AN EVALUATION OF MEDICATION ADHERENCE IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER USING THE THEORY OF REASONED ACTION AND PLANNED BEHAVIOUR

by

DOUGLAS SCOULAR

M.A., The University of British Columbia, 2001
B.A., Simon Fraser University, 1999

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Abstract

Medication to treat children with Attention-Deficit/Hyperactivity Disorder (ADHD) has been shown to be highly efficacious. Despite that, medication adherence rates have been shown to range from 60 to 80%. Mothers have an important role in providing medication to their children with ADHD. In predicting mothers' medication providing behaviour, mothers' cognitions may be an important factor. A theoretical model, The Theory of Reasoned Action and Planned Behaviour (TRAPB), was used to evaluate mothers' cognitions in predicting mothers' medication adherence behaviour for their children with ADHD. This theory proposes that an individual's attitude, subjective norm, and perceived behaviour control cognitions predict their intentions to perform behaviour, and that intentions predict actual behaviour. Fifty-five mothers and their elementary school age children with ADHD took part in the study. Mothers provided their attitudes, subjective norms, perceived behavioral control and intentions regarding providing medication to their children over an upcoming 2-week period. Both mothers and children reported medication adherence information during the 2-week period. Although mothers' attitudes and subjective norms predicted their intentions to provide medication, mothers' intentions failed to predict their medication adherence behaviour. Thus, this study's results suggest limited clinical applications for the TRAPB theory with regards to predicting medication adherence in children with ADHD. Some evidence, however, was presented that individual TRAPB items, along with non-TRAPB variables were predictive of mothers' medication adherence.

Table of Contents

List of Tables

List of Figures

In the following introduction, I provide a brief review of the topics pertinent to my study of medication adherence in children with Attention Deficit/Hyperactive Disorder (ADHD). ADHD is briefly defined and pharmacological treatments commonly used to treat children with ADHD are reviewed. For this pharmacological review, I include information regarding stimulant medication's short- and long-term efficacy and effectiveness. To a much lesser extent, I provide information regarding non-stimulant medications' efficacy and typical use. I then review evidence suggesting that medication adherence in children with ADHD is problematic. Following that, I identify the rates and predictors of medication adherence within the general pediatric literature, as well as predictors of medication adherence in children with ADHD. I then conclude that evaluating the theoretical model, The Theory of Reasoned Action and Planned Behaviour, is a reasonable next step to predict medication adherence in children with ADHD. Within the ADHD literature, researchers have identified isolated predictors of medication adherence but an evaluation of a theoretical model focused on the role of parents' cognitions about giving medication has not been conducted. The Theory of Reasoned Action and Planned Behaviour, which has been widely employed to predict health behaviours, states that an individual's attitude, subjective norm and perceived behavioural control regarding the performance of a behaviour predict the individual's intention to perform the behaviour, and that this intention directly predicts performance of behaviour. Finally, I review techniques typically used to measure medication adherence behaviours, concluding that the 24-hour interview method, a method used previously to measure diabetes medication adherence, is an appropriate measure of medication adherence in children with ADHD. The hypotheses for this study are that the attitudes, subjective norms, and perceived behavioural controls of mothers' of children with

ADHD regarding providing medication to their children predict their intentions to provide medication to their children. Furthermore, mothers' intentions to provide medication to their children are hypothesized to predict mothers' behaviours in providing medication to their children. Moreover, based on previous studies of medication adherence, it was predicted that the frequency of daily medication dosage, child medication side effects, child oppositional defiant behaviour, and maternal depressive symptoms would be negatively related to mothers' medication adherence behaviour. Finally, it was predicted that both the severity of children's ADHD symptoms and medication treatment efficacy would be positively related to mothers' medication adherence behaviour.

Attention-Deficit/Hyperactive Disorder

ADHD is defined as a persistent and pervasive disorder characterized by developmentally inappropriate levels of inattention, hyperactivity, or impulsiveness (DSM-IV, American Psychiatric Association (APA), 1994). Researchers estimate the prevalence of this disorder in children to be within 3 – 7% (APA, 1994). There are three subtypes within the ADHD diagnosis, inattentive, hyperactive-impulsive, and combined. Both the inattentive and hyperactive-impulsive subtypes are represented by nine non-overlapping symptoms. To meet criteria for a diagnosed subtype, the child must exhibit six of the nine symptoms characterized by that subtype. A child meeting criteria for both the inattentive and hyperactive-impulsive subtypes receives the diagnostic label AHDH-combined subtype.

Further diagnostic criteria include that a child's symptoms appear before 7 years of age, last longer than 6 months, and cause significant impairment in functioning (APA, 1994). Often seen impairments include significant academic and social difficulties experienced by children with ADHD (Barkley, 1998). As well, between 30 – 50% of children with ADHD

are diagnosed with conduct or oppositional defiant disorders and approximately 40% with anxiety disorders (Biederman, Newcorn & Sprich, 1991). Both boys and girls are diagnosed with ADHD, with boys outnumbering girls approximately 6 to 1 in clinical samples (APA, 1994). In a meta-analysis, Gaub and Carlson (1998) reported that girls are typically diagnosed later, more likely to have the inattentive subtype, and show fewer conduct or oppositional disorder symptoms than boys.

A Review of Pharmacological Treatments for ADHD

Pharmacological interventions have been widely utilized to treat children with ADHD (Greenhill & Osam, 2000). These interventions consist of a variety of non-stimulant and, to a greater extent, stimulant medications. Moreover, there is an extensive literature examining the efficacy of these medications for treating children with ADHD, but a less extensive literature examining their effectiveness. To clarify the difference between efficacy and effectiveness, it is most useful to consider the primary question of a research study. Researchers design efficacy research to examine the following question: does taking the pharmacological treatment produce the expected outcome? In this case, the outcome is a reduction of ADHD symptoms. In efficacy research, researchers design studies to control all variables, other than the pharmacological treatment, that may contribute to the reduction of ADHD symptoms. The control of these variables allows researchers to generate inferences regarding the causal effects of the pharmacological treatment. It has been long debated whether a treatment, pharmacological or otherwise, will produce similar effects in less controlled contexts (Jacobson & Christensen, 1996; Seligman, 1995). Effectiveness research designs, therefore, examine the following question: does the pharmacological treatment produce an appropriate treatment outcome in "real life" or "natural" contexts? Effectiveness

research examines issues that influence the delivery of the pharmacology treatment to children with ADHD within the community such as availability, acceptability, administration, and adherence. In summary, efficacy research addresses questions regarding the potency of the pharmacological treatment in reducing symptoms. Effectiveness research addresses questions regarding the utility of pharmacological treatment within the community. The present study addressed an effectiveness question, that of stimulant medication adherence in children with ADHD.

The efficacy of stimulant medications. Before studying the effectiveness of medication, medication efficacy should be established. Several meta-analyses and reviews have summarized the numerous studies examining the efficacy of stimulants (e.g., methylphenidate, dextroamphetamine) in treating children with ADHD (e.g., Santosh & Taylor, 2000; Swanson et al., 1993). There is general agreement that stimulants are efficacious and offer few detrimental side effects. Moreover, clinicians have long considered stimulant medication to be the first tier of pharmacological treatment for children with ADHD (Greenhill & Osam, 2000). As an example of the extensive literature supporting the use of stimulants, Spencer et al. (1996) reviewed 140 studies totaling 5,403 school age children and concluded that, on average, 70% of children with ADHD respond positively to stimulant treatment with a reduction of hyperactive, impulsive and inattentive symptoms. Other evidence suggests that this 30% stimulant nonresponse rate in children with ADHD may be lowered to 2% when two stimulants are available for titration versus one (Elia, Borcherding, Rapport, & Keysor, 1991).

Stimulant medication treatment is associated with improvement in many areas of functioning among children with ADHD. In the social realm, children with ADHD show

improvements in peer relationships and peer communications when treated with stimulant medications (Whalen, Henker, & Granger, 1990). Specifically, when medicated, children with ADHD exhibit a decrease in the frequency of aggressive and negative behaviours in the presence of peers (Whalen et al., 1987), and exhibit better social problem solving skills during games with peers (Whalen, et al., 1989). At home, stimulant medication is linked to improvements in parent – child, as well as sibling, interactions (Barkley & Cunningham, 1979). Children with ADHD taking stimulant medication exhibit increased compliance with parental commands (Barkley & Cunningham, 1979) and this increase in compliance is associated with decreased parental controlling reactions (Barkley, Karlsson, Pollard, & Murphy, 1985). The positive effects of stimulant treatment in children with ADHD also are seen in improvements in areas important for academic functioning such as learning of verbal and nonverbal material (Rapport et al., 1989), classroom behaviour (Barkley, 1991), and short-term memory, reaction time, accuracy, and computation (Tannock, Schachar, & Logan, 1995). In summary, there is good evidence regarding the efficacy of stimulant medication for treating children with ADHD.

The effectiveness of stimulant medication treatment for ADHD. Although there is good evidence from efficacy studies for short-term improvements among children with ADHD taking stimulant medication, there is a general lack of research examining the longer-term effectiveness of these medications. The question of longer-term effects has most often been examined with regards to academic functioning (Carlson & Bunner, 1993). An earlier literature review by Barkley (1979) suggested that stimulants fail to positively affect academic achievement scores, and instead are best for promoting gains on short-term academic tasks. Since this review, others have reported similar results. Charles and Swain

(1981) followed boys with ADHD, all of whom were taking stimulant medication for 4 years. At the 4 year mark, results showed no positive effects of medication on academic achievement as measured by standardized tests or teachers' reports. Frankenberger and Cannon (1999) reported a longitudinal study that included 13 children with ADHD matched for gender and verbal IQ scores with 13 children without ADHD. Again, the children with ADHD took methylphenidate for the duration of the study. Cognitive abilities, including verbal and nonverbal skills, were equivalent for medicated children with ADHD and children without ADHD at grades one, and two, but by grade five children with ADHD showed significantly lower levels of cognitive abilities, despite the medication. A similar pattern was reported for language and reading skills achievement. Of note is that these studies of long-term effectiveness provide sparse information regarding medication adherence, as missed medication dosages were not measured and hence the relevance of these studies to the efficacy of medication is unclear (Schachar & Tannock, 1993). In summary, short-term improvements in academic achievement related to medication use do not appear to translate into long-term improvements. Although there is no clear reason for this discrepancy, one reasonable suggestion is the extent to which stimulant medications are inconsistently taken by children with ADHD. Perhaps, the lack of clear long-term stimulant medication effects will be better understood when studies include information regarding stimulant medication adherence (Schachar & Tannock, 1993).

In the largest study to date of stimulant medication treatment for children with ADHD (The MTA Cooperative Group study, 1999a; 1999b), both efficacy and effectiveness issues were addressed. The effectiveness issue, however, was less than optimally addressed because adherence information for one of the groups, Community Care, was not collected. Because of

this, adherence information cannot be compared across the study's treatment groups. Thus, a potentially important interpretation of the study's medication treatment results is unavailable. This study compared participants who received stimulant medication from regular community mental health providers to those who received rigorously controlled stimulant medication treatments. Specifically, the study compared the results from four treatment groups, namely Medication management; Behavioural treatment, and Combined treatment (including medication management and behavioural treatment), and a Community care group over a 14 month period. The study included 579 children, ages ranging from 7 – 9 years, with ADHD combined subtype. In the Combined treatment (n = 145) and Medication management (n = 144) groups, most children received stimulant medications (73.4% methylphenidate, 10.4% dextroamphetamine). In the Combined treatment group, families also engaged in behavioural treatments. To assess treatment effects for all groups, parents and teachers rated both ADHD symptoms and other areas of child functioning. The Medication management and Combined treatment groups both were provided with structured medication treatment support from the MTA study's health professionals, including a medication trial to determine optimal medication type and dosage. Furthermore, throughout the study, participants in these groups received brief, monthly medication maintenance visits that offered support, encouragement and practical advice including revision of medication dosage, as a result of parents' or teachers' reports of the child's behaviours. As well, researchers monitored stimulant medication side effects. In contrast, researchers simply provided the Community care group participants with a list of community mental health resources and provided none of the study's manualized titration procedure, medication monitoring, or support. Researchers obtained information regarding medication use in the

Community care group from quarterly telephone interviews. Most of the Community care participants, approximately two-thirds (84 of 97), received medications, predominately methylphenidate, from their community health providers. The Community care participants received, on average, 2.3 doses per day with a total daily dosage of 22.6 mg. Moreover, the length of time that the children were on medication ranged from a minimum of a 3 month period to the full 14 months of the study. Medication management and Combined treatment participants received, on average, three doses per day with total daily dosages of respectively 37.7 mg, and 31.2 mg. In summary, this study provides a good contrast between a carefully administered and controlled medication regimen versus medication as typically administered in community settings. Overall, the study results indicated that Combined treatment was not better than Medication management, that Medication management was superior to Behavioural treatment, and that Community care treatment, in general, was least beneficial in reducing ADHD symptoms (MTA Cooperative Group, 1999a; 1999b). A limitation of this study is that it did not collect adherence information for all treatment groups. It is possible that the increased efficacy of the regular and intense Medication management condition was, at least partly, due to a corresponding increase in medication adherence.

A brief review of nonstimulant medications for ADHD. To a much lesser extent than stimulant medications, clinicians also employ nonstimulant medications to treat children with ADHD (Greenhill, 2002). One such class of non-stimulant medications is antidepressants (tricyclics and nontricyclics). Biederman et al. (1989) examined the efficacy of the tricyclic, desipramine, for treating children with ADHD and showed that significantly more participants in the desipramine group exhibited an improvement in their ADHD symptoms as compared to the placebo group. Moreover, studies have shown superior efficacy of tricyclics

as compared to placebo for children with ADHD and comorbid depression, anxiety (Biederman et al., 1993), and Tic disorder (Singer et al., 1994). Researchers have reported mixed findings, however, regarding the comparison of the efficacy of tricyclic medication versus stimulant medication for children with ADHD (Garfinkel, Wender, Sloman, & O'Neill, 1983; Rapport, Carlson, Kelly, & Pataki, 1993; Werry, 1980). As well, there are numerous reports of adverse side effects associated with the use of tricyclics to treat children with ADHD (Abramowicz, 1990; Biederman, Baldessarini, Goldblatt, Lapey, Doyle, & Hesslin, 1993; Biederman, Thisted, Greenhill, & Ryan, 1995). These concerns regarding tricyclic use contrast with the numerous studies showing the safety of stimulant medication interventions with children (Swanson et al., 1993). In summary, despite the evidence that tricyclics are an efficacious treatment for children with ADHD as compared to placebo, the use of tricyclics is limited to children with ADHD who show a poor clinical response to stimulant medication treatment. Further, the concerns raised regarding the safety of tricyclic interventions with children with ADHD explain its secondary treatment status to stimulant medication treatment.

Researchers also have reported on the treatment efficacy of non-tricyclic antidepressants such as bupropion hydrochloride and clonidine in treating children with ADHD. As compared to placebo group participants, participants receiving bupropion hydrochloride exhibit greater improvements in hyperactive, impulsive, and conduct problems (Conners, Casat, Gualtieri, & Weller, 1996). As well, researchers report equivalent reductions of symptoms in children with ADHD in studies comparing bupropion hydrochloride and stimulant medications (Barrickman et al., 1995). A recent meta-analysis examining the efficacy of clonidine for treating children and adolescents with ADHD

concluded that clonidine's efficacy in reducing ADHD symptoms in children with ADHD is comparable to that of tricyclics, but is less than stimulant medications. Investigators also have reported poor treatment efficacy and adverse side effects for beta noradrenergic drugs such as pindolol, non-benzodiazepine anxiolytic, and buspirone, as well as atypical antipsychotics in treating children with ADHD (Biederman, &Spencer, 2000; Buitelaar, Van de Gaag, Swaab-Barne-veld, & Kuiper, 1996).

Recently in Canada, atomoxetine has been added as a non-stimulant medication to treat ADHD. Research has supported atomoxetine's efficacy in treating children with ADHD. As compared to placebo, researchers reported significant improvements in the reduction of ADHD symptoms (Michelson et al., 2001). Atomoxetine also has been shown to be comparable with methylphenidate in reducing ADHD symptoms (Kratochvil et al., 2002). Although research is unavailable regarding atomoxetine's long-term side effects, short-term side effects are considered to be within reasonable limits and comparable to a stimulant side effect profile (Wernicke & Kratochvil, 2002)

In summary, clinicians typically employ non-stimulant medications as second tier treatments for children with ADHD. Although these medications generally show greater treatment efficacy than placebos, they are typically less efficacious than stimulants. As well, adverse side effects have been associated with their administration. Atomoxetine is considered a first tier treatment, as it shows a greater efficacy as compared to placebo and a similar efficacy to stimulants. Atomoxetine's side effect profile also is considered satisfactory. Mothers who only treat their children with ADHD with second tier medication treatments were not included in the present study.

Medication Adherence Rates and Issues

Medication adherence rates in children with ADHD. Researchers have also examined the use of medication within the community. Several previous studies have examined rates of medication adherence in children with ADHD. Most of these studies have focused on adherence to stimulant mediations. Firestone (1982) studied 76 children with ADHD, boys and girls, ages 5-9 years treated with methylphenidate and found that 26% of the group refused initial treatment; by the fourth month, 20% had stopped treatment; and by the tenth month 45% had stopped taking the medication. Brown, Borden, Wynne, Sount, and Clingerman, (1987) completed a 3-month study including 58 children with ADHD. These investigators measured adherence by obtaining pharmacists' and parents' reports of the number of dosages of stimulants missed. Of the 34 participants who completed the 3-month treatment, pharmacists' pill counts resulted in an average of 42.47 dosages missed of a total 168 dosages prescribed. Thus, participants returned over 25% of prescribed pills. In contrast to the number of returned pills, according to parents' reports, children did not take an average of 17% of the prescribed dosages. However, despite the overestimation in parents' reports of adherence, their reports remained significantly correlated with the pharmacist pill counts of returned dosages. Kauffman, Smith-Wright, Reese, Simpson, and Jones (1981) reported poor medication adherence in their study following 12 children with ADHD over an 18-week period. Investigators collected weekly urine samples to determine adherence to either dextroamphetamine or methylphenidate treatment. The researchers reported that the mean dextroamphetamine adherence rate was 60% and the mean methylphenidate adherence rate was 67% for the 18-week duration. Measuring medication adherence through multiple means: missed appointments with the prescribing physician, pill counts, as well as teacher and parent reports of adherence, and urine assays, Johnston and Fine (1993) reported an

overall nonadherence rate of approximately 20% during the initial evaluation, and at 6-week and 3-month follow-ups in children with ADHD taking methylphenidate.

