RISKY BEHAVIOR AND IMPULSIVE SENSATION SEEKING
IN YOUNG ADULTS WITH ADHD AND YOUNG ADULTS
WHO REPORT ADHD SYMPTOMS

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WHO REPORT ADHD SYMPTOMS

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Abstract

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RISKY BEHAVIOR AND IMPULSIVE SENSATION SEEKING IN YOUNG ADULTS WITH ADHD AND YOUNG ADULTS WHO REPORT ADHD SYMPTOMS (108 pp.)

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Though only 1-5% of the young adult population suffers from an adult ADHD diagnosis, approximately 30% of young adults self-report significantly impairing ADHD symptoms. Little is known about how adults who experience high levels of current ADHD symptoms but do not meet diagnostic criteria for ADHD differ from adults who clearly meet diagnostic criteria for ADHD. The current investigation examined differences in risky behavior and personality characteristics among adults meeting criteria for an ADHD diagnosis, adults reporting clinically high levels of ADHD symptoms but who were never diagnosed with ADHD, and an adult control group. As hypothesized, both ADHD groups self-reported higher levels of risk-taking behavior and personality traits, risky alcohol use, and recreational drug use relative to controls. Additionally, both ADHD groups showed greater risk-taking behavior on one of two risky behavior tasks than controls. However, with the exception of one risky decision making task, the ADHD groups did not differ from one another. Results provide further evidence that young adults with ADHD are generally riskier than normal controls, but not riskier than young adults who report current ADHD symptoms but have no childhood history of the disorder. Reasons for the lack of differences between the two ADHD groups, along with clinical assessment and treatment implications of the findings, are discussed.
Approved: ________________________________________________________________

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Introduction

Approximately 3-7% of school-age children have Attention-Deficit/Hyperactivity Disorder (ADHD) (American Psychiatric Association, 2000). ADHD is a developmental disorder marked by significantly impairing symptoms of inattention, hyperactivity, and/or impulsivity, and symptoms must be present by the age of seven (American Psychiatric Association, 2000). Though early research suggested that symptoms of ADHD decline with age, recent research indicates that approximately 60% of individuals diagnosed with ADHD as children continue to show symptoms of ADHD, as well as associated problematic behavior, in adulthood (Barkley, Fischer, Smallish, & Fletcher, 2004; Elliott, 2002). Typical symptoms experienced by adults with ADHD include poor time management, inattention, forgetfulness, impulsivity, and more generally, a pattern of executive function deficits (e.g., planning) (Hervey, Epstein, & Curry, 2004; Montano, 2004). Hyperactive symptoms, on the other hand, are believed to decline as children with ADHD develop into adulthood (Kordon, Kahl, & Wahl, 2006).

In increasing numbers, adults complaining of high levels of current ADHD symptoms, who have never previously been diagnosed with ADHD, are presenting to mental health clinics for a diagnosis of ADHD (Farrell, 2003; Jachimowicz & Geiselman, 2004; Kordon et al., 2006; Weyandt, 2003). Multiple difficulties arise in diagnosing ADHD in adulthood, especially when adults referred for ADHD cannot recall the age of onset of symptoms or clearly describe a developmental course of the disorder (Mackin & Horner, 2005). The determination of childhood ADHD symptoms is particularly problematic in adults, due to the questionable sensitivity and specificity of retrospective self-report ADHD scales (Rosler et al., 2006; Suhr, Zimak, Buelow, & Fox, under
review). Diagnostic accuracy is of grave importance in adult ADHD, as it is often treated with stimulant medication, which can be used as a recreational drug or sold for personal profit (Faraone et al., 2000; Jachimowicz & Geiselman, 2004).

Problems with the contemporary diagnostic system of ADHD add to the difficulty of diagnosing ADHD in adulthood (McGough & Barkley, 2004; Pelham Jr., Fabiano, & Massetti, 2005; Reilley, 2005; Riccio et al., 2005; Wasserstein, 2005). Research suggests that the core symptoms of ADHD manifest differently in adulthood, yet the current DSM-IV-TR criteria are based on samples of children between the ages of 4-17 (Wasserstein, 2005). Additionally, the current DSM-IV-TR criteria implicate a categorical approach to diagnosis, despite a large body of evidence suggesting that some ADHD symptoms are in fact dimensional and are present in everyone to some degree (Barkley & Murphy, 1998; Kordon et al., 2006). Of note, while approximately 1-5% of adults have ADHD (Dupaul et al., 2001), as many as 30% of young adults report high levels of current ADHD symptoms, most often inattention, despite never receiving an ADHD diagnosis (Harrison, 2004).

For assessment purposes, it is important to know how these adults with high current levels of ADHD symptoms, but without a developmental history of the disorder, differ from adults with an ADHD diagnosis, yet few studies have explored relevant personality or behavioral differences. The current study explored risk-taking behavior and the risky personality trait of impulsive sensation seeking in young adults who met diagnostic criteria for ADHD, young adults who reported high levels of current ADHD symptoms but did not meet diagnostic criteria for ADHD, and a control group who did not report ADHD symptoms and was never diagnosed with ADHD.
Previous research suggests that adults with ADHD may be at particularly high risk for engagement in risk-taking behavior (e.g., Biederman et al., 2006), defined as the way people act in situations involving the possibility of loss (Yates, 1992), and may show higher rates of risky personality traits (e.g., Garland, 1999, unpublished). According to Weber et al. (2002), risk-taking activities include games of choice/gambling, financial investing, business decisions, health/safety decisions (e.g., smoking), recreation decisions (e.g., sky diving versus bowling), social decisions (e.g., confronting family members), and ethical decisions (e.g., cheating on a test). Risky personality traits measure underlying psychobiological constructs that robustly predict various forms of risk-taking behavior (Zuckerman, 2007), and include traits such as sensation seeking, commonly defined “by the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experience” (Zuckerman, 1994, p. 27). Other risky personality traits, including novelty seeking and impulsivity, correlate moderately to highly with sensation seeking, but are frequently referred to in the literature as separate terms. Zuckerman et al. (1993) found factor analytic evidence for a combined personality factor, and labeled this trait impulsive-sensation seeking in his Alternative Big Five Personality Model. Research suggests that personality inventories, behavioral questionnaires, and behavioral tasks should be used together, because personality inventories assess desire or intention rather than actual behavioral experience (Zuckerman, 2007) and some studies find that behavioral tasks and self-report measures of risk-taking show little to no correlation (Reynolds, Ortengren, Richards, & de Wit, 2006). The current study employed self-report personality and behavioral questionnaires,
as well as behavioral tasks, to comprehensively investigate risk-taking.

Both longitudinal and retrospective studies indicate high rates of risky behavior and personality traits in adults with ADHD. Adults with ADHD report higher rates of substance use/abuse (Biederman et al., 2006; Molina & Pelham, 2003; Weiss & Hechtman, 1993), smoking (Molina & Pelham, 2003; Pomerleau, Downey, Stelson, & Pomerleau, 1995), reckless driving (Barkley, Murphy, O’Connell, Anderson, & Connor, 2006; Barkley, Guevremont, Anastopoulos, Dupaul, & Shelton, 1993; Barkley, Murphy, Dupaul, & Bush, 2002; Barkley, Murphy, & Kwasnik, 1996), felony convictions and arrests (Gunter, Arndt, Riggins-Caspers, Wenman, & Cadoret, 2006), and sexual activity at an early age (Barkley, Fischer, Smallish, & Fletcher, 2004), relative to adults without a history of the disorder. Additionally, adults with ADHD report higher levels of risky personality traits, such as novelty seeking and sensation seeking, when compared to national norms and control groups (Downey, Stelson, Pomerleau, & Giordani, 1997; Garland, 1999; Pomerleau et al., 1995). Notably, risk-taking remains significantly related to adult ADHD, even after controlling for comorbid substance use disorders (Babinski, Hartsough, & Lambert, 1999; Satterfield, Swanson, Schell, & Lee, 1994) and childhood conduct disorder (Gunter et al., 2006; Satterfield, et al., 1994). Despite research suggesting greater frequency of risk-taking behavior in adults with an ADHD diagnosis and adults with current ADHD symptoms, studies often focus on low-base rate events (e.g., drunk driving and arrest), do not determine the severity of risk, and typically do not include both self-report and behavioral measures of risk-taking. Relevant studies also frequently diagnose ADHD based on self-report checklists, without corroborating parental report.
Similar risk-taking findings have been described in retrospective studies of adults reporting ADHD symptoms in adulthood, but who do not meet diagnostic criteria for ADHD in childhood. These adults, who represent as much as 30% of the adult population, report relatively high rates of substance use/abuse (Leland & Paulus, 2005; Petry, 2001), risky sexual behavior (Martins, Tavares, da Silva Lobo, Galetti, & Gentil, 2004), illegal activities (Martins et al., 2004), and gambling (Petry, 2001). There are significant limitations to this body of research in its applicability to young adult, college student populations. With the exception of a few studies (e.g., Dinn, Aycicegi, & Harris, 2004), risk-taking has been explored exclusively in relation to symptoms of impulsivity, rather than inattention, a more common complaint in adults with high levels of ADHD symptoms. Most studies also investigate impulsivity in drug users, cigarette smokers, or pathological gamblers, who may report greater symptomatology relative to college students. Finally, few studies account for the fact that adults reporting high levels of current ADHD symptoms, without a developmental course of the disorder, may represent a heterogeneous group; significant ADHD symptomatology may arise from difficulties encountering greater academic and personal responsibilities (Heiligenstein & Keeling, 1995), malingering to seek personal gain, such as extended time on tests or attainment of the prescription drug Ritalin (Booksh, 2005; Sullivan, May, & Galbally, 2007), or other underlying psychopathology that mimics ADHD symptoms.

Due to the increasing popularity of an ADHD diagnosis in adulthood, differentiating between individuals suffering from the underlying neurological disorder of ADHD and those reporting ADHD symptoms only in adulthood is paramount for the appropriate rendering of clinical services. Despite the clinical assessment implications,
most existing work has compared adults with ADHD symptoms, but without a history of the disorder, and adults with a documented history of an ADHD diagnosis, to controls, but not to each other. Roy-Byrne and colleagues (1997) investigated a clinically-referred sample of one hundred forty-three adults, using a structured psychiatric interview provided by Dr. Joseph Biederman to assess for ADHD and its associated symptoms. Based on DSM-IV criteria and information from the structured interview, participants were divided into three groups: (1) an ADHD diagnosis group, or those who clearly met ADHD criteria; (2) a probable ADHD group, or those who reported significant inattentiveness or hyperactivity/impulsivity consistent with ADHD, but lacked an important element of the diagnostic criteria; and, (3) a normal control group, or those who definitely did not have ADHD. The probable ADHD group had a significantly higher rate of current, but not lifetime, substance abuse/dependence than the ADHD diagnosis and normal control groups, though no other substance use differences were noted between ADHD groups. Additionally, both ADHD groups had higher alcohol intake over the past week than the normal control group. Of note, the probable ADHD group in this study was quite heterogeneous; it consisted of adults with no evidence of a childhood history of ADHD and adults with a severe concurrent psychiatric disorder (e.g., bipolar disorder or mental retardation).

Two recent studies indicate that adults with a diagnosable history of ADHD and adults with current symptomatic complaints, but no history of the disorder in childhood, demonstrate significant risk-taking behavior relative to normal controls, but may not differ from one another (Faraone, Biederman, Spencer, et al., 2006a; Faraone et al., 2007). These studies utilized the same sample, and diagnosis of ADHD was determined
by self-report only. No differences were found between the two ADHD groups on previous arrest history, driving tickets, driving accidents, alcohol abuse/dependence, drug abuse/dependence, cigarette use, and recreational drug use. Nonetheless, both groups were more likely to report ever having a problem with cigarette, alcohol, and marijuana use, and reported more driving tickets and accidents, when compared to a group reporting no history of ADHD in childhood or adulthood (Faraone et al., 2006a; Faraone et al., 2007). Treatment-seeking and non-treatment seeking participants were included in these studies; differences between these two populations were not described, and thus results may have limited external validity to non-treatment seeking, college student samples. In addition, there may be a potential for greater report bias (e.g., overreporting symptoms) among treatment seekers relative to non-treatment seekers. In sum, some evidence is beginning to emerge that clinically-referred ADHD groups may differ greatly from normal controls in self-reported risk-taking behavior, but not from each other.

Although most studies do not suggest self-reported risk-taking differences between ADHD groups, some recent investigations have suggested possible neuropsychological differences between adults attending outpatient clinics with subjective symptomatic complaints of ADHD, but with no history of childhood ADHD, and those who were diagnosed with ADHD in childhood and continued to meet diagnostic criteria (Jenkins et al., 1998; Walker, Shores, Troller, Lee, & Sachdev, 2000). Walker and colleagues (2000) found no significant differences (though did note a trend for worse performance on all measures among the diagnosed ADHD group), while Jenkins et al. (1998) reported greater impairments on measures of attention and executive functioning among the diagnosed ADHD group relative to the non-diagnosed ADHD
Findings of the Jenkins et al. (1998) study are limited by reliance on self-report to determine whether patients had ADHD symptoms in childhood. A more recent study by Faraone, Biederman, Doyle, et al. (2006b), described in more detail above, found no differences between well-diagnosed ADHD groups across a variety of executive functioning and attention measures, yet both ADHD groups were impaired relative to a non-ADHD group. In sum, the current literature comparing clinical samples of ADHD groups on neuropsychological measures is largely inconclusive.

The aim of the present study was to investigate risky behavior and personality traits, using both self-report and neuropsychological measures, in a well-diagnosed non-clinical sample of young adults diagnosed with ADHD, and showing a developmental progression of the disorder, young adults reporting current ADHD symptoms, without a developmental history of the disorder, and young adults not reporting high levels of current or childhood ADHD symptoms. It was hypothesized that adults with an ADHD diagnosis, and adults who report current ADHD symptoms but do not report childhood symptoms, would score higher than adults lacking significant childhood and current symptoms on the self-report risky behavior and personality scales. It was also hypothesized that, relative to controls, adults with an ADHD diagnosis and adults with current ADHD symptoms, but lacking significant symptomatology in childhood, would display riskier decision making on the behavioral measures. To the best of our knowledge, this is the first study exploring risky behavior and personality traits in a non-clinical sample of adults with diagnosed ADHD, adults with current ADHD symptoms but without childhood symptoms, and adults without childhood and current symptomatology.
Method

Participants

Participants were seventy-eight (46 female and 32 male) college undergraduates at a Midwestern university enrolled in introductory-level psychology courses. All participants fell in the age range of 18 to 22 ($M = 19.2$, $SD = 1.11$). The majority of the college sample consisted of underclassmen (47 freshman and 15 sophomores). Most of the sample was Caucasian ($n = 71$), but 1 person identified as Asian/Pacific Islander, 2 as African-American, 2 as Hispanic, and 2 as “other”. General intellect, as measured by the Matrix Reasoning subtest of the WASI, was in the average range ($M = 54.27$, $SD = 5.74$).

Participants were selected from a large sample ($N = 1773$) of undergraduates who had completed several screening measures (described below). Participants for all groups only included individuals who: 1) reported no history of a head injury resulting in a loss of consciousness of greater than 30 minutes and indicated an absence of a learning disability or psychotic disorder, 2) met all the eligibility requirements for the groups of interest for the study, 3) gave informed consent for participation in a future study, 4) provided parental contact information, and 5) scored less than 8 on an inconsistency measure of an adult ADHD symptomatology questionnaire, indicating consistent responding to questions.

