toward early identification and referrals were not. Thus, after accounting for the effects of age, female physicians who had stronger feelings of self-efficacy and more favourable attitudes toward formal screening had higher best practice scores.

The analyses were repeated by (1) removing gender and age in the first step of the regression, and by (2) entering the attitudinal factors in the first step and entering gender and age in the second step. The results yielded the same findings as reported above.

Hypothesis 10. It was expected that male and female physicians would report significantly differing attitudes.

In order to examine gender differences in attitudes, male and female physicians were compared on their scores on each of the attitude factors using one-way between-subjects ANOVAs. Levene's test for equality of variances was non-significant for each analysis. Therefore, the assumption of equal variances between groups was not violated. Male and female physicians differed significantly in their attitudes toward early

identification, F (1, 124) = 6.74, $p < .05$, $\eta^2 = .05$. Specifically, female physicians demonstrated more favourable attitudes ($M = .16$, $SD = .92$) than did male physicians ($M = -.32$, $SD = 1.09$). Males and females in the sample also differed in their self-efficacy attitudes [F (1, 124) = 14.15, $p < .001$, $\eta^2 = .10$], with females demonstrating greater self-efficacy ($M = .23$, $SD = .85$) in comparison to male physicians ($M = -.45$, $SD = 1.13$). In addition, males and females differed significantly in their attitudes toward referrals, F (1, 124) = 8.47, $p < .01$, $\eta^2 = .06$. In this case, male physicians had more favourable attitudes regarding community resources and referrals ($M = .36$, $SD = .93$) than did the female physicians ($M = -.18$, $SD = .99$). There were no gender differences regarding attitudes toward formal screening, F (1, 124) = 2.47, $p > .05$, $\eta^2 = .02$.

To determine gender differences on specific attitudinal items, male and females were then compared on their responses to individual items within each significant factor. ANOVAs were conducted even though responses were measured on ordinal Likert scale items. This parametric method of analysis was chosen over the nonparametric method (i.e., Mann-Whitney test) on the basis of the common use of parametric methods in analyzing Likert scale data in psychological literature and due to the loss of power with nonparametric approaches (Velleman & Wilkinson, 1993). As a precaution, the analyses were replicated with the Mann-Whitney test, which yielded the same results. Therefore, for simplicity, results of the former analyses will be presented here. Means and standard deviations for the attitude items for each gender, as well as F-tests and effect sizes, are presented in Table 15.

With respect to attitudes toward early identification, females felt significantly more strongly than males that it was important for children with autism to receive early

Table 15

ANOVA Comparisons Between Male and Female Physicians on the Attitude Factors and Items

Item	Males (n = 42) M (SD)	Females (n = 84) M (SD)	F	η^2
Factor 1 (early identification)	-.32 (1.09)	.16 (.92)	6.74*	.05
Factor 2 (self-efficacy)	-.45 (1.13)	.23 (.85)	14.15 ***	.10
Factor 3 (referral)	.36 (.93)	-.18 (.99)	8.47**	.06
Factor 4 (formal screening)	.20 (1.05)	-.10 (.96)	2.47	.02
5. It is important to identify children with autism as early as possible.	4.43 (.70)	4.65 (.55)	3.92	.03
6. It is important for children with autism to receive intervention services as early as possible.	4.31 (.68)	4.71 (.45)	15.75***	.11
7. Early intervention services for young children with autism are effective.	4.05 (.76)	4.25 (.73)	2.10	.02
13. There are sufficient resources in my community to provide specialized evaluation services for children suspected of autism.	2.64 (1.01)	2.26 (1.03)	3.88	.03
14. There are sufficient resources in my community to provide early intervention services for children with autism.	2.64 (.91)	2.13 (.94)	8.49**	.06
15. Parents generally follow through on my recommended referrals.	4.00 (.73)	3.94 (.80)	.17	.00
16. I am competent at identifying symptoms of autism.	2.60 (1.13)	3.12 (.80)	9.08**	.07
17. I am competent at conducting a screening for autism.	2.10 (.93)	2.68 (.88)	11.82**	.09
18. I have the clinical expertise to identify most children with autism without the use of a formal screening tool.	1.98 (.92)	2.45 (.90)	7.74**	.06
20. My educational training prepared me for identifying children with autism.	1.98 (1.16)	2.18 (1.02)	1.01	.01

*$p < .05$. ** $p < .01$. *** $p < .001$.

intervention as early as possible. With regards to self-efficacy attitudes, female physicians felt significantly more competent than males at identifying symptoms of autism, conducting a screening for autism, and identifying children with autism without the use of a formal screening tool. Finally, with respect to attitudes toward referrals, male physicians felt significantly more strongly than did females about there being sufficient resources in their community to provide early intervention services for children with autism.

Hypothesis 11. It was expected that currently practicing physicians and medical school students would report significantly differing attitudes.

Prior to conducting the main analysis of Hypothesis 11, a principal components analysis was performed on the attitude scale for the entire sample, including data from both the physicians and students. Thus, the procedure as described under Hypothesis 9 was repeated for the whole sample in order to condense the items into a smaller set of factors and reduce the number of group comparisons being made. An identical factor structure was obtained, including five factors that related to attitudes toward early identification, self-efficacy, referrals, formal screening, and perceived severity. Again, participants' responses were converted into *z*-scores for each of the factors using the regression approach in SPSS Factor.

In order to examine whether attitudes vary as a function of age, physicians and students in their final year of medical school were compared on their scores on each of the attitude factors using one-way between-subjects ANCOVAs. This method of analysis was chosen given that gender differences in attitudes were demonstrated in the prior analysis. Gender was independent of condition, with a one-way between-subjects

analysis of variance showing that the groups did not differ in their distribution of males and females, $F(1, 190) = .08$, $p > .05$. Accordingly, the ANCOVAs were conducted to yield a more precise estimate of group differences by reducing the within-group variability associated with gender differences. Results of the analysis repeated without adjustment for gender as a covariate and using the Mann-Whitney nonparametric test yielded the same results as the ANCOVA findings and supported the use of ANCOVA as the more powerful test of group differences. Therefore, for simplicity, results of the ANCOVA analyses will be presented here. Adjusted marginal means and standard errors for each factor, as well as F-tests and effect sizes, are presented in Table 16.

The assumptions required when conducting an ANCOVA were met. The results indicated that gender did provide a significant adjustment to participants' attitude scores on the factors related to self-efficacy, early identification, and referrals. In addition, there was a significant effect of group on the factors related to self-efficacy and referrals, even after controlling for gender. Physicians and students differed significantly in their self-efficacy attitudes, $F(1, 188) = 8.07$, $p < .01$, $\eta^2 = .04$. The adjusted marginal means show that the students demonstrated greater self-efficacy ($M = .27$, $SE = .12$) than did the physicians ($M = -.14$, $SE = .09$). Physicians and students also differed significantly in their attitudes toward community resources and referrals [$F(1, 188) = 6.93$, $p < .01$, $\eta^2 = .04$], with students demonstrating more favourable attitudes ($M = .26$, $SE = .12$) in comparison to physicians ($M = -.13$, $SE = .09$). As seen in Table 16, there were no gender differences regarding attitudes toward early identification or formal screening.

To determine age differences on specific attitudinal items, physicians and students were then compared on their responses to individual items within each significant factor.

Table 16

ANCOVA Comparisons Between Physicians and Students on the Attitude Factors

Factor	Physicians (n = 126) M^a (SE)	Students (n = 65) M^a (SE)	Source	df	F	η^2
Factor 1 (early identification)	-.08 (.09)	.15 (.12)	Gender	1	6.56*	.03
			Group	1	2.34	.01
			Within-group error	188	(0.97)	
Factor 2 (self-efficacy)	-.14 (.09)	.27 (.12)	Gender	1	12.34**	.06
			Group	1	8.07**	.04
			Within-group error	188	(0.91)	
Factor 3 (referral)	-.13 (.09)	.26 (.12)	Gender	1	9.30**	.05
			Group	1	6.93**	.04
			Within-group error	188	(0.93)	
Factor 4 (formal screening)	-.07 (.09)	.14 (.12)	Gender	1	.04	.00
			Group	1	1.94	.01
			Within-group error	188	(1.00)	

[a] Adjusted marginal means. Values enclosed in parentheses represent mean square errors. *$p < .05$. ** $p < .01$. *** $p < .001$.

Means and standard deviations for the attitude items for each group, as well as F-tests and effect sizes, are presented in Table 17. The results show that gender did provide a significant adjustment to participants' attitude scores on items 13, 14, 16, 17, and 18. After controlling for gender, there was a significant effect of group on items 14, 16, 17, and 20. Specifically, with respect to self-efficacy attitudes, the adjusted marginal means show that students felt significantly more competent than physicians at identifying symptoms of autism and conducting a screening for autism, even after accounting for gender. Students also felt more strongly that their educational training prepared them for identifying children with autism. Last, with regards to attitudes toward community resources and referrals, students felt significantly more strongly than did physicians about there being sufficient resources in their community to provide early intervention services for children with autism.