More recent studies also have addressed medication adherence rates. Diamond, Tannock and Schachar (1999) randomly assigned 91 children with ADHD or ADHD plus anxiety, aged 6-12 years, to either a placebo or a methylphenidate treatment group and followed the children for 4 months. The results indicated similar adherence, as measured by participant drop out rates, for both the ADHD and ADHD/anxiety groups as four children dropped out of the ADHD group and five dropped out of ADHD/anxiety group. Thiruchelvem, Charach, and Schachar (2001) examined stimulant adherence in 71 children with ADHD over 3 years. The investigators defined adherence as children taking the prescribed medication 5 or more days per week. Over 3 years, the adherence rates were 81% for the first year, 67% for the second year, and 52% for the third year. The MTA study (1999a), described above, included medication adherence information for the Medication management and Combined treatment groups (but not the Community Care group). Of the Medication management and Combined group participants, 88.6% successfully completed the 28-day titration phase. Moreover, the MTA (1999b) researchers defined adherence by the following criteria: acceptance of the treatment, family attendance for a minimum of 80% of medication visits, and prescriptions written and delivered to families when they visited. For the Medication management group, 78% of participants were adherent, and in the Combined group 81% of participants were adherent. In a study in a community mental health context, Pliszka et al. (2003) measured medication adherence by reporting the number of children with ADHD who were successfully maintained on a stimulant medication regime over 4 months. Researchers randomly assigned participants to either a medication algorithm group

or a treatment as usual group (participants used typical community mental health resources). At the 4-month follow-up, 74% of participants in the algorithm group and 79% of individuals in the treatment as usual group were successfully maintained on medication treatments. Ibrahim (2002) performed a study following 51 children and adolescents with ADHD for 3 months. Parents of children/adolescents with ADHD, as well as their children or adolescents, provided medication adherence reports at 1 week and 3 months. The majority of children and adolescents were taking stimulant medications ($n = 43$), and the rest were taking an antidepressant medication. The investigator reported average adherence rates of 76% for the first week, and 75% at 3 months. Finally, a study by Ohan and Johnston (2000) collected medication adherence information from both parents and their adolescents with ADHD at two time points, approximately 2 months apart and reported adherence rates ranging from 85 to 89% for both time points.

In summary, using various measurements to assess stimulant medication adherence rates in children with ADHD, studies have most typically found medication adherence rates to be between 60 to 80%. Higher rates seem to be associated with more recent studies, shorter time periods, and more lenient measures or definitions of adherence. Given the strong evidence showing the therapeutic benefits of stimulant medication in treating children with ADHD (Greenhill, 2002), these medication adherence rates can be considered low and problematic as they indicate that 20 to 40% of children with ADHD are not consistently receiving the benefits of their stimulant medication. Within the pediatric chronic illness population, medication adherence rates may vary from 25 to 75% (Matsui, 2000). Although these adherence rates are comparatively lower than those found for ADHD medication, this does not negate the fact that the adherence rates found for children with ADHD continue to

be problematic. Moreover, given the evidence that ADHD is a chronic difficulty (Wilens, Biederman, & Spencer, 2002), diagnosed in childhood but often persistent into adulthood, these rates of adherence suggest that individuals with chronic ADHD difficulties are not receiving the therapeutic benefits of consistently taking stimulant medication. Although a consistent and structured medication treatment regime is more efficacious in treating children with ADHD (MTA Cooperative Group, 1999a; 1999b), the Pliszka et al. (2003) study shows that children with ADHD enrolled in a structured medication treatment regime are not necessarily more medication adherent as compared to children utilizing typical community resources. Thus, optimum medication adherence is not assured even with a highly structured medication regime. This is not surprising considering that even within a highly structured medication regime, there are many factors that may contribute to medication adherence.

One important factor in determining medication adherence is the parents' role in medication administration. Parents' involvement in administering stimulant medication to children with ADHD is wide ranging (Greenhill & Osman, 2000). For example, parents are central in the decision regarding whether to initiate stimulant medication. They also are involved in the administering of medication. Typical stimulant medication regimens range from one to three doses daily and, especially with younger children, it is most often the parent who administers the doses (Santosh & Taylor, 2000). Thus, not only do parents engage in decision making regarding initiating medication for their children, parents also need to ensure that medication is available (i.e., prescriptions are filled) and need to consistently remember to provide medication at required times. The frequency of daily doses and the importance of the timing of administration to maximize positive behavioural effects, as well as the extended duration of stimulant medication treatment, all emphasize the

importance of parents' roles in their children's stimulant medication adherence. A parent's role in medication adherence may include, but is not limited to, decision making regarding the acceptability of medication for their child, building intent to administer the medication consistently, and planning for and consistently administering the medication. Thus, parents' beliefs, attitudes, intentions to provide medication to their children may prove to have important associations with their medication adherence behaviour. To provide a background for considering the types of factors that may influence adherence among children with ADHD, in the next section, I review what is known regarding medication adherence in general pediatric populations.

General pediatric rates and predictors of medication adherence in children. The medication adherence literature for children with ADHD is sparse. Therefore, it is important to review the literature regarding medication adherence for more general pediatric samples to identify predictors of medication adherence that may generalize to children with ADHD. In general, medication adherence rates for children with chronic diseases ranges from a low of 25% to a high of 75% (Matsui, 1997, 2000; Steele & Grauer, 2003). Importantly, researchers identify the following general predictors for adherence: medication regimen, family factors, and medication side effects (Matsui, 1997; 2000; Steele & Grauer, 2003). There is a negative relationship between the complexity of the regimen of drug treatment and associated adherence behaviour. More specifically, medication adherence is lower with an increase in the frequency of daily dosages, as patients are significantly more compliant when daily dosages are specified as once or twice a day as compared to regimens that are thrice or more a day. Mixed findings are reported regarding the relationship between caregivers' beliefs (about medication efficacy and potential side effects) and medication adherence. For

example, some studies have shown a positive relationship between parental beliefs regarding the severity of their children's health problems and medication adherence (Palardy, Greening, Ott, Holderby, & Atchison, 1988; Smith, Ley, Seale, & Shaw, 1987) while others have shown a negative relationship (Bond, Aiken, & Sommerville, 1992; Tamaroff, Festa, Adesman, & Walco, 1992). Conversely, some studies have shown no relationship between parental beliefs about severity of children's health difficulties and medication adherence (Rapoff & Barnard, 1991; Shope, 1981). There is a suggestion that increased parental psychopathology is related to reductions in children's medication adherence behaviour. Furthermore, the severity of adverse side effects from medication is generally found to be related to decreases in medication adherence behaviour. In addition, medication treatment efficacy has been shown to be related to medication adherence, as studies show that medication adherence can decline with related improvements in children's symptoms, as demonstrated in studies of parental medication adherence in providing antibiotic medication to their children (Dawson & Newell, 1994; Jay, Litt, & Durant, 1984). Conversely, longer term medication treatments reported in the pediatric and adult literature suggest that medication efficacy beliefs are positively related to medication adherence (Bartlett, Kristin, Riekert, Butz, Malveaux, & Rand; Malcolm, NG, Rosen, & Stone, 2003). These longer treatment lengths are more consistent with the typical lengths of ADHD medication treatments (Greenhill, 2002). In summary, medication adherence rates often are problematic for children with chronic illness. It is generally shown that both the frequency of dosage, adverse side effects, and presence of parental psychopathology are negatively associated with medication adherence behaviour. The medication treatment efficacy results are more mixed with short term treatments suggesting a negative relationship to medication adherence versus

longer treatments that suggest a positive relationship with adherence. The associations between caregivers' medication beliefs and medication adherence are unclear.

Possible Predictors of Medication Adherence in Children with ADHD

Short-term symptom reductions and side effects attributed to stimulant use. Among children with ADHD, it has been suggested that the continued administration of stimulant medications is dependent upon a child's clinical response to the stimulant medications (Thiruchelvem et al., 2001). To determine a child's clinical response to medication, it is important to note not only benefits, but also any adverse side effects (Greenhill, 2002). There are a number of side effects associated with stimulant use among children with ADHD. For example, Barkley, McMurray, Edelbrock and Robbins (1990) assigned 83 children with ADHD, ages 5 through to 16, to either two daily doses of methylphenidate or two daily dosages of placebo (either .3 mg/kg or .5 mg/kg for each dose). Parents and teachers, unaware if children were receiving lower or higher doses of medication or placebo, rated children's side effects at the end of each week. Parents' and teachers' ratings of children on methylphenidate versus placebo indicated significantly more side effects such as insomnia, anxiety, irritability, decreased appetite, stomachaches, and headaches. A similar study by Fine and Johnston (1993) included 24 children with ADHD aged 6 to 10 years and also compared side effects from administration of methylphenidate versus placebo. Investigators randomly assigned children across days to either two doses/per day of .3 mg/kg (low dosage) or .6 mg/kg (high dosage) methylphenidate or a placebo. Teachers and parents, unaware of a child's medication status, completed ratings of a child's behaviours for up to 3 weeks. Of the 16 side effects rated, three - trouble sleeping, decreased appetite, and bites nails, were reported to occur significantly more on the days children received methylphenidate as

compared to the days children received placebo. In sum, given the pediatric literature that shows an inverse relationship between medication adherence and appearance of side effects (Matsui, 2000; Steele & Grauer, 2003), the studies consistently demonstrating the appearance of side effects associated with stimulant use among children with ADHD suggest that such adverse effects may alter adherence behaviour in this population.

Other side effects, such as tics, behavioural rebound, and cardiovascular problems also have sometimes been linked to stimulant medication use, but these effects are not large or consistent. For example, in his review of the literature, Barkley (1998) concludes that it remains questionable whether stimulant medication causes tics in children with ADHD, but suggests there is some evidence that stimulant use may exacerbate tics. However, other investigators suggest that any exacerbation of tics is clinically mild (Gadow, Sverd, Sprafkin, Nolan & Ezor, 1995; Law & Schachar, 1999). Moreover, for children with ADHD with comorbid chronic motor tic disorder or children with ADHD with comorbid Tourette's disorder there is little evidence of exacerbation of tics with long-term stimulant medication use (Gadow, Sverd, Sprafkin, Nolan, & Grossman, 1999). Similarly, there are questions regarding the relationship between cardiovascular difficulties and methylphenidate treatment in children with ADHD. Tannock, Schachar, Carr, and Logan (1989) reported significantly lower heart rates, as well as lower systolic and diastolic blood pressures, for children with ADHD taking placebo versus children with ADHD taking stimulant medication. As well, they reported higher blood pressure and heart rates for children with ADHD taking higher daily dosages of stimulant medications as compared to lower daily dosages. Other studies, however, have not found differences in heart rate and blood pressure between children in placebo and methylphenidate medication conditions (Brown & Sexson, 1989; Brown,

Wynne, & Slimmer, 1984). Moreover, reported heart rate and blood pressures elevations associated with stimulant medications are typically clinically insignificant (Rapport & Moffitt, 2002). Finally, behavioural rebound has been suggested as an adverse side effect associated with stimulant medication use. Rebound represents a deterioration of behaviour that exceeds baseline rates and occurs in the late afternoon or evening, following daily dosages of stimulants. Johnston, Pelham, Hoza and Sturges (1998) examined rebound effects in 21 boys with ADHD, ages from 4 through to 10 years. The study was conducted over a 2 week period and boys were administered either a twice daily dose of methylphenidate (either .3 mg/kg or .6 mg/kg) or placebo. Parents rated the boys' ADHD symptoms and other problem behaviours each evening. In general, the results showed that parents rated a child's behaviour as more problematic on evenings following a daily dosage of .3 mg/kg of methylphenidate, but not .6 mg/kg, as compared to placebo. Researchers attributed the failure to find a difference between placebo and the .6 mg/kg dosage to a smaller sample size in the .6 mg/kg condition. Despite the significant differences, the extent of rebound was relatively small for most children. Although these side effects such as rebound and tics have not always been found, consistent with the evidence regarding the inverse relationship between side effects and medication adherence (Matsui, 2000; Steele & Grauer, 2003), parents who think that such difficulties are probable correlates of stimulant medication use may be expected to alter their medication adherence behaviour.

Long-term physical effects attributed to stimulant use. Growth suppression (height and weight) related to long-term stimulant use in children with ADHD remains a controversial issue, as studies examining this issue show inconsistent results. Mattes and Gittelman (1983) reported height and weight suppression effects after 2 to 4 years of

stimulant use, and Satterfield, Cantwell, Schell, and Blaschke (1979) found height and weight suppression after 1 year. Nevertheless, others have not found a relationship between stimulant use and height and weight suppression for children treated with stimulants doses ranging up to .8 mg/kg for up to a 2 year duration (e.g., Kalachnik, et al., 1982; Zeiner, 1995). A recent Norwegian study examined the effect of stimulant medications and growth in 91 hyperactive boys ranging from 3 through to 10 years of age (Sund & Zeiner, 2002). Participants were 61 boys treated with dextroamphetamine and 28 boys treated with methylphenidate. Investigators took height, weight, and medication dosage measurements each year over a 5-year period. Mean daily dosages of methylphenidate ranged from a low of 23.9 mg to a high of 33 mg. Results showed that, after 1 year, boys treated with dextroamphetamine exhibited smaller weight gains than those treated with methylphenidate. For the 5-year period, the average height and weight means for the medicated children fell within the 25th to 95th percentile of population norms for Norwegian children. Moreover, neither dosage nor age had any significant effect upon height and weight suppression. Recently, researchers found a significant relationship between the consistent use of stimulant medication and mild height suppression in the MTA study data (MTA Cooperative Group, 2004). Growth suppression issues have been examined in girls with ADHD with no significant relationship found between stimulant use and height or weight suppression (Biederman et al., 2003). Although growth suppression has not been consistently demonstrated to occur with stimulant medication use, this possibility remains a strong parental concern and is likely to alter the medication adherence behaviour of some parents.

An inclination towards future substance use is another issue addressed in the literature regarding long-term stimulant medication use and children with ADHD. It has been noted

that a greater proportion of individuals with ADHD are likely to be involved in smoking, alcohol use, and drug use in adulthood (Biederman et al., 1998; Milberger et al., 1997), and that children with ADHD are more likely to maintain addictive behaviours in adulthood than individuals without ADHD (Wilens, Biederman, & Mick, 1998). The prevalence of substance use difficulties in adults diagnosed with ADHD as children has prompted questions regarding the role of stimulant medication in contributing to the manifestation of substance use disorders. However, investigators report that cocaine and other stimulants are not overly represented among drugs of abuse in individuals with ADHD; rather, researchers report that marijuana is the most represented drug (Biederman et al., 1995). Moreover, stimulant medicated adolescents with ADHD do not show an increased risk for future diagnosed substance use disorders; rather it is never medicated adolescents who appear to be at increased risk for future diagnosed substance use disorders (Biederman et al., 1999; Hechtman, 1985). Therefore, there is little evidence that stimulant medication use in children with ADHD engenders future stimulant based substance use (i.e., cocaine and other stimulants). Nevertheless, as above, parents who are concerned about stimulant medications being associated with future substance use will likely alter their medication adherence behaviour.

Child characteristics and adherence behaviour. Diamond, Tannock and Schachar (1999) studied 53 children with ADHD and 38 children with ADHD plus anxiety who were randomly assigned to either a placebo or a methylphenidate treatment group and followed for 4 months. As noted above, similar adherence and drop out rates were found for the ADHD and ADHD/anxiety groups. Thus, anxiety comorbidity was not associated with increased nonadherence. In contrast, Thiruchelvem et al. (2001) reported a positive relationship

between severity of ADHD symptoms and medication adherence, but an inverse relationship between presence of oppositional defiant disorder and adherence. These investigators also reported an inverse relationship between child age and medication adherence. They explained this inverse relationship by suggesting that parents of younger children are more involved in the medication regime as compared to parents of older children, and that increased parent involvement is related to more optimum medication adherence. In summary, these results show no relationship between presence of comorbid anxiety in children with ADHD and medication adherence behaviour, but do suggest a positive relationship between severity of ADHD symptoms and medication adherence and an inverse relationship between presence of oppositional defiant disorder and medication adherence behaviour.

Typical dosages of stimulant medications and adherence. As noted above, the general pediatric adherence literature indicates an inverse relationship between the frequency of daily dosages and medication adherence (Matsui, 2000; Steele & Grauer, 2003). Therefore, it is important to consider adherence to stimulant medication for children with ADHD within the context of the typical dosage regimen. Clinicians typically prescribe the administration of short-acting methylphenidate twice to three times daily because of its relatively short half-life (Greenhill, 2002). With dextroamphetamine, children typically receive two to three daily doses (Santosh & Taylor, 2000). Dose administration schedules, however, may vary from child to child, and are dependent upon the child's clinical response (Santosh & Taylor, 2000). Available in the United States and recently in Canada are long acting forms of methylphenidate and amphetamine salts. These long acting medications offer the option for once daily administration because the duration of the medication effect is approximately 9 to 12 hours (Wilens et al., 2003). Interestingly, adherence levels of these one a day medications

have not been investigated or compared with the adherence to the multiple dosages of short-acting medications. Sustained release versions of stimulant medication, such as methylphenidate, also are available in Canada. Sustained release methylphenidate has a longer effect duration of approximately 7 to 8 hours as compared to the 3 to 5 hours of immediate release methylphenidate (Lawrence & Lawrence, 1997). Although sustained release methylphenidate was created to offset medication adherence difficulties, this benefit has not been tested (Lawrence & Lawrence, 1997). Because the sustained release and long acting forms of methylphenidate are currently prescribed medications in Canada, mothers who provide their children with these forms of methylphenidate medication will be included in the study. In summary, it might be expected that adherence to stimulant medication will be higher in regimens with fewer (i.e., once to twice daily) daily doses compared to regimens with more frequent daily dosages.

Parental psychopathology and adherence. A recent analysis of the MTA study data was completed to identify potential moderators of stimulant treatment response in children with ADHD (Owens et al., 2003). In the Medication management and Combined treatment groups, the results showed an inverse relationship between parental depression levels and reduction of child ADHD and oppositional defiant symptoms. This relationship was not shown in the Behavioural treatment or Community care group. Although the authors did not directly examine adherence issues, they explain the results by arguing for the importance of parental roles in medication adherence. The authors argue that parents with higher levels of depression are less able to execute the medication regime tasks (i.e., doctor visits, obtaining prescription, and administering the medication to their child) and thus medication adherence is lower. Because medication adherence is lower, the authors maintain that the treatment

efficacy is lower. In summary, parental depression symptoms are suggested to be inversely related to medication adherence behaviour. There are no other studies in the area examining this issue.

Parent cognitions and adherence. To better understand parents' roles in medication adherence, previous studies have examined relationships between the cognitions or beliefs of parents' of children with ADHD and stimulant medication adherence behaviour. Mainly, these studies have examined the relationship between adherence and parents' beliefs regarding the acceptability of medication and their knowledge and beliefs about ADHD. Liu, Robin, Brenner, and Eastman (1991) indirectly examined medication adherence by assessing parents' views regarding medication acceptability. Although no direct measure of medication adherence was included in the study, the authors found a positive relationship between medication acceptability and parental knowledge of ADHD (i.e., knowledge of methylphenidate, understanding of ADHD and its etiology, and behavioural treatment techniques). However, Bennett, Power, Rostain, and Carr (1996) asked 87 mothers of children with ADHD to complete a questionnaire assessing knowledge and medication acceptability, and found that ratings of medication acceptability at intake were not predictive of parents' use of medication to treat their child with ADHD at follow-up. Corkum, Rimer, and Schachar (1999) also examined the relationship between parental knowledge of ADHD and mediation treatment acceptability, enrollment, and adherence. Their study included 81 parents of children with ADHD followed for a 12-month period. Results revealed that parental knowledge of ADHD was unrelated to acceptability of medication treatment and adherence, but greater knowledge of ADHD was predictive of enrollment in a medication treatment program. In summary, previous studies have failed to consistently show a

relationship between parents' beliefs about ADHD or medication and stimulant medication adherence in children with ADHD. I suggest that this failure can be attributed to both measurement and conceptual difficulties. For example, there are many types of parents' cognitions that have not yet been examined, and some of these may be predictive of medication adherence.