Further inclusion/exclusion criteria were specific to each group. The first group, labeled the ADHD diagnosis group (ADHD dx), included young adults who self-reported a childhood diagnosis of ADHD and who met current symptomatic criteria for adult ADHD. More specifically, for inclusion in the ADHD dx group, participants demonstrated: (1) a $t$-score of at least 60 on one or more of the DSM-IV Hyperactive-
Impulsive Symptoms, Inattentive Symptoms, and/or ADHD Symptoms Total subscales of the Conners’ Adult ADHD Rating Scale—Self-Report: Long Version (CAARS—S:L) form; (2) a t-score of at least 57 on the CAARS—Observer: Screening Version (CAARS—O:SV) form on at least one of the DSM-IV Hyperactive-Impulsive Symptoms, Inattentive Symptoms, and/or ADHD Symptoms Total subscales; and, (3) self- or parent-report of an ADHD diagnosis in childhood. Of note, participants reporting a diagnosis of ADHD were initially excluded if they reported currently taking stimulant medication to treat ADHD symptoms. Later IRB approval allowed researchers to ask these participants to refrain from taking medication to treat their ADHD symptoms for 12 hours prior to the study and, thus, previously excluded participants were invited to participate. The ADHD dx group included 23 participants (15 male, 8 female).

The second group, called the ADHD symptom group (ADHD sx), included young adults who had never received a diagnosis of ADHD, but who currently endorsed significant ADHD symptomatology. Participants in the ADHD sx group demonstrated: (1) a t-score of at least 65 on one or more of the DSM-IV Hyperactive-Impulsive Symptoms, Inattentive Symptoms, and/or ADHD Symptoms Total subscales of the CAARS-S:L form; (2) t-scores less than 60 on all of the DSM-IV Hyperactive-Impulsive Symptoms, Inattentive Symptoms, and ADHD Symptoms Total subscales of the CAARS-O:SV form; (3) no self- or parent-reported history of an ADHD diagnosis; and (4) and, a score less than 46 on the 25-item Wender Utah Rating Scale (WURS), indicating no retrospective recall of significant ADHD symptomatology in childhood. The ADHD sx group included 24 participants (11 male, 13 female).
The third group, labeled the normal control group (NC), included a sample of young adults who denied a past ADHD diagnosis and current/past ADHD symptomatology. The NC group participants demonstrated: (1) t-scores of 55 or less on all Self- and Observer- CAARS DSM-IV subscales; (2) no self- or parent-reported history of an ADHD diagnosis; and, (3) a score less than 46 on the WURS. The NC group included 31 participants (19 male, 12 female).

Procedure

The current study was composed of two parts. In part one, participants engaged in a group screening session, where they were asked to complete a battery of self-report questionnaires, only some of which were applicable to the current investigation. Responses to certain questionnaires (the CAARS, WURS, Demographics Questionnaire, and Personal Health History Questionnaire, which are all described in detail below) were used to determine eligibility to participate in a second individual testing session. Participants were also asked to complete a Participant Number Calculation Form so each subject could only be identified by a unique number (see Appendix B3). Participation in part one took approximately 30-40 minutes, for which participants received psychology course credit.

In part two, participants completed self-report questionnaires, the Participant Number Calculation Form, as well as a battery of neuropsychological tests. As several measures in the battery required interference or delays, the neuropsychological battery was administered in a fixed order. The battery included a formal test of effort (The Word Memory Test); because none of the participants’ performances suggested poor effort (according to Green, Allen, & Astner, 1996), no participants were excluded from the final
analysis due to poor performance on the Word Memory Test. Only tests measuring risk-taking behavior, general intellect, and malingering were included in the current analysis and are described in more detail below. Participation took approximately 2 hours, though the measures of interest in the current study only took 40 minutes. Participants were compensated with psychology course credit or monetary compensation of $20 if they no longer needed credit upon completion of the session.

To corroborate participants’ self-report, parents or guardians of participants who met eligibility criteria and provided permission to contact their parents or guardians were mailed a packet with a brief questionnaire, the CAARS-O:SV, and a note explaining the study and the value of their participation. The brief questionnaire asked when any ADHD symptoms first appeared in their child and whether or not their child was ever diagnosed with ADHD, oppositional defiant disorder, or conduct disorder. The CAARS-O:SV was used to corroborate self-reported information from the participants regarding their adult ADHD symptoms. The note included information on the parents’ participation, the student's participation, and confidentiality. Two dollars and a postage-paid envelope were also enclosed in the parent mailing to increase response rates.

Part One Measures

While additional measures were administered as part of a larger study, only the measures of interest to the proposed study are discussed below (additional psychometric information on measures are provided in Appendix B1).

*Personal Health History Questionnaire.* A personal health history questionnaire inquired about a diagnosis of ADHD, including the specific subtype of ADHD diagnosed (See Appendix B4). Further, it asked about any treatment (including medication) for
ADHD symptoms and the level of functional impairment resulting from the ADHD symptoms. It also inquired about the following: drug or alcohol difficulties, diagnosis and treatment for a psychological condition, diagnosis of a learning disability, and history of a head injury that resulted in loss of consciousness for more than 30 minutes.

**Demographic Questionnaire.** A demographic questionnaire asked participants their date of birth, age, sex, year in college, race/ethnicity, high school GPA, and current college GPA (see Appendix B5). The demographic questionnaire also asked participants to provide the address of their parents or guardians in order to attain additional information.

**Adult ADHD Symptom Checklist.** The CAARS-S:L and the CAARS-O:SV assess the core symptoms of ADHD and related problem behaviors (Conners, Erhardt, & Sparrow, 1999). The CAARS-S:L contains 66 items and eight subscales which measure inattention, hyperactivity, impulsivity, and poor self-concept. Additionally, the CAARS-S:L includes an inconsistency index, which was used to exclude participants who did not demonstrate consistent response patterns. The CAARS-O:SV contains 30 items and includes the DSM-IV ADHD symptom measures and the ADHD index, a quick screen of ADHD symptoms. Higher t-scores on both CAARS forms indicate higher levels of ADHD symptomatology. Both the CAARS-S:L and CAARS-O:SV have demonstrated good reliability and validity properties (Conners et al., 1999; Erhardt, Epstein, Conners, Parker, & Sitarenios, 1999). For the present study, participants were asked to complete the CAARS-S:L as if they were not currently on medication to treat ADHD symptoms (if applicable). As noted above, the CAARS-O:SV was part of the parent mailing. Parents
were asked to complete the CAARS-O:SV as if their child was not currently on medication to treat ADHD symptoms (if applicable).

*Childhood ADHD Symptoms Scale.* The WURS (Ward et al., 1993) is a self-report retrospective assessment of the childhood occurrence of ADHD symptoms (see Appendix B6). The original scale consisted of 61 items; from this original scale, Ward et al. (1993) selected 25 items that showed the greatest mean difference between patients with diagnosed ADHD and a non-psychiatric control group. The WURS demonstrates good test-retest reliability (Wierzbicki, 2005) and has shown good convergent validity with an adult measure of ADHD symptoms (Weyandt, Linterman, & Rice, 1995). As suggested by Ward, Wender, and Reimherr (1993), non-ADHD dx participants were excluded from part two if their WURS score exceeded 45.

*Risky Behavior Scale.* The Risk-Behavior Scale of the Domain Specific Risk-Attitude Scale (DOSPVRT; Weber, Blais, & Betz, 2002) assesses self-reported risk-taking behavior across financial, health/safety, recreational, ethical, and social domains (see Appendix B7). The Risk-Behavior Scale consists of 40 Likert-scale items, for which eight questions are included from each risk-taking domain. Based on factor analyses, the Financial subscale was further divided into two 4-item Gambling and Investment subscales (Weber et al., 2002). High scores on the DOSPERT indicate high levels of risk-taking behavior. The Risk-Behavior Scale demonstrates adequate internal reliability and construct validity (Weber et al., 2002).

For the present study, three additional items were included at the end of the 40-item Risk-Behavior Scale. These items asked whether participants had ever used cigarettes, alcohol, or recreational drugs and, if applicable, when they first began the
behavior. The additional items were included because risky substance use behaviors are often evidenced in young adults, particularly with ADHD, but are not explicitly assessed on the Risk-Behavior Scale.

**Impulsive Sensation Seeking Measure.** The Impulsive Sensation Seeking (ImpSS) subscale of the Zuckerman Kuhlman Personality Questionnaire-III, Revised (ZKPQ-III-R; Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993; Joireman & Kuhlman, 2005) is a 19-item subscale that assesses a need for novel experiences, a preference for uncertainty or risk in social relationships and environments, and a propensity to act on impulse with little concern for the consequences (see appendix B8). The ImpSS subscale is part of a 99-item true/false personality questionnaire which measures four additional basic dimensions of personality including aggression-hostility, activity, neuroticism-anxiety, and sociability. In the proposed study, the 19-items of the ImpSS subscale of the ZKPQ-III-R were summed to create a total score of impulsive sensation seeking; higher scores signified higher levels of the impulsive sensation seeking personality dimension. The ZKPQ-III-R has shown substantial evidence for reliability and validity in college samples (Zuckerman et al., 1993; Zuckerman & Kuhlman, 2000). Of note, Zuckerman and Kuhlman (2000) found that scores on the ImpSS predict higher levels of self-reported drinking, smoking, drug use, and sexual risk-taking.

**Alcohol Use Questionnaire.** The Alcohol Use Disorders Identification Test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) is a 10-item scale that measures alcohol intake, alcohol dependence, and adverse consequences from alcohol consumption (Reiss, Reinert, & Allen, 2002) (see appendix B9). A review of recent research on the AUDIT indicated that the measure has good internal consistency and
reliability (Reinert & Allen, 2002). The AUDIT has also demonstrated acceptable construct validity in college student samples (Kokotailo et al., 2004). As is most common in the literature (Shields, Guttmannova, & Caruso, 2004), a single composite score of alcohol use was used in the current study, with higher scores indicating more problematic alcohol use.

Depression Measure. The Beck Depression Inventory-Second Edition (BDI-II; Beck, Steer, & Brown, 1996) assesses the presence of current depressive symptomatology. The BDI-II is a self-report measure consisting of 21 items; it asks participants to select one of four statements which best characterize their mood and behavior over the past two weeks. The BDI-II was administered during part one and re-administered at part two of the study. Both scores were used to assess whether self-reported depression had utility as a covariate in predicting risk-taking. Higher scores on the BDI-II suggest elevated levels of current depressive symptomatology. In previous research, the BDI-II has demonstrated high internal consistency and acceptable construct and discriminant validity (Beck et al., 1996).

Consent for Future Contact. The Consent for Future Contact form asked participants to confirm whether they would be willing to be contacted for a future study (see Appendix B10). Participants who were willing to participate in a future study were asked to provide contact information and sign and date the consent form. Participants who met all eligibility criteria and gave consent for future contact were invited to participate in part two of the study.
Part Two Measures

Laboratory Session Questionnaire. A brief questionnaire that asked about caffeine, alcohol, and prescription/non-prescription medication usage over the past 24 hours was administered prior to the administration of the neuropsychological battery (see Appendix B14).

Intelligence Estimate. The Matrix Reasoning (MR) subtest of the Wechsler Abbreviated Scale of Intelligence (WASI; The Psychological Corporation, 1999) is believed to measure fluid intelligence or adaptive brain functioning (Ryan et al., 2005). In this intelligence task, participants look at a matrix containing one missing item and decide which of five possible response options best represent the missing item. In the current study, the MR subtest of the WASI was used as a measure of general aptitude, with higher scores indicating higher intellect. The MR subtest was normed on an adult sample and has demonstrated good internal reliability, test-retest reliability, and construct validity (The Psychological Corporation, 1999).

Test of Effort. The Word Memory Test (WMT; Green, 2003) is a computerized measure of verbal memory, commonly used to assess effort. Participants are asked to read and memorize a sequence of 20 word pairs. Participants are then tested on immediate recognition of correct words and recognition of correct words and word pairs after a 30-minute delay. There is good psychometric data on the WMT with a variety of populations, including neurological patients, psychiatric patients, and children with ADHD (Green, 2003).

Risky Behavior Task. The Behavior Analogue Risk Task (BART; Lejuez et al., 2002) is a computerized behavioral measure of risk-taking. In this task, the computer
monitor displays a small balloon, a button to pump the balloon, a button to collect money, an indicator of money earned on the current balloon, and an indicator of total money earned. Participants are instructed that each pump of the balloon increases money earned for individual trials by five cents. Participants are also told that the balloon can pop at anytime; if the balloon pops before the participants collect the money on each individual trial, participants do not receive any money for that balloon. The likelihood that the first balloon will explode starts at 1/128 for the first pump of each trial; each balloon is sampled without replacement, meaning that the probability of an explosion increases after each pump of the balloon. All trials are independent of each other. Participants complete a total of 30 trials. Participants are asked to try their best to maximize the amount of play money earned.

The average number of pumps across all unexploded balloons (average adjusted number of pumps) is typically thought of as the most useful performance measure (Skeel, Neudecker, Pilarski, & Pytlak, 2007) and was used to assess risk-taking in the current analysis. High average adjusted pumps scores indicated higher levels of risk-taking behavior. The BART has demonstrated good test-retest reliability and adequate convergent and discriminant validity in previous research (Lejuez et al., 2002; Wallsten, Plescak, & Lejuez, 2005).

*Risky Decision Making Task.* The Iowa Gambling Task (IGT; Bechara et al., 2001) is a computerized, behavioral task of risky behavior and decision making. In this task, participants are presented with four cards labeled ‘A’, ‘B’, ‘C’, and ‘D’ on the computer screen. Participants choose a card from one of the decks. After choosing a card, a message is displayed on the screen either indicating that participants lost or gained
money for that trial. Participants receive a $2000 credit of play money at the beginning of the game. There are 60 cards in each deck. If participants select all 60 cards from any one of the decks, they are instructed to choose from a different deck. All participants are instructed to try their hardest to maximize the amount of play money they earn. Each participant completes 100 trials.

Two of the decks in the IGT are disadvantaged, set so penalties outweigh rewards, while the other two are advantageous, programmed for gains to outweigh penalties. Following the guidelines set forth by Brand, Recknor, Grabenhorst, and Bechara (2007), each participants’ scores were calculated by utilizing the following formula: the net score of cards selected from (‘C’ and ‘D’) minus the net score of cards selected from (‘A’ and ‘B’) in the fifth, and final, quintile of the task. Lower scores on the IGT represent more risky decision-making than higher scores. Overall, there is good convergent and discriminant validity for the IGT (Bechara et al., 2001).

Results

Preliminary Statistical Analyses and Descriptive Statistics

Prior to the multivariate analyses, the variables of age, general intellect, college GPA, gender, and race were tested for their utility as covariates. Tests for violations of normality and homogeneity of variance were also run, where appropriate, and are reported when significant.

Using univariate ANOVAs, age, $F(2, 75) = .35, p > .05$, and general intellect, $F(2, 75) = 1.31, p > .05$, did not differ among groups. Groups did not differ in gender, $\chi^2(2, N = 78) = 2.08, p > .05$, or college GPA, $\chi^2(4, N = 73) = 4.44, p > .05$. Additionally, the three groups did not differ in race, $\chi^2(8, N = 78) = 9.56, p > .05$, even when race was
recoded to compare Caucasians to all other races, $\chi^2(2, N = 78) = 3.22, p > .05$. Even though groups were not different in gender, further exploration for gender differences in risk-taking variables that previous literature has identified as having gender differences were conducted (see Appendix C); no gender differences were found.

