

Psycho-Stimulant Medication Use in the Absence of
Attention Deficit Hyperactivity Disorder

by

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Abstract

ADHD medication use has grown substantially, yet, little is known about treatment-seeking and prescription practices in the absence of ADHD diagnoses. This project utilized data from the National Comorbidity Survey-Adolescent Supplement, a survey of adolescent psychiatric disorders in the U.S. Rates of medication use, and the influence of prescriber specialty and treatment encouragement, on medication use were investigated among adolescents with ADHD, sub-threshold ADHD, and without ADHD. Findings showed that a small but notable proportion of adolescents in the sub-threshold and no ADHD groups took medication for ADHD. Encouragement from psychiatrists but prescriptions from family doctors were associated with medication use. These findings suggest that adolescents with minimal symptoms may be medicated for behaviour within the range of normal, whereas those with numerous symptoms may not be receiving adequate treatment. Second opinions may assist in proper dosage and treatment. The influence of encouragement from psychiatrists and prescribing physicians is discussed.

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Introduction

Attention Deficit Hyper-Activity Disorder (ADHD) is a commonly diagnosed disorder among children and adolescents and has a substantial impact on the health care system (Rowland, Umbach, Stallone, Naftel, Bohlig, & Sandler, 2002). According to the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition Text Revision (APA, 2000), ADHD is characterized by a persistent pattern of inattention or hyperactivity-impulsivity present for at least six months. Prevalence rates are estimated at 3% to 7% of school-aged children, affecting roughly 3.5 million youth. This may, however, be an overestimate, as it is possible that many gifted children are mis-diagnosed as having ADHD (Webb, 2000; Hartnett, Nelson, & Rinn, 2004). Moreover, it is possible that youth are being medicated for ADHD when, in actuality, they are exhibiting behavior within the range of normal or are exhibiting other unrelated problem behaviour.

Epidemiology and Socio-demographic Correlates of ADHD Diagnosis and Medication Use

The research on prevalence rates of ADHD and medication usage among adolescents in North America appears to be quite limited. Thus, this review focuses on both children and adolescents. Use of ADHD medication has grown substantially, with an annual growth rate from 2000 to 2005 of 13.7% among females ages 10-19 and 7.7% among males ages 10-19 in the US (Castle, Aubert, Verbrugge, Khalid & Epstein, 2007). A parent-report study of 17 public elementary schools in North Carolina found that 6.5% of children in grade 1 had a diagnosis of ADHD, with prevalence rates peaking in grade 4 at 13.1%, with children in grades 4 and 5 most likely to be taking medication (Rowland et al., 2002). In addition, 7% of all students in the study (71% of those diagnosed with

ADHD) were receiving medication to treat the symptoms of ADHD. A similar study in southeastern Virginia found prevalence rates of ADHD as high as 18-20% among white males in fifth grade (LeFever, Dawson, & Morrow, 1999). It has previously been noted that boys compared to girls are most likely to be diagnosed with ADHD (Froehlich, Lanphear, Epstein, William, Barbaresi, Katusic, & Kahn, 2007). In Maryland, males in elementary school have been cited to be 3.5 times more likely to receive medication for ADHD than females, with this number increasing to 4.3 times more likely to receive medication in secondary school (Safer & Malever, 2000). Household income also appears to be an influencing factor in the medication and diagnosis of ADHD. Youth in low-income households are most likely to be diagnosed with ADHD, whereas children from high-income households being the most likely to receive medication for ADHD (Froehlich, et al., 2007). Conversely, one Canadian study found that lower SES was associated with greater ADHD medication use (Brownell, Mayer, & Chateau, 2006). Additionally, racial background appears to be related to medication use, with white students are more likely to receive ADHD medication than Hispanic or black students (Safer & Malever, 2000). Overall, it appears that socio-demographic characteristics such as age, sex, and income are influential in the diagnosis and medication of ADHD.

Although the above studies present useful information on the prevalence of ADHD and medication use among both children and adolescents, it is unclear if these patterns hold true for adolescents alone, as it has been noted that increasing age has been associated with less treatment utilization (Berger-Jenkins, McKay, Newcorn, Bannon, & Laraque, 2012). While these prevalence studies are somewhat dated, the high growth rate of individuals being diagnosed and medicinally treated for ADHD poses a significant

concern. Either prevalence rates are higher than the 3-7% estimated by the DSM-5 (American Psychiatric Association, 2013) or some adolescents may be incorrectly diagnosed or taking prescription medication without any formal need to do so.

Effect of Medical Specialty on Prescription Patterns

One factor that may influence medication use among adolescents is the specialty of the prescriber. It seems that there are subtle differences between medical specialties, both in terms of prescribing medication for treating youth with ADHD and the process involved. A study by Stockl and colleagues (2003) sought to investigate physician perception of ADHD medication for treating youth. They found that most physicians felt that stimulant medications were an effective form of treatment. However, many were concerned about side-effects of medication, in addition to the potential risk of medication abuse (Stockl, Hughes, Jarrar, Secnik, Perwien, et al., 2003). Notably, more psychiatrists (50%) indicated concern about medication side effects compared to family physicians (32%). Although the Stockl study provides some insight into typical physician concerns when prescribing medication for ADHD, it is unclear whether these concerns have an impact on physician encouragement to use medication or on the rate at which the specialist prescribes medication to treat ADHD among adolescents. To further examine this issue, a study conducted in Western Australia evaluated differences in prescribing practices between pediatricians and psychiatrists to treat youth between the ages of 2 and 17 for ADHD (Preen, Calver, Sanfilippo, Bulsara, & Holman, 2008). The researchers found that boys and younger individuals were more likely to receive a prescription by a pediatrician than a psychiatrist. This result shows that different specialties may result in different prescribing practices in the treatment of ADHD among youth.

Prevalence rates for ADHD medication non-adherence have also been found to be anywhere between the range of 13.2% to 64% (Adler & Nierenberg, 2010). However there has been very little research on the effect attributable to the specialty of the prescriber in this regard. One study noted that 21% of adolescents who initially take medications for ADHD will discontinue use within a year (Toomey, Sox, Rusinak, & Finkelstein, 2012). This finding has primarily been attributed to treatment efficacy and negative side-effects. Fears of side effects and stigmatization may also play a role in under-utilization or non-adherence of medical treatment of ADHD among those who meet criteria (Charach, Skyba, Cook, & Antle, 2006). However, the research concerning the influence of the prescriber specialty is limited. The current study sought to add to this area of research by addressing the association between the specialty of the prescriber and medication use in a large-scale national survey.

Effect of Significant Others on Accessing Treatment

One area related to ADHD medication use among adolescents that has received little attention is the effect of significant others in the decision making process. A previous study conducted by Sax and Kautz in Washington, DC aimed to examine who was likely to first suggest a diagnosis of ADHD (2003). The study found that teachers were the most likely to suggest a diagnosis of ADHD, comprising nearly half of individuals who suggested the diagnosis, followed by family doctors and psychiatrists (Sax & Kautz, 2003). Similarly, it would be expected that encouragement from teachers, physicians, and psychiatrists would be influential in the decision to seek treatment. However, to my knowledge, this had not yet been examined. Encouragement from parents and guardians is likely very influential in the use of medication for ADHD. The

decision to start an adolescent on medication for ADHD is often not an easy one to make. Increased family stress, brought on by behavioural issues, has been pointed to as a deciding factor for treatment, with medication sometimes used as a last resort (Cormier, 2012). In this case, the adolescent is likely experiencing a number of problems, both at home and at school. A model put forward by Cormier (2012) suggests that the parent or guardian must go through several psychological stages, such as resisting, struggling to find help, and letting go, before arriving at the decision to treat the adolescent using medication. During this time, the decision-making adult struggles to balance concerns of adverse side effects and the possibility of stigmatization with doing what they believe to be the most helpful for the adolescent. Considering the psychological stages presented by Cormier that are needed for a parent to encourage treatment with medication, it would be reasonable to assume that encouragement from parents, as opposed to other individuals, would have the most impact on medication utilization. The current study aimed to extend the literature by examining the association between encouragement from others and ADHD medication use among adolescents.

The Health Capital Model and Medication Utilization

Medication to treat ADHD can be viewed in the context of the health capital model. In this model, physical and mental health can be viewed as an investment commodity, referred to as health capital, in the sense that an individual's health largely dictates the individual's ability to work, either at home or in the workforce (Grossman, 1972). Within this model, physical and mental health may depreciate in value when mental or physical health concerns are present. Individuals may seek treatment for physical and mental health concerns in order to protect against health depreciation and

potential losses in health capital. In order to maintain health capital, medication may be taken as an effective means to stabilize activity levels, thereby preventing depreciation. For example, a person who was once healthy and awakes to a bad fever caused by an infected injury could decide to stay home from work until they are no longer sick. However, this would result in health capital depreciation due to the individual's reduced earning potential and ability to contribute to the household. However, if the same individual had visited a doctor to receive the antibiotics necessary to eliminate the infection he or she is protecting against health capital losses. Alternatively, efforts to protect against losses may occasionally result in unintended losses if the efforts are excessive. Returning to the previous example, if the person merely had a very minor injury yet sought medical treatment when there was no need to do so, he or she would incur losses in the form of time spent in the doctor's office, money for the appointment (in the US) and medication, and any potential side-effects of the medication.

The above health capital framework has been extended to ADHD among adolescents (Currie & Stabile, 2006). It has been noted that youth who suffer from hyperactivity are likely to have reduced human capital accumulation due to lower achievement in school, which in turn is likely to result in poorer long-term educational achievement, such as increased difficulties when seeking and obtaining post-secondary education. It stands to reason that these achievement difficulties would transfer to the workforce both in terms of the type of employment that would be obtainable, and achievement and earning potential once the job has been acquired. For these reasons, problems with attention and hyperactivity/impulsivity are more influential in decreased human capital than many physical health concerns (Currie & Stabile, 2006). Thus, the

urge to protect against such losses may be particularly salient among adolescents who suffer from attention or hyperactivity/impulsivity, or their decision-making parents or guardians. This model offers an explanation of the relatively high rates of medication use among youth who have a diagnosis of ADHD, at least within advantaged socio-demographic groups. However, it is uncertain whether this pattern is consistent among youth who experience mild or moderate symptoms of ADHD, but who do not meet criteria for a formal diagnosis.

Another explanation for increasing rates of medication is the ongoing medicalization of disruptive behaviour. This medicalization is evident in schools, as teachers often take on the role of “disease-spotters” within the classroom setting (Phillips, 2006). Not only are teachers a part of the diagnostic process but may be among the first to attribute disruptive behaviour to ADHD. One study found that, out of all ADHD diagnoses, nearly half were initiated by teachers (Phillips, 2006). It is unclear to what extent this increased attention to disruptive behaviour by teachers is for self-serving reasons, such as maintaining an undistruptive learning environment, or due to genuine concern for the child. Additionally, teachers’ focus may be guided by increased advertisement and information distributed by pharmaceutical companies. In fact, it has been noted that some pharmaceutical companies that produce widely known medications used to treat ADHD have created independent websites aimed at directing teachers how to identify symptoms of ADHD and to address parents about the issue (Phillips, 2006). There has been a recent recommendation to train doctors and teachers alike on pharmaceutical marketing strategies in order to reduce the chance that these professionals are guided into initiating medical treatment more than is necessary (Phillips, 2006).

While medicalization of disruptive behaviour may improve achievement in schools by leading youth to seek treatment and obtain additional resources to assist them through school, it may also lead to individuals with very minor difficulties to commence medical treatment, with adverse side-effects.

In an effort to protect against short-term health losses, adolescents, or decision making parents, may be subjecting adolescents to premature health depreciation, as the long-term side effects of recently developed psycho-stimulant medication are still largely unknown. Symptoms such as weight loss, decrease in appetite, sleep disturbance, and anxiety have been identified as immediate side-effects of ADHD medication (Stockl, et al., 2003). These side effects present a noteworthy concern, as their presence is likely to interfere with school learning and, thus, may contribute to health capital losses. Although the risk of side-effects may be accepted to receive the benefits of medication for adolescents who persistently struggle with attention or hyperactivity/impulsivity, these concerns are particularly salient when considering medication for adolescents with modest symptoms, as the benefits may not offset the risks. Additionally, providing medical treatment to those with no to minimal symptoms may present the family with additional financial burdens, taking away from money that could be used in other areas that would contribute to overall health and well-being, such as nutrition, tutoring, or activities like organized sports that encourage active lifestyles. Therefore, an examination into the medication use of adolescents with minimal to modest symptoms of ADHD is warranted.