General summary for predictors of medication adherence. One purpose of this study was to replicate predictors of medication adherence for children with ADHD found in previous studies. Summarizing from the medication adherence literature for ADHD and nonADHD treatments, the following predictors were included in the study because they have been shown to have an inverse relationship with medication adherence: frequency of daily medication dosage, severity of child medication side-effects, severity of child oppositional defiant disorder symptoms, child age, and severity of maternal depressive symptoms. In addition, from the same literature, severity of child ADHD symptoms was included in the study, as it has been shown to have a positive relationship with medication adherence. As well, medication treatment efficacy was included as a predictor in the study because of its suggested positive relationship with medication adherence for longer term medication treatments. Examining these predictors will not only offer much needed replication of previous research, but will offer insight into how these isolated predictors compare to the predictions afforded by parent cognitions considered from the framework of a theoretical model.

Although previous literature has failed to consistently show a relationship between parental cognitions and medication adherence behaviour, none of these previous studies has employed a theoretical model specifically designed to examine this relationship. By employing a

theoretical model, the numerous possible cognitions are narrowed to a few that are linked theoretically and empirically to behaviour. Thus, for the present study an empirically supported theoretical model linking cognitions to behaviour provided guidance in choosing appropriate parental cognitions as predictors of medication adherence in children with ADHD.

Theory of Reasoned Action and Planned Behaviour (TRAPB)

The TRAPB or its earlier manifestation, The Theory of Reasoned Action, is a theoretical model designed to examine the relationship between cognitions and behaviour (Azjen & Fishbein, 1980). It has been used extensively to identify beliefs, attitudes, intentions, and perceived behavioural control cognitions that predict behaviour across many domains, particularly health behaviours. Examples of the use of the TRAPB in the adult health literature have been extensive and varied, including applications to understanding healthy eating (Sparks & Guthrie, 1998), condom use (Albarracin, Johnson, Fishbein, & Muellerleile, 2001; Baker, Morrison, Carter, & Verdon, 1996; Morrison, 1995), drug and alcohol use (Brubaker, Prue, & Rychtarik, 1987; Laflin, Moore-Hirschl, Weiss, & Hayes, 1994), intention to seek mental health services (Bayer, & Peay, 1997), and physician behaviour (Millstein, 1996).

To a much lesser extent, this theory has been applied to questions concerning parental behaviour including predicting mothers' intentions to breast feed (Humphreys, Thompson, & Miner, 1998; Kloeblen, Thompson & Miner, 1999; Manstead, Plevin, & Smart, 1984), parents' intentions to take their children for routine medical and dental examinations (Hendricks, Freeman, & Sheiham, 1990), parental use of child car restraint devices (Richard, Dedobbeleer, Champagne, & Potvin, 1994), and parental compliance in providing medication

for their epileptic children (Austin, 1989). The wide application of TRAPB reflects the ease with which it can be adapted to varied research areas examining motivation and predicting behaviour (Azjen & Fishbein, 1980), and its success in predicting health behaviour (Albarracin et al., 2001; Sutton, 1998).

The following section provides a basic description of the TRAPB derived from Azjen and Fishbein (1980), as well as Azjen (1988, 1991). A major premise of this theory is that individuals perform behaviour based upon reasoned consideration of available information. The model does not assume that individuals behave spontaneously, but that they engage in a decision process that includes considering possible consequences of performing behaviour, as well as integrating in their decision process others' evaluations of the utility of performing behaviour. The TRAPB hypothesizes that an individual derives proximal and distal cognitive products antecedent to performing behaviour. These cognitive products are defined as intention, attitude, subjective norm, and perceived behavioural control.

In the TRAPB model, the proximal determinant of behaviour is an individual's intention to perform the behaviour. The model defines intention as the individual's subjective prediction of the likelihood of performing a specific behaviour. There are three determinants of an individual's intention: attitude, subjective norm, and perceived behavioural control. These three determinants are considered distal determinants of behaviour.

Attitude. There are two types of beliefs, expectancy and value, that form an individual's attitude. An *expectancy* belief is formed when the individual evaluates the likelihood that a certain consequence is associated with performance of behaviour. An individual may generate a number of potential consequences of performing behaviour and rate the likelihood of each of these consequences occurring. For example, a mother who is in

the process of enrolling her daughter in a particular school may generate the following potential consequences of enrollment: her daughter will obtain good grades, make few friends, and engage in sports activities. As well, this mother is likely to evaluate the likelihood that each of these consequences will occur, such that the likelihood of her daughter obtaining good grades is high, and the likelihood of making few friends and engaging in sports is low. In combination, these consequences and the estimates of their likely occurrence form the mother's expectancies regarding enrollment. In sum, expectancy beliefs are one of two beliefs required in attitude formation and are defined as the consequences of performing behaviour combined with the likelihood of occurrence for each consequence.

A *value* belief is defined when an individual evaluates the positive quality for each of the consequences associated with performing the behaviour. Using the above example, this mother may rate the consequence of her daughter obtaining good grades as highly positive, the consequence of her daughter being unable to make friends as highly negative, and the consequence of her daughter engaging in sports activities as neither positive nor negative. From the combination of expectancy and value beliefs, the mother has an estimation of the likely occurrence of each consequence, and an estimation of the positive quality of each consequence. Together, these form the mother's attitude toward performing the behaviour.

The TRAPB model assumes that all identified consequences of performing behaviour are included, additively, in the process of forming an attitude towards performing behaviour. The process is additive insofar as first the products of expectancy and value beliefs for each consequence are obtained, and second these products are summed to provide an indication of attitude. In theory, the more likely consequences are evaluated to be and the more positively

these consequences are valued, the more favourable an individual's attitude will be towards performing the behaviour. Moreover, the more likely consequences are evaluated to occur and the more negatively these consequences are valued, the less favourable the individual's attitude will be towards performing the behaviour. Thus, attitude is defined as a summation of an individual's beliefs regarding the likely occurrence of and value of each consequence of performing the behaviour.

Subjective Norm. The second distal cognitive process in the TRAPB model, subjective norm, also is belief based and is defined by the extent an individual believes identified others are in favour of him/her performing a specific behaviour. In addition, subjective norm is a function of the extent to which the individual is motivated to comply with each of the identified others. For example, an individual generates a list of identified others (e.g., parents, spouse, children, teachers) who hold an opinion, more or less favourable, about the individual performing a specific behaviour in question. The strength of an identified other's opinion, however, is weighted by the individual's motivation to comply with that specific other. Using the previous example of a mother deciding to enroll her daughter in a particular school, if this mother believes that a teacher holds a favourable opinion of enrolling the daughter in the school, the influence of the teacher's opinion is mitigated if this mother's motivation to comply with the teacher is low. In summary, subjective norm is an additive process. An individual identifies all others who hold an opinion regarding performing a specific behaviour. For each identified other, an individual evaluates the extent this other favours performing a specific behaviour and as well, an individual evaluates the extent he/she is motivated to comply with this other's opinion. The products of each of these evaluations for each of the identified others are summed. The

summation is a measurement of an individual's subjective norm for performing the behaviour.

Perceived behavioural control. The third distal cognitive process, perceived behavioural control, is a more recent addition to the model. Ajzen (1991) suggests its addition is needed because behaviour is not always entirely determined by volitional control and the model's components of attitude and subjective norm do not adequately deal with this possibility. In the present study, one example of a variable outside of a parent's volitional control is their child's attitude towards medication. Perceived behavioural control consists of a summation of an individual's beliefs regarding resources not within their volitional control that influence the occurrence of behaviour. More specifically, perceived behavioural control is defined as an individual's belief regarding the likelihood that each identified resource will be present, multiplied by an evaluation regarding the extent that each identified resource will facilitate/inhibit the performance of behaviour. Summing the products for each of the identified resources provides a measurement of perceived behavioural control.

Measurement of the perceived behavioural control construct has not always been reliable. For example, Beale and Manstead (1991) and Spark (1994) reported reliabilities for this construct of .56 and .49, respectively. Theoretical reasons have been given to explain this construct's measurement difficulties. Conner and Sparks (1996) have suggested that this construct's questions may evoke two mutually exclusive responses from participants related to both control and difficulty. The construct is intended to measure the extent to which participants believe the behaviour is under their volition. However, these questions may also evoke the notion that the behaviour may be difficult to perform successfully. For example, mothers may believe that they can control their behaviour of giving the medication to their

children, e.g., the purchasing of the medication, presenting the medication to their children on time. However, they may be less certain that they will always be successful in, for example, finding the time to purchase the medication, recalling that they need to provide their children with medication, and for that matter ensuring that their children will be present at the times medication is to be given. Thus, two beliefs may be present, one related to volition and the other to completing the task successfully. Given that the measurement difficulties with the construct have not been empirically examined in TRAPB parent-child studies, obtaining good reliability for this construct continues to be a potential problem for researchers. Conner and Sparks (1996) reported better than usual reliability of .74 for their perceived behavioural control questions, and the present study's questions were modeled on theirs.

In summary, these distal cognitive processes, attention, subjective norm and perceived behavioural control influence intention. Intention is a proximal variable that is purported to directly influence the performance of behaviour. Together, these distal and proximal variables form the TRAPB model.

Limitations of the TRAPB model. There have been noted arguments proposing limitations to the effectiveness of the TRAPB model. For example, Fazio (1986) argues that the model overly depends upon individuals exhibiting conscious control and deliberation before performing behaviour. This dependence upon conscious control limits the usefulness of the TRAPB model for analyzing behaviours perceived to be more "automatic" or "habitual." The relevance of Fazio's (1986) argument however is dubious, as I argue that the model does not necessitate that an individual be conscious of the cognitive processes that lead to attitude, subjective norm, intention, and perceived behavioural control. Researchers

have long noted that individuals can perform complex cognitive processes without conscious knowledge of how these cognitive processes are performed, and still obtain appropriate cognitive products (Schneider & Shiffrin, 1977; Sternberg, 1970). As well, Fazio (1986) has argued that the TRAPB model's assumptions regarding the formation of attitudes are not realistic. Specifically, he has argued that there is no evidence that individuals perform the multiplicative calculations of value and expectancy beliefs nor the summation of these multiplications before performing behaviours. Countering this argument, Azjen (1991) suggests that the TRAPB model's outlined calculations are not intended to represent actual cognitive calculations but are meant instead to approximate cognitive calculations. In sum, criticisms of the TRAPB model center on the idea that individuals need to be consciously aware of their decision making process. These criticisms, however, can be argued to stem from a misunderstanding of the model. The TRAPB model does not assume that individuals consciously perform the cognitive processes or are consciously aware of the cognitive products produced. Rather, the TRAPB model offers cognitive processes and cognitive products that may approximate individuals' actual cognitions.

Although well examined in adult heath research, and to a lesser extent in parent-child studies, until the present study, none of the cognitions included in the TRAPB model has been examined with regards to predicting medication adherence behaviour in parents of children with ADHD. Within the TRAPB literature, it has been noted that the model's ability to predict behaviour differs depending on the health behaviour context in which it is applied (Godin & Kok, 1996). Along these lines, there may be specific elements within a particular context, beyond the cognitions considered in the TRAPB, that may impact the individual's ability to successfully perform a behaviour; thus affecting the intention to behaviour

predictive relationship (Fishbein, Triandis, Kanfer, Becker, Middlestadt, & Eichler, 2001). There are several factors intrinsic to ADHD that may reduce the effectiveness of the model in predicting behaviour. For example, parents are providing medication to their children, so both the parent and child are involved in the behaviour. Therefore, parents are making predictions for two people rather than just making predictions about their own behaviour. In addition, providing medication to their child with ADHD is a long-term behaviour for parents, as compared to short-term or infrequent behaviours, such as taking their child to the medical or dental office. Moreover, mothers may consider it more controversial to provide medication to treat their child's ADHD, as compared to mothers who provide medication to treat their children's epilepsy. These factors are discussed below, specifically with regards to intention predicting behaviour.

The methodology stated by Ajzen and Fishbein (1980) to develop TRAPB model items lends itself to linear statistical methods in evaluating the TRAPB model components. Indeed, linear statistical methods to test model components have historically been the norm (Sutton, 1998; Sutton, 2005). In addition, the model assumes that the same set of components is important across all individuals. This focus on the same linear relationships across all participants is a limitation of the model. However, as there is no evidence to suggest that the variable of focus in this study, medication adherence behaviour, is not linearly related to TRAPB model components or to suggest that different aspects of the model are more or less important across families, these limitations did not seem to preclude testing the model.

One may consider the validity of the measurement of individuals' cognitions using the TRAPB method. Specifically, are some measures of cognitions valid and others less so? The TRAPB theory has not developed an explicit method to check for the validity of the

model components. Given that, this question is addressed through this study by using methodology designed to lessen participant response bias, as well as by the inclusion of a measure of the tendency of individuals to present more positively than is the actual case. Refer to the methodology section for elaboration on this issue.

Effectiveness of the TRAPB model. The effectiveness of the TRAPB model's components have been well documented. For example, Albarracin et al. (2001) performed a meta-analysis that included 42 studies that examined condom use behaviour and employed the Theory of Reasoned Action, the Theory of Planned Behaviour, or both. They reported averaged correlations between perceived behavioural control and intentions of .25. Moreover, they reported that, on average, attitude was more strongly correlated with intention (r = .58), as compared to either subjective norm and intention (r = .39) or perceived behavioural control and intention (r = .45). The authors reported an average multiple correlation coefficient (R = .70) for results regressing intention on attitude, subjective norm, and perceived behavioural control. Armitage and Conner (2001) reported that the average multiple correlation regressing intention on attitude, subjective norm, and perceived behavioural control was large (R = .63).

Although studies show that intention is generally predicted from attitude, subjective norm, and perceived behavioural control, comparatively the predictive relationship between intention and behaviour has been shown to vary depending upon methodological factors and factors inherent within the context of the behaviour being predicted. In reporting on the relationship between intention and behaviour, Albarracin et al. (2001) reported a relationship of .45. Armitage and Conner (2001) also performed a meta-analysis including 161 studies all employing the TRAPB model and studying a range of health problems. The focus of their

meta-analysis was to provide evidence regarding the general effectiveness of the model in predicting behaviour. Importantly, the authors addressed whether the relationships between the TRAPB components, intention and performance of behaviour varied depending upon whether performance of behaviour was measured by self-report or observation (third party documentation of reported behaviour). In general, their results indicate that effect sizes between TRAPB components ranged from moderate to large. The average relationship between performance of a behaviour and intention was moderate ($r = .47$). The authors also reported a multiple correlation of .55 between self reports of behaviour with intention and perceived behavioural control and a multiple correlation of .44 between observations of behaviour with intention and perceived behavioural control. Moreover, Albarracin et al. (2001) reported on studies that measured behaviour retrospectively (at the same time as obtaining a measurement of intentions, attitudes, and subjective norms) and on studies that measured behaviour prospectively (measured behaviour subsequent to obtaining a measurement of intentions, attitudes, and subjective norms). Results indicated that average correlations between intention and behaviour were greater for retrospectively measured studies ($r = .57$) as compared to prospectively measured studies ($r = .45$), although the size of the relationship in prospectively measured studies was still acceptable. Godin and Kok (1996) in their review of TRAPB studies reported an average R^2 of .34 for the intention to behaviour relationship. Placing studies in health behaviour categories, for example "Addictive," "Clinical, Screening," and "HIV/AIDS", Godin and Kok (1996) reported that the average R^2 varied by health category showing that Clinical Screening was at the low end with $R^2 = .16$ and HIV/AIDS at the higher end at $R^2 = .42$. Godin and Kok's (1996) results thus suggest that factors specific to a particular context may affect the intention to behaviour

relationship. Given that the current study examines parent-child behaviour in children with ADHD, one may suspect some discrepancy between the current study's results for intention to predict behaviour versus results for this same relationship in adult health behaviour studies.

Turning specifically to parent-child TRAPB studies, attitude and subjective norm have, with few exceptions, predicted parents' intention, but, as in the adult literature, mixed results have been reported regarding the intention to behaviour relationship. For example, Austin (1989) and Manstead, Plevin, and Smart (1984) both showed that attitudes and subjective norms predicted mothers' intentions, and intentions were predictive of behaviour. Specifically, Manstead et al. (1984), reported moderate effect sizes for both mothers' attitudes and subjective norms in relation to intentions to breast feed, respectively $r = .59$, and $r = .46$. However, in another study, mothers' intentions to take their children to medical examinations were not predictive of their behaviours, but attitudes were predictive of intention, $r = .44$, although subjective norms were not (Henricks, Freeman, & Sheiham, 1990). Conversely, intentions were found to predict behaviour in a study predicting the use of child restraint devices (Richard & Dedobbeleer, 1994). Other than examining parenting behaviour, both studies differ in several ways from the present study that examined medication adherence. In the infant feeding study, mothers' were predicting primarily their own feeding method, as the infants' behavioural repertoires were quite limited compared to those of children with ADHD. Moreover, for both the infant feeding and child restraint study, mothers may consider these behaviours to be less controversial than providing their children with medication for ADHD. In contrast, the Austin (1989) study is similar to the present study in that both studies examine the issue of mothers providing medication to their

children. Austin (1989) reported that intentions to provide their children with anticonvulsant medication for epilepsy were predictive of mothers' medication giving behaviour, $r = .44$. On one level of comparison, since the present study also examines parental medication providing behaviour, this similarity would be reasonable evidence to suggest that mothers' intention would predict their behaviour in the present study. However, one also needs to consider the differences between the present study and Austin's (1989) with regards to parenting demands and child behaviour profiles that may influence the intention to behaviour relationship. Parenting demands may be comparatively greater for mothers of children with ADHD than children with epilepsy, considering the disruptive nature of ADHD and the frequently comorbid oppositional defiant symptoms. For example, the hyperactive and impulsive behaviours of children with ADHD may stretch their mothers' monitoring abilities to the limit. Furthermore, children with oppositional disorder symptoms may be less agreeable to taking their medication at the required times. Thus, although mothers may strongly intend to provide medication to their children, their children's behaviours may make it difficult to do so. Overall, results from the empirical literature offer mixed direction with regards to hypothesizing whether intentions will predict behaviour in parent-child interactions, especially pertaining to ADHD medication adherence. On the one hand, theory and some empirical studies would support the prediction that such a relationship should be found. Alternatively, the evidence in support of the relationship is limited to studies that may not generalize to the context of medication adherence in children with ADHD.