Qualitative Analysis

Seventy-two of the participants in the physician sample responded to the question asking them to indicate major obstacles to identifying children with ASDs in the primary care setting. A grounded theory procedure was performed on the responses by the researcher. The process included: (a) identifying codes that allow the key points of the data to be gathered; (b) collecting codes of similar content that allow the data to be grouped; and (c) grouping similar concepts together to generate a theory of explanations that explain the data (Glaser & Strauss, 1967). Subsequent re-coding of the data by a second person (i.e., a graduate student in psychology) using the same coding scheme was performed to obtain a measure of interrater reliability. Because the data were not mutually exclusive and could be coded into more than one category, the extent of

Table 17

ANCOVA Comparisons Between Physicians and Students on the Attitude Items

Item	Physicians (n = 126) M^a (SE)	Students (n = 65) M^a (SE)	Source	df	F	η^2
13. There are sufficient resources in my community to provide specialized evaluation services for children suspected of autism.	2.39 (.09)	2.64 (.13)	Gender	1	4.13*	.02
			Group	1	2.50	.01
			Error	188	(1.08)	
14. There are sufficient resources in my community to provide early intervention services for children with autism.	2.30 (.08)	2.66 (.11)	Gender	1	8.44**	.04
			Group	1	6.55*	.03
			Error	188	(0.81)	
15. Parents generally follow through on my recommended referrals.	3.96 (.07)	3.77 (.10)	Gender	1	.16	.00
			Group	1	2.55	.01
			Error	188	(0.61)	
16. I am competent at identifying symptoms of autism.	2.94 (.08)	3.31 (.12)	Gender	1	11.62**	.06
			Group	1	6.91**	.04
			Error	188	(0.86)	
17. I am competent at conducting a screening for autism.	2.48 (.09)	2.82 (.13)	Gender	1	8.29**	.04
			Group	1	4.84*	.03
			Error	188	(1.03)	
18. I have the clinical expertise to identify most children with autism without the use of a formal screening tool.	2.29 (.09)	2.58 (.12)	Gender	1	7.92**	.04
			Group	1	3.46	.02
			Error	188	(1.00)	
20. My educational training prepared me for identifying children with autism.	2.11 (.10)	2.93 (.10)	Gender	1	2.41	.01
			Group	1	24.88***	.12
			Error	188	(1.15)	

[a] Adjusted marginal means. Values enclosed in parentheses represent mean square errors.
*p < .05. ** p < .01. *** p < .001.

agreement between the two coders was calculated using a percentage agreement index formula: [agreements / (agreements + disagreements)] x100%. An agreement was defined as an instance when both raters coded a given answer into the same category. Interrater reliability was high, with an overall percent agreement of 90%. Disagreements were resolved through discussion and consensus until 100% agreement on all responses was reached.

As a result of the grounded theory analysis, the responses were broken down into 96 items that described a particular obstacle. Similar items were grouped together to form six general categories of obstacles. Five of the items could not be coded into a general category because they were mentioned by less than 10% of respondents. These low-frequency items were combined into a general 'other' category. The top obstacle mentioned by physicians was lack of time, endorsed by almost half (46%) of those who responded to this question. The other obstacles mentioned were, in order from highest to lowest frequency: lack of training, education, or knowledge (32%); difficulties with screening tools (19%); difficulties with referrals (11%); lack of experience or confidence (10%); and, difficulties with parents (10%). These categories, along with general descriptions and examples of specific participant responses, are outlined in Table 18.

Table 18

Categories for the Obstacles Described by Participants, Including General Descriptions and Examples

Category	Description	Examples
Lack of time	Insufficient time to listen fully to parents, make observations, and/or perform a screening and assessment	"Use of screening tools due to time issue" "Time in appointment for proper assessment" "Limited observation time in regular office"
Lack of training/ education/ knowledge	Lack of training, education, or knowledge on autism and how to identify it	"Training to be able to identify autism cases" "Lack of education on the subject" "Inadequate teaching about it" "Up-to-date knowledge"
Difficulties with screening tools	Lack of good, easy-to-use screening tools or lack of tools in general	"Lack of easily administered, quick and reliable objective screening tools" "No good tools" "Tools should be readily available"
Difficulties with referrals	Lack of community resources or referral sources and long waiting times	"Lack of community resources to aid in diagnosis/treatment" "Lack of appropriate professionals to refer to" "Referrals have long waiting times"
Lack of experience/ confidence	Lack of experience with children with autism and lack of confidence in identifying autism	"Lack of exposure/clinical experience" "I have not seen enough" "Lack of confidence"
Difficulties with parents	Difficulties relying on parental report and dealing with parents who minimize, deny, or are reluctant to share concerns	"Highly dependent on parental observations/concerns in preschool children" "Sometimes they are in denial that anything is wrong" "Parents minimizing the problem"
Other	Includes difficulties diagnosing ASDs early, and lack of financial compensation	"Difficult to diagnosis early" "Not compensated"

CHAPTER IV

Discussion

The present study investigated screening and referral practices for ASDs among a group of Canadian primary care physicians. The purposes of the study were to compare current reported practices with published best practice guidelines, to explore whether demographic and attitudinal factors predict physicians' behaviours, and to investigate gender and age differences in physicians' ASD-related attitudes. The findings supported the hypotheses that female physicians would report higher rates of using formal screening tools and that physicians would be more inclined to report taking a wait-and-see approach with children under the age of two. In addition, the hypotheses that insufficient time to screen and long waiting lists would be the most common identified barriers to screening and referrals were supported. Last, as expected, specific physician attitudes were found to significantly predict reported screening and referral behaviour, independent of physician gender and age. This study also found significantly differing ASD-related attitudes between male and female physicians and between physicians and medical school students.

The other hypotheses of this study, however, were not supported. Specifically, physicians in this sample were not significantly more likely to report using informal, rather than formal, methods of screening. No significant differences were found between physicians' region of practice (i.e., metropolitan versus non-metropolitan) and any of the survey variables. In addition, there was a fairly high concordance rate in this study between reported and recommended physician practices.

Each of these results is discussed in further detail below, followed by implications

of the findings and suggestions for improving early identification of ASDs in primary care. Finally, limitations of the present study are discussed and ideas for future research are presented.

Physicians' Current Screening and Referral Practices

Screening Practices. Based on the reviewed literature, it was expected that the majority of physicians would report using informal methods to screen children for ASDs. In contrast, the results of the present study demonstrated that the physician sample was fairly split in their use of screening methods, with slightly less than half (i.e., 48%) of the sample endorsing some type of formal screening measure in conjunction with informal methods, such as clinical judgement. This finding is fairly consistent with prior research showing that a minority of physicians conduct formal screening. Specifically, previous studies conducted in the United States have documented formal screening rates of 46% (Sices et al., 2003) and 28% (Sand et al., 2005) for developmental screening, and 8% (Dosreis et al., 2006) and 42% (Zeiger, 2008) for targeted ASD screening. Thus, formal screening rates among Ontario G.P.'s in the present sample are higher than the rates previously reported but still fairly comparable to those of paediatricians in the United States.

Among those physicians in the sample who reported using formal screening tools, the majority endorsed using developmental measures, such as the Denver Developmental Screening Test, rather than ASD-specific measures. This finding suggests that Ontario physicians may not be familiar with or may not have access to recommended ASD-specific screening measures, such as the M-CHAT (Robins et al., 2001). Indeed, 79% of physicians in this sample endorsed 'lack of familiarity with available screening tools' as a

barrier to formal screening. Other barriers that may help to explain the relatively low rate of formal screening are described further below.

Also consistent with previous research (e.g., Sices et al., 2003; Sand et al., 2005; Zeiger, 2008), the results indicated that the majority of Ontario physicians in this sample are relying solely on their own clinical judgement, lists of developmental milestones, and/or parental concerns to screen for ASDs. While these informal methods are considered important components of the developmental surveillance process, they are considered to be less accurate than formal screening tools in identifying children who are at risk of ASDs at earlier ages (Johnson & Meyers, 2007).

Despite the relatively low rate of formal screening endorsed by physicians, more than two-thirds of the sample indicated that they would be likely to use a formal screening tool whenever they note signs and symptoms related to ASDs, whenever a parent expresses concerns related to ASDs, and/or when a child has a sibling with an ASD. This paradoxical finding may have been due to vague or confusing wording of the survey question. Alternatively, this finding may represent a gap between what physicians think they should be doing versus what they actually are doing in their everyday practices.

With respect to relevant demographic factors, physicians in the present study who endorsed the use of formal screening tools were more likely to be female, aged 50 or younger, and to have 22 or fewer years in practice than physicians who did not endorse formal screening. These results are consistent with previous research demonstrating that female physicians and younger physicians are more likely to routinely use formal screening tools (Sices et al., 2003; Dosreis et al., 2006; Zeiger, 2008) and, in general, to

provide recommended tests and services to patients (Thind et al., 2008; Ramirez et al., 2009). While it is difficult to tease apart the effects of gender and age, since younger physicians in Canada are more likely to be women (CIHI, 2008), results described further below may help to shed light on reasons for this consistent demographic difference.

Finally, physicians who endorsed formal screening were more likely: (1) to have a greater percentage of patients aged 3 or younger, (2) to have had some professional academic training related to ASDs, (3) to have read best practice guidelines related to ASDs, and (4) to report following best practice guidelines. Thus, not surprisingly, more exposure to, training, and awareness of ASDs and best practice guidelines may increase the chances of physicians adhering to recommended practices. While the current best practice guidelines are easily accessible on the Internet, physicians may not be aware of them or how to access them. Indeed, over half of physicians in this sample endorsed the barrier that there are unclear recommendations regarding appropriate screening practices for ASDs.

Referral Practices. The hypothesis that physicians from rural practice regions would be more likely than physicians from metropolitan regions to conduct ASD evaluations themselves was not supported. Unexpectedly, none of the physicians in this sample indicated that they would conduct an ASD evaluation of a child without also referring the child to a specialist. Furthermore, the majority of the sample indicated that they would refer suspected cases without performing an evaluation themselves. The other results of this study suggest several possible explanations for this finding. It may be that physicians are not confident in their abilities to conduct an evaluation and make a diagnosis themselves, or that they have not had the training or clinical experience to do

so, or perhaps they feel that there is not enough time in a patient visit to perform a comprehensive evaluation.