Groups were also compared on current depressive symptomatology and current psychological diagnoses. Groups were significantly different on current depressive symptomatology, as measured by the BDI-II, at time 1, $F(2, 75) = 7.64, p < .01$, but not at time 2, $F(2, 75) = 1.43, p > .05$. Bonferroni-corrected posttests revealed that the ADHD sx group reported higher current depressive symptomatology (time 1) than the NC group ($p < .01$) and that the ADHD dx group’s BDI-II scores were marginally higher than the NC group ($p < .10$), yet the two ADHD groups’ scores did not differ from each other. The BDI-II was further tested for its utility as a covariate by correlating it with the risky behavior and personality self-report measures. The BDI-II correlated with the ImpSS subscale of the ZKPQ-III-R, $r(76) = .31, p < .01$, and marginally with the Risk-Behavior Scale of the DOSPERT, $r(76) = .19, p < .10$. The BDI-II (time 1) was run as a covariate in the self-report risk-taking analyses (see below). Groups were not significantly different on current psychological diagnosis, $\chi^2(2, N = 78) = 2.92, p > .05$. In fact, less than 10% ($n = 7$) of the participants in the entire sample indicated a current psychological diagnosis. See Table 1 for demographic means and standard deviations.

To confirm group membership, groups were also tested to see whether they differed in self-reported child retrospective or current ADHD symptomatology, as well as parent-reported current ADHD symptomatology. These findings confirm expected differences between groups based on the group criteria described above and are reported
Table 1

*Self-Reported Demographics of ADHD dx, ADHD sx, and NC groups*

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADHD dx (n = 23)</th>
<th>ADHD sx (n = 24)</th>
<th>NC (n = 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>35%</td>
<td>54%</td>
<td>39%</td>
</tr>
<tr>
<td>Male</td>
<td>65%</td>
<td>46%</td>
<td>61%</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>0%</td>
<td>0%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Asian</td>
<td>0%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>96%</td>
<td>96%</td>
<td>84%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0%</td>
<td>0%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>College GPA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above 3.0</td>
<td>59%</td>
<td>46%</td>
<td>74%</td>
</tr>
<tr>
<td>2.51-3.0</td>
<td>32%</td>
<td>42%</td>
<td>22%</td>
</tr>
<tr>
<td>Less than 2.50</td>
<td>9%</td>
<td>12%</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td><em>M (SD)</em></td>
<td><em>M (SD)</em></td>
<td><em>M (SD)</em></td>
</tr>
<tr>
<td>Age</td>
<td>19.13 (0.76)</td>
<td>19.38 (1.49)</td>
<td>19.16 (1.10)</td>
</tr>
<tr>
<td>MR</td>
<td>54.91 (5.59)</td>
<td>52.75 (5.94)</td>
<td>55.06 (5.57)</td>
</tr>
</tbody>
</table>
Table 1 (cont.)

<table>
<thead>
<tr>
<th></th>
<th>ADHD dx</th>
<th>ADHD sx</th>
<th>NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDI-II (Time 1)**</td>
<td>8.30 (5.99)</td>
<td>10.67 (6.11)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.90 (4.54)</td>
</tr>
<tr>
<td>BDI-II (Time 2)</td>
<td>7.09 (5.77)</td>
<td>7.97 (7.00)</td>
<td>5.30 (5.04)</td>
</tr>
</tbody>
</table>

Note. ADHD dx = ADHD Diagnosis Group; ADHD sx = ADHD Symptom Group; NC = Normal Control Group; $M$ = mean; $SD$ = Standard Deviation; MR = Matrix Reasoning of the Wechsler Abbreviated Scale of Intelligence; BDI-II = Beck Depression Inventory-Second Edition

** $p < .01$ on ANOVA

<sup>b</sup> ADHD sx > NC on post-hoc tests at $p < .01$

in Appendix C. See Table 2 for means and standard deviations of child and adult report of ADHD symptoms.

The ADHD dx group reported receiving an ADHD diagnosis between the ages of 3 to 19 years of age ($M = 13.09$, $SD = 5.23$). Only 11 of the 23 ADHD dx participants reported a diagnostic subtype; there were 9 Inattentive, 1 Hyperactive/Impulsive, and 1 Combined. A majority ($n = 13$) reported taking current medication to treat ADHD symptoms (e.g., Ritalin, Adderall). 87% ($n = 20$) of the ADHD dx participants reported that their ADHD symptoms negatively impacted the quality of their academic work, and 61% ($n = 14$) endorsed “significant” negative effects of ADHD in social, occupational, or academic domains. According to parent-report, 9% of the ADHD sample was diagnosed
Table 2

*Child and Adult Report of ADHD Symptoms*

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADHD dx (n = 23)</th>
<th>ADHD sx (n = 24)</th>
<th>NC (n = 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>WURS**</td>
<td>38.22 (17.85)a</td>
<td>22.00 (11.52)b</td>
<td>14.29 (9.21)</td>
</tr>
<tr>
<td>CAARS-S:L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E**</td>
<td>72.74 (9.61)a</td>
<td>67.88 (9.31)b</td>
<td>44.26 (5.13)</td>
</tr>
<tr>
<td>F**</td>
<td>62.52 (13.93)a</td>
<td>63.04 (8.12)b</td>
<td>43.48 (6.86)</td>
</tr>
<tr>
<td>G**</td>
<td>70.83 (11.17)a</td>
<td>68.71 (5.47)b</td>
<td>43.42 (6.10)</td>
</tr>
<tr>
<td>CAARS-O:SV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A**</td>
<td>67.52 (7.38)a,c</td>
<td>45.88 (6.07)</td>
<td>42.61 (5.58)</td>
</tr>
<tr>
<td>B**</td>
<td>56.09 (12.01)a,c</td>
<td>43.13 (6.37)</td>
<td>40.03 (4.56)</td>
</tr>
<tr>
<td>C**</td>
<td>63.65 (7.79)a,c</td>
<td>44.17 (6.68)</td>
<td>40.55 (5.48)</td>
</tr>
</tbody>
</table>

*Note.* ADHD dx = ADHD Diagnosis Group; ADHD sx = ADHD Symptom Group; NC = Normal Control Group; $M$ = mean; $SD$ = Standard Deviation; WURS = Wender Utah Rating Scale; CAARS-S:L = Conners’ Adult ADHD Rating Scale: Self-Report-Long Form; E = CAARS-S:L Inattentive Symptoms; F = CAARS-S:L Hyperactive/Impulsive Symptoms; G = CAARS-S:L Combined Symptoms; CAARS-O:SV = Conners’ Adult ADHD Rating Scale: Observer-Short Version; A = CAARS-O:SV Inattentive Symptoms;
Table 2 (cont.)

B = CAARS-O:SV Hyperactive/Impulsive Symptoms; C = CAARS-O:SV Combined Symptoms

** $p < .01$ on ANOVA

a ADHD dx > NC on post-hoc tests at $p < .01$

b ADHD sx > NC on post-hoc tests at $p < .01$

c ADHD dx > ADHD sx on post-hoc tests at $p < .01$

with comorbid oppositional defiant disorder and 4% was diagnosed with conduct disorder (none of the participants were diagnosed concurrently with both disorders). In order to increase the final sample size, two participants in the ADHD dx group who self-reported comorbid reading disorders were included in the current analysis.

Hypotheses Testing

Multivariate ANOVAs and planned contrasts were used to test the first hypothesis, that ADHD dx and ADHD sx adults would score higher than NC adults on the self-report risky behavior and personality scales. Before conducting multivariate analyses, statistical tests were utilized to assess whether the assumptions for employing multivariate ANOVAs were met. With $F(6, 96912.66) = 1.201, p > .05$, the multivariate homogeneity of covariance assumption held. Additionally, the Shapiro-Wilk test, a powerful test for detecting departures from normality (Stevens, 2002), indicated that the group distributions for each variable were normally distributed (all $p > .05$), with the exception of the ADHD sx group on the impulsive-sensation seeking variable ($p < .01$).
When only one variable deviates from normality in one group, transformations are not necessary due to small, insignificant effects on power (Stevens, 2002).

As expected, the groups differed on the dependent variables of risky behavior and impulsive-sensation seeking, with a Wilks’ Lambda statistic of .766, $F(4, 148) = 5.28, p < .01$. Follow-up univariate ANOVAs indicated that the three groups differed in both self-reported risky behavior, $F(2, 75) = 7.32, p < .01$, and self-reported impulsive-sensation seeking, $F(2, 75) = 10.50, p < .01$. Moreover, self-reported risky behavior accounted for 16.3% of the variability between the three groups, while self-reported impulsive-sensation seeking accounted for 21.9% of the variability, indicating small to medium effect sizes (Cohen, 1988). Simple contrasts indicated that, as expected, both ADHD dx and ADHD sx participants reported higher levels of risky behavior (both $p < .01$) and impulsive-sensation seeking (both $p < .01$) than normal controls. Exploring differences between the two ADHD groups, Bonferroni-corrected posttests did not reveal any differences between ADHD dx and ADHD sx groups on either self-report measure ($p > .05$). Of note, the MANOVA was re-run using the BDI-II score (time 1) as a covariate. With a Wilks’ Lambda of .973, $F(2, 73) = 1.01, p > .05$, the BDI-II score was not a significant covariate, and the significant difference between diagnostic groups remained, with a Wilks’ Lambda of .822, $F(4, 146) = 3.75, p < .01$. See Table 3 for means and standard deviations of self-report risk-taking measures.

The second hypothesis, that ADHD dx and ADHD sx adults would display riskier decision making relative to NC adults on the behavioral measures, the Behavior Analogue Risk Task (BART) and the Iowa Gambling Task (IGT), was tested with MANOVAs and planned contrasts. Box’s homogeneity of covariance test indicated that
Table 3

*Risky Behavior and Personality Self-Report Questionnaires*

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADHD dx (n = 23)</th>
<th>ADHD sx (n = 24)</th>
<th>NC (n = 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>DOSPERT**</td>
<td>115.13 (23.77)</td>
<td>119.38 (21.67)</td>
<td>98.62 (19.39)</td>
</tr>
<tr>
<td>ImpSS**</td>
<td>13.48 (3.92)</td>
<td>14.13 (3.51)</td>
<td>9.61 (4.36)</td>
</tr>
</tbody>
</table>

*Note.* ADHD dx = ADHD Diagnosis Group; ADHD sx = ADHD Symptom Group; NC = Normal Control Group; M = mean; SD = Standard Deviation; DOSPERT = Domain Specific Risk Attitude Scale, Composite Score; ImpSS = Impulsive Sensation Seeking Subscale of the Zuckerman-Kuhlman Personality Questionnaire III-Revised, Subscale Score

** p < .01 on ANOVA

*a ADHD dx > NC on contrasts at p < .01

*b ADHD sx > NC on contrasts at p < .01

The homogeneity of variance assumption held, with $F(6, 96912.66) = 1.31, p > .05$. Tests of normality demonstrated normality violations for the NC ($p < .01$) and ADHD dx groups ($p < .01$) on the IGT variable, while the three groups for the BART variable and the ADHD sx group for the IGT variable were normally distributed (all $p > .05$). Power
transformations were conducted (natural log, square root, log base 10, and square) but did not improve the normality of the distribution.

As predicted, the groups performed differently on the risk-taking tasks, with a Wilks’ Lambda statistic of .838, $F(4,148) = 3.42, p < .05$. Follow-up univariate ANOVAs showed group differences on quintile five of the IGT, $F(2,75) = 4.92, p < .05$, but not on average adjusted pumps of the BART, $F(2,75) = 2.15, p > .05$. Observed power of the ANOVA demonstrating group differences on the IGT was .79, marginally below the recommended rate of .80 (Cohen, 1988). Differences on the IGT accounted for 11.6% of the variability among the three groups. On the IGT, contrasts indicated that the ADHD sx group was riskier (scored lower) than the NC group ($p < .05$), but the ADHD dx group did not differ from the NC group ($p > .05$). Additionally, the ADHD dx group was marginally riskier than the NC group on the BART ($p < .10$), but the ADHD sx group did not differ from the NC group ($p > .05$). Exploratory Bonferroni-corrected posttests revealed that the ADHD dx group scored significantly higher than the ADHD sx group on the IGT ($p < .05$). No differences between ADHD groups were found on the BART ($p > .05$). See Table 4 for means and standard deviations of groups on risk-taking behavioral tasks.

*Exploratory Analyses*

Exploratory analyses were also conducted on additional self-report measures of risk-taking and substance use. A Bonferroni-correction was used to reduce the chance of a type I error (Bonferroni-corrected $\alpha = .007$). Group differences were seen on the Alcohol Use Disorders Identification Test (AUDIT), an assessment of risky alcohol use, $F(2, 75) = 6.40, p < .007$. Bonferroni-corrected posttests demonstrated significantly
Table 4

*Risk-Taking Behavioral Tasks*

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADHD dx (n = 23)</th>
<th>ADHD sx (n = 24)</th>
<th>NC (n = 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>IGT*</td>
<td>11.39 (10.54)</td>
<td>2.75 (12.00)</td>
<td>9.68 (8.08)</td>
</tr>
<tr>
<td>BART</td>
<td>40.71 (12.89)</td>
<td>34.25 (15.14)</td>
<td>33.66 (11.79)</td>
</tr>
</tbody>
</table>

Note. ADHD dx = ADHD Diagnosis Group; ADHD sx = ADHD Symptom Group; NC = Normal Control Group; M = mean; SD = Standard Deviation; IGT = Iowa Gambling Task; BART = Behavior Analogue Risk Task

* p < .05 on ANOVA

b ADHD sx > NC on contrasts at p < .05
d ADHD sx > ADHD dx on Bonferroni-corrected posttests at p < .05

higher scores in the ADHD dx group as compared to the NC group (p < .007), with no other significant group differences.

Six ANOVAs were run to test for group differences on subtests of the DOSPERT. Using the conservative Bonferroni procedure discussed above, groups differed in Health, \( F(2, 75) = 6.09, p < .007 \) and Recreational, \( F(2, 75) = 6.99, p < .007 \) subscales. No differences were found in Investment, Gambling, Ethical, or Social risk-taking domains (all \( p > .007 \)). The Shapiro-Wilk test indicated that only the ADHD sx group on
Recreational risky behavior and the NC group on Health risky behavior may have deviated from normality \( (p < .01) \). Power transformations were conducted but did not improve the normality of the distribution. Bonferroni-corrected posttests revealed higher levels of Health and Recreational risk-taking in the ADHD sx group relative to the NC group \( (\text{both } p < .007) \). The ADHD dx group, on the other hand, did not differ on Health and Recreational domains from the NC group or the ADHD sx group \( (\text{all } p > .007) \). See Table 5 for means and standard deviations of the AUDIT and subscales of the DOSPERT.