In summary, meta-analyses of adult health research show generally large effect sizes for the relationships between intention, attitude, subjective norm, and perceived behavioural control constructs. Regarding the intention to behaviour relationship, moderate effect sizes

have been reported, but evidence is mixed with regards to the degree that this relationship may generalize to the current study's participants and context – mothers giving medication to children with ADHD. As well, results indicated that studies that employ prospective measurements of behaviour result in more conservative correlations between intention and behaviour than studies that employ retrospective measurements of behaviour. Moreover, Armitage and Conner's (2001) results showed that self-reported performances of behaviour are more highly correlated with intention compared to observations of behaviour with intention. The authors concluded that self-reports of behaviour hold the possibility of a reporting bias. To offset such a possible bias, the present study included more than one report of behaviour (mothers' and children's) as well as a control measure that assessed each mother's tendency to respond in a socially desirable fashion. Moreover, the present study employed a prospective research design rather than a retrospective design to offset the above noted more liberal correlations typically found with retrospective designs.

Measuring medication adherence behaviour among mothers' of children with ADHD

A conceptualization of adherence. Definitional terms to describe a patient's behaviour in following a medical regimen have been debated. This debate has focused upon the use of the terms compliance versus adherence. The term compliance has been defined by Haynes (1979) as the "extent to which a person's behaviour (in terms of taking medication, following diets, or executing lifestyle changes) coincides with medical or health advice" (pp. 1-2). Problems with this term have focused upon the connotation that the patient passively follows the physician's advice. Furthermore, there is explicit judgment in using this term because treatment failure suggests a noncompliant patient who failed to follow, intentionally or unintentionally, the physician's advice (Donovan & Blake, 1992; Varni & Wallander, 1984).

The term adherence, in contrast, has been suggested to imply a collaborative relationship between physician and patient (Leventhal, 1993). This collaboration consists of the patient being involved in the planning, and most importantly in the implementation of the treatment. As well, collaboration suggests physicians negotiating with patients about treatment options rather than issuing treatment directives to patients without consultation. For researching medication adherence in children with ADHD, adherence is a better term than compliance as parents of children with ADHD have an important role in instigating and perpetuating medication regimes with children of ADHD. Therefore, for this study, the term adherence will be used.

A brief review of medication adherence measurements. Researchers have traditionally categorized medication adherence measurements into either direct or indirect methods. Direct methods are the most objective and quantifiable, but are not without difficulties (Riekert & Drotar, 2000). Examples of different types of direct methods include assays to identify medication levels found in body fluids (e.g., blood or urine), pill counts, and electronic/computer monitoring devices. Drug assay measurements can be impractical for both researcher and participants. For the researcher, drug assays may be costly and time consuming, involving lab analysis and lab personnel to obtain samples. For the participants, drug assays also may be time consuming and inconvenient. Furthermore, although drug assays determine that a medication has been taken by the participant, the time the medication was taken, and the exact amount of medication taken cannot be determined because of individual differences in drug metabolism, absorption rates, and food interactions (Epstein & Cluss, 1985). Moreover, drug assays only reflect recent consumption of the drug and it has

been suggested that participants may alter their medication taking behaviour up to 7 days prior to a drug assay scheduled visit (Feinstein, 1990).

The pill count method entails a noting of the initial number of pills prescribed to the participant to be taken over a specific time period, and a count of the remaining pills, if any, after the specific time period. The number of remaining pills is a measure of nonadherence. A potential problem with this method is that the initial correct number of pills depends upon the accuracy of the pharmacist and errors are possible (Johnson et al., 1996). Another problem with this method is the assumption that the participant has consumed any unreturned pills. Obviously, there are other explanations for unreturned pills such as accidental loss. As well, participants may intentionally discard unused pills rather than provide them for counting (Rudd et al., 1989). In summary, pill counting methods are susceptible to adherence overestimation through misplacement or intentional discarding of pills.

Investigators also have used electronic and computer monitoring devices to measure medication adherence behaviour (Riekert & Drotar, 2000). These devices are part of the pill bottle itself and monitor the frequency of removal of a pill bottle cap. Often these devices consist of a standard pill bottle with a microprocessor in the cap to process the data (Cramer, 1995). Each time a pill bottle cap is removed, this information is stored electronically. Although this method removes the potential of a counting error, there remains no direct measurement of pill consumption. As well, the number of pills taken for each time pill cap removal remains unknown. Moreover, these electronic/computer monitoring devices may not be cost effective and are prone to malfunction (Riekert & Drotar, 2000).

Indirect measures of adherence have typically involved reports from family members and health professionals. Previous studies have targeted different sources to report on

adherence. For example, Gudas, Koocher, and Wpij (1991) examined medication adherence in children with cystic fibrosis and obtained reports from parents, children, and health professionals. Johnson et al. (1992) obtained reports from both children and parents regarding adherence behaviours (e.g., medication, exercise, diet) for children with diabetes. Both Ibrahim (2002) and Ohan and Johnston (2002) reported relatively high agreement between the medication adherence reports of parents' and children or adolescents with ADHD (correlations in the range of .78 to .83). As well, Ibrahim reported good stability for children or adolescents' adherence reports over a 3-month duration (r = .74) and for parents' reports over a 3-month duration (r = .81). There is some concern with over-reporting of adherence by parents and adolescents, typically associated with social desirability in responding (Rapoff, 1999), and some researchers have relied instead on reports of health professionals. For example, Geiss et al. (1992) obtained physicians' reports of patients' adherence behaviours following an office visit. However, concerns with over-reporting even by health professionals, cost, and practicality have led most researchers to rely upon medication adherence reports from parents and their children (Finney, Hook, Friman, Rapoff, & Christophersen, 1993; Riekert & Drotar, 2000). In summary, previous studies assessing adherence have used both direct and indirect measures, and each is imperfect. Although both direct and indirect adherence measures have methodological difficulties, the indirect measures of parent and child/adolescent reports are less expensive, and, in general, less time consuming for both researchers and participants. Their use is supported by evidence of good agreement between parents' reports of medication adherence behaviour and the reports of their children or adolescents with ADHD and by evidence of good temporal stability of these reports. Researchers, however, have noted that adherence reports from parents and children

tend to overestimate adherence behaviour. Therefore, as a potential control for this over-reporting, this study used a measure to assess an individual's tendency to respond in a socially desirable manner, and employed an interview method for assessing adherence to reduce over-reporting biases.

The 24-hour medication interview. The 24-hour interview method addresses some of the problematic issues identified in other measures of adherence (Johnson 2001; Johnson, Freund, Silverstein, Hansen, & Malone, 1990; Johnson, Siverstein, Rosenbloom, Carter, & Cunningham, 1986), such as measurement reactivity and reporter memory bias. Johnson and colleagues (1986) designed this interview to measure adherence behaviour in children with diabetes. Despite the 24-hour interview's initial design as a measure of diabetes' adherence behaviour, Johnson (personal communication, August, 2002) suggests that the interview does not need to be limited to children with diabetes and may be adapted to measure adherence behaviour in children with ADHD. A wide range of diabetes adherence behaviours are gathered in the structured interview including injection regularity, injection time interval, calories consumed, percentage of calories from fat, exercise frequency, duration, and glucose testing. Of these, medication regularity and interval between medication taking are adaptable for measuring medication adherence behaviour in children with ADHD. This interview has many positive characteristics. For example, it obtains adherence reports from both parents and children. As well, the interview specifies that investigators obtain participants' adherence reports within a 24-hour period to reduce memory decay and increasing the accuracy of reporting of the particulars of the adherence behaviour (Johnson et al., 1990). To further facilitate accurate reporting, the interview consists of specific questions focused on cueing the individual to recall the previous day's events (Johnson, 2001). As well, to facilitate

multiple samples of adherence behaviour, the authors specify sampling of adherence behaviour on three occasions over a 2-week period (Johnson, 2001).

In summary, the 24-hour interview is a measure used to obtain parents' and children's reports regarding their medication adherence behaviour. Investigators obtain participants' reports on three randomly chosen days within a 2-week period. On each of these days, parents and children report on their medication adherence behaviour performed on the previous day. This measure has good reliability and validity to measure adherence behaviour in children with diabetes and is well suited for adaptation to measure medication adherence behaviour in children with ADHD.

Hypotheses

In conclusion, from the above discussion of medication adherence among children with ADHD and the TRAPB, several hypotheses for the current study were derived. The first was that mothers' attitudes, subjective norms, and perceived behavioural control in providing their children with medication to treat their ADHD positively predict mothers' intentions to treat their children with medication. Moreover, mothers' intentions to provide their children with medication predict mothers' actual behaviours in giving their children medication to treat their ADHD. Specifically, mothers' intentions to provide their children with medication were predicted to mediate the relationship between each of mothers' attitudes, subjective norms, perceived behavioural controls and their actual behaviours in providing medication to their children with ADHD. The pediatric chronic illness and ADHD medication literature provided the following predictions. It was predicted that frequency of daily medication dosage, presence of child medication side effects, presence of child oppositional defiant behaviour, children's age, and presence of depressive symptoms were predicted to be

negatively related to mothers' medication adherence behaviour. Finally, it was predicted that both severity of children's ADHD symptoms and medication treatment efficacy would be positively related to mothers' medication adherence behaviour.

METHOD

Participants

Participants were 55 mother–child dyads recruited through the distribution of notices throughout British Columbia to family physicians' offices, hospitals, community health offices, ADHD support groups, schools, parent conferences, newspapers, and university psychology clinics. These notices provided a synopsis of the study's purpose, indicating that the study sought to obtain information from mothers who provided medication to their children with ADHD. Interested mothers were directed to contact the UBC Parenting lab for further information if they had a child between 6 and 12 years of age with ADHD who was taking medication to treat her/his ADHD. A mother was excluded from this study if her child with ADHD did not reside with her, if she did not administer any of her child's ADHD medication, or if it was determined by the research assistant that the mother had difficulty communicating in and understanding English. For practical reasons, parental participation in the study was limited to mothers. As compared to fathers, mothers are more likely to take a greater role in child rearing (Pleck, 1997). Therefore, it was extrapolated that mothers were more likely to be the main providers of medication to their children with ADHD.

Of the 55 dyads, 26 resided outside and 29 within the British Columbia Lower Mainland. Each dyad consisted of a child with ADHD and his/her mother. Mothers' ages ranged from 28 to 61 years ($M = 39.55$ years, $SD = 6.67$). Children's ages ranged from 73 to 155 months ($M = 119.62$ months, $SD = 23.55$). Of these children, 44 were boys with ADHD and 11 were girls with ADHD. Each mother reported that her child was diagnosed with ADHD by a health professional. Of the 55 children with ADHD, mothers reported that 23 were diagnosed by pediatricians, 13 by psychologists, 11 by psychiatrists, and 8 by family

physicians. Fifty mothers were biologically related to their child, and five were step and/or adoptive mothers. In terms of race/ethnicity, 74% of mothers described themselves as Caucasian, 6% as First Nations, 2% as East Indian, and 18% did not endorse an ethnic description. Family social economic status was calculated using the Blishen index (Blishen, Carroll, & Moore, 1987). Mothers' and/or fathers' occupations determined the family's numerical position on this index. Canadian families' scores on this measure can range from 17.81 to a maximum of 101.74 ($M = 42.74$, $SD = 13.28$) (Blishen et al., 1987). Higher numbers on the index are equivalent to higher social economic status. For this sample, the family social economic status scores ranged from 17.81 to 70.27 ($M = 38.77$, $SD = 15.29$). This mean corresponds to the lower end of the middle class.

Measures

Sample Descriptives

General Family Information Questionnaire

This measure was designed specifically for this study to obtain mothers' reports of family demographic information and their children's medication regimes. Mothers were asked to report on the daily medication dosages they provided to their children, the number of days per week they provided a medication dose to their children, and any medication doses others (e.g., school teachers, other family members) provided to their children.

Predictors of Degree of Non-Adherence

ADHD Rating Scale – IV (DuPaul, Power, Anastopoulos, & Reid, 1998)

This rating scale was used to determine if a child met criteria for an ADHD diagnosis and as an indication of the severity of the child's ADHD symptoms. Mothers reported on their children's un-medicated ADHD behaviour over the past 6 months in the home. The

Inattention and Hyperactive/Impulsive scales of this measure each have nine items rated on a four point scale of (0) *not at all*, (1) *just a little*, (2) *pretty much*, and (3) *very much*. Mothers' ratings of 2 or 3 were taken to indicate symptom presence (Boyle et al., 1997). Consistent with the DSM-IV criteria for ADHD, children rated by mothers as exhibiting six of the nine ADHD symptoms on the Inattention scale were considered to be Inattentive ADHD subtype. If mothers rated their children as having six of the nine symptoms on the Hyperactive/Impulsive scale, their children were considered to be Hyperactive/Impulsive subtype. Children rated by their mothers as meeting six of nine symptoms on both the Inattention and Hyperactive/Impulsive scales were considered to be Combined ADHD subtype. Satisfactory psychometric properties for the ADHD-Rating Scale IV have been demonstrated including high test-retest reliability for parent ratings 4 weeks apart on both the Inattention subscale (r = .78) and Hyperactive/Impulsive subscale (r = .86) and for the Full scale (r = .85) (DuPaul et al., 1998). As well, this measure has shown good reliability and good criterion validity with the Conners' Parent Rating Scale (DuPaul et al., 1998). In the current study, the Inattention, Hyperactive/Impulsive and Full Scales demonstrated good internal consistencies of .77, .81, and .82 respectively. The number of ADHD symptoms measured symptom severity. Descriptives for the ADHD-IV Rating Scale are shown in the Results sections in Table 1.

Oppositional Defiant Disorder Rating Scale (ODDRS; Hommersen, Murray, Ohan, & Johnston, 2005).

This scale was used to assess children's oppositional defiant disorder symptom severity. Mothers rated eight items, describing DSM-IV criteria for Oppositional Defiant Disorder, based upon their observations of their children's behaviour over the past 6 months.

Mothers rated each item on a four-point scale from "*not at all*" (0) to "*very much*" (3) with higher scores indicating greater oppositional defiant behaviour. Ratings of 2 or 3 were considered to be positive indications of the presence of a symptom. The ODDRS was modeled after the ADHD Rating Scale – IV and good reliability and validity is shown by strong correlations between the ODDRS items and the Child Behaviour Checklist aggression subscale ($r = .73$) (Hommersen et al., 2005). In the current study, the ODDRS showed good internal consistency of .90. Descriptive statistics for this measure are shown in the Results section in Table 1.

Brief Symptom Inventory: Depression Scale (BSI; Derogatis, 1993)

For this study, the BSI Depression scale was used to indicate mothers' severity of depression symptoms. The BSI is a 53-item self-report measure of adult psychological symptoms that includes six items designed to assess depression. For each item, mothers rate the level of distress the symptom causes them on a 5-point scale ranging from 0 (*not at all*) to 4 (*extremely*). Good reliability has been reported and convergent validity has been reported between the BSI Depression scale and both the Wiggins content scales of the MMPI and the Tryon Cluster scores, respectively, .72 and .67 (Derogatis, 1993). For the current study, mothers' scores on the six depression items had an internal consistency of .82. Mothers' scores were averaged across the six depression items with a mean of .52 and standard deviation of .64.

Paulhus Deception Scales (PDS; Paulhus, 2002)

The PDS was used to assess a mother's tendency to present information in a socially desirable manner. The PDS is a 40-item measure comprising of two subscales: Self-Discrepancy Enhancement and Impression Management. Each subscale consists of 20 items

with each item rated on a 7-point scale (1 = *not true* to 7 = *very true*). For the purpose of this study, only the Impression Management subscale was used. The Impression Management scale measures an individual's tendency to communicate to others an exaggeration of their socially desirable behaviours and to diminish their socially undesirable behaviours. The Impression Management scale shows good convergent validity with various lie scales including the MMPI Lie scale and Eysenck Lie scale, and correlates well with The Marlowe-Crowne Social Desirability scale (r = .73) and the Multidimensional Social Desirability Inventory (r = .80) (Paulhus, 2002). The Impression Management scale has good test-retest reliability for a 5-week period of .65 (Paulhus, 2002). The Impression Management scale's internal consistency for the current study was .71. The Impression Management scale had a mean of 11.91 and a standard deviation of 3.10.

The ADHD Medication Belief Report (AMBR)

The AMBR is a self-report measure specifically constructed for this study to elicit the TRAPB components namely, mothers' attitudes, subjective norms, perceived behavioural controls, and intentions about giving their children medication to treat their ADHD. The AMBR was created because there is no standard measure used in TRAPB studies, and instead it is recommended that measures be developed specific to the posed research questions (Ajzen, 2001; Ajzen & Fishbein, 1980; Conners & Sparks, 1996). Typically, there are two types of questions on these measures: *direct* and *indirect* (Ajzen, 2001). Both types are designed to measure TRAPB model constructs (attitudes, subjective norms, perceived behavioural control). Intention is measured by only direct questions (Ajzen, 2001). Whether a question is of the direct or indirect type depends upon how it is constructed. For the current study, I relied on Conners and Sparks (1996) and Ajzen (2001) to provide guidance and

suggested anchors for direct questions. Researchers are advised to construct indirect questions using results obtained from pilot testing and general guidelines provided by Azjen and Fishbein (1980) and Azjen (2001). Therefore, a pilot study was performed for this study including mothers of children with ADHD who were taking medication for ADHD, and the results from this pilot study were used to guide the construction of indirect questions (please see Appendix I for more on the pilot study). Four versions of the AMBR measure were used. Each version had identical items, but the item order varied from version to version to reduce order effects. As well, to reduce mothers' reporting bias when responding to questions, research assistants administered the first half of the AMBR, then switched to the other measures, and returned to the second half of the AMBR at the end of the interview. Appendix II provides all AMBR items and identifies the TRAPB construct (attitude, subjective norm, perceived behavioural control, and intention) that each particular item is designed to test.

In forming the final version of the AMBR, I performed internal consistency analyses for intention, attitude, subjective norm, and perceived behavioural control constructs as measured by direct and indirect items. The acceptable level of internal consistency was set at .70 or above (Groth-Marnat, 1999), and items identified as lowering alpha coefficients below a .70 level were removed and not included in further analyses.

Intention Score. Five items were used to assess mothers' intentions to provide medication to their child with ADHD within the next 2 weeks. Each item was scored on a 7 point scale using the following anchors: "*definitely do*" to "*definitely do not*," "*definitely no*" to "*definitely yes*," or "*strongly disagree*" to "*strongly agree.*" Internal consistency for the five intention items was .42, but with two intention items omitted, items 3 and 4, the internal

consistency for the three remaining intention items was .72. Therefore, these three items were summed and formed the composite Intention Score used for all further analyses.

Attitude Score. There were five direct questions designed to assess a mother's attitude in providing medication to her child to treat his/her ADHD in the next 2 weeks. Each of these direct questions asked mothers to rate their attitude regarding providing medication to treat their children with ADHD on a 7 point scale using the following anchors: "*bad*" to "*good*," "*harmful*" to "*beneficial*," "*unpleasant*" to "*pleasant*," "*unenjoyable*" to "*enjoyable*," or "*foolish*" to "*wise*." There also were indirect attitude questions assessing consequences of providing medication. For each of four consequences, two questions were used – one to obtain mothers' ratings of the likelihood of the consequence occurring on a 7 point scale ranging from "*unlikely*" to "*likely*" (an *expectancy* question) and the other to obtain mothers' ratings of the valence of the consequence on a 7 point scale ranging from "*bad*" to "*good*" (a *value* question). The indirect attitude questions were transformed according to Ajzen and Fishbein's (1980) and Ajzen's (1991) instructions. Each indirect attitude question rating scale was transformed from unipolar scale values of 1 to 7 to bipolar scale values of –3 to +3. Then, a product was derived for each of the four consequences by multiplying its respective *expectancy* and *value* question scores. Because of different scoring of the indirect and direct attitude items (-3 to +3 and 1 to 7), these items were converted to Z scores before being combined. Across the four indirect and five direct attitude questions, internal consistency was .69, and excluding items 11 and 12 improved the alpha to .80. Therefore, a composite Attitude Score was formed by summing these items and this score was used for all subsequent analyses.