Similar to the screening results, physicians in the present study who indicated that they both refer and conduct an evaluation were more likely to report following best practice guidelines than physicians who refer only, suggesting that physicians who are aware of the guidelines are more likely to follow them. In addition, physicians who indicated that they both refer and conduct an evaluation were more likely to have fewer than 1000 patients in their practice, suggesting that these particular physicians may have more time in their schedules to conduct longer patient visits and developmental evaluations.

The majority of physicians in this study referred to paediatricians, rather than multidisciplinary teams of specialists or child psychologists. In addition, the majority of participants reported an average waiting time of between one and six months for a child to see a referral source, with few indicating wait times of more than six months. Even this relatively short time frame is considered too long by parents and specialists (Nachshen, 2008; Renty & Roeyers, 2006; Goin-Kochel et al., 2006), especially considering that parents will have to undergo another even longer wait for treatment services once a definitive diagnosis is made. Currently, families wait approximately two to four years to access government-funded intensive behavioural intervention programs in Ontario (Tam, 2010).

Of particular concern is the finding that physicians were significantly more likely to indicate that they would 'wait and see how symptoms progress' when presented with a vignette describing a child who was under age two in comparison to the same vignette

describing a child who was over age two. This finding is consistent with previous research showing that paediatricians in the United States are more likely to take a wait-and-see approach with children under age two and less likely to refer such young children for specialist assessments (Dosreis et al., 2006). Indeed, research suggests that many medical professionals are reluctant to diagnose ASDs in children under age three (Skellern, Schluter, & McDowell, 2005; Nachshen, 2008). Given the public push for early identification, it is unclear why physicians are less inclined to evaluate, diagnose, or refer very young children. Perhaps physicians are unaware of best practice guidelines recommending against the wait-and-see approach, no matter the age of the child (Johnson & Meyers, 2007; Nachshen, 2008), or newer research which has detected specific behavioural markers of ASDs that are identifiable in very young children (e.g., Bryson et al., 2007; Cassel et al., 2007; Rogers, 2009; Ozonoff et al., 2010). Another possibility is that physicians are less confident in their abilities to identify the early signs and symptoms of ASDs in this young age group.

Concordance with Best Practice Guidelines. Given the relatively low rates of formal screening reported in previous research, it was expected that a minority of GPs would report following the other recommended screening and referral activities as outlined in the Canadian best practice guidelines (Nachshen, 2008). Unexpectedly, there was a moderate concordance rate of 62% between reported and recommended screening and referral practices, with participants indicating that they would conduct, on average, between three and five of the seven recommended activities. Specifically, the majority of physicians endorsed being likely or very likely to conduct an informal screening, to use a general developmental screening tool, and to make referrals for an ASD evaluation, a

speech-language assessment, and for audiological testing. In contrast, a minority of participants endorsed being likely or very likely to use an ASD-specific screening tool, provide education about ASDs, or refer for early intervention. While physicians' level of compliance with these other recommended activities, beyond formal screening, has not been previously studied, the concordance rate in the present study was higher than initially expected. It appears that, once a child is suspected of having an ASD, Ontario physicians are quite likely to take the next logical step of referring a child for the recommended assessments in order to obtain or rule out an ASD diagnosis. However, they are unlikely to jump into immediately referring a child for early intervention services prior to confirming that a diagnosis is present. In addition, despite very specific and emphatic statements within the best practice guidelines which recommend against the wait-and-see approach, 8% of physicians in the present sample endorsed that they would be likely to conduct this one non-recommended activity. This finding is consistent with parental reports describing that they were told by physicians that there was no cause for concern, that no immediate action was needed, or that they should wait for their children to grow out of their problems (Howlin & Moore, 1997; Schall, 2000; Hutton & Caron, 2005; Nachshen, 2008). While 8% may be considered a relatively low proportion of physicians who recommend the wait-and-see approach, this figure also represents countless numbers of children who may be delayed in receiving appropriate assessment and treatment services.

To further assess physicians' knowledge of best practice guidelines, participants' ability to identify the "red flags" of ASDs was explored and was found to be moderate. Specifically, physicians in this sample correctly identified an average of 4 out of the 7 red

flag symptoms. Notably, while the majority of physicians (i.e., more than 64%) correctly identified six of the seven red flags, including 'lack of response to name by 12 months' and 'no babbling by 12 months,' only 20% of physicians in the sample correctly identified 'lack of joint attention' as an indication that a child should be evaluated. It may be that many Ontario physicians are not familiar with the concept of joint attention and its relevance as an early and primary indicator of ASDs.

Strikingly, questions that asked participants about their familiarity with best practice guidelines for ASDs revealed that a minority of physicians had read these recommendations (34%) and even fewer reported that they follow them (20%). These results highlight the work that still needs to be done to promote the utility of ASD best practice guidelines.

Factors Influencing Physicians' Screening and Referral Practices

Barriers to Screening and Referral. Previous surveys of paediatricians in the United States have outlined a number of perceived barriers to conducting recommended screening and referral activities (Halfon et al., 2001; Dosreis et al., 2006). Consistent with these surveys, the two most commonly reported barriers to the use of formal screening tools was 'insufficient time to screen' and 'lack of familiarity with available screening tools', both endorsed by 79% of the physician sample. Physicians who did not endorse formal screening in the present study were significantly more likely to indicate a lack of familiarity as a barrier to screening. Other barriers, endorsed by approximately half of the sample, included unclear recommendations regarding appropriate screening practices for ASDs, lack of access to screening tools, and lack of confidence in identifying ASDs.

Interesting gender differences were also found. Specifically, male physicians were significantly more likely to endorse a lack of confidence in identifying ASDs as a barrier in comparison to female physicians. In contrast, female physicians were significantly more likely than were male physicians to endorse unclear recommendations regarding appropriate screening practices as a barrier. Thus, there appears to be specific gender differences in terms of what factors are perceived as barriers to formal screening, which in turn may play a role in whether male and female physicians choose to conduct formal screening.

As expected, the most commonly reported barrier to making referrals was long waiting lists, endorsed by 64% of participants. Consistent with a prior survey (Woods & Wetherby, 2003), physicians also endorsed 'lack of familiarity with available referral sources' and 'lack of specialists in the area' as major barriers to referrals. A gender difference in perceived barriers to referrals was also found, with female physicians being significantly more likely to endorse long waiting lists as a barrier in comparison to male physicians.

Although physicians in non-metropolitan regions were more likely than physicians in metropolitan regions to endorse a lack of community specialists as a barrier to referrals, the association was not statistically significant. In addition, there were no significant associations between practice region and any other endorsed barriers to screening and referrals. Thus, overall, there appears to be few regional differences within Ontario in terms of physicians' perceived barriers and perceptions of the availability and accessibility of community specialists and resources.

A qualitative analysis of perceived barriers revealed quite similar results. Given

the time constraints that physicians have for filling out surveys, their written responses were, not surprisingly, quite brief and typically included just a few words or a short statement. When asked to indicate major obstacles to identifying children with ASDs in the primary care setting, the top obstacle mentioned was lack of time. Many physicians wrote that there was not enough time during a regular office appointment to use screening tools or to conduct a proper assessment. Other commonly noted obstacles were: (1) a lack of training, education, and/or knowledge; and (2) general difficulties with screening tools. For example, some participants felt that they had inadequate training and education on ASDs and how to identify them and that there is a lack of easily administered, quick or reliable screening tools for use. Physicians also noted difficulties with referrals and a lack of experience and confidence. Specifically, they commented on a lack of community resources to refer to for diagnosis and/or treatment, long waiting times to access referral sources, and a lack of clinical experience with children with ASDs as well as a lack of confidence in identifying ASDs. Last, difficulties with parents were noted, with physicians indicating that parents sometimes minimize the problem or deny that anything is wrong. Clearly, there are multiple perceived barriers preventing physicians from carrying out best practice activities in the primary care setting. Interventions aimed at improving physicians' early identification practices, some of which are suggested further below, will need to focus on strategies for overcoming these barriers.

Beliefs and Attitudes. Studies in the medical literature have demonstrated that medical decision-making, such as the decision to use formal screening tools, can be influenced by physicians' attitudes (e.g., Tudiver et al., 2002; Marcell et al., 2002;

Kennedy et al., 2004). Findings in the current study extended this research by specifically examining physician attitudes related to ASDs and screening and by exploring gender and age differences in ASD-related attitudes. As hypothesized, specific beliefs and attitudes were found to predict physicians' best practice behaviour, even after controlling for known relevant factors such as gender and age. Specifically, physicians with more favourable attitudes towards early identification and physicians with stronger feelings of self-efficacy had higher best practice scores (i.e., they reported that they were likely to conduct a greater number of best practice activities). Attitudes toward referrals and formal screening were not found to be significant predictors.

Similar results were obtained when analyses were restricted to only the male physicians in the sample. Specifically, more favourable attitudes towards early identification and stronger feelings of self-efficacy were again strong predictors of best practice behaviour among the male physicians in this study. Neither age nor attitudes towards referrals or formal screening were shown to be significant predictors among the males. In contrast, when the effects of attitudes were examined among the female participants only, slightly different results were obtained. Over and above the effects of age, female physicians who had stronger feelings of self-efficacy and more favourable attitudes towards formal screening had higher best practice scores. Attitudes toward early identification and referrals were not significant predictors of best practice behaviour among the female physicians.