Exploratory chi-square goodness of fit tests were run to determine whether groups differed in self-reported rates of alcohol use, cigarette smoking, or recreational drug use. Chi-square tests demonstrated that group frequencies were significantly different in recreational drug use, \( \chi^2(2, \ N = 78) = 10.50, \ p < .01 \), and marginally different in cigarette smoking, \( \chi^2(2, \ N = 78) = 5.34, \ p < .10 \), though no differences were found in alcohol use, \( \chi^2(2, \ N = 78) = 1.20, \ p > .05 \). Follow-up chi-square tests indicated that the ADHD dx group, \( \chi^2(1, \ N = 78) = 6.52, \ p < .05 \), and the ADHD sx group, \( \chi^2(1, \ N = 78) = 8.98, \ p < .01 \), had a higher percentage of recreational drug users than the NC group, but that the ADHD dx and ADHD sx groups did not differ from each other \( (p > .05) \). Furthermore, a higher percentage of participants from the ADHD dx group reported cigarette smoking than the NC group, \( \chi^2(1, \ N = 78) = 4.97, \ p < .05 \), and the ADHD sx group was marginally higher than the NC group, \( \chi^2(1, \ N = 78) = 3.31, \ p < .10 \), but ADHD groups did not differ on this variable. See Table 6 for percentages of cigarette smokers, recreational drug users, and alcohol users by group status.
Table 5

Exploratory Self-Report Questionnaires

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADHD dx (n = 23)</th>
<th>ADHD sx (n = 24)</th>
<th>NC (n = 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>AUDIT***</td>
<td>13.43 (6.37)a</td>
<td>10.79 (6.00)</td>
<td>7.71 (5.35)</td>
</tr>
<tr>
<td>DOSPERT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethical</td>
<td>18.13 (7.31)</td>
<td>18.33 (7.82)</td>
<td>13.65 (4.17)</td>
</tr>
<tr>
<td>Gambling</td>
<td>7.39 (4.73)</td>
<td>7.54 (4.42)</td>
<td>6.00 (2.73)</td>
</tr>
<tr>
<td>Health***</td>
<td>23.39 (5.40)</td>
<td>25.54 (6.15)b</td>
<td>20.29 (5.33)</td>
</tr>
<tr>
<td>Investment</td>
<td>12.17 (4.62)</td>
<td>11.17 (2.73)</td>
<td>11.84 (3.84)</td>
</tr>
<tr>
<td>Recreational***</td>
<td>26.52 (8.54)</td>
<td>28.58 (7.39)b</td>
<td>21.16 (7.14)</td>
</tr>
<tr>
<td>Social</td>
<td>27.52 (4.90)</td>
<td>28.21 (5.26)</td>
<td>25.29 (4.99)</td>
</tr>
</tbody>
</table>

Note. ADHD dx = ADHD Diagnosis Group; ADHD sx = ADHD Symptom Group; NC = Normal Control Group; M = mean; SD = Standard Deviation; AUDIT = Alcohol Use Disorders Identification Test; DOSPERT = Domain-Specific Risk Attitude Scale

*** p < .007 on ANOVA

a ADHD dx > NC on Bonferroni-corrected posttests at p < .007

b ADHD sx > NC on Bonferroni-corrected posttests at p < .007
Table 6

*Self-Reported Percentages of Alcohol, Drug, and Cigarette Use*

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADHD dx (n = 23)</th>
<th>ADHD sx (n = 24)</th>
<th>NC (n = 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>91%</td>
<td>83%</td>
<td>81%</td>
</tr>
<tr>
<td>Cigarette</td>
<td>39%</td>
<td>33%</td>
<td>13%</td>
</tr>
<tr>
<td>Drug**</td>
<td>57%⁺⁻³</td>
<td>63%⁺⁻³</td>
<td>23%</td>
</tr>
</tbody>
</table>

Note. ADHD dx = ADHD Diagnosis Group; ADHD sx = ADHD Symptom Group; NC = Normal Control Group; % = Percentage of participants admitting to alcohol, cigarette, or drug use

**p < .01 on chi-square goodness of fit test

⁺⁻ Three groups were compared with each other by follow-up chi-square tests at p < .05

⁻⁻⁻⁻ Three groups were compared with each other by follow-up chi-square tests at p < .01

**Discussion**

The current study investigated risky behavior and personality characteristics in a sample of undergraduate students with a diagnosis of ADHD and reporting current ADHD symptoms (ADHD dx), without a diagnosis of ADHD, but reporting current ADHD symptoms (ADHD sx), and those denying both a diagnosis of ADHD and current ADHD symptoms (NC). To address some of the limitations of previous research
exploring adult ADHD and risky behavior, both self-report and behavioral assessments of risk-taking were included in the study. To improve the clinical utility of the current study, the ADHD dx group was compared to an ADHD sx group, containing young adults who reported high levels of current ADHD symptoms, but did not show a developmental progression of the disorder. To our knowledge, this was the first study to explore risk-taking both objectively and subjectively in a well-diagnosed sample of undergraduates with ADHD.

*Risky behavior and ADHD*

The first hypothesis, that the ADHD dx group and the ADHD sx group would report higher levels of self-reported risky behavior compared to the NC group was supported. On both the Risk-Behavior Scale of the DOSPERT and the Impulsive Sensation-Seeking subscale of the ZKPQ-III-R, ADHD dx and ADHD sx groups reported significantly greater risk-taking than the NC group. Differences on these self-report measures indicated small to medium effect sizes (according to Cohen, 1988). The second hypothesis, that ADHD dx and ADHD sx groups would show higher levels of risk-taking than NC on risky behavior tasks was partially supported. Both the ADHD sx and ADHD dx group demonstrated greater risk-taking relative to NC on one of the two behavioral measures (the ADHD dx group at $p < .10$).

In exploratory analyses, and also consistent with hypotheses, ADHD dx and ADHD sx groups self-reported greater alcohol use and had a higher proportion of recreational drug users relative to the NC group. Exploratory analyses of DOSPERT subscales showed that the ADHD sx group scored significantly higher than the NC group on the Recreational and Health Risk Behavior subscales, though no differences were seen
on other risk subscales. As expected based on the literature review, ADHD dx and ADHD sx groups did not differ on any of the risky behavior self-report or behavioral tasks, with the exception of the IGT.

The findings that ADHD dx participants self-reported higher levels of risky behavior and personality traits than NC participants support and extend previous research. Confirming previous literature (e.g., Faraone et al., 2007), the current study suggested that ADHD dx adults engage in more severe alcohol use and demonstrate higher rates of recreational drug use than NC adults. Furthermore, this study suggested that ADHD dx adults may generally be characterized by a riskier personality than NC adults. Though it is widely believed that adults diagnosed with ADHD are sensation seekers (Zuckerman, 1994), few studies have investigated this relationship empirically (e.g., Garland, 1999, unpublished). The current study suggested that the neurobiological personality trait of impulsive sensation seeking (Zuckerman, 2007) was significantly elevated in ADHD dx adults relative to NC adults. This serves as additional evidence that ADHD dx adults are inherently riskier than NC adults, because the ImpSS subscale of the ZKPQ-III-R assesses risky personality dimensions rather than asking about specific risky activities (e.g., drug use). Finally, as both ADHD sx and ADHD dx groups showed the same pattern of differences with the NC group, the current study suggested that differences between ADHD dx and NC groups may be more of a function of ADHD symptomatology than a categorical ADHD diagnosis (explored in greater detail below).

Results of the current study also indicated that the ADHD dx group scored marginally higher than the NC group on one of two behavioral measures of risk-taking. In previous studies, the BART has been shown to correlate highly with substance use
(Aklin, Lejuez, Zvolensky, Kahler, & Gwadz, 2005) and smoking status (Lejuez et al., 2003). The ADHD dx group’s risky behavior on the BART is consistent with higher self-reported alcohol use and general risk-taking relative to normal controls. Additionally, the ADHD sx group demonstrated riskier behavior than the NC and ADHD dx groups on the IGT. Poor performance on the IGT is generally associated with decision making deficits, and has been associated with alcohol and substance dependence (Bechara et al., 2001).

The difference between ADHD groups on the IGT may suggest that ADHD sx groups make poorer and more risky decisions than the ADHD dx group; however, given that multiple posttests were conducted exploring differences between the two ADHD groups on self-report and behavioral measures, and this was the only significant finding, this difference should not be over-interpreted. Nevertheless, future research should explore differences in risky-decision making tasks between ADHD groups.

Though ADHD dx and ADHD sx groups demonstrated similar self-reported risk-taking relative to the NC group, the relatively inconsistent findings on behavioral tasks is not altogether surprising. First, research suggests that the BART and IGT do not measure an identical risk-taking construct, and that these (and similar tasks) often do not correlate highly with each other (Reynolds et al., 2006; Skeel et al., 2007). Second, most research suggests that self-report and laboratory based measures of risky personality (e.g., impulsivity) may correlate poorly, or even negatively, with each other (Enticott, Ogloff, & Bradshaw, 2006; Hunt, Hopko, Bare, Lejuez, & Robinson, 2005). This could be due to different operational definitions of risk-taking (Barratt, Orozco-Cabal, & Moeller, 2005). For example, with regard to impulsivity, it is possible that self-report instruments measure more subjective and global impulsivity, while behavioral tasks objectively
assess specific types of impulsivity (Reynolds et al., 2006). Thus, the IGT and BART may measure specific domains of risk-taking behavior and, therefore, not inherently relate to self-reported risk-taking. For instance, in the current study, the BART had correlations of $r(76) = .15, p > .05$, and $r(76) = .12, p > .05$, and the IGT had correlations of $r(76) = -.21, p > .05$, and $r(76) = .04, p > .05$, with the total score from the Risk-Behavior Scale and the ImpSS score, respectively. Finally, previous studies using behavioral tasks typically compare clinically-referred samples of adults with ADHD to normal control adults; because these adults likely show more severe psychopathology, it is likely that clinical samples will demonstrate larger effect sizes than non-clinical samples. For example, in the present study, a sample size of $n = 50$ per group would have been needed to detect a difference between the ADHD dx and NC groups on the BART.

Findings are more noteworthy in the context of demographic differences among the current sample, relative to past research. Numerous studies have shown that clinically-referred ADHD dx adults engage in higher levels of risky behavior relative to NC adults (e.g., Biederman et al., 2006). The current study, on the other hand, explored a non-clinical college student population, which represents a group of higher functioning adults with ADHD. College students with ADHD may differ greatly from adults with ADHD who do not attend college; for example, Kern, Rasmussen, Byrd, and Wittschen (1999) suggest that college students with ADHD may be of above average intelligence and have developed more effective compensatory strategies to help them cope with their ADHD symptoms. Even in the current college-student sample, ADHD dx adults reported riskier substance use and general risky-behavior and personality traits relative to NC. More problematic alcohol use in the current sample among ADHD dx college students
relative to NC students is particularly alarming, especially given the staggering base rates of alcohol use and abuse (Kuo et al., 2002) reported in college populations.

The proportion of diagnostic subtypes represented in the current study may also have influenced risk-taking findings. Though results are largely equivocal on which ADHD subtypes most relate to risk-taking in retrospective analyses, longitudinal studies suggest that hyperactive/impulsive symptoms are more highly predictive of substance use than inattentive symptoms, while inattentive and hyperactive/impulsive symptoms may predict later cigarette use (Elkins, McGue, & Iacono, 2007). The current sample largely consisted of adults identifying with an ADHD Inattentive or unconfirmed subtype; in fact, only 2 ADHD dx participants reported a Combined or Hyperactive/Impulsive subtype. Though speculative, disparities in risk-taking between ADHD dx adults and NC adults may have been different (and more robust) if the ADHD dx group contained more Hyperactive/Impulsive or Combined subtypes. Future research may help parse out risky behavior differences among adults diagnosed with different ADHD subtypes in childhood.

Current theoretical explanations for ADHD may be able to account for higher self-reported rates of risky behavior in ADHD dx adults relative to NC adults. Numerous researchers have suggested that ADHD can be explained by a fundamental behavioral inhibition deficit, generally described as an inability to stop behavior when rewards are immediately available (Barkley, 1997; Oosterlaan & Sergeant, 1996). As an example, Barkley’s theory (1997) indicates that individuals with ADHD may not engage in internal speech or dialogue before engaging in behaviors. Internal speech can help individuals solve problems and use moral judgment. It follows that individuals who lack this internal
dialogue may engage in relatively high levels of impulsive, risky, and reckless behavior, as evidenced in the current study. However, the current study (and previous research) suggests that poor decision making is not unique to ADHD dx adults, but rather that ADHD sx adults show similar levels of riskiness. Research is needed to determine whether the ADHD sx adults show a similar behavioral inhibition deficit to ADHD dx adults or if some other deficit accounts for their risk-taking behavior.

**Clinical Implications**

The indication that ADHD dx adults, as well as ADHD sx adults, report similar symptomatology and associated risk-taking behavior has important clinical implications, particularly because college students complaining of inattention are increasingly referred to mental health clinics for a diagnosis of ADHD (Kordon et al., 2006; Reilly, 2005). A minority of these students may meet full DSM-IV criteria for ADHD. Most of these students, however, do not meet childhood criteria for ADHD, either due to difficulty accurately reporting childhood symptoms (Mackin & Horner, 2005), a lack of childhood symptomatology, or not granting consent to contact other informants (e.g., parents) about childhood symptomatology.

Recent neuropsychological research suggests that this ADHD sx group, who meet full criteria for an ADHD diagnosis besides age of onset, may not differ neuropsychologically from adults who meet full ADHD diagnostic criteria, yet both these groups differ from NC adults (Faraone et al., 2006b). Other studies indicate that ADHD sx participants show similar patterns of ADHD symptoms, psychiatric comorbidity, and substance use/abuse with ADHD dx participants (Faraone et al., 2006a; Faraone et al., 2007; Hesslinger, Tebartz van Elst, Mochan, & Ebert, 2003). Employing both self-report
and behavioral risk-taking measures, the current study found the same pattern of results that ADHD dx and ADHD sx groups may in fact differ less from each other than from normal controls.

The question must be asked: why do these ADHD sx adults show similar behavioral and psychological concerns as ADHD dx adults? The two most likely explanations involve methodological issues and concerns with diagnostic criteria. The first methodological issue that may hamper the validity of these studies is the heterogeneity of ADHD sx groups. Available studies sample an all-inclusive ADHD symptom group, without accounting for the tremendous variability of reasons for high reporting of ADHD symptomatology. Increased reporting of inattention in young adulthood can result from a variety of causes, including college maladjustment, psychiatric, neurological, or medical conditions (Reilly, 2005; Spencer & Adler, 2004; Wasserstein, 2005). While the current study addressed some of these concerns by excluding adults with head injury and severe psychopathology, it may be necessary to subtype ADHD symptom groups to determine relevant differences, rather than assuming they are homogeneous simply because they show similar ADHD symptomatology.

Additionally, heterogeneity in ADHD dx groups may impact reported findings. This concern may be harder to control for in research given the tendency for hyperactivity to diminish in adulthood (Kordon et al., 2006).

Second, methodological concerns related to the intensity of symptomatic impairments and previous treatment for these symptoms may influence results. Of the few studies which include an ADHD sx and ADHD dx group, most do not report whether adult ADHD symptom levels differ between ADHD sx and ADHD dx groups. ADHD
symptom levels did not differ in the current analyses between ADHD sx and ADHD dx groups. Additionally, the majority of these studies do not report medication usage in the ADHD diagnosis group, despite research suggesting that stimulant use greatly improves performance on neuropsychological tests (e.g., Aron, Dowson, Sahakian, & Robbins, 2003; Boonstra, Kooij, Oosterlaan, Sergeant, & Buitelaar, 2005); medication status of ADHD participants in the current study was described above.