Although it may be the case that parents of adolescents who exhibit ADHD symptoms often take excessive measures to prevent against losses of health capital, it

may be the case that some action is not only warranted, but beneficial to children in terms of academic success, future learning, and earning potential. One study examined executive functions, such as cognitive flexibility, in children between the ages of 6 and 16 who were receiving medication for ADHD compared to age-matched counterparts who were not receiving medication to treat ADHD (Snyder, Maruff, Pietrzak, Cromer, & Snyder, 2008). Those who did not receive medicinal treatment made more perseverative and rule-breaking errors, and had decreased cognitive efficiency, compared to children who were receiving medication. In addition, another study comparing pre- and post-intervention IQ found that youth who were taking medication to treat ADHD symptoms had higher IQ scores after taking medication, but found no change in IQ score among those who did not take medication (Gimpel, Collett, Veeder, Gifford, Sneddon, et al., 2005). Although it is likely that this increase could be attributed to better concentration and less off-task behaviour during testing, rather than a true change in IQ, related improvements could extend to other areas of life and could be beneficial within academic settings or when entering the workforce. Delayed neurological maturation, such as slower pruning and myelination, as well as functional connectivity problems within sensory motor neural networks, have also been pointed to among non-medicated individuals with ADHD (Choi, Jeong, Lee, & Go, 2013). These abnormalities were linked to greater behavioural and inattentive symptoms, as well as decreased visual working memory, among youth who were not receiving medication to treat ADHD (Choi et al., 2013). They are likely to impact children or adolescents in their daily life, especially related to increased difficulties at school, where these skills are necessary for success. Thus, a low rate of medication among those who meet criteria for ADHD may indicate a group of

adolescents are not receiving the medication that could be quite beneficial for achievement in school and, therefore, future success when entering the workforce.

Although there are many studies on the prevalence of ADHD, as well as the abuse of psycho-stimulant medications that are typically used to treat ADHD (Setlik, Bond, & Ho, 2010; Wilens, Gignac, Swezey, Monuteaux & Biederman, 2006), little is known about the prevalence of youth using psycho-stimulant medications without a formal diagnosis of ADHD. This category of individuals is distinct from youth who take psycho-stimulant medication for recreational purposes in that they, or the parents, perceive a need for intervention. Within the health capital framework, this can be interpreted as utilizing health care services to protect against health depreciation. It is unclear what factors other than increased symptoms influence medication use, such as pressure from others to seek treatment, the primary occupation of the prescriber (psychiatrist or family doctor), and socio-demographic characteristics. The present study attempted to fill these gaps in the literature by addressing these concerns, using a nationally representative survey of adolescents in the United States, within the health capital framework. To my knowledge, the prevalence of, and influences on, psycho-stimulant medication use among adolescents in the absence of a formal diagnosis of ADHD have not yet been investigated.

Purpose of the Study

The purpose of this study was to examine factors influencing the use of psycho-stimulant medication, particularly methylphenidate substances such as Ritalin, among adolescents without a formal diagnosis of ADHD. This was examined by utilizing The National Comorbidity Survey Replication Adolescent Supplement (NCS-A), a nationally

representative survey of adolescents between the ages of 13-17 years old in the U.S. The NCS-A offered a rare opportunity to identify factors that contribute to adolescent prescription medication use in the population. The large sample enhanced the generalizability of the findings and gave a clearer picture of the U.S. national picture than small community studies, conducted at the school or county level. The first objective of the present study was to examine the prevalence of adolescents who are prescribed psycho-stimulant medication in the absence of a diagnosis of ADHD. The second objective was to identify the relationship between socio-demographic characteristics such as age, gender, ethnicity, urbanicity, and parental income that may influence medication use among adolescents. Finally, the current study explored the influence of pressures for treatment seeking (encouragement from parents, teachers, or friends), as well as the specialty of the prescribing physician (psychiatrist, general practitioner, etc.), on psycho-stimulant use among adolescents, while controlling for psychiatric comorbidity.

Research Questions

There has been little research concerning medication use among adolescents who perceive a need for medical treatment yet do not meet diagnostic criteria for ADHD. Therefore, the majority of the research questions were exploratory in nature. The following four questions were investigated:

- 1) What proportion of youth reported using prescribed psycho-stimulant medication without meeting diagnostic criteria for ADHD?
- 2) What socio-demographic characteristics are associated with the diagnosis and medication of ADHD?

- 3) To what extent is the specialty of the prescriber associated with the number of adolescents taking psycho-stimulant medication in the absence of ADHD, while controlling for any significant socio-demographic characteristics?
- 4) To what extent is pressure or encouragement from significant others associated with use of medication to treat ADHD and what is the most likely relationship (parent, friend, teacher, etc.) of such others to adolescents using psycho-stimulant medication?

The current study should be beneficial to clinicians and physicians who typically treat clients with ADHD, as well as to parents, teachers, and adolescents concerned with symptoms of ADHD. A high rate of medication use among adolescents in the absence of ADHD, or any other psychological or medical condition that would warrant such use, would suggest that individuals are taking excessive steps to protect against losses of health capital. If so, psycho-stimulant medications should be prescribed with more caution.

Method

Participants

Participants were drawn from the 2001-2004 NCS-A ($n = 10,148$; response rate = 75.6%), a nationally representative survey of adolescents in the U.S. population between the ages of 13 and 17 years old (Kessler, Avenevoli, Costello, Green, et al., 2009a). The NCS-A was initiated in order to investigate the prevalence and correlates of psychiatric disorders among youth in the USA, as requested by the National Institute on Mental Health (Kessler, Avenevoli, Costello, Green, et al., 2009b). The NCS-A was conducted by the Survey Research Center of the Institute for Social Research at the University of Michigan and was funded by the National Institute of Mental Health (Kessler, Avenevoli,

Costello, Green, et al., 2009b). The original intent was to gather data from approximately 10,000 adolescents residing in the households of individuals who participated in the 2001-2003 National Comorbidity Survey Replication (NCS-R), a nationally representative survey of the adult U.S. population designed to investigate the prevalence and correlates of mental disorders in the adult US population (Kessler and Merikangas, 2004). However, the number of adolescents residing in those households was not enough to meet the targeted sample size of 10,000 adolescents. As a result, the NCS-A was supplemented by a representative sample of students from schools in the same geographic locations as the NCS-R households (Kessler, 2009b). Other than recruitment procedures, all methods were identical for both the school and household sample

Household Sample. In order to recruit participants for the NCS-A household sample, the age and sex of each NCS-A household member was recorded in order to target households with adolescents (Kessler et al., 2009a). If there was more than one individual between the ages of 13 and 17 in the residence, an adolescent was chosen at random using a computer randomization program. A total of 904 adolescents in the household sample participated in the survey, yielding a response rate of 85.9% (Kessler et al., 2009b).

School Sample. The school sample was selected based on a representative sample of junior high, middle school, and high schools from the same region as the NCS-R households. These schools also appeared on a government list of licensed schools in the U.S., which included public, private, and residential schools (Kessler et al., 2009b). After the school district's approval was granted, the principal from each school was contacted and asked for a roster of students within that school in order to contact the

student's family. Schools that agreed to participate received \$200. However, this payment increased to \$300 for schools recruited later in the study when more participants were needed (Kessler et al., 2009a). A random sample of 40-50 students from the roster supplied by the principal was selected to be part of the sample pool. The random sample was obtained by using a computer program that selected a random start point in each school roster and select every n th student, where n represents a number generated by the computer program (Kessler, et al., 2009a). Only 81 of the 289 schools initially contacted (28.0%) agreed to participate, with most refusals due to hesitance to release student information or policies preventing the release of student information. Additional recruitment efforts added replacement schools matching some of the refusal schools on size, geographic location, and demographic characteristics. In the end, a total of 320 schools participated (Kessler et al., 2009b).

Schools that did not provide a roster of students until after parental consent was given were classified as blinded. These schools had a much lower response rate (22.3%, $n = 332$) compared to unblinded schools that provided a roster of students before informed consent was given (81.8%, $n = 8,912$; Kessler et al., 2009b). The low response rate of blinded schools was primarily due to consent forms not being returned by the parents and is in line with other blinded studies. In total, 10,148 adolescents from the household and school samples combined participated in the NCS-A, yielding an overall response rate of 75.6% (Kessler et al., 2009b).

Parental Sample. Parents of adolescents were asked to complete a paper and pencil Self-Administered Questionnaire (SAQ) as a parent-report measure of adolescent mental health. This questionnaire was filled out while the in-home interview was being

conducted with adolescents. The response rate for this parental measure was 63.0%, which reflects completion of the SAQ, regardless of whether or not the adolescent participated (Kessler et al., 2009b). For the current study, only data from cases having both parent and adolescent consent was utilized, resulting in a sample of 6,491. To my knowledge, there is no information available regarding adolescent or parent dropout rates.

Ethical Procedures. Prior to any in-person contact, a letter was sent to each household containing information about the study, a list of frequently asked questions about the study, as well as a 1-800 number to call in case the family had any questions (Kessler, 2009b). Written consent was obtained in person from the parent at the time of first contact and then written assent was obtained from the adolescent. No minors were contacted or interviewed without written consent from the parent. At least one parent or guardian was required to be at home at the time of the interview, with the exception of a small number of emancipated minors, in which case written consent was only obtained from the adolescent (Kessler, 2009a). Adolescents were paid \$50 for taking part in the interview and parents also received \$50 to complete the SAQ parental measure (Kessler et al., 2009b). The Human Subjects Committees of Harvard Medical School, as well as the University of Michigan, approved all recruitment, informed consent, and procedures (Kessler et al., 2009a).

Group Assignment. Participants were assigned to one of three categories for analysis purposes, namely (a) those who met diagnostic criteria for ADHD, (b) those who exhibited sub-threshold ADHD, and (c) those who did not exhibit symptoms of ADHD.

Assignment to these groups was dependent on the number of ADHD symptoms endorsed, as described in greater detail later.

Instrumentation and Materials

The data on the independent variables (socio-demographic characteristics, prescriber specialty, and treatment encouragement) and dependent variable (one-week medication use) were collected using both parent and adolescent report. The NCS-A used two instruments to collect these data. Adolescents completed the Composite International Diagnostic Interview (CIDI), whereas parents completed a Self-Administered Questionnaire (SAQ). All items were adapted from the DSM-IV (Kessler et al., 2009c).

Composite International Diagnostic Interview (CIDI). The NCS-A utilized a modified version of the World Health Organization's (WHO) Composite International Diagnostic Interview (CIDI) Version 3.0 to assess for DSM-IV disorders among adolescents (Merikangas, Avenevoli, Costello, Koretz, & Kessler, 2009). The CIDI measures a number of mood, anxiety, behavior, and substance use disorders. It features modules related to diagnosis, treatment history, risk factors, severity, functioning, and socio-demographic characteristics. A sample of measures from the CIDI is presented in Appendix A.

There were four steps involved in adapting the CIDI for use with adolescents in the NCS-A. First, any diagnostic sections that had predictably low prevalence in adolescents, such as dementia, were removed to shorten the CIDI. Second, the language of all CIDI items was reviewed and modified when necessary to ensure that difficulties with comprehension would be minimized. Third, items were modified to reflect common

daily experiences of adolescents. For example, questions that were originally worded for adults included references to parenting and work life. These contextual examples were replaced with examples such as school life and peer relationships (Merikangas et al., 2009). Finally, Harvard collaborators carefully reviewed each diagnostic section for meaning, clarity, and comparability to the adult CIDI (Merikangas et al., 2009).

To test for convergent validity of the CIDI, a blind clinical reappraisal with 347 NCS-A respondents was conducted comparing diagnoses on the CIDI with a telephone version of the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL; Kaufman, Birmaher, Brent, Rao, Flynn, Moreci, Williamson, & Ryan, 1997). The CIDI reported slightly higher prevalence (7.9, SE = 1.6) than the K-SADS ratings (7.8, SE = 1.6) for ADHD, but this difference was not significant (Kessler, Avenevoli, Costello, Green, Gruber, Guyer, et al., 2009c). High concordance rates were found for mood, anxiety, disruptive behavior, and substance use disorders, with the exception of alcohol dependence and bipolar disorders (Kessler, 2009c). The adolescent version of the CIDI had only recently been released as part of the NCS-A. As such, there has not yet been extensive research on its reliability and validity, other than what has been mentioned already. This remains a limitation of the current study.

Self-Administered Questionnaire (SAQ). A total of 6,491 parents completed the SAQ. This measure collected additional information from parents or guardians in regards to adolescents' mental health. The SAQ included questions pertaining to symptoms of five disorders, namely ADHD, conduct disorder, oppositional defiant disorder, major depressive episode, and dysthymic disorder. These disorders were included in the SAQ

because it has been shown that parental reports are important for accurate diagnosis (Merikangas et al., 2009). The SAQ was deemed necessary as it has been shown that adolescent and parent reports often differ, with parent reports having higher concordance rates with clinical appraisals (De Los Reyes & Kazdin, 2005; Green, Avenevoli, Finkelman, Gruber, Kessler, Merikangas, Sampson, & Zaslavsky, 2010). The SAQ showed good concordance with clinical diagnoses based on blind clinician-administered interviews (Green et al., 2010). Additionally, the SAQ included the Strength and Difficulties Questionnaire (SDQ), a dimensional scale used to collect information on the adolescents' symptoms within the past six months (Goodman, Ford, Simmons, Gatward, & Meltzer, 2003). The SDQ has been reported to have good to excellent internal consistency (0.63–0.83; Bourdon, Goodman, Rae, Simpson, & Koretz, 2005). Where available, the final diagnostic classifications utilized the parental report measure to increase validity.