The present study also demonstrated specific gender and age differences in ASD-related attitudes. First, with respect to gender differences in attitudes, female physicians demonstrated more favourable attitudes toward early identification than did male

physicians. Specifically, the female participants felt significantly more strongly than males that it was important for children with ASDs to receive early intervention as early as possible. In addition, female physicians demonstrated greater self-efficacy beliefs in comparison to male physicians, with females feeling significantly more competent than males at identifying symptoms of ASDs, conducting a screening for ASDs, and identifying children with ASDs without the use of a formal screening tool. Last, male physicians in this study had more favourable attitudes regarding community resources and referrals than did the female physicians. Specifically, male physicians felt significantly more strongly than did females about there being sufficient resources in their community to provide early intervention services for children with ASDs. There were no gender differences regarding attitudes toward formal screening.

The study also demonstrated specific age differences when comparing ASD-related attitudes among physicians and a subsample of medical school students, even after controlling for the effects of gender. The students demonstrated greater self-efficacy beliefs than did the physicians. Specifically, students felt significantly more competent than physicians at identifying symptoms of ASDs and conducting a screening for ASDs. Students also felt more strongly that their educational training prepared them for identifying children with ASDs. In addition, students demonstrated more favourable attitudes toward community resources and referrals in comparison to physicians. Specifically, students felt significantly more strongly than did physicians about there being sufficient resources in their community to provide early intervention services for children with ASDs.

Clinical Implications

The current survey of primary care physicians in Ontario indicated that a substantial proportion of physicians are reporting practices that are inconsistent with current ASD screening and management guidelines. Of particular concern is the finding that many physicians are continuing to rely on clinical judgement alone to identify developmental problems and ASDs instead of using standardized screening tools. A major source of medical mistakes is believed to stem from errors in clinical judgment (Berner & Graber, 2008). Thus, in order for physicians to adhere to best practice guidelines regarding ASD screening, they must accept that clinical judgement is not enough. If physicians continue to rely primarily on informal methods of clinical observation and judgement instead of administering formal screening tools, they will likely continue to miss many opportunities to identify young children at risk for ASDs.

The finding that there are identifiable gender and age differences in ASD-related attitudes which can predict physicians' behaviour also has important clinical implications. The present study demonstrated three key findings: (1) female physicians are more likely to use formal screening tools than are male physicians; (2) physicians with greater self-efficacy beliefs and more positive attitudes toward early identification are more likely to engage in best practice behaviours, including formal screening; and (3) female physicians have greater self-efficacy beliefs and more positive attitudes toward early identification than do male physicians. Together, these results point to self-efficacy and early intervention beliefs as major attitudinal influences on physician behaviour which may partly explain the often cited gender difference in screening in the medical literature.

Why do female physicians feel more competent and confident than do male physicians? It might seem counterintuitive that the group of physicians who feels more confident at identifying ASDs are the ones who are engaging in more formal screening, as presumably they would feel competent and confident enough to rely on their clinical judgement abilities. Perhaps the reverse is true – that female physicians feel more competent and confident *because* they are using formal screening tools to supplement their own clinical judgement. In other words, with repeated exposure to and practice in using screening tools, female physicians may be gaining more familiarity with the early signs and symptoms of ASDs, the behaviours to look for, and specific developmental questions to ask parents, all of which may lead to an increase in confidence in identifying ASDs.

Why do female physicians feel more dissatisfied with community resources than do male physicians? Previous research suggests that female physicians make more follow-up recommendations, make more referrals, and feel more responsible for their patients' follow-through than do male physicians (Franks & Bertakis, 2003; Bertakis, 2009; Ramirez et al.). Therefore, if female physicians in Ontario have greater contact and follow-ups with community resources and specialists than do male physicians, they may also be experiencing greater difficulties and frustrations and, hence, more dissatisfaction with those resources. For instance, this study suggests that females are unhappy with the length of waiting lists to access specialist services, which would be particularly frustrating if they are waiting on follow-up reports from those services in order to provide families with further referrals or recommendations.

While these attitudinal differences provide some insight into gender differences in physician behaviour, much is still unknown about why male and female physicians think and act differently. A variety of theories point to some aspect of the socialization process, such as parental and peer influences, sex role stereotypes, and cultural values and norms, as a potential source of gender differences (Aries, 1996; Wood, 1999; Kimmel, 2000). Regardless of the origins, integrating certain feminist principles into physician education and training (e.g., highlighting communication and interactional skills) could be used to enhance physician behaviour and skills for both genders.

The identified age-differences in ASD-related attitudes found in the current study also have implications. Current students, in comparison to practicing physicians, feel more competent at identifying symptoms of ASDs and conducting a screening for ASDs and they also feel that their educational training has better prepared them for identifying ASDs. There are several potential explanations for these findings. It is possible that current medical school students are, in fact, receiving more education and training related to developmental problems and ASDs and therefore are feeling more confident at identifying and managing children with ASDs in their future practices. Students may also feel more confident than physicians due to the recency of their training. Whether their strong self-efficacy beliefs will persist once they complete medical school and receive further clinical experience is not known. Alternatively, given their limited training and lack of work experience, it is also quite possible that medical school students are overconfident and/or overly optimistic about their training and abilities, whereas the physicians are more realistic about their competencies.

Current medical training specific to the care of individuals with developmental disabilities remains quite limited, suggesting that students' self-efficacy beliefs may not be equal to their actual abilities. While Canadian primary care guidelines developed in 2006 recommend that medical schools devote a minimum of 22 curriculum hours of training in the area of developmental disabilities (Sullivan et al., 2006), medical schools within Ontario typically offer a maximum of one full day of teaching, in addition to one or two specific lectures and problem-based learning modules specific to developmental disabilities (Burge, Ouellette-Kuntz, Isaacs, & Lunsky, 2008). In a study of upper-year medical students at Queen's University and the University of Toronto, the majority of students in the sample indicated that, while the quality of instruction in developmental disabilities was "good" or "better", there was a need for more medical training in this area (Burge et al., 2008). Indeed, only 40% of medical school students in the present sample agreed or strongly agreed that their educational training prepared them for identifying children with ASDs. Thus, while the present study suggests that current students may feel more confident and prepared than do physicians, there remains much room for improvement for medical school training in this topic area.

Suggestions for Intervention. The present research findings provide specific suggestions for future interventions aimed at increasing appropriate screening, identification, and referral for ASDs among Canadian primary care physicians. Several public awareness campaigns from the media and public agencies, such as the CDC's "Know the Signs, Act Early" (CDC, 2010) and First Signs (First Signs, 2011), are currently actively promoting education about ASDs in order to promote earlier diagnosis and intervention. While these campaigns initially focused on educating parents and

health care professionals about the early warning signs of ASDs, there has been increasing awareness in recent years that it will require more than increasing physician knowledge to increase early screening and referral rates. This conclusion is supported by the current research findings demonstrating that there are practical and attitudinal barriers which also need to be addressed in order to increase physician adherence to clinical best practice guidelines. The CDC and First Signs campaigns currently offer a wealth of resources and information to address these other barriers. For instance, First Signs currently offers a screening kit for physicians that not only includes an educational DVD, an outline of developmental milestones, and guidelines to walk physicians through the recommended screening and referral process, but also includes a sample of validated screening tools for developmental and ASD screening. Similarly, the CDC offers similar information on their website and a direct link to download the M-CHAT with instructions from the first author's website (Robins, n.d.). Making this information and these types of kits widely available to Canadian physicians would certainly help to overcome the top rated barrier reported in the current study, beyond lack of time, which was a lack of familiarity with available screening tools. Physicians need to know which screening tools are currently recommended for use with young children, how to access them, and how to use them. This may mean actively distributing screening tools to physicians so that they have them readily available in their offices and can gain practice in using them.

The above campaigns do not, however, address the other top rated barrier to formal screening in the present study – that is, lack of time. Time constraints are consistently reported as a major obstacle to screening in physician surveys (e.g., Dosreis et al., 2006). Public awareness campaigns and national screening initiatives that do not

address time constraints may do little to improve physicians' actual practices. Thus, it is important to consider ways that physicians can incorporate screening into a visit while minimizing the amount of time that is used. A primary solution would be to encourage the use of validated parent-completed screening tools, which have the potential to reduce the amount of direct physician time needed for screening. For instance, a parent could fill out a questionnaire at home prior to the visit, in the waiting room, or with the assistance of a staff member prior to seeing the physician. The results could then be quickly scored by the staff member or physician, leaving more time in the actual medical visit for discussion of the results and parental concerns. An alternative solution would be to encourage a more collaborative healthcare model where other professionals could share the responsibility of routine developmental screening. For instance, family physicians could continue to conduct ongoing developmental surveillance but nurses, nurse practitioners, teachers, and early intervention specialists could also be relied on to administer formal screening tools and make appropriate referrals when needed.

The top rated barrier to referring children to specialists will also need to be addressed. The majority of physicians in this sample, and female physicians in particular, felt that a major barrier to referrals was long waiting lists. While there are no currently available government data regarding how long children in Ontario wait to access referral sources, physicians in this study indicated average wait times of up to six months, suggesting that this timeline is considered too long by many physicians. Improving wait times in Ontario would require government intervention to increase funding and access to diagnostic specialists. However, improving wait times for assessments may seem less of a priority considering that the ASD community in Canada has been advocating for years

for decreasing wait times for early intervention services, with approximately 1500 children on the waiting list for government-funded IBI as of 2010 (Toronto Star, 2010).