Subjective Norms Score. Three items were designed as direct assessments of mothers' subjective norms for providing medication to their children to treat their ADHD. For each item, mothers rated others' opinions regarding mothers providing medication to their children to treat their ADHD on a 7 point scale using the following anchors: "*should not*" to "*should*," "*disapprove*" to "*approve*," or "*unlikely*" to "*likely*." For indirect subjective norms questions, from the pilot study results, four referents (i.e., family members, health professionals, school employees, and family friends) were identified who hold opinions regarding mothers providing medication to their children with ADHD. Two questions were constructed for each of these four referents and these eight questions provided an indirect assessment of subjective norms. For each of these identified referents, one question asked mothers to rate the referent's belief strength on a 7 point scale ranging from "*should*" to "*should not*" insofar that the identified referent thinks the mother should give medication to her child to treat his/her ADHD in the next 2 weeks. In addition, for each of the identified referents, a question was constructed to assess the mother's motivation to comply with the identified referent's beliefs on a 7 point scale ranging from "*not at all*" to "*very much*." Following suggestions of Ajzen (1991) and Ajzen and Fishbein (1980), rating scales for referents' belief strengths questions were transformed from unipolar scale values of 1 to 7 to bipolar scale values of –3 to +3. However, rating scales for motivation to comply questions remained unipolar, as it is assumed that mothers are unlikely to be motivated to perform behaviours opposite of how they perceive important others want them to behave (Conners & Sparks, 1996). A product was derived for each of the four referents by multiplying the respective belief strength question by the motivation to comply question. Because of different scoring of the indirect and direct subjective norm items, each was converted to a Z

score before being combined. For the four indirect and three direct subjective norm questions, internal consistency was .81. These items were summed and formed the composite Subjective Norms Score used in subsequent analyses.

Perceived Behavioural Control Score. Five direct items were constructed to assess mothers' perceived behavioural controls in providing medication to their children to treat their ADHD in the next 2 weeks. Each direct item was rated by mothers on a 7 point scale using the following anchors: "*strongly disagree*" to "*strongly agree*," "*no control*" to "*control*," or "*difficult*" to "*easy*." For indirect items the pilot study results, Appendix I, identified four factors (i.e., child's attitude regarding taking medication, family members help, mother's ability to deliver medication, and medication characteristics) that might inhibit or facilitate mothers providing medication to their children with ADHD. Two questions were constructed for each of the four factors providing eight indirect questions assessing perceived behavioural control for mothers providing medication to their children with ADHD. One question asked mothers to rate the anticipated frequency that a factor would be present on a 7 point scale ranging from "*unlikely*" to "*likely*." Another question asked the extent the factor facilitated, on a 7 point scale ranging from "*unlikely*" to "*likely*" mothers providing medication to their children to treat their ADHD in the next 2 weeks. Mothers' ratings of indirect perceived behavioural control questions were transformed from unipolar to bipolar ratings (Ajzen, 1991; Conners & Sparks, 1996). A product was derived for each of the four factors by multiplying its respective anticipated frequency question by its likelihood to facilitate question. Again, Z score transformations were used because of the different scoring between indirect and direct perceived behavioural control. The four indirect and five direct perceived behavioural control items yielded an internal consistency of .36. This internal

consistency could not be improved by omitting items. Therefore, this construct was not used in further analyses.

Medication Efficacy

Mothers' attitudes regarding the efficacy of the medication they provide to their children with ADHD were examined using AMBR items 13, 15, and 17 (please refer to Appendix II to review the AMBR items). Each of the three items presented a beneficial consequence related to their child taking medication for his/her ADHD. For each item, mothers rated the likelihood of this beneficial consequence on a 7 point scale ranging from "*unlikely*" to "*likely*." The internal consistency for these items was .79. These items were summed and formed a composite score to represent medication efficacy used in analyses.

Medication Side Effects

AMBR item 11 was used to measure mothers' reports of medication side effects. Mothers rated the presence of medication side-effects related to their children taking medication for their ADHD on a 7 point scale ranging from "*unlikely*" to "*likely*."

Degree of Non-adherence, a Measure of Medication Adherence

Degree of Non-adherence Measure

This was a structured interview designed specifically for this study and was a modification of a structured interview used to assess treatment compliance for childhood diabetes (Johnson et al., 1986). This measure assessed the regularity with which mothers provided their children with medication. There were two steps to obtaining a measure of mothers' degree of non-adherence.

The first step, conducted at study enrollment, necessitated mothers providing the ideal time or times during the day they would provide medication to their children with ADHD.

Mothers provided times to the hour and minutes. Mothers were asked the following question if they provided medication once a day, "What is the ideal time, to the hour and minutes, during each day or evening to provide your son/daughter medication to treat his or her ADHD?" If mothers provide medication more than once a day, they were asked the following question, "What are the ideal times, to the hour and minutes, during each day or evening to provide your son/daughter medication to treat his or her ADHD?" Ideal medication times were recorded for each mother and used to compare with mothers' actual medication giving behaviour in a subsequent 2-week period.

Step two involved obtaining reports of mothers' medication giving behaviours within a 2-week period using structured phone interviews conducted with mothers on three randomly determined days. Mothers were not told beforehand the specific days that they would be contacted. During the structured interview, a mother reported on her previous day's activities with her child from initial morning contact until her child's bedtime. It was expected that during the structured interview a mother would include an account of medication giving behaviour including the time or times she provided medication to her child. A benefit of this type of interview is that mothers are provided with the context of the previous day's events, and this context helps to prime mothers to provide accurate accounts of their behaviour with their child including their medication giving behaviour (Johnson et al., 1986). In the interview, if a mother recounted the day's events and did not volunteer any medication giving behaviour, the mother was prompted by the question: "Did you provide any medication yesterday to treat your child's ADHD?"

A simple example will illustrate how reports on the interview were scored to indicate degrees of nonadherence. A mother has provided the time of 7:30 a.m. as the ideal time to

provide medication to her child. However, during the structured interview, she reported 8:15 a.m. as the actual time she provided medication to her child. The difference between the ideal time and actual time is 45 minutes. Only absolute differences between mothers' ideal times and the actual times were calculated. It is the difference, in this example 45 minutes, between the ideal time and actual time that is the measure of the degree of non-adherence. All resulting differences between ideal and actual medication giving times for each mother were summed and averaged to create a Degree of Non-Adherence Score. If a mother reported no actual medication dosage on a day that a medication dosage was expected, then the difference between ideal and actual medication time was 24 hours (1440 minutes). Thus, mothers' Degree of Non-Adherence scores could range from a minimum of 0 minutes, representing medication given on time, to a maximum of 1,440 minutes representing that dosages were missed entirely for the day.

A parallel interview measure was developed to use with the children with ADHD to obtain their degree of non-adherence reports. This interview was developed in accordance with Johnson et al.'s (1986) recommendations for creating a child's version of the interview measure. The format of the interview was the same as the mothers' interview. To obtain a child's report of degree of non-adherence, a difference was taken between a mother's reported ideal medication giving time and her child's report of the time the medication was actually given. These absolute differences were summed and averaged to create a child's Degree of Non-Adherence Score. Researchers report good reliability and validity for the 24-hour interview measure. In a standardization study, investigators found moderate to high agreement between parents' and children's reports on the interview (Johnson et al., 1986). Across 13 medication adherence behaviours, the average relationship between parents' and

children's reports was r =. 62, from a low of .42 (for glucose testing frequency) to a high of r =. 78 (for regularity of injection time) (Johnson et al., 1986). Johnson et al. (1990) also reported measure reliability in a study comparing children's reports with observers' reports of children's adherence behaviours. The authors reported excellent agreement between observers' reports and children's reports of injection time with a mean of 98% and a range between 50% and 100%. Reliability of the interviews in the present sample is reported in the results section.

Procedure

Research assistant training

Prior to study commencement, research assistants participated in investigator-led study training sessions. To facilitate training, research assistants engaged in role-plays, taking turns as research assistants interviewing study participants, and as the study participants. In the interviewing role, research assistants were required to follow a script written by the investigator. This script was written to meet the following criteria: to provide study protocol standardization, as well as to limit reporting bias by study participants. This script provided precise dialogue that research assistants were to use with participants. The script also had specific study protocol directions. Training sessions were held to discuss and agree upon any script revisions. Training was completed when the final version of the script was completed, and the investigator judged each research assistant as proficient in administering the script dialogue and study protocol. Research assistants were instructed to follow this script with each mother and to report to the investigator any instances of deviation from the script. Research assistants reported no critical deviations from the script.

Initial contact with potential participants

When a mother interested in the study contacted the laboratory, she was asked questions designed to determine her suitability for the study by a research assistant and the research procedure was explained to her. If she and her child met the study requirements, she was informed that a consent form and child assent form to participate in the study would be sent to her with an addressed stamped envelope for return. Upon receipt of the signed consent form from the mother, as well as a signed assent form from her child, participants were contacted to arrange a time for an initial telephone interview.

First phone interview with participants

For the initial phone interview, research assistants completed the AMBR , the General Family Information Questionnaire, the Paulhus Deception Scale (Impression Management scale items), the ADHD-IV Rating Scale, the ODDSR, and the depression items from the BSI with the mother. These measures were presented to participants in counterbalanced order to reduce order effects. To reduce the possibility that AMBR items would prime participants' responses, a number of AMBR items were presented to the participant, then another questionnaire was selected and its items presented, then the remaining AMBR items were presented to the participant. Upon completion of these questionnaires, each mother was reminded that she and her child would be contacted three more times within the next 2 weeks and interviewed about medication giving behaviour.

Medication interviews with participants

Research assistants randomly determined three days to conduct the medication interviews within the 2 weeks following the initial interview (from among the days the mother gave her child medication). Mothers were interviewed separately from their children,

but on the same day. Whether the mother or child was interviewed first was decided by chance. If a mother's child declined to provide a medication interview, interviews proceeded with the mother. Mothers were paid $20.00 for study participation.

Results

Description of Participants

Given the focus of this study on medication adherence, rather than ADHD per se, child diagnosis was based on mothers' reports of symptoms and the fact that the child was receiving medication for ADHD as prescribed by a community practitioner, rather than on a formal diagnostic assessment. Of the 70 mothers who contacted the parenting laboratory, 55 met study criteria (refer to page 43 to review study criteria). Of the 15 participants who did not meet criteria, 2 were fathers (mothers were not involved in providing medication to their children) and 13 were not presently providing medication to their children with ADHD. All 55 of the participating children met criteria for ADHD on the ADHD-IV Rating Scale. By ADHD subtype, 80% of the children met symptom criteria for the Combined subtype, 16.4% met symptom criteria for the Inattentive subtype, and 3.6% met symptom criteria for the Hyperactive/Impulsive subtype. Over half of the children, 69%, were reported to exhibit the number of oppositional defiant symptoms on the ODDRS sufficient to meet criteria for Oppositional Defiant Disorder. Table 1 presents the means and standard deviations for the average number of inattentive, hyperactive-impulsive, and oppositional defiant disorder symptoms reported for the children in the study.

Table 1

Means and Standard Deviations for Ratings of ADHD and ODD Symptoms (n = 55)

Variable	*M*	*SD*
ADHD-IV Rating Scale		
Inattentive	8.10	1.38
Hyperactive/Impulsive	7.18	2.29
Combined	15.29	2.64
Oppositional Defiant Disorder Rating Scale		
Oppositional Defiant Disorder	4.82	2.62

Note. Scores represent the number of symptoms rated by mothers as a 2 or 3 on a 0 to 3 scale.

Medication Description

Of the 55 children, 65% took a form of methylphenidate medication. The most common form of methylphenidate was short acting, followed by the HCL extended release and the slow release forms. The average methylphenidate dosage for each of the three types was consistent with standard prescribed dosages (Modi, Lindemulder, & Gupta, 2000; Volkow & Swanson, 2003). For the short acting form of methylphenidate, mothers provided a minimum of one and a maximum of three daily doses for a minimum of 3 days per week to a maximum of 7 days per week. Mothers provided a maximum of one daily dose for both the slow release and HCL extended release forms for a minimum of 5 days to a maximum of 7 days per week. Dextroamphetamine was taken by 29% of the sample, and 6% of participants took atomoxetine. Average dosages for both dextroamphetamine and atomoxetine also were

consistent with standard prescribed dosages (Biederman, Spencer, & Wilens, 2004; Greenhill, 2002). For mothers who provided dextroamphetamine to their children, the minimum daily dose was one and the maximum was two, provided a minimum of 5 days per week to a maximum of 7 days per week. Mothers provided atomoxetine to their children a maximum of one dose daily, 7 days per week. Not all medication dosages were provided by mothers. Please refer to Table 2 for further descriptive information regarding medication.

Table 2

Means, Standard Deviations and Frequencies for Dose, and Dosages

Variable	Frequency	Dosage (mg.)	Daily Doses[a] Mother	Total	Days[b]
Medication types					
Methylphenidate Short Acting	23				
M		13.73	1.52	1.93	6.04
SD		8.67	.68	.91	1.37
Methylphenidate Slow Release	5				
M		24.00	1.00	1.40	6.60
SD		11.40	.00	.55	.89
Methylphenidate HCI Extended Release	8				
M		31.50	1.00	1.13	6.88
SD		12.73	.00	.35	.35
Dextroamphetamine	16				
M		13.13	1.25	1.25	6.25
SD		6.49	.45	.45	1.00
Atomoxetine	3				
M		21.67	1.00	1.33	7.00
SD		2.89	.00	.58	.00
All study participants	55				
M		- -	1.29	1.53	6.33
SD		- -	.53	.74	1.09

[a]Daily doses are both the number of doses per day provided by the child's mother (*Mother*) and doses per day provided by the child's mother and others (*Total*). [b]Days = the number of days per week that the child receives medication.

Johnson et al. (1990) recommend that significantly correlated mother and child adherence reports should be averaged to form a composite adherence score. Furthermore, this correlation should be of a magnitude to fall within the large effect size range. For the current study, 41 mother-child dyads had both the mother and her child report degree of non-adherence information (see Table 3 for means and standard deviations). For the remaining 14 mother-child dyads, only mothers reported degree of non-adherence information. Of these 14 children, 6 children refused to speak with the interviewer, 2 children stated they could not tell time, and 6 children were unavailable to speak with the interviewer. A *t*-test was performed to examine any age differences between the two groups of children, those who reported adherence information and those that did not report adherence. *T*-test results showed that the adherence reporting children were significantly older, mean age of 126.82 months and standard deviation of 19.04 months, as compared to the non-reporting children, 98.5 months and standard deviation of 23.34 months, $t\ (53) = 4.54, p < .01$. Among the 41 dyads with both mother and child reports, mother and child degree of nonadherence reports were significantly correlated and fall within the large effects range, $r\ (41) = .78, p < .001$ and the mean levels were not significantly different, $t\ (39) = 1.24$, *ns*. Despite no significant difference, children's reports of degree of nonadherence were higher than mothers' reports; perhaps this difference can be attributed to reporting error. Therefore, as recommended by Johnson et al. (1990), mother and child degree of non-adherence reports were averaged to form a Degree of Non-Adherence Score used in analyses. For the 14 mother-child dyads without child degree of non-adherence reports, only mothers' degree of non- adherence reports were used in analyses.

Table 3

Means and Standard Deviations for Mothers' and Children's and Combined Reported Degrees of Non-Adherence Scores

Reporter	*M*	*SD*
Mother	164.53	282.85
Child	242.78	334.54
Mother and child combined	181.57	279.33

Note. Degree of Non-Adherence scores are represented in minutes. For each of the three days that adherence was assessed, the scores were derived by taking the difference between mothers' ideal times that they would provide medication and mothers' and, if available, their child's reported actual times that medication was provided. Differences for each dosage time were averaged across the three days to obtain an average Degree of Non-Adherence Score. For each variable, scores ranged from 0 to 1,440.

Demographic Variables related to TRAPB Scores and Degree of Non-Adherence Scores

To investigate whether the AMBR scores or Degree of Non-Adherence scores varied according to various demographic characteristics, the sample was divided according to their demographic characteristics and *t*-tests were performed to determine if there were any significant group differences for Attitude, Subjective Norms, and Intention scores or for

Degree of Non-Adherence scores. Differences due to child's gender, mother versus mother and child as reporters of degrees of non-adherence, one versus more daily medication doses, and methylphenidate versus other forms of medication were investigated. The discovery of differences across demographic groups is important as it would suggest that subsequent analyses include controls for these variables, so adjustments to reduce Type II errors were considered important. It was determined that it would useful to have a power of .50 to detect small effect sizes (i.e., $r = .20$). Given there were 55 mother-child dyads in the present study, alpha was therefore set at .15. The means, standard deviations and probability values for these comparisons are presented in Table 4 for the AMBR scores and in Table 5 for Degrees of Non-Adherence scores. No significant differences were found. Given the lack of significant relations between demographic variables and AMBR scores or Degrees of Non-Adherence scores, all subsequent analyses included all study participants.

Table 4

AMBR Scores' Means, and Standard Deviations for Demographic Comparisons

Demographic variable		*M*	*SD*	*P* value
Child gender				
Attitude				
Boys	($n = 44$)	-.38	5.49	.27
Girls	($n = 11$)	1.53	3.20	
Subjective Norms				
Boys	($n = 44$)	.25	4.38	.39
Girls	($n = 11$)	-1.02	4.00	
Intention				
Boys	($n = 44$)	20.80	.85	.43
Girls	($n = 11$)	21.00	.60	
Medication reporter				
Attitude				
Mom only	($n = 14$)	-.31	5.84	.80
Mom and child	($n = 41$)	.11	4.96	
Subjective Norms				
Mom only	($n = 14$)	.95	4.06	.34
Mom and child	($n = 41$)	-.32	4.38	
Intention				
Mom only	($n = 14$)	20.86	.53	.91
Mom and child	($n = 41$)	20.82	.83	

Demographic variable		*M*	*SD*	*P* value
Medication type				
Attitude				
Methylphenidate	($n = 36$)	-.42	5.85	.34
Other	($n = 19$)	.80	3.44	
Subjective Norms				
Methylphenidate	($n = 36$)	-.43	4.47	.32
Other	($n = 19$)	.81	3.96	
Intention				
Methylphenidate	($n = 36$)	20.81	.89	.69
Other	($n = 19$)	20.89	.46	
Family geographic location				
Attitude				
Urban	($n = 29$)	-.22	5.77	.74
Rural	($n = 26$)	.10	3.39	
Subjective Norms				
Urban	($n = 29$)	-.33	3.96	.27
Rural	($n = 26$)	1.01	5.11	
Intention				
Urban	($n = 29$)	20.12	.92	.38
Rural	($n = 26$)	20.39	.86	

Table 5

Degrees of Non-Adherence Scores' Means and Standard Deviations for Demographic Comparisons

Demographic variable		*M*	*SD*	*P* value
Child gender				
Boys	(n = 44)	150.83	220.70	.28
Girls	(n = 11)	304.56	437.14	
Family geographic location				
Urban	(n = 29)	182.55	220.47	.78
Rural	(n = 26)	200.02	287.35	
Degrees of non-adherence reported by				
Mom only	(n = 14)	160.80	127.24	.22
Mom and child	(n = 41)	222.81	305.33	
Number of daily medication doses				
One	(n = 41)	186.86	300.76	.81
Two or three	(n = 14)	166.10	213.14	
Medication type				
Methylphenidate	(n = 36)	141.61	223.30	.21
Other	(n = 19)	257.29	357.60	

Table 6

AMBR Scores Means, Standard Deviation, Minimums and Maximums (n = 55)

Variable	M	SD	Minimum	Maximum
AMBR score				
Attitude[a]	0.00	5.15	-12.66	5.13
Subjective Norms[a]	0.00	4.30	-8.84	6.89
Intention	20.84	0.76	16.00	21.00

[a]Data is provided as the sum of Z scores.