The lack of differences could also be explained by research suggesting that ADHD occurs along a continuum, rather than being a discrete disorder (Kordon et al., 2006). Behavioral and genetic research suggests that ADHD represents extremes of normal behavior, and further that it is not necessarily pathological to be inattentive, forgetful, or disorganized (Levy, Hay, McStephen, Wood, & Waldman, 1997; Murphy, Gordon, & Barkley, 2000; Stevenson et al., 2005; Wasserstein, 2005). Thus, the demarcation between those diagnosed with ADHD and those not meeting full criteria is often quite small (Kordon et al., 2006). Some ADHD dx adults who experience high levels of ADHD symptoms may be more impaired than ADHD sx adults who experience relatively low levels of ADHD symptoms, while the converse could also be true. Therefore, current functioning may be more of a function of ADHD symptom levels, with high symptomatology predicting worse outcomes, than diagnostic category. Though this debate about whether ADHD is a categorical disorder or is better represented by a continuum may be outside the scope of this paper, it must be reiterated that symptomatic variation could be accounting for recent empirical findings.

Another potential reason to explain similarities between ADHD groups has been addressed in recent research conducted with “late onset” (Faraone et al., 2006a, p. 1724)
ADHD adults, who report impairing symptoms in adulthood but do not meet age of onset criteria. In these studies, Faraone and colleagues (2006a, 2006b, 2007) did not observe clinical and functional differences between adults whose onset of ADHD symptoms began before age seven and adults whose symptoms began after age seven, though numerous differences were seen compared to controls. As a result, Faraone and colleagues (2006a) argue that the 7-year-old age of onset criteria for a DSM-IV diagnosis of ADHD may be too stringent, indicating that a 12-year-old age of onset (or older) may be more appropriate. In the current study, the ADHD dx group’s average age of diagnosis was 13. While this may imply that both ADHD groups would be labeled “late onset” ADHD according to Faraone and colleagues (2006a), the current study only assessed the age of diagnosis, not the age at which the ADHD symptoms began. Thus, it will be important for future studies to address the limitations in the current study, by comparing well-diagnosed ADHD sx adults to adults first experiencing symptoms both in early childhood and in early adolescence.

The current study could also have numerous implications for the treatment of adult ADHD. First, it highlights the importance of prevention. More concretely, treatment addressing the prevention of risk-taking in ADHD is paramount to the safety and health of these individuals. Prevention of risky behavior can be overlooked in this population, due to other significant (and often more conspicuous) deficits in academic domains. Of note, the relationship between ADHD and risk-taking may be bi-directional; at least one study suggests that treating ADHD symptoms can reduce the risk of substance use disorders in adulthood (Katusic et al., 2005). Second, children and adolescents with ADHD would likely benefit from psychoeducational programs informing them about
their relative risk of developing substance use or risky behavior, but programs need to be suited to the attentional level of children with ADHD.

**Limitations**

There were numerous limitations to the current study. First, the study was conducted on a college student sample, which may represent a sample of higher functioning adults with ADHD. Additionally, the sample was non-treatment seeking, meaning it was conducted on a general population of college students rather than on adults seeking treatment in mental health clinics. Both these sampling factors may lessen the severity of pathology that was evidenced in this sample relative to most studies conducted on ADHD and risky behavior. However, these limitations can also be seen as strengths, in that few studies have been conducted on the general population of college students with ADHD, despite approximations that 2-4% of college students are affected by impairing ADHD symptoms (Weyandt, 2004).

The current study also contained some methodological limitations which could not be avoided due to practical constraints. First, the sample of adults with ADHD may not have met clinical cutoff criteria, because some participants were included in the study who had $t$-scores less than 1-1.5 standard deviations greater than the mean on symptomatic measures of adult ADHD. Second, most literature suggests that males report greater risk-taking behavior than females (e.g., Roberti, 2004), yet gender was not perfectly matched between groups in the current study. However, it should be mentioned that analyses suggested that gender was not a significant factor in self-reported or behavioral risk-taking in the current sample. Third, participants were not excluded for comorbidities or substance abuse difficulties. No research has illustrated that adults with
comorbid learning disabilities and ADHD would perform worse than adults with ADHD on risky behavior tasks, yet these additional factors could potentially confound results. Fourth, though structured interviews are typically seen as the gold standard in assessment of ADHD (Pelham, Fabiano, & Massetti, 2005), rating scales were used to assess ADHD symptoms in the current sample. This may not be a significant limitation because the existing literature indicates that structured interviews do not add incremental validity to rating scales in ADHD research (Pelham et al., 2005).

Future Directions

Future research is needed to determine the developmental differences between ADHD dx and ADHD sx groups. For example, the ADHD sx adults may have sub-threshold levels of ADHD in childhood, but due to an unlimited number of circumstances (e.g., academic difficulties, substance use) may report impairing ADHD symptoms in adulthood. In addition, research is needed to better describe or even subtype the ADHD sx cohort. Young adults who report ADHD symptoms due to severe depression or anxiety, may have different psychological and behavioral presentations than adults who can not focus due to a head injury. Longitudinal studies exploring ADHD dx children with NC children, as well as sub-threshold ADHD children, may also increase the understanding of the developmental course of ADHD. Research on ADHD sx children could help determine developmental differences from individuals with a diagnosis of ADHD, which could greatly improve differential diagnosis of ADHD in adulthood. Future research should also explore adult ADHD in both treatment-seeking and non-treatment seeking samples, as conducting research in clinically-referred samples may over-represent severe psychopathology.
Greater clarity is needed in the risky behavior literature as well. More research needs to be conducted on similar, overlapping constructs, (e.g., sensation seeking and novelty seeking) to demonstrate whether they could be better classified as one underlying construct. Moreover, current behavioral tasks propose to explain general risky behavior or personality, yet research indicates that risky behavior is composed of somewhat disparate factors. Thus, research is needed to develop risk-taking behavioral tasks with greater specificity to each risk-taking domain.
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Appendix B1—Psychometric Properties

Adult ADHD Symptom Checklist

The Conners’ Adult ADHD Rating Scale Self-Report: Long Version (CAARS-S:L) and the Conners’ Adult ADHD Rating Scale Observer: Screening Version (CAARS-O:SV) assess the core symptoms of ADHD and related problem behaviors (Conners et al., 1999). The CAARS-S:L contains 66 items and nine subscales which measure inattention, hyperactivity, impulsivity, and poor self-concept. The CAARS-O:SV contains 30 items and includes the DSM-IV ADHD symptom measures and the ADHD index, a quick screener of ADHD symptoms. The CAARS-S:L and CAARS-O:SV were normed on a large sample of nonclinical adults (18 years and older) from the United States and Canada. Gender was also considered in the norming process.

The five subscales normed on the CAARS-S:L include: Inattention/Memory Problems, Hyperactivity/Restlessness, Impulsivity/Emotional Lability, Problems with Self-Concept, and the ADHD Index. Men were found to score significantly higher than women on Inattention/Memory Problems and Hyperactivity/Restlessness subscales, while there were no gender differences for the Impulsivity/Emotional Lability, Problems with Self-Concept, and the ADHD Index subscales. Accounting for age and gender, internal reliability was between $r = .81$ and $r = .89$ for the five subscales and inter-item correlations ranged from $r = .27$ to $r = .57$ (Conners et al., 1999). Test-retest reliability was examined in 61 individuals attending an adult ADHD clinic; over approximately a one-month interval, test-retest reliability ranged from .80 to .91 on the five subscales (Conners et al., 1999).
There is also impressive validity information for the CAARS-S:L. As evidence for its discriminant validity, a group of adults who met DSM-IV criteria for ADHD was compared to a group of normal adults randomly selected on the basis of age and gender (Erhardt et al., 1999). A discriminant function analysis was used to classify the adults into ADHD and control groups; this analysis produced an overall correct classification rate of 85%. The ADHD index was explored using a group of 96 adults referred to a clinic for ADHD assessment and 96 normal adults matched with the clinical sample by age and sex. Diagnostic efficiency statistics yielded sensitivity of 71%, specificity of 75%, positive-predictive power of 74% and negative-predictive power of 72% (Conners et al., 1999). There is also considerable convergent validity evidence. For example, moderate to high correlations were found between self-report and observer ratings on the CAARS-S:L and CAARS Observer Long Version (Conners et al., 1999). Also, Erhardt et al. (1999) explored the relationship between current levels of ADHD symptoms and childhood symptomatology. The authors found the WURS to correlate with Inattention/Memory Problems \( r = .37, p < .01 \), Hyperactivity/Restlessness \( r = .48, p < .01 \), Impulsivity/Emotional Lability \( r = .67, p < .01 \), and Problems with Self-Concept \( r = .37, p < .01 \). No reliability or validity information was found for the DSM-IV subscales as they report, nearly verbatim, DSM-IV criteria. This is a significant limitation of the CAARS-S:L, especially given the lack of research conducted on adult ADHD in the DSM-IV.

The CAARS-O:SV contains four subscales: DSM-IV Inattentive Symptoms, DSM-IV Hyperactive/Impulsive Symptoms, DSM-IV Total ADHD Symptoms, and the ADHD index. None of the subscales showed significant effects of age or gender. Internal
reliability coefficients for the four subscales ranged from .80 to .89, and inter-item correlations ranged from .26 to .48 (Conners et al., 1999). Test-retest correlations for the CAARS-O:SV were examined in a sample of 50 nonclinical adults who rated their spouses on two occasions, two weeks apart. These correlations ranged from .89 to .95 on the four subscales (Conners et al., 1999).

Convergent validity of the ADHD index was measured by correlating it with the Total DSM-IV ADHD Symptom Scale. The authors found a .81 correlation for females and .87 correlation for males (Conners et al., 1999). Further, the ADHD index of the CAARS:O-SV scale was correlated with the ADHD index of the CAARS:S-L. The authors found a .53 correlation for females and a .52 correlation for males (Conners et al., 1999). Similar to the CAARS-S:L, psychometric data on the CAARS-O:SV is limited because no reliability and validity information was reported on DSM-IV subscales as they report, nearly verbatim, DSM-IV criteria.

Childhood ADHD Symptoms Scale

The Wender Utah Rating Scale (WURS) is a self-report retrospective assessment of the childhood occurrence of ADHD symptoms (Wierzbicki, 2005). The original scale consisted of 61 items; from this original scale, Ward et al. (1993) selected 25 items that showed the greatest mean difference between patients with diagnosed ADHD and a non-psychiatric control group.

There is good reliability evidence for the WURS in adult samples. Ward et al. (1993) compared the scores of adult patients with ADHD (n = 81), adults with major depression (n = 70), and a non-psychiatric control group (n = 100) on the WURS. All adult patients with ADHD met Utah Criteria (see McGough & Barkley, 2004 for a review
of Utah Criteria) for both a child and adult history of ADHD. Participants in the depression group scored over 21 on the 17-item Hamilton Rating Scale for Depression (Hamilton, 1967) and had no history of an axis-II diagnosis or an ADHD diagnosis. The 25-item WURS had split-half reliability correlations of \( r = .90, p < .01 \) in the non-psychiatric control group. Later, Wierzbicki (2005) examined the WURS in a sample of 111 college students twice over a one-month period. The author found high internal consistency (\( \alpha = .89 \) and \( \alpha = .91 \)) for the first and second sessions, respectively. Wierzbicki (2005) estimated the one-month test-retest reliability Pearson product-moment correlation (\( r = .62 \)), indicating adequate test-retest reliability.

There is also considerable validity evidence for the 25-item scale. Ward et al. (1993) compared the WURS to a 10-item Parents’ Rating Scale (PRS; Conners, 1990) in adult subjects with ADHD and a non-psychiatric, adult control group. The PRS is a scale given to parents to assess their children’s retrospective ADHD symptoms. They found moderate correlations between the WURS and PRS for both the non-psychiatric subjects (\( r = .49, p < .01 \)) and the ADHD group (\( r = .41, p < .01 \)). Weyandt and colleagues (1995) examined the validity of the WURS in a college sample. They reported a correlation of (\( r = .54, p < .05 \)) between the WURS and the Adult Rating Scale (Weyandt et al., 1995), a self-report instrument of attention, impulsivity, and hyperactivity symptoms.

Cutoff scores can be useful in diagnostic classification (Ward et al., 1993). When a cutoff score of 46 on the WURS was used in the study by Ward et al. (1993), they found that 86% of the patients with ADHD, 99% of the normal subjects, and 81% of the depressed subjects were correctly classified.

*Risky Behavior Scale*
The Risk-Behavior Scale of the Domain Specific Risk-Attitude Scale (DOSPERT) assesses self-reported risk-taking behavior across financial, health/safety, recreational, ethical, and social domains (Weber et al., 2002). The Risk-Behavior Scale consists of 40 items, from which eight questions are included from each risk-taking domain. Each question asks participants to indicate the likelihood that they would engage in certain risky behaviors on a Likert scale ('1' = very unlikely to '5' = very likely).

To adequately validate and refine the DOSPERT, the authors conducted a series of three studies on large samples of college undergraduates \((n_1 = 560, n_2 = 119, n_3 = 357,\) respectively). Overall, the final 40-item Risk-Behavior Scale from study three displays adequate internal reliability. Cronbach's alphas were reported for each of the five subscales as follows: the Financial subscale had an \(\alpha = .84\), the Health/safety subscale had an \(\alpha = .77\), the Recreational subscale had an \(\alpha = .83\), the Ethical subscale had an \(\alpha = .78\), and the Social subscale had an \(\alpha = .70\). It should be noted that the Financial subscale was separated into Gambling and Investment subscales, each of which consisted of four questions; the Gambling subscale had an \(\alpha = .89\) and the Investment had an \(\alpha = .84\) (Weber et al., 2002). Across all items, the coefficient \(\alpha = .88\) (Harrison, Young, Butow, Salkeld, & Solomon, 2005).

Much of the reliability and validity evidence was found using the original 50-item Risk-Behavior Scale from study one; this scale looked similar to the Risk-Behavior Scale from study three, except some items were refined and two items from each subscale were eliminated. Using the original scale, adequate one-month test-retest reliability was found for the Health (.75), Ethics (.72), and Recreational (.80) subscales. Low test-retest reliability was found for the Financial (.44) and Social (.58) subscales. The authors found
evidence for convergent and discriminant validity using the original, 50-item, Risk-Behavior Scale. As expected, the subscales did not correlate with the Choice Dilemma Scale (Kogan & Wallace, 1964), assessing decisions that hypothetical people will make involving risk, indicating acceptable discriminant validity. The authors also predicted the subscales of the Risk-Behavior Scale to correlate with Budner’s (1962) Scale for Intolerance of Ambiguity, measuring intolerance of situations where there are few cues as to how to act, and the Sensation Seeking Scale (SSS-V; Zuckerman, 1994). Budner’s (1962) scale for Intolerance of Ambiguity correlated significantly with all risk-behavior subscales except Investment risk; the highest correlation ($r = .65, p < .05$) was for the Recreational Risk-Behavior subscale. The SSS-V correlated significantly with all domains of risk-taking behavior, with the largest correlation between the Thrill-And-Adventure-Seeking subscale of the SSS-V and the Recreational Risk-Behavior subscale ($r = .56, p < .05$). Moreover, self-reported frequencies of behavior in the risky domains correlated significantly with the Risk-Behavior Scale’s subscale scores. As expected, a card game task (Weber, Shafir, & Sharoni, 2004) correlated most significantly with the Financial subscale ($r = .28, p < .05$). Though further validation of the 40-item Risk-Behavior Scale is desirable, overall, Weber et al. (2002) provided sufficient evidence for adequate reliability and convergent/discriminant validity using their original Risk-Behavior Scale.