Along with addressing these practical barriers, it will certainly be important to continue to promote knowledge about ASDs, including the early signs and symptoms. The findings of the present study suggest that most physicians are aware of six of the seven red flag symptoms of ASDs, with the exception of joint attention. Only 20% of physicians in the sample correctly identified a lack of joint attention as an indication that a child should be evaluated for an ASD. Thus, educational campaigns and training programs should emphasize in plain language what joint attention looks like in young children. While most formal screening tools inquire about a child's joint attention skills, physicians can also learn simple methods for assessing for it in a medical visit by attempting to direct a child's attention to objects within the room and observing the child's response.

A major effort must also be directed towards changing physicians' perceptions of their own abilities and of the importance of early intervention. Changing physician attitudes may require changes in how students are educated during their medical training. For example, this may include not only making students and physicians more familiar with available screening tools but also specifically teaching them how to use these tools and that the use of these tools will significantly increase the numbers of children identified with ASDs, as well as teaching about the importance and effectiveness of early behavioural intervention. The majority of physicians in this study indicated that they had none to very little professional training and experience related to ASDs. It seems logical and efficient to train physicians during their years of medical education, rather than

attempting to retrain them once they are already in practice. Still, ongoing education for practicing physicians will be needed as knowledge about ASDs and diagnostic criteria are continually evolving.

Increasing physicians' general awareness of best practice guidelines is also important. A minority of physicians in this study had read published best practice guidelines for ASDs. If a large proportion of physicians are not familiar with recommended practice guidelines, it stands to reason that they are not incorporating these recommendations into practice. In this regard, the professional medical societies might consider increasing the visibility of such guidelines by offering training opportunities, such as workshops at national meetings. Condensing these guidelines into a simpler, briefer format for physicians may also prove helpful, particularly considering that the current Canadian guidelines are a lengthy 89 pages (Nachshen, 2008). The guidelines do, however, include a brief two-page summary which may be appropriate for widespread dissemination to physicians.

Although clinical practice guidelines regarding assessment practices for ASDs have been promoted for more than a decade, the results of this and previous studies (e.g., Wolfe, Sharp, & Wang, 2004; Zeiger, 2008) suggest an apparent lack of influence of these guidelines on the day-to-day practice of physicians. In fact, previous reports suggest that it takes 17 years, on average, for physicians to integrate clinical recommendations into routine medical practice (Institute of Medicine Committee on Quality of Health Care in America, 2001). Thus, despite all of the above recommendations and suggestions, important questions remain. How relevant are best practice guidelines for physicians' clinical practices? Is it practical, even necessary, to

expect physicians to carry out these recommended activities? For instance, the Canadian guidelines currently recommend that physicians simultaneously refer a child both for assessments and for early intervention (Nachshen, 2008). Physicians in the present study indicated that they would be likely to refer a child for an ASD evaluation, a speech-language assessment, and an audiological assessment, but they would be unlikely to immediately refer a child for early intervention. Immediate referrals to early intervention programs may, in fact, be inappropriate given the current health care system in Ontario. Specifically, organizations in Ontario which provide government-funded IBI services currently require a diagnosis for a child to be placed on the waitlist (Ontario Ministry of Children and Youth Services, 2010). Thus, within this context, it makes sense that physicians would need to wait for a firm diagnosis prior to referring a child for early intervention. Moving forward, it will be important to consider which guidelines are both necessary and practical in clinical practice.

Theoretical Implications

The Health Belief Model (HBM) proposes six attitudinal elements that might influence whether or not an individual will perform a health behaviour: perceived susceptibility and perceived severity of a disease, perceived benefits of and barriers to action, cues to action, and self-efficacy. In the present study, ASD-related attitudinal variables based on the HBM elements were able to explain a sizeable percentage of the variance in physicians' best practice behaviour. Thus, the results lend support to the HBM and to the appropriateness of using components of the model to predict physician behaviour.

The present results also suggest that perhaps not all sources of attitudinal

influence are equal, with the perceived benefits and self-efficacy elements of the HBM emerging as significant independent predictors of physicians' behaviour. This finding is congruent with HBM theory, which asserts that physicians would be less likely to conduct recommended activities if they did not believe in the importance of such activities or lacked confidence in their abilities to do so. In addition, it is noteworthy that, of the HBM variables, self-efficacy was the strongest predictor of physicians' behaviour in the present study. This finding is consistent with previous applications of the HBM that have found significant effects for self-efficacy in relation to physician behaviour (e.g., Olson et al., 2002; Leiferman et al., 2010). The finding also provides support for the 1988 expansion of the HBM (Rosenstock, Strecher, & Becker, 1988) to include a focus on individuals' confidence in their abilities to perform a recommended behaviour. Still, a large percentage of the variance in physician's best practice behaviour in the present study remains unexplained. This suggests that there are important predictor variables that were not studied and that the HBM might benefit from further elaboration. For example, other models of preventive health behaviour that built on the HBM have included variables related to locus of control, availability of resources, social pressures, and constraints on action, such as job demands (Antonovsky & Kats, 1970; Langlie, 1977; Mechanic, 1995).

Overall, the HBM has proven useful in providing a better understanding of specific attitudinal variables that predict physicians' ASD-related practices. However, the model is not as useful in providing an understanding of how physicians' beliefs and attitudes are expected to interrelate. How do physicians' attitudes influence one another? How might they combine to influence behaviour? Such questions were beyond the scope

of the current study but should guide further testing of the structural characteristics of the HBM in relation to physician behaviour.

Limitations

There are a number of limitations to the present study. Most notably, the overall response rate was lower than expected and lower than that reported in other previous survey studies of U. S. physicians (e.g., Sices et al., 2003; Sand et al., 2005; Dosreis et al., 2005). However, the response rate was quite consistent with response rates found among Ontario GPs in the 2005 and 2008 national physician surveys (College of Family Physicians of Canada, 2005, 2008). In fact, the current study's response rate was almost double that reported for the most recent 2010 survey (College of Family Physicians of Canada, 2011).

There are several possible reasons for the low response rate. First, other previous physician surveys provided individual monetary incentives to participants (e.g., Sices et al., 2003; Dosreis et al., 2006), and small financial incentives have been shown to increase physician survey response rates (VanGeest, Johnson, & Welch, 2007). The present study did not include individual financial incentives, but rather offered a chance to win one larger financial incentive. Second, endorsements by professional associations are also known to increase physician survey response rates (VanGeest et al., 2007). The cover letter and study materials for the present survey documented a university affiliation and indicated that the survey was being conducted by a graduate student as a dissertation project. However, the study was not endorsed by an organized medical group. Other studies on similar topics have been conducted by physicians who were already recognized and published experts in their field. In addition, the low response rate may be

related to the length of the survey. Previous research suggests that participants are 60% more likely to respond to shorter versus longer questionnaires (Edwards et al., 2009), and that any questionnaire that exceeds 1000 words, as does the present study's survey, might be considered too long (Jepson, Asch, Hershey, & Ubec, 2005). Since the present study was conducted for the purposes of the doctoral dissertation, the benefits of using a shorter survey had to be weighed against the benefits of obtaining more research data. Still, despite a lower response rate, responses were obtained from all geographical regions within Ontario. An investigation into possible region-by-region differences might yield interesting findings, but for the purpose of this study and considering the relatively low amount of participants in some regions versus others, the results were presented as a whole provincial sample.

Another limitation of the present study pertains to the potential self-selection bias. As with any survey, only those interested in the survey content will likely choose to participate. This may also partly explain the low response rate. The title and content of the survey clearly indicated the purpose of the study which may have influenced who chose to respond and who chose not to. Thus, physicians with a strong interest in ASDs may have been more likely to respond than those without that interest. It is also possible that the physicians who chose to respond represent a subset of physicians who are more knowledgeable than the larger physician population in terms of developmental screening and ASDs. Given that half of the sample reported having a family member or friend with a developmental disability, it appears likely that this group of physicians would be more interested and/or more familiar with the study topic. In addition, analyses comparing respondents with non-respondents suggest a possible non-response bias in that a higher

than expected proportion of female physicians from urban areas, such as Toronto, responded to the study. However, it should be noted that the regional bias found in this study reflects actual census data indicating that the greatest percentage of Ontario family physicians practice in the urban Toronto area (OPHRDC, 2007). Furthermore, physicians' region of practice was not significantly associated with any of the survey variables. Nevertheless, responder bias may limit the generalizability of the results.

With respect to the questionnaire, because the order of survey questions was not counterbalanced, it is possible that physicians' responses to earlier items in the questionnaire affected their responses to later items, including the attitudes scale. However, because of the nature of a mailed self-report survey, even with the use of counterbalancing it would not have been possible to guarantee that participants completed survey items in the order presented. In addition, although the questionnaire was reviewed by two Ontario GPs, it was not pilot tested among a larger representative sample before administration. A pilot study may have helped enhance the content validity and reliability of the survey.

A final limitation of this study was the reliance on physician self-report. Because the method of data collection relied on the accuracy and validity of physicians' self-report, the data may not be as accurate as data collected using more reliable, direct observation methods. Certainly, a bias could result from physicians reporting a higher level of service delivery than they actually practice, or more positive attitudes than they actually believe. For instance, it is possible that this bias is related to the higher rate of formal screening found in this study compared to other previously reported studies. Therefore, the present results should be cautiously interpreted as they may reflect an

optimistic bias in terms of actual physician practices.

Future Research

First and foremost, the present research results need to be replicated with a larger sample size to allow for better application to the general Canadian GP population. It would also be interesting to replicate the results with a group of Canadian paediatricians, as paediatricians have more specialized education and training than do GPs and, therefore, may have a different perspective than other primary care providers. Furthermore, studies are needed that look more closely at GPs' education and training in developmental delays and ASDs in medical school and residency in order to identify potential areas of training that could be improved.