Administration of Measures. Lay interviewers administered the revised adolescent version of the CIDI using the laptop computer-assisted personal interviews (CAPI) method. The laptop CAPI method was the preferred method of administration over a paper and pencil administered design due to the complexity of the survey, which features many screening and skip-items, that without the CAPI system, would likely introduce interviewer errors, such as skipping items or completing incorrect items (Kessler et al., 2009b). The parent report SAQ was presented in paper and pencil format, largely due to financial restraints (Kessler et al., 2009b).

Assessment of ADHD. For the purposes of this study, ADHD and sub-threshold ADHD were assessed using the combined parent (SAQ) and adolescent (CIDI) reports.

The combined parent and adolescent reports to meet diagnostic criteria are presented in Appendix B. In order to meet diagnostic criteria for ADHD in the NCS-A, a total of at least six inattention symptoms or six hyperactivity-impulsivity symptom items had to be endorsed by the parent, adolescent, or both. Each symptom item could only be counted once as a positive endorsement. In addition, these inattentive or hyperactive-impulsive symptoms must have persisted for at least six months and were considered to be maladaptive and inconsistent with the adolescent's developmental level, as is consistent with DSM-IV guidelines (APA, 1994). Nine inattention items were included in the survey pertaining to the following symptoms:

- 1) Often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities.
- 2) Often has difficulty sustaining attention in tasks or play activities.
- 3) Often does not seem to listen when spoken to directly.
- 4) Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions).
- 5) Often has difficulty organizing tasks and activities.
- 6) Often avoids, dislikes, or is reluctant to engage in sustained mental effort (such as schoolwork or homework).
- 7) Often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools).
- 8) Is often easily distracted by extraneous stimuli.
- 9) Is often forgetful in daily activities.

Hyperactivity-impulsivity items covered the following nine symptoms:

- 1) often fidgets with hands or feet or squirms in seat.
- 2) Often leaves seat in classroom or in other situation in which remaining seated is expected.
- 3) Often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness).
- 4) Often has difficulty playing or engaging in leisure activities quietly.
- 5) Is often on the go or often acts as if driven by a motor.
- 6) Often talks excessively.
- 7) Often blurts out answers before questions have been completed.
- 8) Often has difficulty awaiting turn.
- 9) Often interrupts or intrudes on others (e.g., butts into conversations or games).

In addition, to meet DSM-IV criteria, either the adolescent or the parent must have reported that onset of some inattentive or hyperactive-impulsive symptoms occurred before age seven, and were present in two or more settings such as at school, work, or home, or affected personal relationships/social life. Finally, it must have been reported that the symptoms endorsed significantly affected social, academic or occupational functioning.

A clinical reappraisal study ($n = 321$) directed specifically at ADHD diagnosis found that the composite CIDI showed moderate concordance with the well-validated K-SADS, the child and adolescent versions of the Schedule for Affective Disorders and Schizophrenia (Green et al., 2010). The composite score obtained a sensitivity (the ability to correctly identify individuals with a diagnosis) rating of 59.2, with higher

specificity (the ability to correctly identify individuals without a diagnosis) at 82.7 (Parikh, Mathai, Parikh, Sekhar, & Thomas, 2008; Green et al., 2010). It should be noted that parents were more accurate than adolescents at reporting ADHD symptoms. However, parents also had a tendency to over-report symptoms in comparison to blind clinician ratings (Green et al., 2010). A comparison of all diagnoses assessed in the NCS-A found moderate to excellent concordance.

In the present study, adolescents who did not meet ADHD criteria in the NCS-A were evaluated for inclusion in a “sub-threshold ADHD” category. Individuals who endorsed having three or more hyperactive-impulsive symptoms or three or more inattentive symptoms without meeting criteria for a diagnosis of ADHD were categorized in the sub-threshold ADHD group (Faraone, Biederman, Spencer et al., 2006). It was of concern that some adolescents may have previously met criteria for ADHD but, due to successful psycho-stimulant treatment and reduced symptom presentation, no longer met diagnostic criteria in the NCS-A, despite having long-standing and substantial difficulties with attention or hyperactivity and impulsivity. Unfortunately, there were no items in the NCS-A that tapped into this domain regarding history of effective treatment. To minimize this risk, all adolescents who reported receiving psycho-stimulant medication were examined in the current study to see if any had reported having attention problems prior to the age of 7 for at least 6 months. Adolescents meeting this criterion were also examined to see if they appeared to have subjectively less difficulties at present with ADHD as indicated by responding “no” to “Did you still have a lot of problems with restlessness or impatience during the past 12 months?” The intent of this procedure was to remove any adolescents who responded accordingly in an effort to reduce the

likelihood that mild presentation of symptoms was due to effective medical treatment of an adolescent who met criteria for ADHD, rather than a case of an individual who is receiving medication to treat sub-threshold symptoms. However, no adolescents satisfied this condition of reporting attention or hyperactivity prior to the age of 7 for at least six months who did not still have past year difficulties with restlessness or impatience in the year prior to the survey, so none were excluded from the sub-threshold category.

Adolescents who had less than 3 inattentive or hyperactive symptoms were grouped into the “no ADHD” category. Initially, this decision was to be made based on both the parent and adolescent reports. Unfortunately, due to the skip-logic nature of the CIDI, there were too many instances of missing data to utilize adolescent reports. As a result, classification into the “no ADHD” and “sub-threshold ADHD” categories was based on parent report, as it was the only measure with sufficient data for the required analyses.

Medication Use: During the interview, in order to assess for medication use adolescents were asked, “Did you take any type of prescription medicine in the past 12 months for problems with your emotions, energy, concentration, sleep, or ability to cope with stress? Include medicines even if you took them only once.” Adolescents who responded “yes” to this question were then handed a list of medications (Appendix C) and asked, “Which of the medicines on this list did you take for any of those problems in the past 12 months?” At this time, the interviewer was instructed to ask the respondent to check medication bottles if he or she was unsure of the name. If the adolescent was still unsure, the interviewer was instructed to ask a parent who was present in the home. The interviewer also recorded the type of problem for which the medication was used,

including cognitive symptoms such as poor concentration (Appendix C). Parents were also asked, “was [their child] ever prescribed medication for attention or concentration problems?” and “[did the adolescent take] the medication regularly for at least one week?”

Socio-demographic Characteristics. The current study used multiple logistic regression to examine the influence of several socio-demographic characteristics assessed in the NCS-A in relation to medication use in the absence of ADHD. Characteristics examined included age (13, 14, 15, 16, and 17), sex (male, female), race/ethnicity (White, Black, Hispanic or Other), family income (low: \$0-\$19,999; low-average: \$20,000-\$34,999; high-average: \$35,000-\$74,999; and high: \$75,000+), and urbanicity (large-mid metro, urban fringes, large-small town-rural).

Comorbidity. As mentioned above, the NCS-A included both adolescent and parent report data on five disorders, including ADHD (Merikangas et al., 2009). The current study evaluated the possibility of comorbid ADHD and each of the disorders assessed, namely Oppositional Defiant Disorder, Major Depressive Disorder, Dysthymic Disorder, and Conduct Disorder. These diagnoses were statistically controlled for during regression analyses in order to minimize the chances that medication was being taken primarily to treat one of these disorders.

Treatment Encouragement. Adolescents who reported symptoms of ADHD during the CIDI were asked by interviewers, “Did you ever in your life talk to a medical doctor or other professional either about your problems with concentration or attention or about your problems of being restless or impatient? By other professional we mean psychologists, counselors, spiritual advisors, herbalists, acupuncturists, and other healing

professionals.” Adolescents who responded “yes” to this question were later asked, “Who encouraged you or put pressure on you to get treatment?” Responses were classified under one of the following categories: parents; family, friends, or neighbors; teacher or other school professional; psychiatrist; family doctor; judge, court, or social worker; or other. Multiple logistic regression analyses were used to test the odds of the independent measures (e.g., encouraged treatment seeking) predicting the dependent variable (i.e., use of psycho-stimulant medication for at least one week) (Tabachnick & Fidell, 2007). Additional models were added to adjust for significant socio-demographic correlates, as well as for other psychiatric comorbidity. This analysis included only adolescents who reported treatment-seeking encouragement, with one significant other being identified by each adolescent.

Prescriber Specialty: Adolescents who reported being prescribed medication were asked, “Who prescribed the medication?” Responses to this question were categorized into “psychiatrist,” “family doctor,” “no one,” and “other.” Specialties included in the “other” category included “some other doctor” or “some other health professional.” Any adolescents who responded “no one” to this question were omitted from the analyses to control for the possibility of recreational psycho-stimulant use. Logistic regression analyses were then used to examine the relationship between psycho-stimulant medication use and the specialty of the prescriber. Additional models were added to adjust for any socio-demographic variables that were found to be significantly associated with medication use, as well as for psychiatric comorbidity.

Procedures

One hundred and ninety seven highly trained interviewers from the Survey Research Center at the University of Michigan administered the NCS-A (Kessler et al., 2009b). Each new interviewer was required to complete a 2-day general interviewer-training course. Experienced interviewers were required to take a refresher course. In addition, each interviewer took a 5-day training course that was specific to the NCS-A design and methods. The interviewer administered the CIDI at the adolescents' home in face-to-face interviews with a laptop using the computer-assisted personal interview (CAPI) method, which is a program that assists interviewers by using skip-technology. This program directs the interviewer to questions based on previous responses from the respondent. Several measures were taken to ensure quality control. First, CAPI was programmed to be time-controlled in order to prevent the interviewer from speeding through the survey. Second, one of 18 regional supervisors inspected each completed survey within 24 hours of completion to check for errors and missing data. The interviewer was instructed to re-administer any sections of the survey in which errors were found. Finally, supervisors re-contacted 10% of all respondents in order to verify information and re-interview them on a random selection of questions to check for accuracy.

Analyses

Missing Values. The data collected on the independent variables and dependent variable were examined for missing values prior to analysis. Multiple imputation was used for missing values, as is commonly accepted for large-scale databases with both continuous and categorical data (Holmes Finch, 2010; He, Zaslavsky, Harrinton, Catalano, & Landrum, 2010). During this process, several values are fitted to the data

and imputed to create multiple datasets. All analyses performed take into consideration the multiple dataset format and yield an aggregate result. Missing values were treated with multiple imputation according to the context of the survey question. For values that were missing due to refusal or non-response, multiple imputation was conducted as usual. For values that were missing due to the skip-logic design of the survey, the method of imputation is based upon the relationship between the answered and non-answered survey questions. For example, if the response for “have you ever been encouraged to seek treatment for attention [or restlessness] problems?” was “no,” then data for “who encouraged treatment” would be imputed and subsequently removed. Imputing values for these types of questions that are directly related to the preceding question which was responded to negatively allows for more accurate imputation of the dataset as a whole, while later removing these imputed values reduces the risk of biasing the dataset with positive imputed data (He, Zaslavsky, Harrinton, et al., 2010). In this way, missing values due to skip-logic did not contribute to the classification of the independent variable being measured. In cases for which either missing values were present for an entire index (ADHD), or a participant had 5% or more of the total responses missing from the survey, the participants were eliminated from the analyses, resulting in a reduced sample of 6008 (DiLalla & Dollinger, 2006).

Effect Size. Odds ratios were presented in tables alongside 95% confidence intervals as a measure of effect size and margin of error (Cohen, 1994; Cummings & Finch, 2005). That is to say, that given each analysis, an odds ratio of 1.00 represents the categorical response to which the other responses are being compared. An odds ratio above 1.00 represents increased odds that the categorical response is associated with the

variable being analyzed, with 95% accuracy. For example, if when examining adolescents who meet ADHD criteria, males had an odds ratio exceeding the female comparison group, which is set at 1.00, this would indicate that males are more likely to have ADHD than females. However, if the odds ratio for males is below 1.00, this indicates females are more likely to have ADHD than males. The confidence interval can help determine significant associations; if the range of the confidence interval contains 1.00, the association is not significant. An a-priori sample size calculation was conducted and revealed that 122 participants were needed for an anticipated medium effect size of 0.15 for multiple logistic regression, with power set at 0.80 and an alpha of 0.05 (Soper, 2012). This estimate is in line with recommendations for the minimum number of participants for regression analyses (Wilson, Van Voorhis, & Morgan, 2007). The sample obtained from the NCS-A was large enough to satisfy this criterion and allow examination of medium effects within both the sub-threshold ADHD group and those who meet diagnostic criteria for ADHD.