**Impulsive Sensation Seeking Measure**

The Impulsive Sensation Seeking (ImpSS) subscale of the ZKPQ-III-R is a 19-item subscale which reflects a need for novel experiences, a preference for uncertainty or risk in social relationships and environments, and a propensity to act on impulse with
little concern for the consequences (Joireman & Kuhlman, 2005). The ImpSS subscale is part of a 99-item true/false personality questionnaire which measures four other basic dimensions of personality including aggression-hostility, activity, neuroticism-anxiety, and sociability. It also contains a 10-item malingering scale.

There is substantial evidence for the reliability and validity of the ZKPQ-III-R. For the purposes of the present study, the psychometric properties of only the ImpSS subscale are discussed. Originally, Zuckerman et al. (1993) administered the ZKPQ-III-R to a personality and psychology class of undergraduate students. Notably, men scored significantly higher than females in the psychology course $t(730) = 4.47, p < .01$ and marginally higher than females in the personality course $t(187) = 1.91, p < .10$ on the ImpSS. When accounting for gender, the authors noted an internal reliability coefficient between ($\alpha = .74$ and $\alpha = .82$). Zuckerman (2002) found a retest reliability of .80 for an American sample tested twice over a one-month interval.

There is adequate construct validity for the ImpSS subscale as well. In the original validation study, Zuckerman et al. (1993) conducted a factor analysis of the five subscales of the ZKPQ-III-R, the five subscales of the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992), and the three subscales of the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975). The authors found evidence for four factors accounting for 74% of the variance from the three scales. The ImpSS subscale of the ZKPQ-III-R, the Conscientiousness subscale of the NEO-FFI, and the Psychoticism subscale of the EPQ all loaded highly on the sensation seeking, impulsivity, and aggression factor (with factor loadings of .74, -.86, and .80, respectively). The ImpSS subscale also loaded .48 on another factor measuring extraversion and sociability, but did
not load on either the neuroticism or agreeableness/openness factors (with factor loadings of .08 and -.02, respectively). Many studies have found evidence for the ImpSS subscale’s convergent validity. In the Zuckerman et al. (1993) study, the ImpSS subscale correlated highly with the total score of the SSS-V ($r = .66$, $p < .01$). Also, individuals low on the Consideration of Future Consequences Scale (CFC; Strathman, Gleicher, Boninger, & Edwards, 1994) scored higher on the ImpSS ($r = -.18$, $p < .05$) (Joireman, 1999). More specifically, the authors found that the CFC correlated with impulsivity ($r = -.29$, $p < .01$ and $r = .17$, $p < .05$, respectively), but not sensation seeking ($r = -.02$, $p > .05$ and $r = .12$, $p > .05$, respectively) from the ImpSS subscale (Joireman, 1999).

Furthermore, there is evidence for the predictive validity of the ImpSS subscale. Zuckerman and Kuhlman (2000) found that scores on the ImpSS predict higher levels of self-reported drinking, smoking, drug use, and sexual risk-taking.

**Alcohol Use Questionnaire**

The Alcohol Use Disorders Identification Test (AUDIT) is a 10-item scale that measures alcohol intake, alcohol dependence, and adverse consequences from alcohol consumption (Babor et al., 2001; Reinert & Allen, 2002). A review of the recent literature by Reinert and Allen (2002) indicated that the AUDIT is internally consistent in a broad range of samples and settings (median Cronbach $\alpha$ in the .80s). One study of college students suggested that 2-week test-retest reliability is excellent on the AUDIT (Reinert & Allen, 2002).

The AUDIT has also demonstrated excellent criterion validity and can be used as a screen for alcohol dependence and abuse (Reinert & Allen, 2007). In a sample of problem-drinking college students (O’Hare & Sherrer, 1999), the AUDIT showed good
convergent validity with two other measures of problem drinking behavior, the Drinking Context Scale (O’Hare, 1997a) and the College Alcohol Problem Scale (O’Hare, 1997b). Moreover, the AUDIT has demonstrated cross-cultural validity, in Nigerian, Italian, and Spanish samples (Adewuya, 2005). Most studies suggest that the AUDIT fits a two-factor model, reflecting alcohol consumption and alcohol dependence/consequences (Reinert & Allen, 2002). At least one study has found evidence for a one-factor structure (Skipsey, Burleson, Kranzler, 1997) representing a general alcohol use/abuse construct.

**Depression Measure**

The Beck Depression Inventory-Second Edition (BDI-II) assesses the presence of current depressive symptomatology (Beck et al., 1996). The BDI-II is a self-report measure consisting of 21 items; it asks participants to select one of four statements which best characterize their mood and behavior over the past two weeks.

The BDI-II demonstrates good psychometric properties. Three studies of college students demonstrated that the BDI-II has good internal consistency (.89 - .9) (Steer & Clark, 1997; Storch, Roberti, & Roth, 2004; Wiebe & Penley, 2005). Moreover, Wiebe and Penley (2005) illustrated that the BDI-II has adequate test-retest reliability over a 1-week interval. Carmody (2005) also explored psychometric properties of the BDI-II in a large sample of ethnically diverse college sample and reported that no differences were found in depressive symptomatology among the various ethnicities. Females typically score higher on the BDI-II than males (Beck et al., 1996; Carmody, 2005)

Multiple studies have also demonstrated the validity of the BDI-II in college samples. Storch and colleagues (2004) found considerable evidence for the convergent
validity of the BDI-II; it correlates highly with both the depression ($r = .76$) and anxiety factors ($r = .69$) of the State-Trait Anxiety Inventory-Trait questionnaire (STAI; Spielberger, Gorsuch, & Lushene, 1970). Research also indicates that the BDI-II correlates moderately to highly with the Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer, 1998; Steer & Clark, 1997). Additionally, Steer and Clark (1997) demonstrated evidence for the discriminant validity of the BDI-II in college samples, because it did not correlate with the Independence subscale of the Sociotropy and Autonomy Scales, which typically correlates with measures of well-being and positive adjustment.

Intelligence Estimate

The Matrix Reasoning (MR) subtest of the Wechsler Abbreviated Scale of Intelligence (WASI) is believed to measure fluid intelligence or adaptive brain functioning (Ryan et al., 2005; The Psychological Corporation, 1999). In this intelligence task, participants look at a matrix containing one missing item and decide which of five possible response options best represent the missing item.

The MR subtest of the WASI demonstrates excellent psychometric properties. The MR subtest was normed on an adult sample ($n = 106$) (The Psychological Corporation, 1999). In this adult sample, the subtest demonstrated good internal reliability with an average $\alpha = .94$ (The Psychological Corporation, 1999). Test-retest reliability was also measured on the MR subtest; participants were tested twice, with a test-retest interval ranging from approximately two to 12 weeks. The test-retest reliability for the subtest was .79 (The Psychological Corporation, 1999). To assess content validity, the MR subtest of the WASI was compared to the MR subtest of the Wechsler Adult Intelligence Scale–Third Edition (Wechsler, 1997). Correlation coefficients between the
MR subscales were adequate \((r = .66)\) (The Psychological Corporation, 1999). The construct validity of the MR subscale of the WASI was assessed by intercorrelating the subtest with other verbal subtests and non-verbal subtests of the WASI. The MR subtest was highly correlated with the other non-verbal subtests of the WASI \((r = .90)\), indicating excellent convergent validity (The Psychological Corporation, 1999). The MR subtest was related to the verbal performance on the WASI as well, yet the strength of this relationship appeared substantially weaker \((r = .64)\) (The Psychological Corporation, 1999).

**Test of Effort**

The Word Memory Test (WMT) is a computerized measure of verbal memory, commonly used to assess effort. Participants are asked to read and memorize a sequence of 20 word pairs (Green, 2003). Participants are then tested on immediate recognition of correct words and recognition of correct words and word pairs after a 30-minute delay.

The seminal study of the computerized Word Memory Test tested 159 referrals to psychological and neuropsychological clinics involving compensation claims. The WMT demonstrated strong convergent validity, with medium to high correlations with other tests of effort (e.g., California Verbal Learning Test). Green et al. (1996) derived response bias cutoffs of 82% of Immediate Recall, Delayed Recall, and Consistency to identify malingers on the WMT; these cutoffs were conservative, in order to reduce the rate of false positive classifications. These cutoffs were used to determine poor effort in the current analysis.

The WMT has demonstrated adequate reliability data. Within a given test session, effort measures of the WMT correlate highly (Green, 2003). Test-retest correlations are
much lower (e.g., $r = .43$ for immediate recall), however, due to the variability of effort across testing sessions (Green, 2003).

Using data from a population of college students presenting to a clinic for an ADHD or learning disability assessment, Sullivan and colleagues (2007) found high rates of symptom exaggeration in the ADHD group (47.6%) but not the LD group (15.4%). Among the ADHD group, performance on Immediate and Delayed recall of the WMT was significantly correlated with high symptom report on the CAARS-S:L, indicating higher symptom exaggeration in patients who performed worse on the WMT. These findings were corroborated by another study using a clinical sample of young adults referred for neuropsychological evaluation (Suhr, Hammers, Dobbins-Buckland, Zimak, & Hughes, under review). Adults identified by the WMT as showing poor effort were identified by other measures of effort or inconsistency with low sensitivity but 100% specificity. Overall, there is good psychometric data on the WMT with a variety of populations, including neurological patients, psychiatric patients, and children with ADHD (Green, 2003).

**Risky Behavior Task**

The Behavior Analogue Risk Task (BART) is a computerized, behavioral measure of risk-taking. The BART has shown good psychometric properties. A within-session measure of test-retest reliability showed a high correlation ($r = .82$) when the adjusted number of pumps were examined over three trials (Lejuez et al., 2002). Furthermore, the BART has also been shown to yield consistent scores across administrations (Wallsten et al., 2005). The BART has shown adequate convergent validity with a variety of risky personality self-report measures. Total money earned on
the BART was correlated with the total score of the Barratt Impulsivity Scale \((r = .28, p < .01)\) (Patton, Stanford, & Barratt, 1995), the Eysenck Impulsivity subscale \((r = .24, p < .05)\) of the Eysenck Impulsiveness Scale (I7; Eysenck, Pearson, Easting, & Allsopp, 1985), and the total score on the SSS \((r = .35, p < .01)\) (Lejuez et al., 2002). It must be noted that the BART did not significantly correlate with the Eysenck Venturesomeness Subscale of the I7 \((r = .20, p > .05)\) (Lejuez et al., 2002). The BART was significantly positively associated with self-report measures of risky behavior with correlations ranging from \((r = .25, p < .05)\) for driving behavior, sexual behavior, and theft to \((r = .44, p < .01)\) for gambling (Lejuez et al., 2002). Thus, the BART appears to be related to real-world risk-taking behaviors (Wallsten et al., 2005). The BART also demonstrates adequate discriminant validity; it did not correlate with the Anxiety Sensitivity Index (Reiss, Peterson, Gursky, & McNally, 1986), the Center for Epidemiological Studies Depression Scale (Radloff, 1977), or the Empathy Subscale of the I7 (Lejuez et al., 2002).

**Risky Decision Making Task**

The Iowa Gambling Task (IGT) is a computerized, behavioral task of risky behavior and decision making (Bechara et al., 2001). The IGT has been validated on participants shown to engage in riskier decision making. For example, Bechara et al. (2001) reported that adults with ventromedial brain damage perform worse than either normal controls or substance abusers on the IGT, while substance abusers also perform worse than normal controls. Also, adolescents with ADHD perform worse on the task than adolescents without ADHD (Ernst et al., 2003). Thus, the IGT appears to relate to impaired decision making. As predicted, the IGT showed low, insignificant correlations with a variety of neuropsychological measures, such as trials one through five of the Rey-
Auditory Verbal Learning Test (Schmidt, 1996), and self-report personality measures (e.g., the Beck Depression Inventory of Beck, Steer, & Garbin (1998)), which can be used as evidence for its discriminant validity (Bechara et al., 2001).
Appendix B2—Part One Informed Consent

Ohio University
Informed Consent to Participate in Research

Title of Research: Categorical versus Dimensional Approaches to Psychological Characteristics in College Students

Principal Investigator: Laura C. Fox, M.S. & Julie A. Suhr, Ph.D., Ohio University

Department: Psychology

Federal and university regulations require us to obtain signed consent for participation in research involving human subjects. After reading the statements below, please indicate your consent by signing this form.

Explanation of Study

You are invited to participate in a research study that explores the relationship of psychological characteristics, such as forgetfulness, distractibility, and restlessness, to aspects of individuals’ physical and psychological health history. The purpose of the research is to understand how certain symptom patterns are related to past and present psychological functioning.

You will complete several rating scales designed to assess for the presence of specific psychological characteristics. You will also complete several questionnaires that assess aspects of your physical and psychological history. The rating scales and questionnaires are paper-pencil instruments. On one of the questionnaires we ask your permission to send home a rating scale to your parent or guardian in order to receive an additional perspective about the presence of certain psychological characteristics. At no time will any of your responses on the questionnaires or rating scales be shared with your parent/guardian. The session will be proctored by a trained graduate or undergraduate student who is supervised by the study director. We expect that your participation will take approximately 1 hour.

Risks and Discomforts

The questionnaires do not pose any known risks to you. Revealing aspects of your physical and psychological history on the questionnaires may result in some mild discomfort or distress. If disclosure of personal information proves to be distressing, you will be provided with contact information for Counseling and Psychological Services at Hudson Health Center and the Ohio University Psychology and Social Work Clinic. You will also have the option of ending your participation in the study.

Benefits

Benefits of this research are primarily for others, as your participation will enhance our understanding of the relationship between certain symptom patterns and aspects of past and current psychological functioning.
Confidentiality and Records

All information obtained from you in this study will be kept strictly confidential. This information will be identified according to a code number known only to those directly involved with this research project. The code number will be derived from your first/middle initials and birth month/day, to facilitate matching with data obtained from your parents, but you will not be identifiable by this code number. In reporting the study we will provide results based on group performance, with no individual identifying information.

Compensation

You will receive 1 experimental point for your participation in this study.

Contact Person

If you have any questions about your participation, please do not hesitate to ask the experimenter. You may also contact the study director, Julie Suhr, Ph.D. (740-593-1091) if you have additional questions or concerns.

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, (740)593-0664.

I certify that I have read and understand this consent form and agree to participate as a subject in the research described. I agree that known risks to me have been explained to my satisfaction and I understand that no compensation is available from Ohio University and its employees for any injury resulting from my participation in this research. I certify that I am 18 years of age or older. My participation in this research is given voluntarily. I understand that I may discontinue participation at any time without penalty or loss of any benefits to which I may otherwise be entitled. I certify that I have been given a copy of this consent form to take with me.