One major area of concern identified by this and previous studies is that of the barriers preventing primary care physicians from using formal screening tools and following best practice guidelines. The current study highlighted the particular relevance of attitudinal barriers. More research in the area of physicians' attitudes and how to modify them needs to be done. Changing physicians' beliefs and attitudes, especially those tied to self-efficacy, may prove much more challenging than increasing physicians' familiarity with available screening tools, but will be particularly important for improving primary care screening practices.

It is clear that the publication of best practice guidelines has not been sufficient in changing physicians' practices to date. Further research into increasing the accessibility and ease of use of best practice guidelines for GPs would also be important. Last, it would be beneficial for future research to also investigate the types of professional trainings, workshops, and interventions that physicians would be likely to participate in,

as well as exploring the impact and effectiveness of educational and clinical interventions in modifying physicians' practices.

Conclusion

To our knowledge, the present study represents the only investigation of Canadian physicians' assessment and referral practices for ASDs reported to date and includes data from a diverse set of family physicians within Ontario. Although based on a small sample of the overall target population, these data highlight tangible opportunities to improve physicians' screening and referral practices. First, training to increase physicians' skill set in identifying the early symptoms of ASDs and in the use of formal screening tools may improve physician behaviours and their self-efficacy in identifying ASDs in young children. Ideally, this training would begin prior to graduation from medical school. Second, better dissemination and emphasis of endorsed best practice guidelines should be provided, since most physicians in this study seemed unaware of such guidelines and inadequately trained in this topic area. Third, focused efforts to recognize and address gender-specific and age-specific behaviours and attitudes are important and may help to increase physician adherence to clinical practice guidelines. Finally, further evaluation of potential barriers to formal screening and early identification, including both practical and attitudinal barriers, is needed. As ASD screening initiatives move forward, it would seem essential to consider strategies to overcome the barriers to recommended screening and referral practices that were identified in the present study. Addressing these issues in future ASD initiatives may increase the chances that an effective ASD screening and referral strategy becomes better integrated into primary care practice.

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Appendix A

Methodology Feedback Questionnaire Results

I would be most likely to participate in a survey that is provided by (check only one):

Mail	**70%**
Internet	30%
Phone	0%
No preference	0%

The longest amount of time that I would be willing to spend on a survey is (check only one):

Up to 15 minutes	**100%**
Up to 20 minutes	0%
Up to 30 minutes	0%

I would be more likely to participate in a study if the following incentive was provided to me (check the three options that would influence you the most):

$1.00 up-front	0%
A lottery that will select <u>one</u> participant to win $250	**40%**
A lottery that will select <u>three</u> participants to win $100	0%
A lottery that will select <u>six</u> participants to win a $50 gift card to Chapters	20%
A lottery that will select <u>one</u> participant to win a case of wine	30%
An informational article for physicians about screening for autism	**50%**
A screening instrument for autism	**80%**
A poster of the early warning signs for autism	30%
A letter from a physician regarding the importance of this topic	20%
A letter from a parent of a child with autism about the importance of this topic	0%
I would prefer no monetary incentive	0%
I would prefer no informational incentive	0%
I would prefer no incentive	0%
Other (please specify):	0%

Appendix B

Permission to Distribute the CAIRN Newsletter

From:	"Sherry Cecil" <cecils@univmail.cis.mcmaster.ca>
Subject:	Re: Use of newsletter for study
Date:	Fri, 04 May 2007 11:59:39 -0400
To:	zicherm@uwindsor.ca

Hello, Andrea.

I do apologize for the lateness of my reply. By all means, please distribute the newsletter widely if it can be of help. We have made it available to a number of other educational institutions and it is now being used as part of the curriculum in some of them.

Thank you for your feedback.

Regards,

Sherry Cecil
Communications Consultant
Offord Centre for Child Studies
Chedoke Site, Patterson Building
1200 Main Street West
Hamilton, ON L8N 3Z5
Phone: 905-521-2100, ext. 74946
Fax: 905-574-6665
email: cecils@mcmaster.ca

Appendix C

Permission to Distribute the M-CHAT

From:	"Diana Robins" <psydlr@langate.gsu.edu>
Subject:	Re: Use of M-CHAT for study
Date:	Mon, 07 May 2007 12:43:18 -0400
To:	"Andrea Berenstein" <zicherm@uwindsor.ca>

Dear Andrea,
You are welcome to distribute the M-CHAT and scoring instructions. If it's hard copy/PDF, please use the version with our copyright at the bottom. If you want to refer to the links on the internet, please refer physicians to www.firstsigns.org

Best of luck with your study.
Diana Robins

Appendix D

Study Questionnaire

University of Windsor

SURVEY OF SCREENING AND REFERRAL PRACTICES FOR AUTISM

Please indicate your consent to participate in this study by noting your initials here: ____

A. How do you <u>screen</u> children for autism in your practice (check all that apply):

1. □ I ask about attainment of typical developmental milestones
2. □ I ask parents about developmental concerns
3. □ I obtain a family history of autism spectrum disorders
4. □ I engage children in social and communicative interactions and observe their behaviour
5. □ I use clinical judgment
6. □ I use a parent-completed general developmental screening tool
7. □ I use a parent-completed autism-specific screening tool
8. □ I use a physician-administered general developmental screening tool
9. □ I use a physician-administered autism-specific screening tool
10. □ Other: _____

B. Which of the following <u>formal screening tools</u> do you use to screen children for autism (check all that apply):

1. □ I do not use formal screening tools
2. □ Ages and Stages Questionnaire (ASQ)
3. □ Battelle Developmental Inventory Screening Tool (BDI-ST)
4. □ Bayley Infant Neurodevelopmental Screen (BINS)
5. □ Brigance Screens-II
6. □ Child Development Inventory (CDI)
7. □ Denver Developmental Screening Test (Denver or Denver-II)
8. □ Parents' Evaluation of Developmental Status (PEDS)
9. □ Checklist for Autism in Toddlers (CHAT)
10. □ Modified Checklist for Autism in Toddlers (Modified-CHAT)
11. □ Pervasive Developmental Disorders Screening Test-II (PDDST-II)
12. □ Other: _____

C. How likely are you to use an <u>autism-specific</u> screening tool in the following situations (circle your response):

	Very Unlikely	*Unlikely*	*Likely*	*Very Likely*
1. At the 18 month well-child visit	1	2	3	4
2. At the 24 month well-child visit	1	2	3	4
3. Whenever I note or observe signs and symptoms related to autism	1	2	3	4

4. Whenever a parent expresses developmental concerns related to autism	1	2	3	4
5. When a child has a sibling with autism or other developmental disability	1	2	3	4

D. When autism is suspected, do you refer a child to a specialist for an autism evaluation or do you perform the evaluation yourself (check one):

1. □ I refer 2. □ I perform the evaluation myself 3. □ I do both

E. If you refer a child suspected of autism, to whom do you refer (check all that apply):

1. □ Paediatrician
2. □ Child psychologist
3. □ Child psychiatrist
4. □ Child neurologist
5. □ Speech-language pathologist
6. □ Audiologist
7. □ Occupational therapist
8. □ Social worker
9. □ Behavioural & educational specialist
10. □ Multidisciplinary team of specialists
11. □ Other: _____

F. In past referrals, what was the average waiting time for a child to see the referral source (check one):

1. □ < 1 month 2. □ 1 - 6 months 3. □ 7 - 12 months 4. □ > 12 months

G. Brian, a 26-month-old boy, is accompanied by his mother for a visit. Brian's physical exam is normal. Brian's mother reports that he is walking well and has 10 words. He can occupy himself for an hour at a time, and his mother comments: "He doesn't seem to need anything from me. He ignores me when I call to him, and he doesn't look at me like my other children do." Brian's mother believes his behaviour will improve "when he learns to use his words to tell me what he wants, instead of just repeating them back to me." When you point to a picture on your office wall and ask Brian to look at it, he does not respond. **Based on this information, how likely would you be to perform each of the following activities (circle your response):**

	Very Unlikely	*Unlikely*	*Likely*	*Very Likely*
1. Wait and see how symptoms progress	1	2	3	4
2. Conduct an informal screening (e.g., further probing of social-communication skills)	1	2	3	4
3. Use a formal general developmental screening tool	1	2	3	4
4. Use a formal autism-specific screening tool	1	2	3	4
5. Provide education about autism and a list of available community resources	1	2	3	4
6. Immediately refer Brian for a comprehensive autism evaluation by a specialist	1	2	3	4

7. Immediately refer Brian to an early intervention program	1	2	3	4
8. Immediately refer Brian for a speech-language assessment	1	2	3	4
9. Immediately refer Brian for audiological testing	1	2	3	4

H. If Brian was 18-months-old, how likely would you be to wait and see how symptoms progress (check one):

1. □ Very Unlikely 2. □ Unlikely 3. □ Likely 4. □ Very Likely

I. Which of the following symptoms are considered absolute indications that a child should be evaluated for autism (check all that apply):

1. □ Lack of warm, joyful expressions
2. □ Lack of response to name by 12 months
3. □ No babbling by 12 months
4. □ Lack of appropriate eye gaze
5. □ Lack of coordination of nonverbal communication
6. □ No gesturing (pointing, waving bye-bye, etc) by 12 months
7. □ Lack of attention-seeking behaviours
8. □ No single words by 16 months
9. □ Lack of imitation
10. □ Repetitive movements or posturing of body, arms, hands, or fingers
11. □ No 2-word spontaneous (not just echolalic) phrases by 24 months
12. □ Solitary or unusual play patterns
13. □ Any loss of any language or social skills at any age
14. □ Lack of joint attention