TRAPB Model Predicting Degrees of Non-Adherence

Please refer to Table 6 for AMBR Scores means, standard deviations, minimums and maximums. Refer to Figure 1 for AMBR score inter-correlations and correlations with Degrees of Non-Adherence. As predicted, mothers' Attitude Score was correlated positively with mothers' Intention Score. Additionally as predicted, mothers' Subjective Norms Score was positively correlated with the Intention Score. Mothers' Attitude Score was positively correlated with mothers' Subjective Norms Score. Contrary to the TRAPB model, mothers' Intention Score to provide medication to their children with ADHD was not correlated with mothers' Degree of Non-Adherence Score. In addition, contrary to predictions, neither mothers' Attitude Score nor Subjective Norms Score were significantly correlated with mothers' Degree of Non-Adherence Score. Because the results suggest no significant relationship between mothers' Intention Score and mothers' Degree of Non-Adherence

Score, further analyses testing Intention Score's role as a mediator between Attitude, Subjective Norms and Degree of Non-Adherence Scores were not performed[1].

The perceived behavioural control construct was shown to be unreliable and therefore not included in the above analyses. However, to explore possible contributions of the single perceived behavioural control items they were each correlated with intention and behaviour. Individual perceived behavioural control items were not predictive of Intention scores. Of these items, one was shown to be significantly related to non-adherence behaviour, "Giving the medication likely depends on my child's attitude towards medication". This correlation is reported in Table 9.

[1]The correlations among TRAPB components and behaviour were calculated separately for reports of adherence provided by mothers versus by children, and revealed highly similar patterns of results.

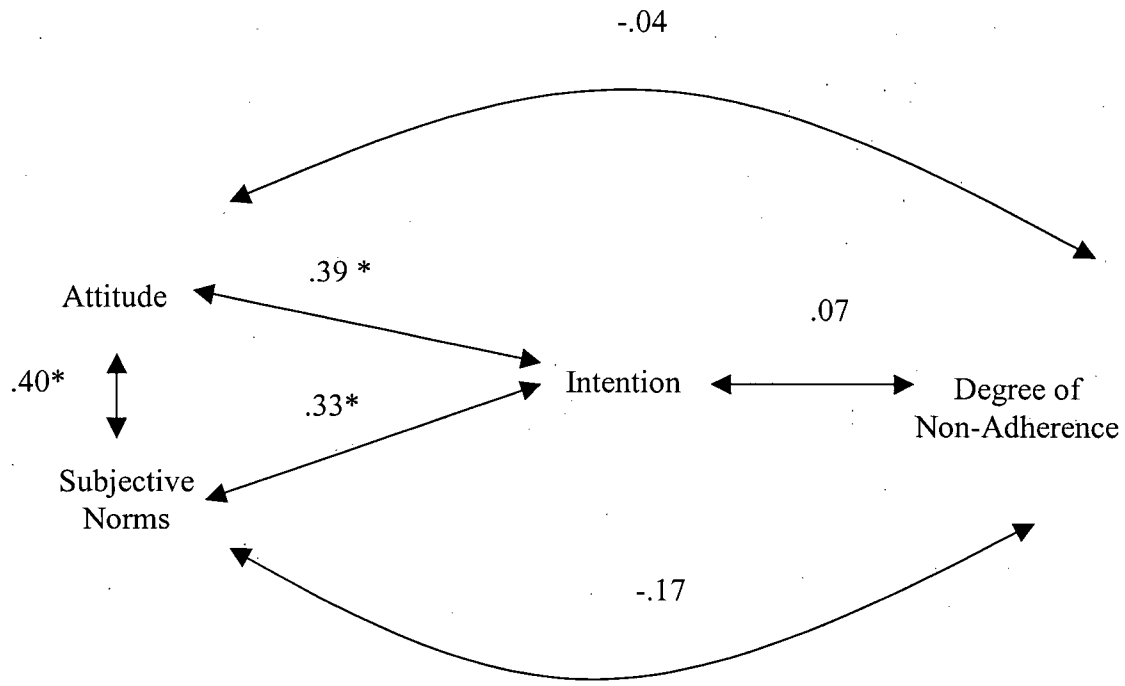

Figure 1. Correlations between AMBR Scores and Degree of Non-Adherence (n=55)

Note. *p < .05, one-tailed.

Other Predictors of Degree of Non-Adherence

Beyond the TRAPB model, the other purpose of this study was to replicate whether the predictors identified in the pediatric chronic illness and ADHD literature also predicted medication adherence. As expected, Medication Efficacy was significantly negatively related to Degree of Non-Adherence Scores. Additionally as predicted, child age was positively related to Degree of Non-Adherence Scores. The relationship between Medication Side Effects and Degree of Non-Adherence Scores was in the expected direction. These correlations are provided in Table 7. It should be noted that many of the predicted relationships between mother and child characteristics and medication adherence were not significant. Number of medication doses were not related to medication adherence.

Table 7

Pearson Correlations between Predictor Variables and Degrees of Non-Adherence (n=55)

Predictor variable	*R*	*P* value
Medication side effects	.16	.13
Medication efficacy	-.36	.01
BSI Depression Scale	-.06	.34
PSD Impression Management Scale	.03	.40
ODDRS	.10	.24
ADHD-IV Rating Scale total symptoms	-.15	.14
Child age	.28	.02

Note. One-tailed P values

Secondary Analyses

Percentage of missed medication dosages. Given that Intentions Scores as well as many of the parent and child characteristics were not predictive of degrees of non-adherence, it is important to examine whether the lack of prediction was due to problems with the method by which adherence was calculated. An additional method of computing medication adherence, percentage of missed medication doses, was used in the following analyses. This method has been used in previous studies examining medication adherence (Brown et al.,1987; Ibrahim, 2002; Matsui, 2000; Ohan & Johnston, 2000). Each medication dose that mothers provided to their children with ADHD during the 3 days within the 2-week study period that was more than 60 minutes different from mothers' reported ideal medication dose time was determined to be a missed dose. The total number of missed doses was then divided by the total number of medication doses that were to be provided for the 3 days to create a Percentage of Missed Doses Score. The mean of Percentage of Missed Doses was 23.45% (SD = 26.43%) with a minimum of 0% and maximum of 100%. Lending support to the validity of the Degree of Non-Adherence score used in the primary analyses, the Percentage of Missed Doses score was strongly and positively related to the Degrees of Non-Adherence score, r (55) = .70, $p < .001$. Pearson correlations relating predictor variables to Percentage of Missed Doses are presented in Table 8. Medication Efficacy was negatively related to Percentage of Missed Doses. As well, child age was positively correlated with Percentage of Missed Doses with. Moreover, child oppositional disorder symptoms were inversely related to Percentage of Missed Doses, $r = .21$ at a p value of .07. Given that the mean percentage of

missed doses for this study is consistent with previous reports of missed doses (Brown et al., 1987; Ibrahim, 2002; Ohan, & Johnston, 2000), that the two methods used to calculate adherence for this study are highly correlated, and that the results of the relationships between adherence predictor variables and adherence are generally consistent between the two calculated measures of adherence for this study, it is likely that the measure of adherence for this study is valid.

Table 8

Pearson Correlations between Predictor Variables and Percentage of Missed Doses (n=55)

Predictor variable	*r*	*P* value
Medication side effects	.10	.27
Medication efficacy	-.22	.05
BSI Depression Scale	.06	.34
PDS Impression Management Scale	-.15	.14
ODDRS	.21	.07
ADHD-IV Rating Scale Total Symptoms	-.04	.39
Child age	.35	.001
Intention	.04	.38

Note. P values are one-tailed.

Correlating individual AMBR items with medication adherence. For exploratory purposes to determine future research directions, all individual AMBR items were correlated with the Degree of Non-Adherence Scores. Consistent with previous analyses in this study, power for these correlations was set at .50, thus correlations with effect sizes over $r = .20$ and

a corresponding alpha level at or below .15 were included in the table. Correlations are reported in Table 9.

Table 9

Pearson Correlations between AMBR Items and Degree of Non-Adherence Scores (n=55)

AMBR item	AMBR item question stem[a]	r
14	My child's improved ability to focus and concentrate would be good	-.40**
17	Would improve my child's school performance	-.41**
18	My child's improved school performance would be good	-.55**
19	People important to me think I should give medication	-.35**
20	People important to me approve of my giving medication	-.38**
21	People important to me likely want me to give medication	-.29*
27	School employees think I should give medication	-.23*
35	Giving the medication likely depends on my child's attitude towards medication	-.23*

Note. *$p \leq .05$; ** $p < .01$ (one-tailed). [a]Refer to Appendix II to view AMBR items.

Mothers who related medication use to an improvement in their child's ability to focus and concentrate and improved school performance showed reduced non-adherence. In addition, mothers' degrees of non-adherence were less if mothers' rated important others, including school personnel, as approving of mothers giving their children medication. Finally, one perceived behavioural control item was related to medication adherence in that mothers who rated their child's attitude as a likely determinant in their providing their child with medication showed less non-adherence.

Discussion

One purpose of this study was to examine the relationships between mothers' attitudes, subjective norms, perceived behavioural control and mothers' intentions regarding providing medication to their children with ADHD. Confirming predictions, both mothers' attitudes and subjective norms predicted mothers' intentions to provide medication to their children with ADHD. However, the perceived behavioural control construct was shown to be unreliable and was not used in analyses. The second purpose was to examine the relationship between mothers' intentions regarding providing medication to their children with ADHD and mothers' medication adherence behaviours. Contrary to prediction, this relationship was not significant. The third, and final, purpose of this study was to examine the relationships between medication adherence behaviour and predictors of medication adherence previously identified in the ADHD adherence literature and/or the general pediatric adherence literature. Among these variables, two were shown to be significantly related to medication adherence behaviour across both measures of adherence, mothers' beliefs about medication efficacy and the child's age.

TRAPB Constructs Predicting Mothers' Medication Adherence

As predicted by the TRAPB model, both mothers' attitudes and subjective norms regarding giving their child medication for ADHD were positively related to mothers' stated intentions to provide medication to their children. The effect sizes for both of these relationships fell within the moderate range and are generally consistent with TRAPB studies of adult health issues that show effect sizes that range from moderate to large (Armitage & Conner, 2001). Regarding the few TRAPB studies that have addressed child health and parenting behaviour, Austin (1989) showed that for mothers giving anticonvulsant

medication to their children, their combined attitudes and subjective norms successfully predicted intention with an effect size falling within the large range (R =.62). In a study examining mothers' intentions to breast feed their infant children, mothers' attitudes successfully predicted their intentions (r =.44) to breast feed, but their subjective norms were not predictive of intention (Henricks et al., 1990), and Manstead et al. (1984) reported moderate effect sizes for both mothers' attitudes and subjective norms in relation to intentions to breast feed, respectively r = .59, and r = .46. In general, although the results of this study are consistent with these previous reports, the magnitude of results is somewhat lower in this study. One possible explanation for the present study's finding of moderate rather than moderate to large effect sizes is that there was limited variance among mothers' reported intentions to provide medication to their children. The mean of mothers' intentions was 20.84 with a standard deviation of .76 and a minimum of 16 and a maximum of 21. Given this range restriction, the strength of the correlations between mothers' intentions and both attitudes and subjective norms may have been reduced.

Despite the moderate effect sizes, the present study did successfully replicate findings in both the adult health and child health TRAPB literature that show that both attitudes and subjective norms predict intentions. Of important note is that this study replicates these findings with the rigorous methodology advised by critics of the TRAPB (Sutton, 1998; Weinstein, 1993). In their reviews of TRAPB studies, these critics have suggested that behaviour measured retrospectively rather than prospectively, as well as inadequate measures to prevent participant response bias in responding to TRAPB measures, have sometimes led to inflated results. The present study measured behaviour prospectively and, to prevent TRAPB items from priming participants' responses, AMBR questionnaires were presented to

participants in two separate sections, with other questionnaires provided to participants between the sections.

Among the TRAPB predictive relationships, the results for the intention to behaviour relationship have been shown to be least consistent across studies examining different behaviours. Mothers' intentions to provide medication to their children (as well as their subjective norms and attitudes) were not predictive of mothers' medication adherence behaviours in this study. There are a number of possible explanations for this finding. To begin with, factors intrinsic to parent-child studies, and especially the nature of ADHD, may be helpful in explaining the failure of mothers' intentions to predict their medication adherence behaviour.

There have been relatively few parent-child studies within the TRAPB literature examining the intention to behaviour relationship. Within the parent-child studies that have been conducted, results have been mixed with regards to intention successfully predicting behaviour (Austin, 1989; Hendricks et al., 1990). However, the study with perhaps the greatest similarity to this one, the Austin (1989) study of medication adherence in epilepsy, unlike the present study's results, did find that intention predicted behaviour. There are some key contextual differences between medicating children for epilepsy versus for ADHD that may explain the disparate results. There is little doubt that parent-child interactions are often disruptive in families of children with ADHD (Johnston & Mash, 2001), and these disruptions are often associated with increased parenting stress levels, as well as lowered parenting efficacy. In the current study, mothers did report high intentions to provide medication to their children but perhaps factors such as parenting stress and diminished parenting efficacy (both perhaps resulting from excessive demands placed upon parents in

coping with ADHD) impacted upon mothers' abilities to actually provide the medication to their children at the times they wished to do so.

In addition, child factors cannot be discounted with regards to contributing to reduced medication giving behaviour, specifically the ADHD behaviours exhibited by these children. For example, ADHD children by nature and diagnostic criteria (APA, 2004) are known to forget parent instructions and to engage in impulsive decision-making. Given these examples, one could envision a mother asking her child with ADHD to be available at a certain time to receive his or her medication, and her child forgetting these instructions – thus delaying the time medication is given. Moreover, a mother's child may be present to receive the medication but impulsively decide to refuse the medication at that time, causing a delay in mothers providing medication. Given that these children will not typically be medicated prior to their first morning medication dose, or for their afternoon or evening doses - a prior medication dose may be losing its efficacy, the child's ADHD behaviours may be especially expressive just before receiving medication doses. The oppositional behaviours of these children may also accentuate mothers' difficulties in successfully administering medication. One could speculate that a mother's child may argue with regards to their willingness to take their medication or simply not comply with their mother's intention to take their medication. This study's finding that mothers' beliefs that their children's attitudes toward medication were predictive of mothers' medication adherence behaviours may buttress the speculation that a child's negative attitude towards medication may well prevent mothers' intentions to provide medication from translating into actual medication giving behaviour. In summary, conceptual reasons related to the nature of ADHD have been offered to explain the failure of mothers' intentions to predict their behaviour.

One also can examine methodological issues, often emphasized by TRAPB researchers to explain failures of intention to predict behaviour (Fishbein et al, 2001; Sutton, 2005). Along these lines, one can examine the present study's methodology that included a measure of behaviour, measured prospectively, with multi-informant reports of this behaviour (i.e., both mother and their child's reports). The TRAPB research literature, though extensive, has often reported only associations with intention, and has not measured actual behaviour (Armitage & Conner, 2001; Godin & Kok, 1996). Furthermore, the TRAPB research literature has provided relatively few studies examining the intention to behaviour relationship specifically related to parent-child behaviours. In sum, the relationship between intention and behaviour has not been as robustly examined as other aspects of the TRAPB model. Even when studies using the TRAPB model have reported significant relationships between intention and behaviour, these finding have been criticized on methodological grounds (Sutton, 1998; Weinstein, 1993). For example, many studies have examined behaviour as reported retrospectively instead of prospectively (Laflin et al., 1994; Richard, Van der Plight, & de Vries, 1995). These studies obtained participants' self-reports of retrospective behaviours at the same time as their reports of attitudes, subjective norms, perceived behavioural control and intentions. Thus, it is possible that participants' responses regarding their attitudes, subjective norms or intentions may have primed and biased their retrospective behaviour responses to be consistent with their attitudes, subjective norms and intention reports.

The extent to which shared rater variance affects the correlational relationships among the TRAPB constructs and behaviour is a controversial issue (Armitage & Conner, 2001; Sutton, 1998; Weinstein, 1993), but on whole there is evidence that studies that

employ a single method and rater (e.g., Austin, 1989; Manstead et al., 1984) to collect all TRAPB data as well as behaviour measures typically show higher correlations as compared to studies that employ one method or rater to collect TRAPB data and another method or rater to collect behaviour (e.g., Richard et al., 1994). Therefore, the methodological rigour of the present study offers one possible explanation for the lack of a significance relationship between mothers' intentions and medication behaviours.

Other methodological explanations for the non-significant relationship between intention and behaviour in this study also can be considered. Overall, mothers' showed little variation is their intention responses, restricting the range and perhaps reducing the correlation with behaviour. Moreover, it has been noted that the TRAPB intention variable is a better proximal than distal predictor of behaviour (Sutton, 1998). Specifically, time lengths greater than 1 month between obtaining intentions about performing behaviour and obtaining reports of behaviour generally show lower or nonsignificant correlations between these constructs (Ajzen, 1988; Conners & Sparks, 1996). In this study, however, there was a maximum 2-week period between obtaining mothers' intentions and reports of their medication behaviours. Therefore, the length of time between the two measures is unlikely to have unduly attenuated the relationship between intention and behaviour.