Signature _____________________________ Date __________
Printed Name ____________________________
Appendix B3—Participant Number Calculation Form

Please write down the **last 4 digits**
of your social security number:     _____  _____ _____ _____

Record the **month** and **day** of your birth date.
Add this **4 digit** figure to your SS # above.
If the month or day is only 1 digit, please put a '0'
in the first space. For example, if you were born on
January 1, you should record it as '01/01':

\[
+_____  _____ / _____ ____ \\
M        M     D      D
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\[
= _____ _____ _____ _____
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Add the number of letters in your mother's **FULL
FIRST** name. Do not use nicknames. For example, if
your mother's first name is Christine, but she goes by
the nickname Chris, you should record it as ‘09’, the
number of letters in CHRISTINE.:

\[
+_____ _____
\]

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_____ _____ _____ _____
\]

Please put this sheet back in the manila envelope provided. If you have any questions, please ask
the experimenter.
Appendix B4—Personal Health History Questionnaire

1. Have you ever been diagnosed with ADHD or ADD?
   ____ Yes. If so, age at diagnosis _______
   ____ No

2. If you know your specific ADHD diagnosis (i.e., subtype), please indicate below (circle):
   ADHD Combined Type  ADHD Inattentive Type  ADHD Hyperactive-Impulsive Type

3. Do you have a current diagnosis of ADHD or ADD?
   ____ Yes.
   ____ No

4. What treatment have you received for your ADHD symptoms? (check all that apply)
   ____ Ritalin
   ____ Adderall
   ____ Strattera
   ____ Dexedrine
   ____ Concerta
   ____ Metadate
   ____ Cylert
   ____ Focalin
   ____ Other (describe: ________________________________)

5. Are you currently taking medication to address symptoms of ADHD?
   ____ Yes. If so, please describe: ______________________
   ____ No

6. How have your ADHD symptoms affected your:
   Academic work ________________________________
   Work/occupation _______________________________
   Interpersonal relationships ________________________

7. Do you feel your ADHD symptoms have had a significant negative effect on your school work, ability to function at a job, or your social relationships?
   ____ Yes
   ____ No
8. Has anyone in your family been diagnosed with ADHD?
   ___ Yes. If so, describe: ________________________________________
   ___ No

9. Do you have current difficulties with drug or alcohol use?
   ___ Yes. If so, describe: ________________________________________
   ___ No

10. Have you ever been diagnosed with depression, anxiety, or other psychological condition?
    ___ Yes. If so, describe: ________________________________________
        ___ No

11. Have you ever received treatment (e.g., prescription medication, counseling, herbal
    supplements) for depression, anxiety, or other psychological condition?
    ___ Yes. If so, describe: ________________________________________
    ___ No

12. Are you currently diagnosed with depression, anxiety, or other psychological condition?
    ___ Yes. If so, describe: ________________________________________
    ___ No

13. Are you currently receiving treatment (e.g., prescription medication, counseling, herbal
    supplements) for depression, anxiety, or another psychological condition?
    ___ Yes. If so, describe: ________________________________________
    ___ No

14. Have you been diagnosed with a learning disability?
    ___ Yes. If so, describe: ________________________________________
    ___ No

15. Have you ever received a blow to the head that caused you to lose consciousness for more
    than 30 minutes?
    ___ Yes
    ___ No
Appendix B5—Demographic Questionnaire

Month/Year of birth: __________ Age: __________ Sex (circle one): Male / Female

Year in college (circle one): Freshman Sophomore Junior Senior

Race/Ethnicity: _____ Native American or Alaskan Native
               _____ Asian or Pacific Islander
               _____ Black, not of Hispanic origin
               _____ Hispanic
               _____ White, not of Hispanic origin
               _____ Other (please describe: ________________)

What was your high school GPA?
   ___ less than or equal to 2.5 (less than a C)
   ___ 2.51 to less than 3.0 (C to B)
   ___ 3.0 or greater (B or better)

What is your current overall college GPA?
   ___ less than or equal to 2.5 (less than a C)
   ___ 2.51 to less than 3.0 (C to B)
   ___ 3.0 or greater (B or better)

Have you ever repeated a grade in elementary, middle, or high school?
   ___ Yes. What grade? __________
   ___ No

___________________________________  _______________
Signature        Date

As part of the study, we would like to send a short questionnaire home to your parent(s) or guardian(s). The questionnaire contains items that assess the presence of behaviors and psychological characteristics, and it is similar to one of the questionnaires that you will be completing as part of this study. At no time will any of your responses on the questionnaires or rating scales be shared with your parent/guardian. Please provide the address to which the questionnaire should be mailed.

Name: 

Address: 

Town/State/Zip:
Appendix B6—Wender Utah Rating Scale

<table>
<thead>
<tr>
<th>AS A CHILD I WAS (OR HAD):</th>
<th>Not at all or very slightly</th>
<th>Mildly</th>
<th>Moderately</th>
<th>Quite a bit</th>
<th>Very Much</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Concentration problems, easily distracted</td>
<td></td>
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<tr>
<td>2. Anxious, worrying</td>
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<td>3. Nervous, fidgety</td>
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<td>4. Inattentive, daydreaming</td>
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<td>5. Hot- or short-tempered, low boiling point</td>
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<tr>
<td>6. Temper outbursts, tantrums</td>
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<td>7. Trouble with stick-to-it-iveness, not following Through to finish things started</td>
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<td>8. Stubborn, strong-willed</td>
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<tr>
<td>9. Sad or blue, depressed, unhappy</td>
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<tr>
<td>10. Disobedient with parents, rebellious, sassy</td>
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<tr>
<td>11. Low opinion of myself</td>
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<tr>
<td>12. Irritable</td>
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<tr>
<td>13. Moody, ups and downs</td>
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<td>14. Angry</td>
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<td>15. Acting without thinking, impulsive</td>
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<tr>
<td>16. Tendency to be immature</td>
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<td>17. Guilty feelings, regretful</td>
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<tr>
<td>18. Losing control of myself</td>
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<td>19. Tendency to be or act irrational</td>
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<tr>
<td>20. Unpopular with other children, didn't keep friends for long, didn't get along with other children</td>
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<tr>
<td>21. Trouble seeing things from someone else's point of view</td>
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<tr>
<td>22. Trouble with authorities, trouble with school, visits to principal's office</td>
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<tr>
<td>23. Overall a poor student, a slow learner</td>
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<tr>
<td>24. Trouble with mathematics or numbers</td>
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<tr>
<td>25. Not achieving up to potential</td>
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</tbody>
</table>
Appendix B7—Risk-Behavior Scale of the DOSPERT

ID # ____________________________

Instructions: For each of the following statements, please indicate your likelihood of engaging in each activity or behavior. Provide a rating from 1 to 5, using the following scale:

1. Admitting that your tastes are different from those of your friends.
2. Going camping in the wilderness, beyond the civilization of a campground.
3. Betting a day’s income at the horse races.
4. Buying an illegal drug for your own use.
5. Cheating on an exam.
6. Chasing a tornado or hurricane by car to take dramatic photos.
7. Investing 10% of your annual income in a moderate growth mutual fund.
8. Consuming five or more servings of alcohol in a single evening.
9. Cheating by a significant amount on your income tax return.
10. Disagreeing with your father on a major issue.
11. Betting a day’s income at a high-stakes poker game.
12. Having an affair with a married man or woman.
13. Forging somebody’s signature.
14. Passing off somebody else’s work as your own.
15. Going on a vacation in a third-world country without prearranged travel and hotel accommodations.
16. Arguing with a friend about an issue on which he or she has a very different opinion.
17. Going down a ski run that is beyond your ability or closed.
18. Investing 5% of your annual income in a very speculative stock.
19. Approaching your boss to ask for a raise.
20. Illegally copying a piece of software.
21. Going whitewater rafting during rapid water flows in the spring.
22. Betting a day’s income on the outcome of a sporting event (e.g., baseball, soccer, or football).
23. Telling a friend if his or her significant other has made a pass at you.
24. Investing 5% of your annual income in a conservative stock.
25. Shoplifting a small item (e.g., a lipstick or a pen).
26. Wearing provocative or unconventional clothes on occasion.
27. Engaging in unprotected sex.
28. Sealing an additional TV cable connection off the one you pay for.
29. Not wearing a seatbelt when being a passenger in the front seat.
30. Investing 10% of your annual income in government bonds (treasury bills).
31. Periodically engaging in a dangerous sport
   (e.g., mountain climbing or sky diving).
32. Not wearing a helmet when riding a motorcycle.
33. Gambling a week's income at a casino.
34. Taking a job that you enjoy over one that is prestigious but less enjoyable.
35. Defending an unpopular issue that you believe in at a social occasion.
36. Exposing yourself to the sun without using sunscreen.
37. Trying out bungee jumping at least once.
38. Piloting your own small plane, if you could.
39. Walking home alone at night in a somewhat unsafe area of town.
40. Regularly eating high cholesterol foods.

Instructions: Please answer the following questions to the best of your ability. If you have never engaged in any of
the following behaviors, mark ‘N/A’ on the corresponding line.

41. If you smoke cigarettes, at what age did you first begin smoking cigarettes?
42. If you drink alcohol, at what age did you first begin drinking alcohol?
43. If you use recreational drugs (e.g., marijuana, ecstasy, cocaine, etc.),
at what age did you first begin using recreational drugs?
Appendix B8—Impulsive Sensation Seeking Subscale of the ZKPQ-III-R

ID #

Instructions: This inventory consists of numbered statements. Read each statement and decide whether it is true as applied to you or false as applied to you. If a statement is true or mostly true, as applied to you, mark an ‘X’ in the corresponding ‘TRUE’ box. If a statement is false or not usually true, as applied to you, mark an ‘X’ in the corresponding ‘FALSE’ box. If a statement does not apply to you or if it is something that you don’t know about, make no mark on the answer sheet. Still, try to give an answer to every statement.

<table>
<thead>
<tr>
<th>#</th>
<th>Statement</th>
<th>TRUE</th>
<th>FALSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I tend to begin a new job without much advance planning on how I will do it.</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>I do not worry about unimportant things.</td>
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<td>3</td>
<td>I enjoy seeing someone I don’t care for humiliated before other people.</td>
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<td>4</td>
<td>I never met a person that I didn’t like.</td>
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<tr>
<td>5</td>
<td>I do not like to waste time just sitting around and relaxing.</td>
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<tr>
<td>6</td>
<td>I usually think about what I am going to do before doing it.</td>
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<tr>
<td>7</td>
<td>I am not very confident about myself or my abilities.</td>
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<tr>
<td>8</td>
<td>When I get mad, I say ugly things.</td>
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<tr>
<td>9</td>
<td>I tend to start conversations at parties.</td>
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<tr>
<td>10</td>
<td>I have always told the truth.</td>
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<tr>
<td>11</td>
<td>It's natural for me to curse when I am mad.</td>
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<tr>
<td>12</td>
<td>I do not mind going out alone and usually prefer it to being out in a large group.</td>
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<tr>
<td>13</td>
<td>I lead a busier life than most people.</td>
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<tr>
<td>14</td>
<td>I often do things on impulse.</td>
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<td>15</td>
<td>I often feel restless for no apparent reason.</td>
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<tr>
<td>16</td>
<td>I almost never litter the street with wrappers.</td>
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<tr>
<td></td>
<td>I would not mind being alone in a place for some days without any human contact.</td>
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<tr>
<td>17</td>
<td>I like complicated jobs that require a lot of effort and concentration.</td>
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<tr>
<td>18</td>
<td>I very seldom spend much time on the details of planning ahead.</td>
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<tr>
<td>19</td>
<td>I sometimes feel edgy and tense.</td>
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<tr>
<td>20</td>
<td>I almost never feel like I would like to punch or slap someone.</td>
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<tr>
<td>21</td>
<td>I spend as much time with my friends as I can.</td>
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<tr>
<td>22</td>
<td>I do not have a great deal of energy for life's more demanding tasks.</td>
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<tr>
<td></td>
<td>I like to have new and exciting experiences and sensations even if they are a little frightening.</td>
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<tr>
<td>23</td>
<td>My body often feels all tightened up for no apparent reason.</td>
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<td>24</td>
<td>I always win at games.</td>
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<td>25</td>
<td>I often find myself being &quot;the life of the party.&quot;</td>
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<td>26</td>
<td>I like a challenging task much more than a routine one.</td>
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<td>27</td>
<td>Before I begin a complicated job, I make careful plans.</td>
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<td>28</td>
<td>I frequently get emotionally upset.</td>
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<td>Statement</td>
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<td>31.</td>
<td>If someone offends me, I just try not to think about it.</td>
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<td>32.</td>
<td>I have never been bored.</td>
<td></td>
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<td>33.</td>
<td>I like to be doing things all of the time.</td>
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<td>34.</td>
<td>I would like to take off on a trip with no preplanned or definite routes or timetables.</td>
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<td>35.</td>
<td>I tend to be oversensitive and easily hurt by thoughtless remarks and actions of others.</td>
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<td>36.</td>
<td>In many stores you just cannot get served unless you push yourself in front of other people.</td>
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<td>37.</td>
<td>I do not need a large number of casual friends.</td>
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<td>38.</td>
<td>I can enjoy myself just lying around and not doing anything active.</td>
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<td>39.</td>
<td>I enjoy getting into new situations where you can't predict how things will turn out.</td>
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<td>40.</td>
<td>I never get lost, even in unfamiliar places.</td>
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<td>41.</td>
<td>I am easily frightened.</td>
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<td>42.</td>
<td>If people annoy me I do not hesitate to tell them so.</td>
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<td>43.</td>
<td>I tend to be uncomfortable at big parties.</td>
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<tr>
<td>44.</td>
<td>I do not feel the need to be doing things all of the time.</td>
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<td>45.</td>
<td>I like doing things just for the thrill of it.</td>
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<td>46.</td>
<td>I sometimes feel panicky.</td>
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<td>47.</td>
<td>When I am angry with people I do not try to hide it from them.</td>
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<td></td>
<td>At parties, I enjoy mingling with many people whether I already know them or not.</td>
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<td>48.</td>
<td>I would like a job that provided a maximum of leisure time.</td>
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<td>49.</td>
<td>I tend to change interests frequently.</td>
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<td>50.</td>
<td>I often think people I meet are better than I am.</td>
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<td>51.</td>
<td>I never get annoyed when people cut ahead of me in line.</td>
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<td>52.</td>
<td>I tend to start my social weekends on Thursday evenings.</td>
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<td>53.</td>
<td>I usually seem to be in a hurry.</td>
<td></td>
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<td>54.</td>
<td>I sometimes like to do things that are a little frightening.</td>
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<td>55.</td>
<td>Sometimes when emotionally upset, I suddenly feel as if my legs are unsteady.</td>
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<td>56.</td>
<td>I generally do not use strong curse words even when I am angry.</td>
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<td>57.</td>
<td>I would rather &quot;hang out&quot; with friends than work on something by myself.</td>
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<td>58.</td>
<td>When on vacation I like to engage in active sports rather than just lie around.</td>
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<td>59.</td>
<td>I'll try anything once.</td>
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<td>60.</td>
<td>I often feel unsure of myself.</td>
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<td>61.</td>
<td>I can easily forgive people who have insulted me or hurt my feelings.</td>
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<td>62.</td>
<td>I would not mind being socially isolated in some place for some period of time.</td>
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<td>63.</td>
<td>I like to wear myself out with hard work or exercise.</td>
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<tr>
<td>64.</td>
<td>I would like the kind of life where one is on the move and traveling a lot, with lots of change and excitement.</td>
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<td>#</td>
<td>Statement</td>
<td>TRUE</td>
<td>FALSE</td>
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<td>66</td>
<td>I often worry about things that other people think are unimportant.</td>
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<td>67</td>
<td>When people disagree with me I cannot help getting into an argument with them.</td>
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<td>68</td>
<td>Generally, I like to be alone so I can do things I want to do without social distractions.</td>
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<td>69</td>
<td>I never have any trouble understanding anything I read the first time I read it.</td>
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<td>70</td>
<td>I sometimes do &quot;crazy&quot; things just for fun.</td>
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<td>71</td>
<td>I often have trouble trying to make choices.</td>
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<tr>
<td>72</td>
<td>I have a very strong temper.</td>
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<td>73</td>
<td>I have never lost anything.</td>
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<td>74</td>
<td>I like to be active as soon as I wake up in the morning.</td>
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<td>75</td>
<td>I like to explore a strange city or section of town by myself, even if it means getting lost.</td>
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<td>76</td>
<td>My muscles are so tense that I feel tired much of the time.</td>
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<td>77</td>
<td>I can't help being a little rude to people I do not like.</td>
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<td>78</td>
<td>I am a very sociable person.</td>
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<td>79</td>
<td>I prefer friends who are excitingly unpredictable.</td>
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<td>80</td>
<td>I often feel like crying sometimes without a reason.</td>
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<tr>
<td>81</td>
<td>No matter how hot or cold it gets, I am always quite comfortable.</td>
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<td>82</td>
<td>I need to feel that I am a vital part of a group.</td>
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<td>83</td>
<td>I like to keep busy all the time.</td>
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<td>84</td>
<td>I often get so carried away by new and exciting things and ideas that I never think of possible complications.</td>
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<td>85</td>
<td>I don't let a lot of trivial things irritate me.</td>
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<td>86</td>
<td>I am always patient with others even when they are irritating.</td>
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<td>87</td>
<td>I usually prefer to do things alone.</td>
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<td>88</td>
<td>I can enjoy routine activities that do not require much concentration or effort.</td>
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<td>89</td>
<td>I am an impulsive person.</td>
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<td>90</td>
<td>I often feel uncomfortable and ill at ease for no real reason.</td>
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<tr>
<td>91</td>
<td>I often quarrel with others.</td>
<td></td>
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<tr>
<td>92</td>
<td>I probably spend more time than I should socializing with friends.</td>
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<tr>
<td>93</td>
<td>It doesn't bother me if someone takes advantage of me.</td>
<td></td>
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<tr>
<td>94</td>
<td>When I do things, I do them with lots of energy.</td>
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<td>95</td>
<td>I like &quot;wild&quot; uninhibited parties.</td>
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<td>96</td>
<td>After buying something I often worry about having made the wrong choice.</td>
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<tr>
<td>97</td>
<td>When people shout at me, I shout back.</td>
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<tr>
<td>98</td>
<td>I have more friends than most people do.</td>
<td></td>
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<tr>
<td>99</td>
<td>Other people often urge me to &quot;take it easy.&quot;</td>
<td></td>
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</table>
Appendix B9—Alcohol Use Disorders Identification Test