J. Which of the following are obstacles, in your practice, to the use of formal screening tools for autism (check all that apply):

1. □ Insufficient time to screen
2. □ High costs of using screening tools
3. □ Lack of familiarity with available screening tools
4. □ Lack of access to screening tools
5. □ Lack of confidence in screening tools (e.g., too many false positives)
6. □ Lack of confidence in using screening tools
7. □ Lack of knowledge about autism
8. □ Lack of confidence in identifying autism
9. □ Unclear recommendations regarding appropriate screening practices for autism
10. □ Other issues have greater priority
11. □ Other:_____

K. Which of the following are obstacles, in your practice, to referring suspected cases of autism to community specialists (check all that apply):

1. □ Lack of familiarity with available referral sources

2. □ Lack of specialists in the area
3. □ Long waiting lists
4. □ Referral sources are not useful or helpful
5. □ Difficulties with the referral system
6. □ Other: _____

L. Indicate the extent that you agree or disagree with each of the following statements (circle your response):

1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

1. Autism is one of the most common developmental disabilities affecting children today.	1	2	3	4	5
2. Children who have siblings with autism or other developmental disabilities are at increased risk of having autism.	1	2	3	4	5
3. Autism is a serious, lifelong disability.	1	2	3	4	5
4. Without treatment, autism leads to negative developmental outcomes for children.	1	2	3	4	5
5. It is important to identify children with autism as early as possible.	1	2	3	4	5
6. It is important for children with autism to receive intervention services as early as possible.	1	2	3	4	5
7. Early intervention services for young children with autism are effective.	1	2	3	4	5
8. It is important for physicians to spend time using formal screening tools.	1	2	3	4	5
9. Formal screening tools are an effective method for identifying autism.	1	2	3	4	5
10. It is important to get a second opinion from another professional.	1	2	3	4	5
11. It is possible to identify autism in a child under 2 years of age.	1	2	3	4	5
12. Discussing the possibility of autism will not upset parents.	1	2	3	4	5
13. There are sufficient resources in my community to provide specialized evaluation services for children suspected of autism.	1	2	3	4	5
14. There are sufficient resources in my community to provide early intervention services for children with autism.	1	2	3	4	5
15. Parents generally follow through on my recommended referrals.	1	2	3	4	5
16. I am competent at identifying symptoms of autism.	1	2	3	4	5
17. I am competent at conducting a screening for autism.	1	2	3	4	5

18. I have the clinical expertise to identify most children with autism without the use of a formal screening tool.	1	2	3	4	5
19. I know how and where to refer a child for a specialized evaluation for autism.	1	2	3	4	5
20. My educational training prepared me for identifying children with autism.	1	2	3	4	5

Please give some information about yourself:

M. Gender: □ Male □ Female
N. Age: _____
O. Practice Setting: □ Private Practice □ Hospital □ Community Clinic □ Other
P. City/town where you practice: _____
Q. How many years have you been in practice? _____
R. Do you work full-time or part-time hours? □ Full-Time □ Part-time
S. Do you have any children? □ Yes □ No
R. Do you have a family member/friend with a developmental disability? □ Yes □ No
T. How many patients do you have in your practice?
□ < 500 □ 500 – 1000 □ 1001 – 2000 □ 2001 – 3000 □ > 3000
U. What percentage of patients in your practice is aged 3 or younger?
□ < 10% □ 10 – 30% □ 31 – 60% □ 61- 90% □ > 90%

V. When a child is brought in for a visit, what percentage of the time is the accompanying person a:

1.	Mother	□ < 25%	□ 25 – 49%	□ 50 – 75%	□ > 75%
2.	Father	□ < 25%	□ 25 – 49%	□ 50 – 75%	□ > 75%
3.	Both Parents	□ < 25%	□ 25 – 49%	□ 50 – 75%	□ > 75%
4.	Other	□ < 25%	□ 25 – 49%	□ 50 – 75%	□ > 75%

W. How many children diagnosed with autism have you seen in the past year?
□ 0 □ 1 – 5 □ 6 - 10 □ 11 - 20 □ > 20

X. How much professional academic training have you received related to autism?
□ None □ Very Little □ Some □ Considerable □ Extensive

Y. How much professional clinical experience have you had with children with autism?
□ None □ Very Little □ Some □ Considerable □ Extensive

Z. Have you <u>read</u> any published best practice guidelines for the screening, assessment, and diagnosis of autism in young children? □ Yes □ No

AA. In your practice, do you <u>follow</u> any published best practice guidelines for the screening, assessment, and diagnosis of autism in young children? □ Yes □ No

What do you see as the major obstacle to identifying children with autism in the primary care setting?

_____
_____
_____
_____

Thank you for your participation.

Appendix E

Medical Student Questionnaire

SURVEY OF ATTITUDES TOWARDS AUTISM

Please enter the password included in the letter of information you received:

Please indicate your consent to participate in this study by noting your initials here:

Indicate the extent that you agree or disagree with each of the following statements (check your response):

1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

1. Autism is one of the most common developmental disabilities affecting children today.	1	2	3	4	5
2. Children who have siblings with autism or other developmental disabilities are at increased risk of having autism.	1	2	3	4	5
3. Autism is a serious, lifelong disability.	1	2	3	4	5
4. Without treatment, autism leads to negative developmental outcomes for children.	1	2	3	4	5
5. It is important to identify children with autism as early as possible.	1	2	3	4	5
6. It is important for children with autism to receive intervention services as early as possible.	1	2	3	4	5
7. Early intervention services for young children with autism are effective.	1	2	3	4	5
8. It is important for physicians to spend time using formal screening tools.	1	2	3	4	5
9. Formal screening tools are an effective method for identifying autism.	1	2	3	4	5
10. It is important to get a second opinion from another professional.	1	2	3	4	5
11. It is possible to identify autism in a child under 2 years of age.	1	2	3	4	5
12. Discussing the possibility of autism will not upset parents.	1	2	3	4	5
13. There are sufficient resources in my community to provide specialized evaluation services for children suspected of autism.	1	2	3	4	5
14. There are sufficient resources in my community to provide early intervention services for children with autism.	1	2	3	4	5

15. Parents generally follow through on my recommended referrals.	1	2	3	4	5
16. I am competent at identifying symptoms of autism.	1	2	3	4	5
17. I am competent at conducting a screening for autism.	1	2	3	4	5
18. I have the clinical expertise to identify most children with autism without the use of a formal screening tool.	1	2	3	4	5
19. I know how and where to refer a child for a specialized evaluation for autism.	1	2	3	4	5
20. My educational training prepared me for identifying children with autism.	1	2	3	4	5

Please give some information about yourself:

Gender: □ Male □ Female

Age: _____

What medical school do you attend:

_____

Are you in the final year of the program or did you recently graduate: □ Yes □ No

How much academic training have you received related to autism?

□ None □ Very Little □ Some □ Considerable □ Extensive

How much clinical experience have you had with children with autism?

□ None □ Very Little □ Some □ Considerable □ Extensive

Have you <u>read</u> any published best practice guidelines for the screening, assessment, and diagnosis of autism in young children? □ Yes □ No

Thank you for your participation.

Appendix F

Pre-Notice Letter

(Insert Date)

(Insert Address)

Dear Dr. (Insert Name),

A few days from now you will receive in the mail a request to complete a brief questionnaire for an important research study being conducted by Andrea Berenstein and Dr. Marcia Gragg from the Department of Psychology at the University of Windsor. The purpose of this study is to examine screening and referral practices for autism among Ontario physicians.

We are writing in advance because we have found that many people like to know ahead of time that they will be contacted. The survey is being sent to physicians across Ontario and your input is very important to us. Information provided by this study may play a role in improving the identification of autism in young children.

Thank you in advance for your time and consideration.

Sincerely,

Andrea Berenstein, M.A.
PhD Candidate
Department of Psychology
University of Windsor
(647) 998-9631
zicherm@uwindsor.ca

Marcia Gragg, PhD, C. Psych
Assistant Professor
Department of Psychology
University of Windsor
(519) 253-3000, Ext. 2227
mgragg@uwindsor.ca

Appendix G

Cover Letter for First Mailing

(Insert Date)

(Insert Address)

Dear Dr. (Insert Name),

We are writing to request your help with a study being conducted by Andrea Berenstein and Dr. Marcia Gragg from the Department of Psychology at the University of Windsor. This study is examining how family physicians throughout Ontario approach screening and referral for suspected cases of autism. Currently, health practitioners throughout Canada and elsewhere are experiencing a staggering increase in the numbers of children with autism coming to their attention. Prevalence is now estimated at 1 per 150 children. Screening and referral activities are crucial to early identification. This is our chance to hear directly from you. The data we gather will be used to identify key barriers to screening and referral and may help to improve the identification process for children with autism.

Enclosed you will find a questionnaire that we ask you to complete and return as soon as possible in the **postage-paid envelope** provided.	Or, you can complete the questionnaire online by visiting: **www.uwindsor.ca/autismstudy** (type in the password "screening")

The questionnaire should take approximately **15 minutes** to complete. All information will be kept **anonymous and confidential**.

If you choose to participate, you can be included in a draw to **win $250**. In addition, all participants will be offered a **screening instrument** for autism and information about screening and referral guidelines for autism. Please fill out and return the Draw Entry Ballot form with your questionnaire, or complete it online, so that we can contact you regarding these incentives and delete your name from the mailing list. Further information about this study can be found in the enclosed letter of information.

Thank you very much for your help.