Results

Table 1 presents descriptive information for the adolescent sample, with frequencies listed for categorical data. Pooled data was obtained from multiple imputation described earlier. It should be noted that the number of people described in the table differ by variable due to the skip logic nature of the survey. For example, although the entire sample was asked age and gender, only adolescents who presented with some difficulties with attention or hyperactivity/impulsiveness were asked about medication use, encouragement to seek treatment, and specialty of the prescriber. This is reflected in the number of participants dropping from 6295 to 595.8, a derivative of the multiple

imputation process described above. The mean age of the adolescent sample was 15.0 (SD = 1.39). It should also be noted that only 62.9% of parents reported information on household income, with the vast majority of participants falling in the lowest income bracket. The parent report surveys were used only for the purposes of determining diagnostic category within the current study. No demographic information is available for the parental sample, other than income, which is presented in Table 1.

Due to the skip-logic nature of the survey, there were insufficient numbers of adolescents even after imputation who reported minimal to no symptoms of ADHD but who provided data on prescriber specialty and who had encouraged medication use. For this reason, logistic regression analyses could not be used regarding this ADHD group. There was, however an adequate number of individuals in both the sub-threshold and ADHD groups to conduct multiple logistic regression based on the a-priori sample size calculation, as described above (Soper, 2012). The independent variables, specialty of the prescriber and encouragement from others, were not significantly correlated with the dependent variable, one-week medication use, indicating that multi-collinearity is likely not a problem (specialty: $r = 0.10$, $p = 0.34$; encouragement: $r = 0.11$, $p = 0.37$).

Research Questions #1: What proportion of youth reported using prescribed psycho-stimulant medication without meeting diagnostic criteria for ADHD?

The percentages of individuals taking psycho-stimulant medication were calculated for individuals in each of three categories, namely those who meet diagnostic criteria for ADHD, those who exhibit sub-threshold ADHD, and those who do not exhibit symptoms of ADHD. These results are presented in Table 2, which shows that 16% of all

Table 1

Pooled Descriptive Characteristics of Adolescent Sample

	<i>n</i> (%)
Sex	<i>n</i> = 6295
Male	3081 (48.9%)
Female	3214 (51.1%)
Age	<i>n</i> = 6295
13	1079 (17.1%)
14	1459 (23.2%)
15	1206 (19.1%)
16	1254 (20.0%)
17 or 18	1297 (20.6%)
Household Income	<i>n</i> = 3957
\$0 - \$19,999	3645 (92.1%)
\$20,000 - \$34,999	80 (2.0%)
\$35,000 - \$74,999	124 (3.1%)
\$75,000	108 (2.7%)
Encouragement	<i>n</i> = 595.8
Parents	299 (50.2%)
Friends/Family	14 (2.3%)
School	44 (7.3%)
Psychiatrist	140 (23.5%)
GP	15.6 (2.6%)

Table 1 Continued

Encouragement Continued

Judge/Social Worker	72.8 (12.1%)
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Other	10.4 (1.7%)
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Specialty	$n = 595.8$
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GP	166.2 (27.9%)
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Psychiatrist	167 (28.0%)
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Other	47.2 (7.9%)
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Don't know	215.4 (36.2%)
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Table 2

One-Week Medication by Diagnostic Category For Total Sample

Diagnostic Category	Taking Medication (<i>n</i> = 499; 8.3%)	Not Taking Medication (<i>n</i> = 5509; 91.7%)	Total (<i>n</i> = 6008)
No ADHD	153 (30.7%)	3877 (70.4%)	67.1%
Sub-threshold ADHD	69 (13.8%)	946 (17.2%)	16.9%
Meets ADHD Criteria	277 (55.5%)	686 (12.4%)	16.0%

adolescents in this study met diagnostic criteria for ADHD, with an additional 16.9% categorized as having sub-threshold ADHD. Lastly, two thirds of adolescents (67.2%) reported exhibiting no, or minimal, attention or hyperactive-impulsive symptoms.

Of those taking medication, 55.5% met criteria for ADHD, while 13.8% were in the sub-threshold category. Surprisingly, 30.7% of all adolescents who were taking medication for ADHD fell into the no ADHD category, representing the second largest number of individuals taking medication. Even so, most adolescents with no ADHD symptoms were not taking medication (96.2%). Taken together, it appears that although adolescents who meet ADHD criteria represent the greatest proportion of individuals receiving medication, the number of individuals taking medication among this group is not as high as might be expected. Additionally, it appears that a small but notable proportion of adolescents among the no ADHD (3.8%) and sub-threshold ADHD (6.8%) category are taking medication at a higher rate than warranted medically.

Research Question #2: What socio-demographic characteristics are associated with the diagnosis and medication of ADHD?

Descriptive information of socio-demographic characteristics related to diagnostic categories is presented in Table 3, followed by an analysis of significant socio-demographic characteristics as indicated by odds ratios, presented in Table 4. The socio-demographic comparisons were made using the no ADHD category as the reference group and, as such, data are only presented for those with ADHD and sub-threshold ADHD. Males were more likely to be classified into the ADHD and sub-threshold groups than females. Additionally, White adolescents were significantly less likely to have sub-threshold ADHD when compared to adolescents who identified their racial background

Table 3

Descriptive Data on Socio-demographic Characteristics by Diagnostic Category

	No ADHD	Sub-threshold	ADHD
	n (%)	n (%)	n (%)
Sex	n = 4197	n = 1073	n = 1025
Male	1812.2 (43.2)	611.6 (57.0)	657.6 (64.2)
Female	2384.8 (56.8)	461.4 (43.0)	367.4 (35.8)
Urbanicity			
Metro	1742 (41.5)	409 (38.1)	421 (41.1)
Other Urban	1395 (33.2)	416 (38.8)	367 (35.8)
Rural	1060 (25.3)	248 (23.1)	237 (23.1)
Age			
13	713 (17.0)	193 (18.0)	173 (16.9)
14	937 (22.3)	277 (25.8)	245 (23.9)
15	823 (19.6)	191 (17.8)	192 (18.7)
16	851 (20.3)	193 (18.0)	210 (20.5)
17/18	873 (20.8)	219 (20.4)	205 (20.0)
Race/Ethnicity			
White	2913 (69.4)	641 (59.7)	626 (61.1)
Black	606 (14.4)	231 (21.5)	192 (18.7)
Hispanic	458 (10.9)	133 (12.4)	141 (13.8)
Other	220 (5.2)	68 (6.3)	66 (6.4)

Table 3 Continued

Income	n = 2705	n = 655	n = 597
\$0-\$19,999	2492 (92.1)	602 (91.9)	551 (92.3)
\$20,000 - \$34,999	47 (1.7)	18 (2.7)	15 (2.5)
\$35,000 - \$74,999	90 (3.3)	14 (2.1)	20 (3.4)
75,000+	76 (2.8)	21 (3.2)	11 (1.8)

Table 4

*Socio-demographic Characteristics of Adolescents in Sub-threshold ADHD and ADHD**Categories*

	Sub-threshold ADHD	ADHD
	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Sex		
Female	1.00	1.00
Male	1.64 (1.36-1.98)***	2.16 (1.77-2.63)***
Urbanicity		
Rural	1.00	1.00
Other Urban	1.22 (.96-1.54)	1.12 (.87-1.43)
Metro	.94 (.75- 1.18)	1.04 (.82-1.32)
Age		
17 & 18	1.00	1.00
16	1.07 (.82-1.39)	1.06 (.81-1.39)
15	1.04 (.79-1.37)	1.08 (.82-1.43)
14	1.28 (.99-1.65)	1.24 (.95-1.61)
13	1.10 (.82-1.46)	1.08 (.80-1.46)
Income		
\$75,000 +	1.00	1.00
\$35,000 - \$74,999	.54 (.26-1.15)	1.54 (.69-3.44)
\$20,000 - \$34,999	1.29 (.62-2.69)	2.14 (.90-5.10)

\$0 - \$19,999	.82 (.50-1.35)	1.51 (.79-2.87)
Table 4 Continued		
Race/Ethnicity		
Other	1.00	1.00
Hispanic	.97 (.63-1.48)	1.01 (.64-1.60)
Black	1.17 (.86-1.59)	1.28 (.92-1.79)
White	.68 (.52-.88)**	.83 (.63-1.11)

Note: *p<.05, **p<.01, ***p<.001

as Other. These were the only significant socio-demographic characteristics associated with diagnostic classification. Contrary to expectations, low household income was not significantly related to ADHD diagnosis. This may be a result of the income distribution, which was largely skewed toward the low end and, therefore, mitigated against a valid test of the relationship.

Socio-demographic characteristics related to medication use are presented in Table 5. Age, race, and sex, but not income or urbanicity, were found to be significant risk factors for medication use. Females were less likely to be taking medication for ADHD than males (OR= .73; C.I.= 0.57 - 0.95, $p < 0.01$). Similarly, Black adolescents were less likely to be taking medication than White adolescents (OR= 0.58, C.I.: 0.38 - 0.90, $p < 0.05$). Those in the 14 and 15 year-old age groups were more likely to take medication than 13 year-olds (OR= 1.73, C.I.: 1.14 – 2.63, $p < 0.05$ and OR=1.49, CI: 1.04 – 2.13, $p < 0.05$, respectively). These variables were statistically controlled for in subsequent analyses. Contrary to expectations, adolescents from high-income families were not more likely to receive medication than those in low-income families. However, as noted above, there was a large amount of missing data for household income, with the vast majority of participants reporting to be in the lowest income bracket. Thus, the findings on income related to medication use and diagnostic category in the current study are likely not valid. Taken together, it appears that White, male, 14 and 15 year olds are the most likely to receive medication to treat symptoms of ADHD.

Research Question #3: To what extent is the specialty of the prescriber associated with the number of adolescents taking psycho-stimulant medication in the absence of ADHD, while controlling for any significant socio-demographic characteristics?

Table 5

Socio-demographic Characteristics of Adolescents Medicated for ADHD

	<i>n</i> (%)	Odds Ratio
Sex		
Male	293 (58.7)	1.00
Female	206 (41.3)	.73 (.57 - .95)*
Urbanicity		
Metro	214 (42.9)	1.00
Other Urban	164 (32.9)	.85 (.63 – 1.16)
Rural	121 (24.2)	1.16 (.83 – 1.61)
Age		
13 years	62 (12.4)	1.00
14 years	103 (20.6)	1.73 (1.14-2.63)**
15 years	94 (18.8)	1.49 (1.04 – 2.13)*
16 years	110 (22.0)	1.40 (.98 – 2.02)
17+ years	130 (26.1)	1.10 (.79 – 1.54)
Income		
\$0 - \$19,999	277 (94.2)	1.00
\$20,000 - \$34,999	6 (2.0)	.31 (.14 - .70)
\$35,000 - \$74,999	8 (2.7)	.32 (.08 – 1.32)
\$75,000 +	3 (1.9)	.38 (.10 – 1.46)

Table 5 Continued

Race/Ethnicity

White	375 (75.2)	1.00
Black	53 (10.6)	.58 (.38 - .90)*
Hispanic	23 (4.6)	1.18 (.67-2.07)
Other	48 (9.6)	.89 (.45 – 1.79)

*p<.05, **p<.01, ***p<.001

Table 6 displays descriptive data for the prescriber specialty and encourager identity by diagnostic category. A large proportion of adolescents who received medication to treat ADHD did not know the specialty of the prescriber. This may represent that parents are the primary decision makers for health care decisions for adolescents, and as such adolescents are somewhat ill-informed of their treatment-seeking process. Alternatively, it may be that adolescents are unsure of the distinction between prescriber specialties. Adolescents in the sub-threshold ADHD and ADHD categories both had more frequent reports of family doctors being the specialty of the prescriber compared to psychiatrist. Parents were most often cited as the individual encouraging treatment across all diagnostic groups.