Action specificity in the TRAPB model is a more subtle issue than that of time specificity. However, a lack of action specificity may have contributed to the non-significant relationship between mothers' intentions and medication-providing behaviour in this study. To illustrate, for this study the five AMBR question intention item stems were written as: I intend, I plan, I would like, I want, I expect ...*to give* my child medication to treat his/her ADHD in the next 2 weeks. For each of the five questions, "to give" was used to describe the

medication behaviour to be predicted. Perhaps, "to give" was not specific to the medication behaviour measured, specifically whether or not medication was given *on time*. Perhaps, to be consistent with the TRAPB theoretical consideration of action specificity, the AMBR intention questions should have been written as I intend, I plan, I would like, I want, I expect …to give my child's medication *on time* to treat his/her ADHD in the next 2 weeks. There is no empirical evidence within the AMBR literature to suggest, however, that substituting this phrase "on time" for "to give" would indeed have resulted in a significant relationship between mothers' intentions and medication behaviour. Indeed, wording did not unduly affect the intention to behaviour relationship in a study by Austin (1989). This study used the following intention question: "I intend to give my child his or her anticonvulsant medication regularly." In a subsequent 2-week period, parents responded to a medication behaviour questionnaire consisting of six questions, not one of which included the phrase, "to give." Yet, the intention to behaviour relationship was moderate in this study, $r = .44$. So, it appears that a lack of action specificity in the question wording did not unduly affect the relationship. Evidence from the current study cannot sufficiently address this question of action specificity. However, analyses were performed to examine the relationship between mothers' intentions and percentage of missed medication dosages. Measuring missed medication dosages may be arguably considered to be a behaviour specific to the AMBR intention question stem phrase "to give." These results, however, were also non-significant. In summary, it is difficult to rule out the contribution of methodological reasons to this study's non-significant intention to behaviour relationship finding. Along these lines, the above discussion suggests that more specific theoretical criteria are necessary to inform researchers as to the correct formation of TRAPB question stems in future research. Especially,

theoretical guidelines need to be more explicit to aid the constructing of TRAPB intention questions with regards to specificity of "action"(Ogden, 2003).

In this study, mothers' attitudes regarding medication use were positively correlated with their reports of subjective norms. This relationship was not predicted because these two variables are theorized to be unrelated (Ajzen & Fishbein, 1980). Despite this theoretical position, empirical evidence regarding the relatedness versus independence of these variables has been mixed within the TRAPB adult health literature (Albarracin et al., 2001; Armitage & Conner, 2001). Among TRAPB child health studies, Manstead et al. (1984) as well Richard et al. (1994) found that mothers' attitudes were significantly related to mothers' subjective norms. One explanation for the present study's finding of a positive relationship between attitudes and subjective norms is that the decision to provide a child with medication is sometimes a family-based decision process. Mothers may involve family members and other important individuals (e.g., school teachers, health professionals) in making their decisions regarding medication. Because of this process, mothers' attitudes about medication may be strongly influenced by family members' attitudes about medication, or the converse may occur in that family members' attitudes may be strongly influenced by mothers' attitudes. One could assume that, at the very least, mothers and fathers will consult each other regarding the use of medication for their children. It also would not be that far fetched to assume that other family members such as grandparents may be consulted. As well, given that ADHD symptoms are often apparent within the school context and teachers may play roles in treatment (Pfiffner & Barkley, 1998), it would not be unreasonable to consider that mothers may seek or receive input from teachers regarding their opinions about ADHD

medication. All of these factors could account for the relationship between attitudes and subjective norms.

In summary, as expected, aspects of the TRAPB model of social cognition were supported and both mothers' attitudes and subjective norms regarding giving their children medication for ADHD predicted mothers' stated intentions in this regard. Thus, this model appears useful in explaining this aspect of mothers' role in medication adherence. However, suggesting a major limitation to this model, mothers' stated intentions were unrelated to their subsequent medication providing behaviour. Factors intrinsic to the nature of ADHD, both parenting and child related, were provided as possible explanations for this study's failure to find that mothers' intentions predict behaviour. Moreover, methodological strengths of the study, including inclusion of a prospective, multi-informant measure of behaviour also are offered as explanations for the failure of the model to significantly predict mothers' behaviour.

The following clinical implications can be derived from the findings of this research. The results provide preliminary evidence that the TRAPB findings shown in other health related areas are limited in their generalizability to parents of children with ADHD and the issue of medication adherence. Generally, clinicians are most interested in medication adherence behaviour (Matsui, 1997; 2000; Steele & Grauer, 2003), rather than just intention. Given this interest, this study's significant and null findings are both important in helping clinicians to understand their role in promoting optimum medication adherence behaviour in children with ADHD. Clinicians can predict mothers' stated willingness to provide medication to their children from mothers' reports of how much they favour providing medication to their children and their reports of attitudes toward medication of others'

important to the mother. Among clinicians, there is a need for time efficient interactions with patients (Hoagwood et al., 2000). Thus, it is assumed that clinicians would welcome the ability to predict patients' intentions regarding medication adherence from asking mothers' for their own and others' attitudes. However, the null findings for this study also are important, for they limit the utility of discussing adherence with patients or of assuming that stated intentions will accurately predict behaviour. The clinical utility of asking mothers to report their medication attitudes and important others' medication attitudes and even to report their willingness to provide medication is substantially reduced because these measures fail to predict mothers' medication giving behaviour. Obtaining verbal reports from mothers, at least based upon these TRAPB constructs, are not sufficient to predict mothers' medication providing behaviour to their children. Clinicians therefore should have little confidence that these types of verbal reports from mothers will predict their medication giving behaviour, specifically with regards to providing the medication to their children on time. Given the failure of these TRAPB verbal reports to predict behaviour, it is still possible that other types of mothers' verbal reports would be predictive of behaviour, or that nonverbal variables, not considered in this study, may be predictive of behaviour. For example, perhaps certain other measures of adherence should be explored such as pill containers that list dates and the times the pills should be provided to children. These possibilities will be explored further below.

Although the TRAPB construct – intention was not predictive of medication adherence, some individual AMBR items were predictive. The following findings were not predicted; thus are exploratory in nature. Results indicated that mothers who showed less delay in medication administration times also reported that they view medication as likely to improve their child's ability to focus and concentrate, and to improve their overall school

performance. Among the subjective norm items, more accurate medication administration times were found among mothers who reported that they believed that school employees (e.g., teachers, principal) held positive opinions regarding mothers giving their children medication to treat their ADHD. In addition, mothers exhibited lower delays in the administration of medication if they reported that their children held positive beliefs regarding taking medication. Inferences from these results need to be tempered because they are exploratory and because of the correlational methodology employed in this study. Thus, further evaluation of these variables is warranted in future studies. Despite these cautions, clinicians may benefit in assessing mothers' opinions on these types of items in an effort to better predict medication adherence.

Non-TRAPB predictors of Medication Adherence

Other non-TRAPB related predictors of mothers' medication adherence behaviour also were examined in this study. The two measures of adherence, degrees of adherence and missed medication dosages, were highly correlated, so the following discussion will focus on interpreting results consistent across the two measures. Consistent with previous medication adherence findings from the general pediatric literature (Matsui, 1997; 2000; Steele & Grauer, 2003), mothers' reports of greater efficacy of medication for ADHD significantly predicted their degree of adherence to ideal times in giving these medications. This result can be simply interpreted that mothers are more adherent when they believe that the medication they are providing yields benefits for their children – the notion that utility is as a motivator of behaviour. Consistent with findings in both the ADHD medication adherence literature (Smith, et al., 1998; Thiruchelvem et al., 2001) and the general pediatric literature medication adherence literature (Matsui, 1997; 2000; Steele & Grauer, 2003), mothers of older children

had greater medication adherence administration delays and missed dosages. A possible explanation is that older children may be more likely than younger children to voice their opposition to taking their medication. An additional explanation is that older children may be less available to their mothers as compared to younger children. Older children have more freedom to participate in activities without parental supervision (e.g., playing in the neighbourhood with friends, after school activities) and thus may be less likely to be present at medication providing times.

Oppositional defiant disorder symptom severity, medication side effects, mothers' depression severity and severity of ADHD symptoms all failed to predict medication adherence across both measures of adherence. However, oppositional defiant disorder symptoms were predictive at trend level for missed medication dosages. Thiruchelvem et al. (2001) showed that in children with ADHD, the severity of oppositional defiant disorder symptoms was inversely related to medication adherence, and that ADHD symptom severity was positively related to medication adherence. Of note, is that for the Thiruchelvem et al. (2001) study both the oppositional defiant disorder and ADHD symptom severities were reported to occur within the school context, as reported by schoolteachers. For the present study, mothers reported oppositional defiant symptoms and ADHD symptoms both at home and in other contexts. Given that the two studies used different reporters of child symptoms and focused on different contexts, the disparity in results is not altogether surprising.

The finding that the missed medication doses measure but not the degree of nonadherence measure was significantly related with child oppositional requires discussion. Perhaps the low effect size for this finding suggests that children's oppositional symptoms do not consistently interfere with all mothers' in their attempts to successfully provide

medication to their children on time. Specifically, perhaps for this study's participants, these children's oppositional behaviours were not always focused around times medications were provided.

Researchers in the general pediatric literature have reported an inverse relationship between severity of medication side effects and medication adherence (Becker, 1975; Marston, 1970; Shope, 1981). To my knowledge, within the ADHD literature there have been no studies relating mothers' cognitions regarding their perception of medication side effects and their medication adherence behaviour. One could speculate that if mothers believed that medication side effects were severe enough that they would cease providing medication to their children with ADHD entirely and seek alternative treatments. Such mothers and children would not have been represented in the present sample. The child's tolerance to medication side effects has been monitored in medication efficacy studies of children with ADHD, and when children show increased side effects to a specific medication, alternative medications are used (The MTA Cooperative Group study, 1999a; 1999b). As with the research studies, it is accepted practice for community practitioners to titrate medication doses and monitor side effects when initiating medication treatment with children (Greenhill, 2002). Therefore, medication side effects are managed early on in the treatment process, rather than later. Given that in this study mothers on average had been providing their children with medication for 34.15 months, standard deviation of 22.35 months, with this length of time, most medication side effects should be of little concern to mothers. Indeed, this appears to be the case, as measured on a 7 point scale asking mothers to rate how *unlikely* to *likely* that medication side effects would occur, mothers had a mean of 3.80 (*SD* =2.2), suggesting mothers on whole predicted little chance for occurrence of

medication side effects. Given this result, mothers' generally perceived problems with medication side effects as minimal and because of this perception, medication side effects had no impact upon their medication giving behaviour.

Mothers' reports of their own depression symptoms were not significantly related to mothers' medication giving behaviour across either measure of adherence. Within the general pediatric adherence literature, there have been mixed results regarding the relationship of parental psychopathology and adherence (Matsui, 1997; 2000; Steele & Grauer, 2003). Methodological reasons, specifically range restriction, may explain these depression results. In this study, mothers endorsed, with little variation, low rates of depression symptoms. Perhaps, these reports of low rates were related to the mothers' uneasiness in reporting symptoms via telephone to research assistants, as compared to paper and pencil questionnaire reports completed for a clinician, or this study's mother participants were generally free of depression symptoms.

Study Strengths

This study makes a number of contributions to the understanding of medication adherence in children with ADHD. For example, the Theory of Reasoned Action and Planned Behaviour measure was adapted specifically for this study to assess mothers' attitudes, subjective norms, perceived behavioural control and intention cognitions regarding ADHD medication. Many of the measure's items were generated, in part, through information gained through a pilot study that focused upon obtaining medication beliefs from mothers of children with ADHD. By doing so, this measure attempted to incorporate question content specifically important to mothers of children with ADHD. Furthermore, this the first study in the ADHD medication adherence literature to specifically employ a

theoretical model, the TRAPB, to examine mothers' cognitions to predict their medication adherence behaviour.

The methodology used to measure medication adherence is a further strength of this study. The adherence measure was adapted from a reliable and valid method of measuring adherence in children with diabetes, focusing upon delays of administration (Johnson, et al., 1986). As compared to previous methods that have relied on single self-reports of adherence (e.g., Austin, 1989; Manstead et al., 1984), this study obtained reports from two sources, the mother and her child. Moreover, there was a strong positive correlation between mothers' adherence reports and their children's reports, supporting the reliability of this measure. Another strength of this measure is that it used multiple adherence reports (i.e., 3 days within a 2-week period), instead of a single retrospective report. Given limitations of individuals' memory abilities to accurately recall adherence information over lengthy time periods, and the advantages of using multiple adherence reporters (Johnson, et al., 1986), this study's adherence measure is considered an improvement over previous adherence methods used in the ADHD literature. Within the general pediatric literature, it has been noted that medication adherence self-reports tend to be over-estimates of adherence (Matsui, 2000). However, contrary to this suggestion there was no relationship between mothers' reports of impression management and medication adherence behaviour in this study. Again, this is further evidence pointing to the validity of the adherence measure. Also supporting the validity of the measure, the percentage of missed medication dosages for this study, 23 percent, is consistent with results generated in previous studies (Brown et al., 1987; Ibrahim, 2002; Ohan & Johnston, 2000). One could argue whether this study's measure was truly a measure of nonadherence? Some may argue that nonadherence is only present if the dosage is

completely missed for that day. That is one definition of adherence. To my knowledge, however, there is no definitive gold standard of nonadherence, as it has been defined differently across the adherence literature. As well, the two different methods of measuring adherence were significantly and strongly related. In sum, given the strong relation between mother and children medication adherence reports, the lack of a relation between impression management and medication adherence reports, and the consistency with previous studies, the medication adherence measure used in this study appears to be both reliable and valid.

Study Limitations

As well as strengths, this study has limitations. First, a liberal alpha level was tolerated in an effort to identify future research issues. However, because of the liberal alpha, some of the conclusions from this study need to be interpreted with caution. Along these lines, although the sample size was determined based on achieving a power of .80 to detect medium to large effects (Cohen, 1992), the sample size is still relatively small (Cohen, 1988). However, given that only a few of the study's results could be considered at a trend level of probability, the small sample size does not appear to have any detrimental effects with regards to power. The reliability of a TRAPB construct was also an issue, as the attitude, subjective norm, and intention TRAPB constructs were each considered reliable, but the perceived behavioural construct was not. Another study limitation is that 14 of the 55 children did not provide adherence information reports. Reasons given for this included the child's refusal to participate (after giving initial assent to participate in the study was obtained), child's consistent unavailability to be interviewed, and children who could not tell time. Given the general comorbidity of ADHD and oppositional defiant disorder symptoms, some children's refusal to participate may have reflected this oppositionality. For the 14

nonparticipating children, the mean number of oppositional defiant disorder symptoms was slightly higher than for the remaining 41 children, however, this was not a statistically significant difference. Furthermore, age may have been a contributing factor to child nonparticipation due to difficulties in comprehending the adherence interview. The non-participating children were indeed significantly younger than the participating children. Although it would have been preferable that all children participated in the study, analyses indicated no differences between the adherence information when both mothers and their children reported versus when only mothers reported.

A further study limitation is that adherence information was collected for only a 2-week period. Considering that the average number of months that children in the study had been taking medication to treat their ADHD was 34.15 months (standard deviation of 22.35 months), a 2-week sample of their medication adherence behaviour is a relatively brief sample, at best. This limitation, however, is also strength in that this is an effectiveness study, so it was important to obtain as natural a community sample as possible. Moreover, one needs to notice that although the average time taking medication was approximately 3 years, there was a wide range of lengths of time that medication had been taken by participants in this sample, from approximately 3 weeks to close to 4 years. Finally, there was no significant relationship between length of time medication was taken and medication adherence. The limited ability of the TRAPB to adequately predict later occurring behaviour (Ajzen, 1988) was an important factor contributing to the decision to collect adherence information within a 2-week window. With this limitation, it should be acknowledged that the results might not be representative of mothers' adherence behaviour over longer time periods. Moreover, adherence information was collected on only 3 days within this 2-week period, and averaged

to represent the 2-week period. Thus, it is assumed, rather than empirically validated, that this averaged adherence information is representative of mothers' medication adherence behaviour for the 2 week period.

Other methods of validating the adherence measure could have been employed in this study and should be explored in future research. For example, pill counting methods could have been used. These pill counting methods may have involved reports by pharmacists, physicians or other health care professionals. Similarly, other family members observations of medication times could have been employed.

Other family members' roles with regards to medication adherence were not directly examined in this study. Fathers, grandparents, and extended family members may have a role, albeit perhaps less important than the mothers' role, in providing medication to children. But the role of these other family members with regards to providing medication, at this point, can only be speculated upon because of the lack of empirical literature. Those who have reviewed fathers' roles in parenting (Pleck, 1997) have suggested that their parenting roles are increasing but are not yet equivalent to mothers. Moreover, and especially pertinent to ADHD medication adherence research, it has been suggested that fathers' involvement in the family is negatively correlated to the severity of their child's behaviour problems - including hyperactivity, impulsivity and aggressiveness (Flouri & Buchanan, 2003). Given that for the present studys' participants, child symptoms were reported to be generally severe with regards to both ADHD and oppositional defiant disorder symptoms, one could speculate that the involvement of the fathers in providing medication is low. Of the 70 potential participants who contacted the researcher for inclusion in the study, only two were fathers who regularly provided medication to their children. In sum, the above arguments are not

meant to persuade against including fathers in research, but point out the difficulties with doing so.

Future Research

There are other variables that may have been included in this study and should be considered in future research. For example, barriers to medication treatment have been identified as related to compliance (Firestone & Witt, 1982). These barriers have been suggested to include treatment cost and time commitment. Especially among those in the present study with lower SES, treatment costs may well be a variable that predicts missed medication dosages, if families are not always able to purchase medication. Time management stresses may also be an important variable in predicting medication adherence. For mothers who are especially busy in their parenting duties, it is conceivable that medication dosages could either be missed or late. Parent monitoring ability is another parenting variable that may be related to medication compliance. Monitoring involves the parent knowing where the child is and what the child is doing (Dishion & McMahon, 1998). The obvious association here is that a parent needs to know where her child is to successfully provide medication to her child. As well, parenting efficacy may show a relationship with medication adherence. Parenting efficacy is somewhat related to the TRAPB perceived behavioural control construct in that both constructs assess a parent's view of their capability to perform behaviour. However, the constructs differ in that parenting efficacy evaluates a parents' ability to perform a breadth of parenting tasks (Coleman & Karraker, 1998) as compared to the perceived behavioural control construct that assesses a single task (e.g., ability to provide medication) (Ajzen, 1981). Perhaps parents need to be able to successfully perform a range of their typical parenting tasks to also be able to successfully provide

medication. One could envision parents becoming overwhelmed with other non-medication providing parenting tasks, and not having the necessary resources to provide medication to their children. Moreover, Berry and West (1993) have suggested that parents high in efficacy are better able to persist in parenting tasks. One could speculate that persistence is an important ingredient in maintaining regular medication adherence.

As this study did with the TRAPB, futures studies should continue to examine well-researched social cognitive models to predict behaviour, and to test whether these models can be usefully applied in predicting mothers' adherence in providing medication to their children with ADHD. Given that the TRAPB intention construct did not prove to be a successful predictor of medication adherence behaviour in this study, other health belief models may prove to be better predictors of medication adherence for children with ADHD. For example, the Health Belief Model (Bogart & Delahanty, 2004) does not include a measure of intention to predict behaviour and instead is based upon four constructs, illness susceptibility, illness severity, and both benefits and barriers to receiving treatment. One current study result, medication efficacy, was predictive of medication adherence. This result is consistent with the perceived medication efficacy component found in the Health Belief Model (Weinstein, 1993).