Sincerely,

Andrea Berenstein, M.A.
PhD Candidate
Department of Psychology
University of Windsor
(647) 998-9631
zicherm@uwindsor.ca

Marcia Gragg, PhD, C. Psych
Assistant Professor
Department of Psychology
University of Windsor
(519) 253-3000, Ext. 2227
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Appendix H

Letter of Information

University of Windsor

LETTER OF INFORMATION FOR CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Screening and referral practices for autism among Canadian family physicians

You are asked to participate in a research study conducted by Andrea Berenstein (graduate student) and Dr. Marcia Gragg (assistant professor), from the Department of Psychology at the University of Windsor. Results of this study will contribute to a doctoral dissertation. If you have any questions or concerns about the research, please feel free to contact:

Andrea Berenstein, M.A.	Marcia Gragg, PhD, C. Psych.
Doctoral Candidate in Child Clinical Psychology	Research Supervisor
Department of Psychology	Department of Psychology
University of Windsor	University of Windsor
(647) 998-9631	(519) 253-3000, Ext. 2227
zicherm@uwindsor.ca	mgragg@uwindsor.ca

PURPOSE OF THE STUDY

(1) To examine how family physicians in Ontario approach screening and referral for suspected cases of autism; (2) To identify barriers to these practices in the primary care setting; (3) To examine the attitudes of family physicians and medical school students towards screening and early identification for autism

PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

- If you are a family physician, you will fill out a survey that will include questions about demographics, your screening and referral practices for autism, the early symptoms of autism, and your views on screening and early identification. This will take approximately 15 to 20 minutes of your time. You can choose to:
    - Complete the questionnaire that was mailed to you and return it in the enclosed stamped, addressed envelope, or
    - Complete the study online by visiting the following website and using the password "screening": **www.uwindsor.ca/autismstudy**
- If you are a medical school student**,** you will fill out a survey that will include questions about demographics and your views on screening and early identification. This will take approximately 5 to 10 minutes of your time. You can complete the study online by visiting the following website and using the password "screening:" **www.uwindsor.ca/autismstudy**

POTENTIAL RISKS AND DISCOMFORTS

There are no foreseeable physical or psychological risks.

POTENTIAL BENEFITS
Your input will be very helpful. You may personally benefit from participation by being provided with (1) a screening instrument for autism, and (2) information for physicians describing screening and referral procedures for autism. Furthermore, the results of this study may help to improve early identification for children with autism. Identifying key barriers to autism screening will help to inform future screening initiatives and may increase the chances that an effective screening strategy becomes integrated into primary care practice.

PAYMENT FOR PARTICIPATION
If you choose to participate, you can be included in a draw to win $250. If you choose not to participate, you may still be included in the draw.

CONFIDENTIALITY
Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Your name will not be recorded or associated with your survey answers. Instead, all materials will be coded by participant number only. Draw ballots will be destroyed upon completion of the study. All data will be securely kept in a locked filing cabinet within a locked office at the University of Windsor for six years.

PARTICIPATION AND WITHDRAWAL
You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time before you return the questionnaire by mail or submit it online without consequence of any kind. You may also refuse to answer any questions you do not want to answer and still remain in the study. If you choose to withdraw from the study, you may still enter the draw and receive the informational incentives described above by submitting the Draw Entry Ballot form, or by contacting Andrea Berenstein at zicherm@uwindsor.ca. The investigator may withdraw you from this research if circumstances arise which warrant doing so. Because the data will be coded numerically, it will not be possible to identify or remove your survey data from the study once it has been submitted.

FEEDBACK OF THE RESULTS OF THIS STUDY
A summary of the research findings will be available on the following websites when the study is completed.
Web address: www.uwindsor.ca/autismstudy; www.uwindsor.ca/autism
Date when results are available: June 2010

SUBSEQUENT USE OF DATA
This data may be used in subsequent studies.

RIGHTS OF RESEARCH PARTICIPANTS
You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research participant, contact:

Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

CONSENT TO PARTICIPATE
By return mailing the questionnaire or by completing and submitting the questionnaire online, you are giving your consent to participate in this study.

SIGNATURE OF INVESTIGATOR
These are the terms under which I will conduct research.

_____ _____

Signature of Investigator Date

Appendix I

Draw Entry Ballot Form

DRAW ENTRY BALLOT FORM

Please submit this form with your questionnaire. If you choose not to participate, you may still complete and submit this form in order to enter the draw and receive the incentives, or email Andrea Berenstein at zicherm@uwindsor.ca.

The information you list below will not be associated with your questionnaire. It will only be used to: 1) track whether you have responded so we can remove you from the mailing list, and 2) contact you should you win the lottery draw or to send you the informational incentives. Your responses on the questionnaire will remain anonymous and confidential.

Name:_____

Email:_____

I wish to be included in the lottery to win $250:

- ☐ Yes
- ☐ No

I wish to receive the following:

- ☐ A screening instrument for autism
- ☐ An informational newsletter about early screening and referral procedures for autism
- ☐ Information about Canadian best practice guidelines for screening, assessment, and diagnosis of autism

Appendix J

Thank You/Reminder Letter

(Insert Date)

(Insert Address)

Dear Dr. (Insert Name),

Last week a survey was mailed to you by Andrea Berenstein and Dr. Marcia Gragg from the Department of Psychology at the University of Windsor. The survey seeks information about your screening and referral practices for autism. If you have already completed and returned the survey to us, please accept our sincere thanks. If not, we would greatly appreciate it if you could take a few moments and complete the survey at your earliest convenience. We are especially grateful for your help because it is only by receiving input from physicians like you that we can assess and improve identification practices for children with autism.

You can complete the paper questionnaire and send it back to us as soon as possible in the **postage-paid envelope** provided.	Or, you can complete the questionnaire online by visiting: **www.uwindsor.ca/autismstudy** (type in the password "screening")

If you did not receive a survey, or if it was misplaced, please contact us and we will mail one to you right away.

Thank you for helping us with this important study.

Sincerely,

Andrea Berenstein, M.A.
PhD Candidate
Department of Psychology
University of Windsor
(647) 998-9631
zicherm@uwindsor.ca

Marcia Gragg, PhD, C. Psych
Assistant Professor
Department of Psychology
University of Windsor
(519) 253-3000, Ext. 2227
mgragg@uwindsor.ca

Appendix K

Cover Letter for Second Mailing

(Insert Date)

(Insert Address)

Dear Dr. (Insert Name),

Several weeks ago, an information package was sent to you by Andrea Berenstein and Dr. Marcia Gragg, from the Department of Psychology at the University of Windsor, asking for your help with a research study. This study is examining how family physicians in Ontario approach screening and referral for suspected cases of autism. To the best of our knowledge, we have not yet heard from you. We are writing again because of the importance that your questionnaire has for helping us obtain accurate results. It is only by hearing from everyone in the sample that we can be sure that the results are truly representative.

We are enclosing a replacement questionnaire with this letter. Your response is very important.

You can complete the paper questionnaire and send it back to us as soon as possible in the **postage-paid envelope** provided.	Or, you can complete the questionnaire online by visiting: **www.uwindsor.ca/autismstudy** (type in the password "screening")

Your participation in this study will take approximately **15 minutes** of your time. All information will be kept **anonymous and confidential**. If you choose to participate, you can be included in a draw to **win $250**. In addition, all participants will be offered a **screening instrument** for autism and information about early screening and referral guidelines for autism. In order to receive these incentives, pease fill out and return the Draw Entry Ballot form with your questionnaire, or complete the form online. Further information about this study can be found in the enclosed letter of information.

Please take the time to fill out and return the questionnaire soon. We know that you are very busy and appreciate you taking the time to help us with this important study.

Sincerely,

Andrea Berenstein, M.A.
PhD Candidate
Department of Psychology
University of Windsor
(647) 998-9631
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Marcia Gragg, PhD, C. Psych
Assistant Professor
Department of Psychology
University of Windsor
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Appendix L

Medical Students Recruitment Letter

We are writing to request your help with a study being conducted by Andrea Berenstein and Dr. Marcia Gragg from the Department of Psychology at the University of Windsor. This study is examining beliefs and attitudes towards autism among medical students and family physicians throughout Ontario.

Currently, health practitioners throughout Canada and elsewhere are experiencing a staggering increase in the numbers of children with autism coming to their attention. Prevalence is now estimated at 1 per 150 children. This is our chance to hear directly from you about your views on factors related to identifying and screening children with autism. The data we gather may help to improve the identification process for children with autism.

If you are a student in the **final year of medical school at an Ontario University**, you are eligible to participate. You are asked to complete a brief questionnaire, which you can complete online by visiting:

www.uwindsor.ca/autismstudy (type in the password "screening").

The questionnaire should take approximately **5 to 10 minutes** to complete. All information will be kept **anonymous and confidential**. If you choose to participate, you can be included in a draw to **win $250**. In addition, all participants will be offered a **screening instrument** for autism and information about screening and referral guidelines for autism.

This study has received approval from the University of Windsor Research Ethics Board. Please contact us or visit the website for further information about this study.

Thank you very much for your help.

Sincerely,

Andrea Berenstein, M.A.
PhD Candidate
Department of Psychology
University of Windsor
(647) 998-9631
zicherm@uwindsor.ca

Marcia Gragg, PhD, C. Psych
Assistant Professor
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Vita Auctoris

Name: Andrea Naomi Berenstein

Place of birth: Toronto, Ontario

Year of birth: 1979

Education: York Mills Collegiate Institute, Toronto, Ontario
1994-1998

University of Western Ontario, London, Ontario
1998-2002, B.A. Honours

University of Windsor, Windsor, Ontario
2003-2005, M.A.

University of Windsor, Windsor, Ontario
2005-Present, Doctoral Candidate