Table 7 presents the pooled imputed results for medication use in relation to the specialty of the prescriber. Odds ratios are presented alongside models that adjust for the effects of socio-demographic variables (AOR-1), as well as socio-demographic variables and psychiatric comorbidity (AOR-2). Logistic regression revealed that, among those in the sub-threshold ADHD category, adolescents who were prescribed medication by either a psychiatrist or “other” were less likely to report using medication for at least one week than if they were prescribed by family doctors (odds ratio (OR): 0.29; confidence interval (C.I.): 0.09 - 0.97, $p < 0.05$ and OR: 0.17; C.I.: 0.03 - 0.98, $p < 0.05$ respectively). This relationship held true after adjusting for significant socio-demographic variables, as indicated by the adjusted odds ratio (AOR-1: 0.20, C.I.: 0.05 - 0.73, $p < 0.05$ and AOR-1: 0.11, C.I.: 0.01 - 0.93, $p < 0.05$). However, after adjusting for psychiatric comorbidity and socio-demographic variables, this association was only significant among those who were prescribed medication by a psychiatrist, as indicated by the second adjusted odds

Table 6

Descriptive Data on Prescriber Specialty and Encourager Identity

	No ADHD	Sub-threshold	ADHD
	n = 41.6	n = 131.4	n = 389.6
Specialty	n (%)	n (%)	n (%)
Family Doctor	5.8 (19.2)	25.4 (27.4)	52.8 (34.6)
Psychiatrist	5.8 (19.2)	16.8 (18.1)	34.8 (22.8)
Other	1.4 (4.6)	6.2 (6.7)	11.6 (7.6)
Don't know	17.2 (57.0)	44.4 (47.8)	53.4 (35.0)
Encourager			
Parents	11.6 (39.5)	43.6 (48.0)	62.8 (41.6)
Friend/Family	0.8 (2.7)	1 (1.1)	4.8 (3.2)
School	3 (10.2)	6 (6.6)	15.8 (10.5)
Psychiatrist	10.4 (35.4)	29.2 (32.2)	42.2 (28.0)
Family Doctor	1.2 (4.1)	2.4 (2.6)	3 (2.0)
Judge/Social Worker	2.4 (8.2)	8.6 (9.5)	22.2 (14.7)

Table 7

Medication Use by Specialty of the Prescriber

Specialty	Sub-threshold ADHD			ADHD		
	OR	AOR-1	AOR-2	OR	AOR-1	AOR-2
Family doctor	1.00	1.00	1.00	1.00	1.00	1.00
Psychiatrist	.29 (.09-.97)*	.20 (.05-.73)*	.20 (.05-.82)*	.36 (.17-.74)**	.36 (.17-.75)**	.63 (.33-1.21)
Other	.17 (.03-.98)*	.11 (.01-.93)*	.13 (.02-1.21)	.66 (.28-1.56)	.67 (.28-1.61)	.69 (.25-1.92)
Don't know	.58 (.21-1.65)	.62 (.21-1.88)	.65 (.20-2.07)	1.03 (.61-1.73)	1.01 (.58-1.75)	1.02 (.56-1.86)

Note: AOR-1 adjusted for significant socio-demographic variables; AOR-2 adjusted for significant socio-demographic variables and psychiatric comorbidity. *p<.05, **p<.01, ***p<.001

ratio (AOR-2: 0.20, C.I.: 0.05 - 0.82, $p < 0.05$). Thus, after adjusting for socio-demographic characteristics and psychiatric comorbidity, it appears that adolescents within the sub-threshold group had increased odds of receiving ADHD prescriptions from family doctors compared to psychiatrists. These findings show that family doctors are the most likely to prescribe medication to treat both ADHD and sub-threshold ADHD. Similarly, individuals who were prescribed medication by psychiatrists were less likely to take medication, compared to those prescribed medication by family doctors among those who met criteria for ADHD (OR: 0.36, C.I.: 0.17 - 0.74, $p < .01$), even after adjusting for socio-demographic characteristics (AOR-1: 0.36, C.I.: 0.17 - 0.75, $p < 0.05$). This relationship was no longer significant after adjusting for psychiatric comorbidity (AOR-2: 0.63, C.I.: 0.33 - 1.21, *ns*). In other words, although a similar pattern emerged within the ADHD classification (i.e., that medication was more often prescribed by family doctors compared to psychiatrist) after adjusting for socio-demographic characteristics and comorbidity, no relationship between the prescriber and medication use was found regarding adolescents with ADHD.

Research Question #4: To what extent is pressure or encouragement from significant others associated with use of medication to treat ADHD and what is the most likely relationship (parent, friend, teacher, etc.) of such others to adolescents using psychostimulant medication?

Table 8 presents the pooled logistic regression results for medication use in relation to encouragement to seek treatment. No respondents in the sub-threshold category identified judge/social workers as a source of encouragement; therefore this response option could not be evaluated among adolescents in the sub-threshold category.

Professionals within academic settings, as well as psychiatrists, appeared to be influential in encouraging adolescents to take medication to treat ADHD. Among adolescents who were classified as part of the sub-threshold ADHD category, encouragement to seek pharmacological treatment from school professionals significantly increased the odds of medication use compared to encouragement from parents, after adjusting for socio-demographic variables (AOR-1: 3.95, C.I.: 1.14-13.71, $p < 0.05$).

Among the ADHD group, psychiatrists who encouraged treatment appeared to have the most influence on medication use, with 3.19 increased odds compared to encouragement from parents (C.I.: 1.98 – 5.13, $p < 0.001$). This association remained significant after adjusting for socio-demographic characteristics (AOR-1: 3.36, C.I. : 2.01 - 5.61, $p < 0.001$ and psychiatric comorbidity (AOR-2: 2.89, C.I.: 1.42 - 5.88, $p < 0.01$). Encouragement from school professionals among adolescents who met criteria for ADHD was also significant after adjusting for socio-demographic variables and psychiatric comorbidity (AOR-3: 2.60, C.I.: 1.42 – 5.88, $p < 0.01$). Taken together, it appears that encouragement from school professionals is somewhat influential in both the sub-threshold and ADHD groups compared to encouragement from parents alone, whereas psychiatrists are the most influential when encouraging treatment for adolescents who meet ADHD criteria.

Table 8

Medication Use by Encourager Identity

SUB THRESHOLD			
Encourager	OR	AOR1	AOR2
Parents	1.00	1.00	1.00
Friend/Family	.62 (.16-1.65)	.50 (.11-2.21)	.34 (.08-1.53)
School	1.95 (.71-5.38)	3.95 (1.14-13.71)*	1.94 (.50-7.61)
Psychiatrist	.81(.07-10.1)	.64 (.04-9.51)	.65 (.04-11.26)
GP	.60 (.20-1.81)	.77 (.23-2.58)	.93 (.25-3.48)
ADHD			
	OR	AOR1	AOR2
Parents	1.00	1.00	1.00
Friends/Family	1.60 (.25-10.13)	1.59 (.25-10.31)	1.28 (.20-8.31)
School	2.06 (.63-6.74)	2.28 (.68-7.59)	2.60 (1.17-5.76)*
Psychiatrist	3.19 (1.98-5.13)***	3.36 (2.01-5.61)***	2.89 (1.42-5.88)**
GP	.85 (.21-3.45)	.84 (.20-3.55)	.55 (.09-3.24)
Judge/Social Worker	2.21 (.55-8.88)	1.77 (.42-7.48)	2.51 (1.27-4.96)

Note: APR-1 adjusted for significant socio-demographic variables; AOR-2 adjusted for

significant socio-demographic variables and psychiatric comorbidity.

*p<.05, **p<.01, ***p<.001

Discussion

Prevalence of ADHD

This study shows that a substantial proportion of adolescents in the U.S. are reporting ADHD symptoms. The prevalence rates for those who endorse criteria for ADHD are higher than the rates cited in the DSM-5 (American Psychiatric Association, 2013), with 16.0% of adolescents in this study falling into this category. An additional 16.9% of adolescents meet sub-threshold criteria. Although 67.1% of adolescents reported no or minimal symptoms, these numbers are concerning, as difficulties with hyperactivity in particular have been related to lowered test scores and may reduce health capital more than many physical health concerns (Currie & Stabile, 2006).

The current population-based study aids in identifying the high rate of ADHD symptomatology among diverse youth across the United States. Prevalence rates of ADHD have been cited previously to be as high as 18-20% (LeFever, Dawson, & Morrow, 1999). However, this finding only pertained to White males in fifth grade, with lower rates found among females and youth in other grades. Contrary to these findings, White adolescents in the current study were the least likely to meet ADHD criteria. Those who identified as being Black were the most likely to meet both ADHD and sub-threshold criteria, followed by Hispanic, “other,” and finally, White adolescents. Adolescents who identified as males were significantly more likely than females to report ADHD symptoms, both those meeting criteria for ADHD and those sub-threshold for ADHD. This finding echoes previous research in identifying males as more likely to suffer from ADHD.

Patterns of Medication Use

The present study found that overall medication use is higher than previously documented, although medication use for those who meet criteria for ADHD may be somewhat lower (LeFever, et al., 1999; Rowland et al., 2002). Despite almost one-third (32.9%) adolescents reporting some symptoms of ADHD, only 8.3% of all adolescents reported receiving medication to treat ADHD. The latter figure is slightly higher than that found by Rowland and colleagues (2002), who indicated a 7% medication rate among all students. Among adolescents taking medication, the rate of medication differs between adolescents who meet criteria for ADHD (55.5%) and adolescents with minimal or no symptoms (30.7%), as well as adolescents with sub-threshold symptoms (13.8%). Overall, it appears that adolescents who have the most difficulties with attention and hyperactivity/impulsivity may be using medical treatment less than expected, whereas adolescents with fewer difficulties may be utilizing medical treatment more than expected, particularly those with minimal or no symptoms of ADHD.

Together, these findings extend earlier research that indicated substantial growth in rates of ADHD and medication use between 2000 and 2005 (Castle, et al., 2007). The finding that a meaningful proportion (8.3%) of all adolescents take prescribed psychostimulant medication without meeting diagnostic criteria for ADHD suggests that some adolescents, particularly adolescents in the 14-15 year-old age group, are being medicated more than would be expected, as will be discussed in greater detail later. Additionally, Black adolescents were significantly less likely to use medication than White participants and also used medication less than those who identified as Hispanic, although this relationship was not significant. This may indicate that Black adolescents are utilizing treatment less than would be expected. The potential for unnecessary

medication may be especially relevant for those who reportedly exhibit no or minimal symptoms of ADHD, compared to those who fall within the sub-threshold category, and may be just below diagnostic cut-off in terms of age of onset, duration of symptoms, and severity of symptoms.

Surprisingly, nearly 4% of those who reported no or minimal ADHD symptoms took medication to treat symptoms. Although this may appear low, considering that the majority of the total sample fell into the “no ADHD” category, this accounts for 30.7% of all adolescents receiving medication. This finding adds to the argument that families with adolescents who exhibit mild to moderate symptoms of ADHD may be taking excessive measures to protect against losses in health, education, and future earning potential, as is noted in the health capital model (Grossman, 1972). Additionally, in part these rates appear to be a result of pressure on teachers to identify problem behaviour and encourage treatment in order to maintain an efficient teaching environment within classroom settings.

Rates of medication may continue to rise in concordance with easier access to medication. Currie and colleagues (2014) noted that areas with more insurance coverage have greater psycho-stimulant medication use than those with less insurance coverage. Moreover, this increased medication usage did not result in a great improvement in terms of emotional and academic outcomes. Surprisingly, the greater insurance coverage was linked to negative effects, such as elevated rates of anxiety and depression, increased rates of repeating grades, and decreased rates of high school graduation. The finding that medication use may be associated with decreased achievement is of particular importance for adolescents who may be taking medication unnecessarily and, inadvertently, are being

put at risk for losses of health capital.

Compared to Rowland (2002), who found that 71% of adolescents who were diagnosed with ADHD received medication, the current study shows that adolescents who have the highest need for treatment are utilizing pharmacological intervention at a modest rate, with only about one-third of adolescents who meet criteria for ADHD utilizing medication. The cause for such low medication utilization among these adolescents is unknown. However, three possible reasons come to mind. First, some adolescents may be aware that they suffer from ADHD, but they or significant others choose alternative methods of treatment, such as behavioural interventions. Unfortunately, this possibility cannot be investigated based on the NCS-A data. Second, although some adolescents may meet criteria for ADHD and have noticed difficulties in different areas of life, these difficulties may not be severe enough to offset the risk of medication side-effects and/or stigmatization (Comier, 2012). Finally, although some adolescents meet criteria for ADHD, they may not seek professional guidance and thus, may be unaware that the difficulties they are experiencing are attributable to ADHD. This scenario would indicate a failure to adequately identify ADHD, which, if not corrected, would result in lower achievement in school and upon entering the workforce.

Socio-demographic Correlates of ADHD Medication Use

Minimal differences between age groups were found in use of medication for ADHD, within both the sub-threshold and ADHD categories, peaking at age 14. However, it should be noted that, although this age group is the most likely to use medication to treat ADHD, there was no evidence that they experienced the highest frequency of ADHD symptoms. It may be that this age group is using medication at

excessive rates. This is consistent with earlier research showing that increased age is associated with decreased medical treatment utilization (Berger-Jenkins, McKay, Newcorn, Bannon, & Laraque, 2012). The latter trend may be partially due to adolescents' increased autonomy with age, as well as decreased parental influence. In this light, it may be the case that parents are starting to cede to adolescents more responsibility for their own health care decisions during the mid-teenage years.

In the current research, income was not related to treatment by medication. This finding, or lack thereof, may be attributable to both a high refusal among respondents rate regarding income questions and the fact that a large majority of parents who did provide this information fell into the lowest income bracket. Previous research has suggested that high household income was associated with increased utilization of medication for the treatment of ADHD (Froehlich, et al., 2007). Given a larger and more diverse sample, the present research may have shown a similar relationship.