Methods to increase child participation in providing medication adherence information should also be developed. Given that parent-child relationships are considered to be transactional including variables that examine the child' role in medication adherence may prove beneficial in future studies. Along these lines, child variables that examine children's behaviour or cognitions just prior to receiving medication may be informative. These variables may include examining children's ability to be present for medication doses;

evaluating children's attitudes towards receiving medication, for example, examining children's level of argument with their mothers prior to receiving a medication dose. This may be especially challenging for future studies that include children with ADHD who also exhibit oppositional defiant disorder symptoms. For these children, incentives to participate in the study may be especially important. Other than the $20.00 offered to mothers for their participation in the current study, this study did not include an incentive specifically for mothers' children to participate. Future studies may increase child participation by offering children specific incentives within ethical limitations. In addition, it is speculated that this study's methodology - gathering adherence information through telephone interviews, may have been problematic for some children. Perhaps, some children would prefer face-to-face interviews to offer adherence information versus telephone interviews.

One could argue that performing a study with participants at their initial decision making stage regarding providing medication to their children may prove beneficial. The purported benefit would be that at the initial decision making time there would be greater variance in beliefs about medication across individuals. However, I know of no empirical evidence supporting such a view. Moreover, it would be difficult to determine the point at which parents begin to deliberate on the issue of providing medication to their children. Nevertheless, designing a study that may include parents who are within 2 weeks of beginning to provide medication to their children and relating their cognitions about medication to medication adherence may add to the adherence literature.

This was the first study to use a theoretical model, TRAPB, to examine mothers' cognitions to predict their medication providing behaviour for children with ADHD. The TRAPB model has been suggested to predict an individual's health behaviours from

cognitions. For the present study, mothers' attitude and subjective norms positively predicted their intentions to provide medication to their children. However, contrary to TRAPB theory mothers' intentions were not predictive of behaviour. Factors related to parent-child relations, especially with regards to the nature of ADHD, were provided to explain the null finding for the intention to behaviour relationship. Moreover, methodological reasons were offered to account for the lack of a significant relationship. The present study's methodological contributions, including the use of multiple raters and a prospective measure of behaviour, sets a methodological standard for future TRAPB studies that examine medication adherence in children. From this study's results, health professionals who work with mothers who provide medication to their children should not assume that these mothers' verbal reports of their intentions to provide medication will relate to their actual medication giving behaviour. This suggests that health professionals may better identify mothers' medication adherence through behavioural means of measuring adherence. With regards to the measurement of medication adherence in children with ADHD, the present study utilizes a reliable and valid method adapted from diabetes adherence research (Johnson, 2001). Multiple reporters of adherence, multiple adherence reports versus single reports, along with the 24 hour structured adherence interview format, were all used to reduce reporting bias that is often reported in the adherence literature. That this study's adherence results were both consistent with previously reported adherence results and that impression management was unrelated to adherence reports, suggests that this study's adherence methodology is both reliable and valid. Along with child age, medication efficacy was shown to predict medication adherence. Individual AMBR items were also shown to predict medication adherence. Mothers who perceived medication as enhancing both their child's ability to focus

and concentrate and overall school performance exhibited better medication adherence behaviour. Moreover, there was a positive relationship between mothers who believed that their child had a positive attitude towards medication and medication adherence. Finally, mothers who perceived school employees as agreeing with mothers providing medication showed better medication adherence. Further research is needed to determine the validity of these variables in predicting adherence. With regards to theoretical models to predict adherence behaviour, this study showed that medication efficacy was predictive of adherence, and models such as the Health Belief Model, which includes an efficacy component, may more prove to be useful in predicting mothers' medication providing behaviour in children with ADHD.

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Appendix I

A Pilot Study to Generate Indirect AMBR Questions

This study was performed to generate indirect questions for inclusion on the AMBR measure (see Appendix II). Ajzen and Fishbein (1980) provide guidelines in forming these questions. These indirect questions are included to assess the beliefs forming the basis of an individual's attitudes, subjective norms, and perceived behavioural controls for performing behaviour (Ajzen & Fishbein, 1980). Ajzen and Fishbein theorize that, for each behaviour to be performed, there are mutually exclusive beliefs (for attitude, subjective norm, and perceived behavioural control) linked to performing that behaviour. Therefore, individuals hold a set of beliefs linked to the performance of one type of behaviour, and hold a different set of beliefs related to the performance of another type of behaviour. To assess these beliefs, the authors suggest that researchers form indirect questions specific to their research question (i.e., specific to the behaviour to be predicted by the measure).

Ajzen and Fishbein (1980) offer guidelines regarding the formation of indirect questions, taking into account their theoretical assumption that individuals hold a specific and mutually exclusive set of beliefs regarding performing a particular behaviour. Specifically, the guidelines recommend that researchers complete a pilot study to generate the indirect AMBR questions. Moreover, the guidelines suggest that pilot study participants be representative of the participants in the main study, and report on performance of the same behaviour as in the main study. Further, researchers are to obtain the following results from a pilot study to form attitude, subjective norm, and perceived behavioural control indirect questions. To form attitude questions, it is important to obtain from pilot study participants their predicted *consequences* of performing behaviour. In the present pilot study, the

performed behaviour was mothers providing medication to their children with ADHD. Thus, mothers of children with ADHD reported predicted consequences, by reporting on potential advantages and disadvantages, of providing medication to their children with ADHD. For subjective norm indirect questions it is important to obtain from pilot study participants, their reports of *identified others* who hold opinions regarding performance of behaviour. Thus, in the present pilot study, mothers reported any identified others (e.g., teachers, spouses, physicians) who hold an opinion regarding mothers providing medication to their children with ADHD. For perceived behavioural control questions, it is important to obtain from pilot study participants *inhibiting or facilitating factors* in performing behaviour. In the present pilot study, mothers identified any factors that would inhibit or facilitate their ability to provide medication to their children with ADHD. The writer used the pilot study results, along with additional suggestions (Ajzen, 2001), to form AMBR indirect attitude, subjective norm, and perceived behavioural control questions for inclusion on the AMBR measure (see Appendix II) to be used in the main study.

Method

Participants

Participants were 20 mothers of children with ADHD included in an ongoing study in Dr. Johnston's Parenting Lab at the University of British Columbia examining mother-child interactions in families with a child with ADHD. The university ethics committee approved both the pilot study and the ongoing Parenting Lab study. Mothers provided consent to participate in the pilot study. For the pilot study, several inclusion criterion were used: the mother was currently administering medication to treat her child with ADHD, the medication

was recognized as a typical medication used to treat children with ADHD, the mother indicated that a mental health or educational professional had diagnosed the child with ADHD, and the child did not have a pervasive developmental delay. In addition, to be included in the study a mother needed to rate her child's behaviour as exhibiting six or more Inattention or six or more Hyperactive/Impulsive symptoms as being present on the Disruptive Behaviour Scale (Dupaul, Power, Anastopoulos, & Reid, 1998).

Mothers also reported demographic information including mother's age, child gender and age, and social economic status. Children were all boys and the average child's age, social economic status (SES) and mother's age are presented in Table 1. Calculations of SES were performed using education level and occupation for both mother and father (Hollingshead, 1975), with higher values indicating a lower SES status.

Table 1

Mothers' Demographic Characteristics

	(*n*=20)	
Variable	*M*	*SD*
Child's age in months	100.05	12.13
SES	2.26	1.04
Mother's age in years	37.05	5.39

Mothers reported on their children's medication type, medication regime, and medication history by completing the demographic portion of a questionnaire designed for this study, *Beliefs about Medication for ADHD*. For medication type, 12 mothers

administered methylphenidate, 7 administered Dexedrine, and 1 mother administered both methylphenidate and Dexedrine. The average frequency of daily dosages, the number of days per week that medication is administered, and the number of weeks the child has been receiving medication are reported in Table 2.

Table 2

Mothers' Medication Administering Behaviour

	(*n*=20)	
Variable	*M*	*SD*
Frequency of administration of daily dosages	1.90	.85
Days per week child receives medication	5.75	.91
Weeks mothers have been administering medication to their children	102.65	68.49

Measures

Beliefs about Medication for ADHD. This questionnaire was specifically created for this study and designed in accordance with Ajzen and Fishbein's (1980) instructions. For each of these six questions included on the questionnaire, mothers were provided five spaces to write their responses. The first two questions were designed to elicit mothers' predicted consequences in providing medication to their children: "What do you see as the advantages of you giving your child medication to treat his/her ADHD?" and "What do you see as the

disadvantages of you giving your child medication to treat his/her ADHD?" The next two questions were designed to elicit the identified others who mothers perceive as having opinions regarding mothers providing medication to their children with ADHD: "Are there any groups or individuals who approve of you giving your child medication to treat his/her ADHD?" and "Are there any groups or individuals who disapprove of you giving your child medication to treat his/her ADHD?" To elicit inhibiting or facilitating factors in mothers providing medication to their children with ADHD, mothers responded to two questions: "What helps you to give your child medication to treat his/her ADHD?" and "What hinders you to give your child medication to treat his/her ADHD?"

Procedure

Research assistants provided the *Beliefs about Medication for ADHD* questionnaire to mothers to complete. Mothers completed the *Beliefs about Medication for ADHD* questionnaire and other Parenting Lab questionnaires and returned them to the Parenting Lab by mail. Of the questionnaires sent to mothers, 74% were returned and included in the pilot study results.

Results and Discussion

To code mothers' Beliefs about Medication for ADHD questionnaire responses, a research assistant, the first coder, transcribed all mothers' responses. The same research assistant read all the responses and created categories for each of the three questionnaire sections: predicted consequences, identified others, and inhibiting/facilitating factors. These categories were formed to enable the research assistant to code mothers' responses into categories. The criterion for coding a mother's responses as belonging to a particular category was that the response shared the same semantic meaning as the category. The same

research assistant then examined each mother's questionnaire responses and determined the appropriate category for each response. A single response could only belong in one category. The research assistant coded all mothers' questionnaire responses into categories. The author reviewed the research assistant's categories and coding of mothers' questionnaire responses into categories. The author and the research assistant discussed coding disagreements and made appropriate amendments. For reliability coding, a second independent coder was provided the mothers' transcribed responses, as well as descriptions of the categories generated by the first coder. The second coder was instructed to code each mother's response by placing it into the category that had the same semantic meaning as the response. The reliability agreement for each section was calculated by the percentage of coder agreement, between the first and second coder, in placing mothers' responses in their respective categories. The reliability results were 85% coder agreement in the predicted consequences section, 100% coder agreement for the identified others section, and 79% coder agreement for the inhibiting/facilitating factors section.

Mothers provided 102 responses in the predicted consequence questionnaire section. The frequency of predicted consequence responses in each category are reported in Table 3. In addition, mothers provided 73 responses in the identified others questionnaire section (please see Table 4). For the inhibiting/facilitating factor questionnaire section, mothers reported 63 responses. Of these responses, 46 of these responses could not be coded into an inhibiting/facilitating factor category, as these responses fit into either the predicted consequences or identified others categories. Therefore, only 17 of these responses were coded into categories, and the frequencies are reported in Table 5.

Table 3

Mothers' reports of predicted consequences in providing medication to their children

Predicted Consequence	Frequency of responses
Short-term adverse medication side effects	31
Improves child's ability to focus and concentrate	17
Improves child's social interaction	12
Improves child's school performance	10
Increases child's self-esteem	7
Long-term adverse medication side effects	7
Increases child's calm and quiet behaviour	6
Improves child's behaviour at home	5
Decreases child's social acceptance	4
Lowers child's self-esteem	3

Table 4

Mothers' reports of identified others

Identified others	Frequency of responses
Family members	21
Health care professionals	17
School employees	16
Family's friends	12
General public	6
Media	1

Table 5

Mothers' reports of inhibiting/facilitating factors

Inhibiting/facilitating factor	Frequency of responses
Child's attitude regarding taking medication	7
Family members help	4
Mothers' ability to deliver medication	4
Medication characteristics	1
Medical procedures related to taking medication	1

According to Ajzen and Fishbein's (1980) guidelines, the most frequently cited responses in each of three questionnaire sections are used to form indirect questions. In addition, the authors suggest that researchers arbitrarily choose how many of the top responses in each questionnaire section to use to form indirect questions. In this study, the four most frequent responses in each questionnaire section were used to form indirect questions. These questions correspond to items on the AMBR measure presented in Appendix II.

Appendix II

AMBR Items

Intention Questions (items 1 – 5).

1. I intend to give my child medication to treat his/her ADHD in the next two weeks.

1----------2----------3----------4----------5----------6----------7

Definitely do not Neutral Definitely do

2. I plan to give my child medication to treat his/her ADHD in the next two weeks.

1----------2----------3----------4----------5----------6----------7

Definitely do not Neutral Definitely do

3. I would like to give my child medication to treat his/her ADHD in the next two weeks.

1----------2----------3----------4----------5----------6----------7

Definitely no Neutral Definitely yes

4. I want to give my child medication to treat his/her ADHD in the next two weeks.

1----------2----------3----------4----------5----------6----------7

Strongly disagree Neutral Strongly agree

5. I expect to give my child medication to treat his/her ADHD in the next two weeks.

1----------2----------3----------4----------5----------6----------7

Unlikely Neutral Likely

Attitude Direct Questions (items 6 – 10).

6. My giving my child medication to treat his/her ADHD in the next two weeks would be:

1----------2----------3----------4----------5----------6----------7

Bad Neutral Good

7. My giving my child medication to treat his/her ADHD in the next two weeks would be:

1----------2----------3----------4----------5----------6----------7

Harmful Neutral Beneficial

8. My giving my child medication to treat his/her ADHD in the next two weeks would be:

1----------2----------3----------4----------5----------6----------7

Unpleasant Neutral Pleasant

9. My giving my child medication to treat his/her ADHD in the next two weeks would be:

1----------2----------3----------4----------5----------6----------7

Unenjoyable Neutral Enjoyable

10. My giving my child medication to treat his/her ADHD in the next two weeks would be:

1----------2----------3----------4----------5----------6----------7

foolish Neutral wise

Attitude Indirect Questions (items 11-18).

11. Giving my child medication to treat his/her ADHD in the next two weeks will cause him/her to experience medication side-effects.

1----------2----------3----------4----------5----------6----------7

Unlikely Neutral Likely

12. My child experiencing medication side-effects would be:

1----------2----------3----------4----------5----------6----------7

Bad Neutral Good

13. Giving my child medication to treat his/her ADHD in the next two weeks will improve his/her ability to focus and concentrate.

1----------2----------3----------4----------5----------6----------7

UnLikely Neutral likely

14. My child's improved ability to focus and concentrate would be:

1----------2----------3----------4----------5----------6----------7

Bad Neutral Good

15. Giving my child medication to treat his/her ADHD in the next two weeks will improve his/hers social interactions.

1----------2----------3----------4----------5----------6----------7

Unlikely Neutral Likely

16. My child's improved social interactions would be:

1----------2----------3----------4----------5----------6----------7

Bad Neutral Good

17. Giving my child medication to treat his/her ADHD in the next two weeks will improve his/her school performance.

1----------2----------3----------4----------5----------6----------7

UnLikely Neutral likely

18. My child's improved school performance would be:

1----------2----------3----------4----------5----------6----------7

Bad Neutral Good

Subject Norm Direct Questions (Items 19-21).

19. People who are important to me think I:

1----------2----------3----------4----------5----------6----------7

Should not Neutral Should

give my child medication to treat his/her ADHD in the next two weeks.

20. People who are important to me would:

1----------2----------3----------4----------5----------6----------7

Disapprove Neutral Approve

that I give my child medication to treat his/her ADHD in the next two weeks.

21. People who are important to me want me to give my child medication to treat his/her ADHD in the next two weeks

1----------2----------3----------4----------5----------6----------7

Unlikely Neutral Likely

Subjective Norm Indirect Questions (Items 22 – 29).

22. My family members think I:

1----------2----------3----------4----------5----------6----------7

Should not Neutral Should

give my child medication to treat his/her ADHD in the next two weeks.

23. With regard to giving your child medication to treat his/her ADHD in the next two weeks, how much do you want to do what your family members think you should do:

1----------2----------3----------4----------5----------6----------7

Not at all Neutral Very much

24. Health care professionals think I:

1----------2----------3----------4----------5----------6----------7

Should not Neutral Should

give my child medication to treat his/her ADHD in the next two weeks.

25. With regard to giving your child medication to treat his/her ADHD in the next two weeks, how much do you want to do what health care professionals think you should do.

1----------2----------3----------4----------5----------6----------7

Not at all Neutral Very much

26. School employees think I:

1----------2----------3----------4----------5----------6----------7

Should not Neutral Should

give my child medication to treat his/her ADHD in the next two weeks.

27. With regard to giving your child medication to treat his/her ADHD in the next two weeks, how much do you want to do what school employees think you should do.

1----------2----------3----------4----------5----------6----------7

Not at all Neutral Very much

28. Family friends think I:

1----------2----------3----------4----------5----------6----------7

Should not Neutral Should

give my child medication to treat his/her ADHD in the next two weeks.

29. With regard to giving your child medication to treat his/her ADHD in the next two weeks, how much do you want to do what family friends think you should do.

1----------2----------3----------4----------5----------6----------7

Not at all Neutral Very much

Perceived Behavioural Control Direct Questions (Items 30-34).

30. Whether I do or do not give my child medication to treat his/her ADHD in the next two weeks is entirely up to me.

1----------2----------3----------4----------5----------6----------7

Strongly disagree Neutral Strongly agree

31. How much control do you feel you have over giving your child medication to treat his/her ADHD in the next two weeks.

1----------2----------3----------4----------5----------6----------7

No control Neutral Complete control

32. I would like to give my child medication to treat his/her ADHD in the next two weeks, but I don't really know if I can.

1----------2----------3----------4----------5----------6----------7

Strongly disagree Neutral Strongly agree

33. I am confident that I could give my child medication to treat his/her ADHD in the next two weeks if I wanted to.

1----------2----------3----------4----------5----------6----------7

Strongly disagree Neutral Strongly agree

34. For me to give my child medication to treat his/her ADHD in the next two weeks is

.1----------2----------3----------4----------5----------6----------7

Difficult Neutral Easy

Perceived Behavioural Control Indirect Questions (Items 35-42).

35. Giving my child medication to treat his/her ADHD in the next two weeks depends upon his/her attitude regarding taking the medication . . .

1----------2----------3----------4----------5----------6----------7

UnLikely Neutral likely

36. My child's attitude regarding taking medication makes giving my child medication to treat his/her ADHD in the next two weeks . . .

1----------2----------3----------4----------5----------6----------7

Less Likely Neutral More likely

37. When giving my child medication to treat his/her ADHD in the next two weeks family members help is

1----------2----------3----------4----------5----------6----------7

UnLikely Neutral Likely

38. Family members help makes giving my child medication to treat his/her ADHD in the next two week

1----------2----------3----------4----------5----------6----------7

Less Likely Neutral More likely

39. Giving my child medication to treat his/her ADHD in the next two weeks depends upon my ability to deliver him/her the medication . . .

1----------2----------3----------4----------5----------6----------7

Unlikely Neutral Likely

40. My ability to deliver the medication to him/her makes giving my child medication to treat his/her ADHD in the next two weeks. . .

1----------2----------3----------4----------5----------6----------7

Less Likely Neutral More likely

41. Giving my child medication to treat his/her ADHD in the next two weeks depends upon the medication characteristics. . .

1----------2----------3----------4----------5----------6----------7

Unlikely Neutral Likely

42. The medication characteristics makes giving my child medication to treat his/her ADHD in the next two weeks. . .

1----------2----------3----------4----------5----------6----------7

Less Likely Neutral More Likely