White participants in the present study were significantly more likely to receive medication to treat ADHD than Black participants, but not Hispanic participants. This suggests that Black adolescents, despite higher symptom counts, may be utilizing medication less than expected. Alternatively, considering the decreased symptoms associated with being White, paired with an increased likelihood of receiving medication, White youths may be at particularly high risk of over-medication. This difference may be due to the parents of Black adolescents being able to invest time and energy in protecting health capital or may lack the resources necessary to obtain medical treatment. Additionally, it may be that due to racial biases in both education and employment, White adolescents have the highest capital and, therefore, are faced with larger potential losses

if symptoms go untreated.

It may be the case that medication is perceived as the most desirable form of treatment, due to alternative forms of treatment carrying greater financial and time costs, both of which are viewed as commodities within the context of the health capital model. A study by Jensen and colleagues (Jensen, Garcia, Glied, Crowe, Foster, Schlander, Hinshaw, Vitiello, Arnold, Elliott, Hechtman, Newcorn, Pelham, Swanson, and Wells, 2005) investigated the most cost-effective form of treatment for children with ADHD. Based on treatment costs over a 14 month period and symptom reduction, these researchers found that pharmacological treatment was the most cost-effective form of treatment, followed by behavioural treatment, and combined pharmacological and behavioural treatment. However, the most cost-effective form of treatment for children with co-morbid conditions, such as internalizing or externalizing disorders along with ADHD, was a combined approach featuring both pharmacological and behavioral treatment. Perhaps the addition of behavioural therapies help youth cope with symptoms of both ADHD and the internalizing or externalizing disorder, who at the same time are trying to find a medication balance that adequately reduces symptoms of multiple disorders. This finding, along with those of the current study, can be contextualized within the health capital model. It is hardly surprising that parents would prefer to invest in health stock in the most convenient and affordable means possible. Consequently, the most affordable method of treatment identified by Jensen and colleagues is also the most popular in the American population.

It is important to bare in mind the influence of cultural when reviewing the current findings, as high prevalence rates of ADHD and treatment with medication may

be due to increased medicalization of behavioural deviations. For example, European and Scandinavian countries tend to have lower medication use for the treatment of ADHD than highly medicalized cultures such as the USA (Knopf, Holling, Huss, & Schlack, 2012; Reid, Hakendorf, & Prosser, 2002). Cross-cultural studies have found higher ADHD prevalence rates in the United States (11.4%-16.1%) compared to Iceland, Australia, Italy, and Sweden (2.4%-7.5%), with prevalence rates steadily increasing internationally as newer versions of the DSM are produced (Faraone, Sergeant, Gillberg, & Biederman, 2003). The highest rates of symptom endorsement and number of individuals who met criteria for ADHD across cultures tends to be found when using more recent versions of DSM criteria. This calls into question the validity of this widely used diagnostic measure. It is worth considering that, although elevated rates of ADHD may be representative of more powerful diagnostic tools and increased symptom awareness, they may also result from increased medicalization of ADHD. It is no secret that pharmaceutical companies have a vested interest in medicalization of ADHD and may be indirectly influencing the rate of diagnosis and medical treatment. In recent years, the increased medicalization of ADHD has coincided with additional pressure placed on both teachers and medical professionals to identify and aid in treatment of ADHD, due in part to increased advertising and information supplied by pharmaceutical companies (Phillips, 2006). While this additional attention may assist some adolescents to obtain beneficial treatment, it may also lead to increased utilization of medication among individuals who have minimal symptoms of ADHD. Alternatively, it may be the case that cultures with higher rates of ADHD and medication utilization value time more highly as a commodity and are, therefore, more likely to favor treatment that minimizes time

expenditures. For this reason, countries such as the United States are more likely to favor medication over time consuming individual, family, or behavioural interventions to treat ADHD.

Specialty of the Prescriber

Family doctors as prescribers, compared to psychiatrists or other specialties, were more likely to be associated with medication use among adolescents in the sub-threshold category. Moreover, after adjusting for socio-demographic characteristics and psychiatric comorbidity, family physicians were still greater associated with medication use than psychiatrists. Similarly, family doctors compared to psychiatrists, but not other specialties, were more likely to prescribe pharmacological treatment to adolescents in the ADHD category. This finding may be cause for concern, as it is surprising that doctors who specialize in psychological difficulties are often not the ones who diagnose and treat this particular disorder. It has previously been noted that adolescents who visited a psychiatric clinic, as opposed to a general pediatric clinic, for symptoms of ADHD had lower Health Related Quality of Life and also reported greater psychiatric comorbidity (Varni, Libers, Ripperger-Suhler, Boutton, Ransom, 2011). Even after controlling for comorbidity, general practitioners may be more likely to prescribe medication for adolescents who do not meet full criteria for ADHD, due to having less exposure to severe cases of ADHD to serve as a comparison and less training in this area. In addition, a family doctor is typically the most accessible health care provider able to prescribe medication. Thus, less time, energy, and money is needed from an adolescent and parent in order to see a family doctor than to see a psychiatrist. Although ease of access to family doctors may be beneficial to adolescents who have a bona fide need for

medication, it may result in excessive medical treatment among adolescents with no to minimal symptoms, or sub-threshold symptoms, of ADHD. As stated previously, such treatment may present an undue risk of side-effects and stigmatization, in addition to the financial costs of medications.

One possible way to alleviate over-medication would be for families to seek second opinions. A Washington study noted that second opinions often result in reduced rates of medication or dosages for treatment of ADHD (Thompson, Varley, McClennan, Hilt, Lee, Kwan, Lee, & Trupin, 2009). It appears that the proportion of prescriptions written by family doctors for ADHD is on the rise. A study by Lillemoen and colleagues found that, of prescriptions that had been filled, those written by a family doctor had increased from 17% in 2004 to 48% in 2008 (Lillemoen, Kjosavik, Hunskar, & Ruths, 2012). Of course, different specialists may have different prescription practices. For example, family doctors and pediatricians have been found in one study to make more rule-based decisions, such as following diagnostic criteria and clinical guidelines when prescribing medication, compared to psychiatrists, who are primarily interested on symptom control (Kovshoff et al., 2013). Although this might lead many to believe that the above differences would result in family doctors writing fewer prescriptions for ADHD, it is unclear how strictly diagnostic criteria are followed or to what extent differential diagnoses are considered. Additionally, it may be difficult for family doctors who lack the expertise of a specialist to properly consider severity of symptoms in a short appointment. Interestingly, psychiatrists appear to minimize the significance of ADHD medication side-effects than family doctors and tend to favor long-term treatment (Kovshoff et al., 2013). This may partially be due to increased desire to normalize

behaviour, as psychiatrists often are referred patients with greater comorbidity and severity (Varni, Libers, Ripperger-Suhler, Boutton, Ransom, 2011). It may be the case that family doctors, compared to psychiatrists, are more willing to talk to the adolescent or families about potential side-effects and modify dosages in attempts to alleviate concerns when commencing treatment. Thus, individuals who seek treatment from psychiatrists compared to family doctors may have greater fear of unknown side-effects, which may contribute to reduced use of medication, as was found in the current study. Unfortunately, this may leave adolescents who are in the need of treatment without any form of adequate intervention. This again stresses the importance of second opinions and follow-up appointments in order to re-evaluate the need for treatment and proper dosages. Considering the low rates of medication among adolescents who meet criteria for ADHD within the current study, especially compared to Rowland (2002), further research may benefit from an examination of difficulties with medication adherence, which could also result in losses in health capital. Importantly, the causes and long-term effects of non-adherence are still largely unknown (Adler, & Nierenberg, 2010).

Encouragement

It was expected that parents would be the most influential people encouraging adolescents to accept pharmacological intervention for ADHD. However, professionals within academic settings, as well as psychiatrists, appeared to be more influential than parents, both within the sub-threshold category and among those who met criteria for ADHD. It is interesting that encouragement from psychiatrists is associated with greater medication use, but family doctors tend to write more prescriptions for ADHD medication. The relationship between the adolescents and the significant others who

encourage treatment-seeking can be interpreted as an investment on behalf of the adolescents. That is to say, those who have the most influence over adolescents are likely those individuals who are closest to, and have the most time and energy invested in, adolescents (such as parents and other family). However, in the current study, it was found that psychiatrists and school professionals are more influential in pharmacological treatment-seeking. These findings point towards the professional credibility of psychiatrists' opinions when considering ADHD medication. It may be that parents are often unsure of the degree to which their child is behaving abnormally. Having professionals highlight or confirm the parents' worries may be necessary to motivate medical treatment-seeking. Moreover, it may be difficult for most parents to understand both the benefits and risks associated with taking medication for attention and behavioural problems (Hansen & Hansen, 2006). One study notes that, in an effort to help the child succeed, parents will make medical treatment decisions in an effort to do "what helps most" while balancing concerns of adverse side effects and the possibility of stigmatization (Cormier, 2012). Encouragement from professionals may aid in the decision process and may result in medication treatment-seeking as a health investment for the adolescent and also for the parent by reducing worry about the adolescent's problems.

One alternative to medication that could help maintain human capital are programs aimed at providing alternative parenting strategies. Ineffective parenting has been linked to difficulties with self-control, which is highly related to ADHD (Unnever, Cullen, & Pratt, 2003). A study evaluating this theory found that increased parental monitoring was shown to alleviate problems with self-control.

Although parents of adolescents who exhibit ADHD symptoms may sometimes take excessive measures to prevent against losses of health capital, taking action even under uncertain conditions may be beneficial to the child in terms of academic success, future learning, and earning potential. Thus, the relatively low rate of medication usage found by the current study among those who meet criteria for ADHD suggests that the health capital of many adolescents is being jeopardized unnecessarily.

Limitations

The current study has several limitations. First, because the current research is cross-sectional in design, the predictive validity related to encouragement is limited. That is to say, it is unknown whether encouragement from others to seek treatment was the true catalyst or if the adolescent or decision-making adult were already considering medication to treat ADHD. However, this research could be beneficial in setting the groundwork for longitudinal studies based on the release of future waves of the NCS-A. For example, future studies may be better able to identify the link between encouragement to seek medical treatment and medication use when encouragement is evaluated over time. In addition, the results are only fully generalizable to the United States, as many factors related to medical treatment, such as access to and cost of health care and prescription, may vary by country (Kazdin, 1999). Further research is needed to extend the findings to the Canadian context.

Another limitation is the length of the CIDI, which on average took about 2.5 hours to complete (ranging between 69-347 minutes; Kessler et al., 2009b). This length of survey may have been particularly difficult for adolescents who endorsed symptoms of ADHD and may have resulted in the adolescent under-reporting symptoms in order to

rush the survey along. However, it should be noted that the CIDI is comparable in length to the Schedule for Affective Disorders and Schizophrenia for School-Age Children, which is well-validated, commonly used, and on average takes 180 minutes to administer (Merikangas et al., 2009). In addition, the skip-logic nature of the survey allowed for reduced survey time for adolescents who did not require administration of the full module based on screener questions. In the future, it may be beneficial to administer a short-form survey or to perform the interview on multiple days to ensure that attention at the time of interview plays a minimal role.

There is currently limited information on the reliability and validity of the adolescent version of the CIDI. Although this instrument was adapted from a well-validated interview schedule, it is not known how well the psychometric properties transferred to the adapted version. More research is needed in this area.

Some of the adolescents in the NCS-A may have responded differently or minimized symptoms based on the sex or personality of the interviewer, or in socially desirable ways based on self-esteem, especially for embarrassing questions when asked by a member of the opposite sex (DiLalla & Dollinger, 2006; Uziel, 2010). One way that this could have been alleviated would be to use audio, computer-assisted, self-administered interviewing (A-CASI), which allows respondents to listen to questions on headphones and enter responses on a laptop without anyone being aware of the question or response (Kessler, 2009b).

It should be noted that parents have been shown to over-report symptoms when compared to blinded clinical evaluations (Green et al., 2010). However, over-reporting of symptoms in this context would result in adolescents utilizing medical treatment in the

absence of ADHD even more frequently than found within the current study and, as such, many of the discussion points would in fact be strengthened. Alternatively, if parental over-reporting of symptoms resulted in false classification into the ADHD group and such adolescents are not taking medication, it would stand to reason that a higher proportion of adolescents correctly placed in this category are taking medication for ADHD than the current results would suggest. In this case, rates of medication among adolescents with bona fide ADHD would be closer to previous studies that found over two-thirds of school-aged students with ADHD receive medication (Rowland et al., 2002).

The current study had a reduced sample size due to needing both adolescent and parent report. This reduction may have somewhat biased the sample, making the generalizability of the study limited. Additionally, only one significant other who encouraged adolescents to seek treatment was able to be examined. It may be the case that including multiple responses may have resulted in differing findings dependent on the number of individuals who encouraged the adolescent to seek treatment.

Conclusion:

In conclusion, there appears to be a group of adolescents, small proportionally but large in number, who are receiving medication to treat very mild to moderate symptoms of ADHD. Additionally, the prevalence rate of ADHD appears to be considerably higher than cited in the DSM-5, with the current study finding that 16.0% of adolescents meet criteria. It also appears that the specialty of the prescriber and individual who encourages treatment have an impact on medication utilization. The finding that some adolescents with minimal and modest symptoms of ADHD are being prescribed and taking

medication for ADHD lends support to the notion that they or their significant others (e.g. parents) are taking excessive measures to protect against health capital losses. This finding could have substantial public health implications and warrants further research into prescribing practices. Minimizing unnecessary medication use may actually protect against health capital depreciation, as the long term side effects of relatively recently developed medications are still unknown. This knowledge may influence parents and teachers to recommend alternative forms of treatment, such as behavioural interventions, to help adolescents with minor symptoms of ADHD, or who are already on medication to treat ADHD.

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Appendix A

Sample of CIDI Diagnostic Measures Used

Earlier in the interview you mentioned having a time that began before the age of seven when you had a lot more trouble than most people with concentration or attention. The next questions are about that time. How often did you have the following problems during that time:

How often did you lose things like assignments or books or other things you needed?

☐ Very Frequently, ☐ Often, ☐ Once in a while, ☐ Never

How often did you make a lot of careless mistakes in your homework, work, or other activities?

☐ Very Frequently, ☐ Often, ☐ Once in a while, ☐ Never

How often did you forget what you were supposed to be doing or what you had planned to do?

☐ Very Frequently, ☐ Often, ☐ Once in a while, ☐ Never

How often did people say that you did not seem to be listening when they spoke to you?

☐ Very Frequently, ☐ Often, ☐ Once in a while, ☐ Never

How often did you quickly lose interest in games you were playing or in work you were doing at home or at school?

☐ Very Frequently, ☐ Often, ☐ Once in a while, ☐ Never

How often were you unable to keep your mind on what you were doing if things were going on nearby?

☐ Very Frequently, ☐ Often, ☐ Once in a while, ☐ Never

How often did you dislike, stay away from, or put off doing things that required a lot of concentration?

☐ Very Frequently, ☐ Often, ☐ Once in a while, ☐ Never

How often did you get confused when you had to make plans or decide the order in which to do things?

☐ Very Frequently, ☐ Often, ☐ Once in a while, ☐ Never

How often did you leave chores, homework or other work unfinished even when you meant to get them done?

☐ Very Frequently, ☐ Often, ☐ Once in a while, ☐ Never

You had several concentration and attention problems, such as [INTERVIEWER LISTS ITEMS ENDORSED]. Can you remember your exact age the very first time in your life

when you had any of these problems for six months or longer?

☐ Yes ☐ No

About how old were you the first time (you had any of these problems)?

Response in years

What grade was that?

Response

Was it before you were seven?

☐ Yes ☐ No

Was it before your teens?

☐ Yes ☐ No

Did you still have a lot of problems with concentration and attention during the past 12 months?

☐ Yes ☐ No

How old were you the last time you had six months or longer when you had a lot of problems with concentration or attention?

Response

About how many years altogether [/ have you had / did you have] these problems?

Response

How often did these concentration and attention problems ever cause you problems at school?

☐ Very Frequently, ☐ Often, ☐ Once in a while, ☐ Never

How often did these concentration and attention problems ever cause you problems at work?

☐ Very Frequently, ☐ Often, ☐ Once in a while, ☐ Never

How often did these concentration and attention problems ever cause you problems in your personal relationships or social life?

☐ Very Frequently, ☐ Often, ☐ Once in a while, ☐ Never

Think about the one month or longer in the past 12 months when these concentration and attention problems were worst. Using the 0 to 10 scale, where 0 means no interference and 10 means very severe interference, what number describes how much these problems interfered with each of the following activities during that time?

Your chores at home?

Response

Think about one month or longer in the past 12 months when these concentration and attention problems were worst. Using the 0 to 10 scale, where 0 means no interference and 10 means very severe interference, what number describes how much these problems interfered with each of the following activities during that time?

Your ability to do well at school or work?

_____Response

Think about one month or longer in the past 12 months when these concentration and attention problems were worst. Using the 0 to 10 scale, where 0 means no interference and 10 means very severe interference, what number describes how much these problems interfered with each of the following activities during that time?

Your ability to get along with your family?

_____Response

Think about one month or longer in the past 12 months when these concentration and attention problems were worst. Using the 0 to 10 scale, where 0 means no interference and 10 means very severe interference, what number describes how much these problems interfered with each of the following activities during that time?

Your social life?

_____Response

About how many days out of 365 in the past 12 months were you totally unable to work or go to school or carry out your normal activities because of these problems?

_____Record Response

Did you ever in your life talk to a medical doctor or other professional about your concentration and attention problems? (By other professional we mean psychologists, counselors, spiritual advisors, herbalists, acupuncturists, and other healing professionals.)

____ Yes ____ No

Appendix B

CIDI-PSAQ Scoring Algorithm**Minor Depressive Disorder -- DSM-IV criteria**

CP_MND = 1 if Criteria A (Parts 1, 1b, and 2) is met, SAQ_MND = 5 otherwise.

Criteria A Part 1: Symptoms have been present during the same 2 week period and at least one of the symptoms is either

(1) depressed mood or (2) loss of interest or pleasure.

Parent Criteria A Part 1 is Yes (1) OR

Adolescent Criteria A Part 1 is Yes(1).

Criteria A Part 1b: At least two (but less than five) of the following symptoms have been present: at least one of the symptoms is either (a) or (b).

Note: 2 to 4 symptoms required. If at least 2 sxs and the number of symptoms and the number of symptoms which take the values (Dont Know,Refused) is less than 5 then criteria is met for having at least 2 but less than 5 symptoms.

1. depressed mood most of the day, nearly every day, as indicated by either subjective report(e.g. feels sad or empty) or observation by others.

Parent Criteria A Part 1b Symptom 1 is Yes(1) OR

Adolescent Criteria A Part 1b Symptom 1 is Yes(1).

2. markedly diminished interest or pleasure in all, or almost all, activities most of the day,

Parent Criteria A Part 1b Symptom 2 is Yes(1) OR

Adolescent Criteria A Part 1b Symptom 2 is Yes(1) OR

3. significant weight loss when not dieting or weight gain

Parent Criteria A Part 1b Symptom 3 is Yes(1) OR

Adolescent Criteria A Part 1b Symptom 3 is Yes(1) OR

4. insomnia or hypersomnia nearly every day.

Parent Criteria A Part 1b Symptom 4 is Yes(1) OR

Adolescent Criteria A Part 1b Symptom 4 is Yes(1) OR

5. psychomotor agitation or retardation nearly every day

Parent Criteria A Part 1b Symptom 5 is Yes(1) OR

Adolescent Criteria A Part 1b Symptom 5 is Yes(1) OR

6. fatigue or loss of energy nearly every day.

Parent Criteria A Part 1b Symptom 6 is Yes(1) OR

Adolescent Criteria A Part 1b Symptom 6 is Yes(1) OR

7. feelings of worthlessness or excessive or inappropriate guilt

Parent Criteria A Part 1b Symptom 7 is Yes(1) OR

Adolescent Criteria A Part 1b Symptom 6 is Yes(1) OR

8. diminished ability to think or concentrate, or indecisiveness,

Parent Criteria A Part 1b Symptom 8 is Yes(1) OR

Adolescent Criteria A Part 1b Symptom 8 is Yes(1) OR

9. recurrent thoughts of death

Parent Criteria A Part 1b Symptom 9 is Yes(1) OR

Adolescent Criteria A Part 1b Symptom 9 is Yes(1) OR

Criteria A Part 2: The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Parent Criteria A Part 2 is Yes(1) OR Adolescent Criteria A Part 2 is Yes(1) OR

Major Depressive Episode -- DSM-IV criteria

CP_MDE = 1 if (Criteria A (Parts 1 and 2) and C(Part 1 OR Part 2 are met) or CIDI Irritable Major Depression, CP_MDE = 5 otherwise.

Criteria A Part 1: Symptoms have been present during the same 2 week period and at least one of the symptoms is either

(1) depressed mood or (2) loss of interest or pleasure.

Parent Criteria A Part 1 is Yes(1) OR

Adolescent Criteria A Part 1 is Yes(1).

Criteria A Part 2: At least five of the following symptoms must be present and represent a change from previous functioning:

Note: change from previous functioning is implicit in the item corresponding to each symptom (e.g. more than usual, less than usual)

1. depressed mood most of the day, nearly every day, as indicated by either subjective report(e.g., feels sad or empty) or observation made by others.

Parent Criteria A Part 2 Symptom 1 is Yes(1) OR

Adolescent Criteria A Part 2 Symptom 1 is Yes(1).

2. markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day(as indicated by either subjective account or observation made by others)

Parent Criteria A Part 2 Symptom 2 is Yes(1) OR

Adolescent Criteria A Part 2 Symptom 2 is Yes(1).

3. significant weight loss when not dieting or weight gain (e.g., a change of

more than 5% of body weight in a month), or decrease or increase in appetite nearly every day.

Parent Criteria A Part 2 Symptom 3 is Yes(1) OR
Adolescent Criteria A Part 2 Symptom 3 is Yes(1).

4. insomnia or hypersomnia nearly every day.

Parent Criteria A Part 2 Symptom 4 is Yes(1) OR
Adolescent Criteria A Part 2 Symptom 4 is Yes(1).

5. psychomotor agitation or retardation nearly every day(observable by others, not merely subjective feelings of restlessness or being slowed down).

Parent Criteria A Part 2 Symptom 5 is Yes(1) OR
Adolescent Criteria A Part 2 Symptom 5 is Yes(1).

6. fatigue or loss of energy nearly every day.

Parent Criteria A Part 2 Symptom 6 is Yes(1) OR
Adolescent Criteria A Part 2 Symptom 6 is Yes(1).

7. feelings of worthlessness or excessive or inappropriate Guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick)

Parent Criteria A Part 2 Symptom 7 is Yes(1) OR
Adolescent Criteria A Part 2 Symptom 7 is Yes(1).

8. diminished ability to think or concentrate, or indecisiveness, nearly every day(either by subjective account or as observed by others)

Parent Criteria A Part 2 Symptom 8 is Yes(1) OR
Adolescent Criteria A Part 2 Symptom 8 is Yes(1).

9. recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.

Parent Criteria A Part 2 Symptom 9 is Yes(1) OR
Adolescent Criteria A Part 2 Symptom 9 is Yes(1).

Criteria C: The symptoms cause clinically significant distress

Part 1: Parent Criteria C Part 1 is Yes(1)

Part 2: The symptoms cause impairment in social, occupational or other important areas of functioning

Parent Criteria C Part 2 is Yes(1) OR
Adolescent Criteria C Part 2.
Part 1 OR Part 2.

Dysthymia -- DSM-IV criteria CP_DYS = 1 if Criteria B and H(Part 1 OR Part 2) are met, SAQ_DYS = 5 otherwise;

Criteria A: Depressed mood for most of the day for more days than not, as indicated either by subjective account or observation by others, for at least 2 years

Criteria Not Operationalized. Criteria B: Presence, while depressed, of two (or more) of the following:

1. poor appetite or overeating
Parent Criteria B Symptom 1 is Yes(1) OR
Adolescent Criteria B Symptom 1 is Yes(1).
2. insomnia or hypersomnia
Parent Criteria B Symptom 2 is Yes(1) OR
Adolescent Criteria B Symptom 2 is Yes(1).
3. low energy or fatigue
Parent Criteria B Symptom 3 is Yes(1) OR
Adolescent Criteria B Symptom 3 is Yes(1).
4. low self esteem
Parent Criteria B Symptom 4 is Yes(1) OR
Adolescent Criteria B Symptom 4 is Yes(1).
5. poor concentration or difficulty making decisions

Parent Criteria B Symptom 5 is Yes(1) OR
Adolescent Criteria B Symptom 5 is Yes(1).
6. feelings of hopelessness
Criteria Not Operationalized

Criteria H The symptoms cause clinically significant distress

Part 1: Parent Criteria H Part 1 is Yes(1)

Part 2: The symptoms cause clinically significant impairment in social, occupational, or other important areas of functioning

Parent Criteria H Part 2 is Yes(1) OR
Adolescent Criteria H Part 2.

Attention Deficit Disorder -- DSM-IV Criteria

CP_ADD = 1 if Criteria A (Parts 1 and 2), C are met, CP_ADD = 5 otherwise.

Criteria A Part 1: Six (or more) of the following symptoms of inattention have persisted for at least 6 months to a degree that is

maladaptive and inconsistent with developmental level:

1. often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities.

Parent Criteria A Part 1 Symptom 1 is Yes(1) OR
Adolescent Criteria A Part 1 Symptom 1 is Yes(1).

2. often has difficulty sustaining attention in tasks or play activities.

Parent Criteria A Part 1 Symptom 2 is Yes(1) OR
Adolescent Criteria A Part 1 Symptom 2 is Yes(1).

3. often does not seem to listen when spoken to directly.

Parent Criteria A Part 1 Symptom 3 is Yes(1) OR
Adolescent Criteria A Part 1 Symptom 3 is Yes(1).

4. often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions).

Parent Criteria A Part 1 Symptom 4 is Yes(1) OR
Adolescent Criteria A Part 1 Symptom 4 is Yes(1).

5. often has difficulty organizing tasks and activities.

Parent Criteria A Part 1 Symptom 5 is Yes(1) OR
Adolescent Criteria A Part 1 Symptom 5 is Yes(1).

6. often avoids, dislikes, or is reluctant to engage in sustained mental effort (such as schoolwork or homework)

Parent Criteria A Part 1 Symptom 6 is Yes(1) OR
Adolescent Criteria A Part 1 Symptom 6 is Yes(1).

7. often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools).

Parent Criteria A Part 1 Symptom 7 is Yes(1) OR
Adolescent Criteria A Part 1 Symptom 7 is Yes(1).

8. is often easily distracted by extraneous stimuli.

Parent Criteria A Part 1 Symptom 8 is Yes(1) OR
Adolescent Criteria A Part 1 Symptom 8 is Yes(1).

9. is often forgetful in daily activities.

Parent Criteria A Part 1 Symptom 9 is Yes(1) OR

Adolescent Criteria A Part 1 Symptom 9 is Yes(1).

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

1. often fidgets with hands or feet or squirms in seat.

Parent Criteria A Part 2 Symptom 1 is Yes(1) OR

Adolescent Criteria A Part 2 Symptom 1 is Yes(1).

2. often leaves seat in classroom or in other situation in which remaining seated is expected.

Parent Criteria A Part 2 Symptom 2 is Yes(1) OR

Adolescent Criteria A Part 2 Symptom 2 is Yes(1).

3. often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness).

Parent Criteria A Part 2 Symptom 3 is Yes(1) OR

Adolescent Criteria A Part 2 Symptom 3 is Yes(1).

4. often has difficulty playing or engaging in leisure activities quietly.

Parent Criteria A Part 2 Symptom 4 is Yes(1) OR

Adolescent Criteria A Part 2 Symptom 4 is Yes(1).

5. is often on the go or often acts as if driven by a motor

Parent Criteria A Part 2 Symptom 5 is Yes(1) OR

Adolescent Criteria A Part 2 Symptom 5 is Yes(1).

6. often talks excessively

Parent Criteria A Part 2 Symptom 6 is Yes(1) OR

Adolescent Criteria A Part 2 Symptom 6 is Yes(1).

7. often blurts out answers before questions have been completed.

Parent Criteria A Part 2 Symptom 7 is Yes(1) OR

Adolescent Criteria A Part 2 Symptom 7 is Yes(1).

8. often has difficulty awaiting turn.

Parent Criteria A Part 2 Symptom 8 is Yes(1) OR

Adolescent Criteria A Part 2 Symptom 8 is Yes(1).

9. often interrupts or intrudes on others (e.g., butts into conversations or games)

Parent Criteria A Part 2 Symptom 9 is Yes(1) OR

Adolescent Criteria A Part 2 Symptom 9 is Yes(1).

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

Parent Criteria B OR

Adolescent Criteria B is Yes(1).

Criteria C: Some impairment from the symptoms is present in TWO OR MORE settings (e.g., at school[or work] and at home):

1. school

Parent Criteria C Part 1 is Yes(1) OR

Adolescent Criteria C Part 1 is Yes(1).

2. home

Parent Criteria C Part 2 is Yes(1) OR

Adolescent Criteria C Part 2 is Yes(1).

3. work

Parent Criteria C Part 3 is Yes(1) OR

Adolescent Criteria C Part 3 is Yes(1).

4. personal relationships or social life

Criteria Not Operationalized

Criteria D: There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.

Parent Criteria D OR Adolescent Criteria D is Yes(1).

Oppositional Defiance Disorder -- DSM-IV Criteria CP_ODD = 1 if Criteria A and B are met, CP_ODD = 5 otherwise.

Criteria A: A pattern of negativistic, hostile, and defiant behavior lasting at least 6 months, during which four (or more) of the following are present:

1. often loses temper.

Parent Criteria A Symptom 1 is Yes(1) OR

Adolescent Criteria A Symptom 1 is Yes(1).

2. often argues with adults.

Parent Criteria A Symptom 2 is Yes(1) OR

Adolescent Criteria A Symptom 2 is Yes(1).

3. often actively defies or refuses to comply with adult's requests or rules.

Parent Criteria A Symptom 3 is Yes(1) OR

Adolescent Criteria A Symptom 3 is Yes(1).

4. often deliberately annoys people.

Parent Criteria A Symptom 4 is Yes(1) OR

Adolescent Criteria A Symptom 4 is Yes(1).

5. often blames others for his or her mistakes or misbehavior.

Parent Criteria A Symptom 5 is Yes(1) OR

Adolescent Criteria A Symptom 5 is Yes(1).

6. is often touchy or easily annoyed by others.

Parent Criteria A Symptom 6 is Yes(1) OR

Adolescent Criteria A Symptom 6 is Yes(1).

7. is often angry and resentful.

Parent Criteria A Symptom 7 is Yes(1) OR

8. is often spiteful and vindictive.

Parent Criteria A Symptom 8 is Yes(1) OR

Adolescent Criteria A Symptom 8 is Yes(1).

Criteria B: The disturbance in behavior causes clinically significant impairment in social, academic or occupational functioning.

Parent Criteria B OR

Adolescent Criteria B is Yes(1).

Conduct Disorder -- DSM-IV Criteria

CP_CD = 1 if Criteria A and B are met, CP_CD = 5 otherwise.

Criteria A :

criteria:

A repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated as manifested by the presence of three(or more) of the following

1. often bullies, threatens, or intimidates others.

Parent Criteria A Symptom 1 is Yes(1) OR

Adolescent Criteria A Symptom 1 is Yes(1).

2. often initiate physical fights.

Parent Criteria A Symptom 2 is Yes(1) OR

Adolescent Criteria A Symptom 2 is Yes(1).

3. has used a weapon that can cause serious physical harm to others(e.g., a bat, brick, broken bottle, knife, gun).

Parent Criteria A Symptom 3 is Yes(1) OR
Adolescent Criteria A Symptom 3 is Yes(1).

4. has been physically cruel to people.

Parent Criteria A Symptom 4 is Yes(1) OR
Adolescent Criteria A Symptom 4 is Yes(1).

5. has been physically cruel to animals.

Parent Criteria A Symptom 5 is Yes(1) OR
Adolescent Criteria A Symptom 5 is Yes(1).

6. has stolen while confronting a victim (e.g., mugging, purse snatching, extortion, armed robbery).

Parent Criteria A Symptom 6 is Yes(1) OR
Adolescent Criteria A Symptom 6 is Yes(1).

7. has forced someone into sexual activity.

Parent Criteria A Symptom 7 is Yes(1) OR
Adolescent Criteria A Symptom 7 is Yes(1)

8. has deliberately engaged in fire setting with the intention of causing serious damage.

Parent Criteria A Symptom 8 is Yes(1) OR
Adolescent Criteria A Symptom 8 is Yes(1).

9. has deliberately destroyed other's property (other than by fire setting).

Parent Criteria A Symptom 9 is Yes(1) OR
Adolescent Criteria A Symptom 9 is Yes(1).

10. has broken into someone else's house, building, or car.

Parent Criteria A Symptom 10 is Yes(1) OR
Adolescent Criteria A Symptom 10 is Yes(1).

11. often lies to obtain goods or favors or to avoid Obligations (i.e., cons others)

Parent Criteria A Symptom 11 is Yes(1) OR
Adolescent Criteria A Symptom 11 is Yes(1).

12. has stolen items of nontrivial value without confronting a victim(e.g., shoplifting, but without breaking and entering, forgery).

Parent Criteria A Symptom 12 is Yes(1) OR
Adolescent Criteria A Symptom 12 is Yes(1).

13. often stays out at night despite parental prohibitions, beginning before age 13 years. Note: beginning before age 13 years not operationalized

Parent Criteria A Symptom 13 is Yes(1) OR

Adolescent Criteria A Symptom 13 is Yes(1).

14. has run away from home overnight at least twice while living in parental or parental surrogate home (or once without returning for a lengthy period).

Parent Criteria A Symptom 14 is Yes(1) OR

Adolescent Criteria A Symptom 14 is Yes(1).

15. is often truant from school, beginning before age 13 years.

Note: beginning before age 13 years not operationalized

Parent Criteria A Symptom 15 is Yes(1) OR

Adolescent Criteria A Symptom 15 is Yes(1).

Criteria B: The disturbance in behavior causes clinically significant impairment in social, academic, or occupational functioning.

Parent Criteria B OR Adolescent Criteria B is Yes(1).

Appendix C

List of medications given to adolescents when asked, “Which of the medicines on this list did you take for any of those problems in the past 12 months?”

DID YOU TAKE ANY OF THE FOLLOWING MEDICINES?

Running head: ADHD MEDICATION USE

Acetophenazine	Depakote	Lamotrigine
Adapin	Desipramine	Librax
Adderall	Desoxyn	Libritabs
Alprazolam	Desoxyn Gradumet	Librium
Amantadine	Desyrel	Limbitrol
Ambien	Dexedrine Dextroamphetamine	Lithium
Amitriptyline	Dextrostat	Lithium Carbonate
Amobarbital	Dihydroergotamine Mesylate	Lithium Citrate Syrup
Amoxapine	Diazepam	Lithobid
Amphetamines	Diphenhydramine	Lithonate
Amytal	Disulfiram	Lithotabs
Anafranil	Divalproex	Lorazepam
Antabuse	Doral	Loxapine
Antidepressant	Doriden	Loxitane
Antipsychotic	Doxepin	Ludiomil
Aquachloral	Droperidol	Luminal
Artane	Duralith	Luvox
Asendin	Effexor	Maprotiline
Ativan	Elavil	Marplan
Aventyl	Epitol	Mellaril
Benadryl	Equanil	Meprobamate
Benztropine	Eskalith	Mesoridazine
Bupropion	Eskalith CR-450	Methamphetamine
Buspar	Estazolam	Methotrimeprazine
Buspirone	Ethchlorvynol	Methyl-Phenidate
Carbamazepine	Etrafon	Midazolam
Carbatrol	Fluoxetine	Miltown
Catapres	Fluphenazine	Mirtazapine
Celexa	Flurazepam	Mitran
Chloral Hydrate	Fluvoxamine	Moban
Chlordiazepoxide	Gabapentin	Moclobemide
Chlorpromazine	Gen-Xene	Molindone
Citalopram	Glutethimide	Nardil
Clomipramine	Halazepam	Navane
Clonazepam	Halcion	Nefazodone Nembutal
Clonidine	Haldol	Neuramate
Clorazepate	Haldol Depot	Neurontin Norpramine
Clorazil	Haloperidol	Nortriptyline
Clorprothixene	Hydroxyzine	Obetrol
Clozapine	Imipramine	Olanzapine
Clozaril	Inapsine	Orap
Cogentin	Inderal	Oxazepam Oxybutynin
Cylert	Isocarboxazid	Pamelor
Dalmane	Janimine	Parnate
Depacon	Klonopin	Paroxetine
Depakene	Lamictal	Paxil

Paxipam	Tranxene
Pemoline	Tranlycypromine
Permitil Perphenazine	Trazodone
Phenelzine Phenergan	Triavil
Phenobarbital	Triazolam
Phenytoin	Trifluoperazine Triflupromazine
Pimozide	Trihexyphenidyl
Placidyl	Trilafon
Prazepam	Trimipramine
Prolixin	Valium
Prolixin Depot	Valproate
Propofol	Valproic Acid
Propranolol	Venlafaxine
Prosom	Versed
Protriptyline	Vesprin
Prozac	Vistaril
Quazepam	Vivactil
Quetiapine	Wellbutrin
Remeron	Xanax
Reserpine	Zaleplon
Restoril	Zoloft
Risperdal	Zolpidem
Risperidone	Zyban
Ritalin	Zyprexa
Secobarbital	
Seconal	
Serax	
Serentil	
Seroquel	
Sertraline	
Serzone	
Sinequan	
Sodium Pentobarbital	
Sodium Valproate	
Sonata	
Stelazine	
Surmontil	
Symmetrel	
Taractan	
Tegretol	
Temazepam	
Thioridazine	
Thiothixene	
Thorazine	
Tindal	
Tofranil	

WHAT PROBLEMS DID YOU TAKE THE MEDICINE FOR?**I. Mood**

- Sadness/depression/crying
- Manic mood
- Anger or irritability
- Nerves/anxiety
- Panic
- Suicidal thoughts

II. Physical symptoms

- Low energy
- Poor appetite
- Poor sleep
- Physical pain

III. Cognitive symptoms

- Poor concentration
- Poor memory

IV. Role functioning

- Fighting

V. Other

- Not getting along with others
- Poor school or work performance
- Alcohol/drug problems
- Other(specify)