**Please circle the answer that is correct for you:**

1. How often do you have a drink containing alcohol?
   - Never
   - Monthly or less
   - 2-4 times a month
   - 2-3 times a week
   - 4 or more times a week

2. How many drinks containing alcohol do you have on a typical day when you are drinking?
   - 1 or 2
   - 3 or 4
   - 5 or 6
   - 7 or 9
   - 10 or more

3. How often do you have six or more drinks on one occasion?
   - Never
   - Less than monthly
   - Monthly
   - Weekly
   - Daily or almost daily

4. How often during the last year have you found that you were not able to stop drinking once you had started?
   - Never
   - Less than monthly
   - Monthly
   - Weekly
   - Daily or almost daily

5. How often during the last year have you failed to do what was normally expected of you because of drinking?
   - Never
   - Less than monthly
   - Monthly
   - Weekly
   - Daily or almost daily

6. How often during the last year have you needed a drink first thing in the morning to get yourself going after a heavy drinking session the night before?
   - Never
   - Less than monthly
   - Monthly
   - Weekly
   - Daily or almost daily

7. How often during the last year have you had a feeling of guilt or remorse after drinking?
   - Never
   - Less than monthly
   - Monthly
   - Weekly
   - Daily or almost daily

8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?
   - Never
   - Less than monthly
   - Monthly
   - Weekly
   - Daily or almost daily

9. Have you or someone else been injured as a result of your drinking?
   - No
   - Yes, but not in the last year
   - Yes, during the last year

10. Has a relative, friend, doctor, or any other health worker been concerned about your drinking or suggested you cut down?
    - No
    - Yes, but not in the last year
    - Yes, during the last year
Appendix B10—Consent for Future Contact

Based on your responses to questionnaires and measures used in the present study, you may be eligible to participate in other studies that are taking place in the Psychology Department. Please indicate below if you provide permission for someone from the Psychology Department to contact you in the near future with an invitation to participate in another study. In providing your consent to be contacted, you are **not** obligated to participate in a future study.

_____ Yes, I give my consent to be contacted for a future study offered in the Psychology Department.

_____ No, do not contact me in the future regarding another study.

If you would like to be contacted, please provide your name and e-mail and/or phone number:

Name: ______________________________________________

☐ Phone: ______________________________

☐ E-mail: ______________________________

**Please indicate how you would like to be contacted by checking the box beside your preferred means of contact.

____________________________________  _______________
Signature        Date
Appendix B11—Study Debriefing

Title of Research:
Categorical versus Dimensional Approaches to Psychological Characteristics in College Students

Principal Investigators:
Laura Fox, M.S. & Julie Suhr, Ph.D.
Department of Psychology, Ohio University

Thank you for participating in this investigation of psychological characteristics in college students and their relation to certain aspects of physical and psychological health history. The goal of this study is to examine psychological and behavioral characteristics commonly associated with Attention-Deficit/Hyperactivity Disorder (ADHD) and the degree to which they differentiate young adults who do and do not meet diagnostic criteria for ADHD. Results from this investigation will help investigators understand more about the nature and severity of ADHD characteristics in college students. At this time we would be happy to discuss with you any questions regarding your participation in the study.

During your participation in this study, we inquired about personal information, such as presence of psychological difficulties, substance abuse problems, and learning disorders. Revealing such information may cause individuals some discomfort or prompt them to seek evaluation and/or treatment for their difficulties. Below is a list of counseling resources that are available to Ohio University students that you may contact if you would like to pursue evaluation and/or treatment:

- Counseling and Psychological Services, 3rd Floor Hudson Health Center: 740-593-1616
- Ohio University Psychology and Social Work Clinic, 002 Porter Hall: 740-593-0902

If you have additional questions or concerns about your participation, please do not hesitate to contact the study director, Julie Suhr, Ph.D. (740) 593-1091.

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance at Ohio University (740) 593-0664.
Ohio University
Informed Consent to Participate in Research

Title of Research: Evaluation of Neuropsychological Performance in Young Adults with and without Attention-Deficit/Hyperactivity Disorder

Principal Investigator: Laura C. Fox, M.S. & Julie A. Suhr, Ph.D., Ohio University

Department: Psychology

Federal and university regulations require us to obtain signed consent for participation in research involving human subjects. After reading the statements below, please indicate your consent by signing this form.

Explanation of Study

You are invited to participate in a research study on cognitive performance in men and women with and without a diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD). The purpose of the research is to determine if cognitive skills, such as attention, verbal fluency, and general thinking skills, are affected by the presence of ADHD symptoms.

You will be asked to complete a brief questionnaire that inquires about your recent use of caffeine, alcohol, medications, and recreational drugs. Following this questionnaire, you will complete a series of cognitive tests that will assess attention, motor speed, memory, and thinking skills. The tests will involve both oral and written responses. All tests will be administered by a trained graduate or undergraduate student who is supervised by the study director. We expect that your participation will take approximately 2 hours.

Risks and Discomforts

The cognitive tests do not pose any known risks to you.

Benefits

Benefits of this research are primarily for others, as your participation will enhance our understanding of the potential impact of ADHD symptoms on cognitive functioning.

Confidentiality and Records

All information obtained from you in this study will be kept strictly confidential. This information will be identified according to a code number known only to those directly involved with this research project. In reporting the study we will provide results based on group performance, with no individual identifying information.
Compensation

You will receive 2 experimental points for your participation in this study, or a prorated payment equaling 1 point per hour in the event that you discontinue your participation before the conclusion of testing.

Contact Person

If you have any questions about your participation, please do not hesitate to ask the experimenter. You may also contact the study director, Julie Suhr, Ph.D. (740-593-1091) if you have additional questions or concerns.

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, (740)593-0664.

I certify that I have read and understand this consent form and agree to participate as a subject in the research described. I agree that known risks to me have been explained to my satisfaction and I understand that no compensation is available from Ohio University and its employees for any injury resulting from my participation in this research. I certify that I am 18 years of age or older. My participation in this research is given voluntarily. I understand that I may discontinue participation at any time without penalty or loss of any benefits to which I may otherwise be entitled. I certify that I have been given a copy of this consent form to take with me.

Signature________________________________ Date ____________

Printed Name__________________________________________
Ohio University
Informed Consent to Participate in Research

Title of Research: Evaluation of Neuropsychological Performance in Young Adults with and without Attention-Deficit/Hyperactivity Disorder

Principal Investigator: Laura C. Fox, M.S. & Julie A. Suhr, Ph.D., Ohio University

Department: Psychology

Federal and university regulations require us to obtain signed consent for participation in research involving human subjects. After reading the statements below, please indicate your consent by signing this form.

Explanation of Study

You are invited to participate in a research study on cognitive performance in men and women with and without a diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD). The purpose of the research is to determine if cognitive skills, such as attention, verbal fluency, and general thinking skills, are affected by the presence of ADHD symptoms.

You will be asked to complete a brief questionnaire that inquires about your recent use of caffeine, alcohol, medications, and recreational drugs. Following this questionnaire, you will complete a series of cognitive tests that will assess attention, motor speed, memory, and thinking skills. The tests will involve both oral and written responses. All tests will be administered by a trained graduate or undergraduate student who is supervised by the study director. We expect that your participation will take approximately 2 hours.

Risks and Discomforts

The cognitive tests do not pose any known risks to you.

Benefits

Benefits of this research are primarily for others, as your participation will enhance our understanding of the potential impact of ADHD symptoms on cognitive functioning.

Confidentiality and Records

All information obtained from you in this study will be kept strictly confidential. This information will be identified according to a code number known only to those directly involved with this research project. In reporting the study we will provide results based on group performance, with no individual identifying information.
**Compensation**

You will receive $20.00 for your participation in this study, or a prorated payment of $5.00 in the event that you discontinue your participation before the conclusion of testing.

**Contact Person**

If you have any questions about your participation, please do not hesitate to ask the experimenter. You may also contact the study director, Julie Suhr, Ph.D. (740-593-1091) if you have additional questions or concerns.

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, (740)593-0664.

I certify that I have read and understand this consent form and agree to participate as a subject in the research described. I agree that known risks to me have been explained to my satisfaction and I understand that no compensation is available from Ohio University and its employees for any injury resulting from my participation in this research. I certify that I am 18 years of age or older. My participation in this research is given voluntarily. I understand that I may discontinue participation at any time without penalty or loss of any benefits to which I may otherwise be entitled. I certify that I have been given a copy of this consent form to take with me.

Signature_________________________________________ Date ____________
Printed Name_________________________________________
Appendix B14—Laboratory Session Questionnaire

1. Have you consumed any caffeine in the past 3 hours?  YES  NO
   If yes, please describe:_________________________________________________

2. Have you consumed any alcohol in the past 24 hours?  YES  NO
   If yes, please indicate the number and type(s) of alcoholic drinks consumed:
   ___________________________________________________________________

3. Have you used any recreational drugs in the past 24 hours?  YES  NO
   If yes, please indicate the type of drug and quantity used:
   ___________________________________________________________________

4. Have you taken any prescription medication within the past 24 hours?  YES  NO
   If yes, please describe:________________________________________________

5. Have you taken any non-prescription medication within the past 24 hours?  YES  NO
   If yes, please describe:________________________________________________
Appendix B15—Study Debriefing

Title of Research:
Evaluation of Neuropsychological Performance in Young Adults with and without Attention-Deficit/Hyperactivity Disorder

Principal Investigators:
Laura Fox, M.S. & Julie Suhr, Ph.D.
Department of Psychology, Ohio University

Thank you for participating in this investigation of cognitive functioning in young men and women with and without a diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD). The goal of this study is to determine if cognitive skills, such as attention, memory, and general thinking skills, are affected by the presence of ADHD symptoms. Results from this investigation may indicate that individuals with a diagnosis of ADHD have a specific cognitive profile that provides a greater understanding of the underpinnings of the disorder. Additionally, an understanding of specific cognitive impairments associated with ADHD may aid in developing interventions to address such weaknesses. At this time we would be happy to discuss with you any questions regarding your participation in the study.

If you have additional questions or concerns about your participation, please do not hesitate to contact the study director, Julie Suhr, Ph.D. (740)593-1091.

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance at Ohio University (740)593-0664.
Dear Parents:

Your son/daughter has expressed an interest in participating in our study that investigates psychological characteristics in college students and their relationship to certain aspects of physical and psychological health history. Ohio University’s Institutional Review Board has approved this study. The goal of our research is to understand how the symptom patterns commonly associated with Attention-Deficit/Hyperactivity Disorder (ADHD) are related to past and present physical and psychological functioning. Specifically, we are comparing individuals diagnosed with ADHD with those not diagnosed with the condition. In writing to you, we are seeking to confirm the presence or absence of ADHD symptoms in your son/daughter through the use of a brief questionnaire that contains a list of behaviors for you to rate. Since it is standard procedure for parental questionnaires to be used in the assessment of symptoms of inattention and hyperactivity/impulsivity, we must contact the parents of all participants to request additional information to complete this study. When completing the questionnaire, please consider your son/daughter’s functioning when he/she is not on medication (if he or she has been prescribed medication to address symptoms of ADHD). Your responses to this questionnaire will not be shared with your son/daughter.

Your help in completing our investigation would be greatly appreciated. We ask that you take a few minutes to complete the attached questionnaire and return it in the enclosed postage-paid envelope. All responses to the questionnaire remain strictly confidential. To help ensure confidentiality, each questionnaire is identified with a numerical code only. This number is used to combine your responses with the information provided by your son/daughter.

By completing the enclosed questionnaire, it is understood that you are consenting to the use of this information in our research project. You are, of course, under no obligation to complete this questionnaire. Further, if your son/daughter attends Ohio University, his/her grades are in no way related to this decision.

I would like to thank you for your kind attention to this letter. Please accept the enclosed $2.00 as an expression of our thanks for your time and effort in completing the questionnaire. If you require any further information, please do not hesitate to call me at (740) 593-1091.

Sincerely,

Julie Suhr, Ph.D.
Associate Professor
Department of Psychology
Appendix B17—Brief Parent Questionnaire

ID# ____________________

1. If the characteristics listed on the rating scale strongly apply to your son or daughter, please circle when they first appeared:
   
   Before Elementary School
   Elementary School
   Middle School
   High School
   College
   
   These characteristics do not apply to my son/daughter

2. Please indicate if your son or daughter has ever received a diagnosis of:

   Attention Deficit/Hyperactivity Disorder     ___ Yes     ___ No
   Oppositional Defiant Disorder (ODD)         ___ Yes     ___ No
   Conduct Disorder (CD)                       ___ Yes     ___ No
Appendix C

Gender and Risk-Taking

While previous data suggests that males self-report higher levels of risky behavior and personality traits than females (Harris, Jenkins, & Glaser, 2006; Roberti, 2004), no differences were found between genders on risky behavior self-report measures in the current analysis (all \( p > .05 \)). Consistent with past research using behavioral measures of risk-taking (Hunt et al., 2005; Skeel et al., 2007), gender differences were not found on the BART or IGT in the current study (all \( p > .05 \)).

Self-Reported ADHD symptoms

Groups differed significantly on the WURS, \( F(2,75) = 22.80, p < .01 \); however the equal variances assumption may have been violated, \( F(2,75) = 5.67, p < .01 \). A post-hoc Dunnett T3 test (equal variances not assumed) indicated that the ADHD dx group reported higher childhood symptomatology than the ADHD sx \( (p < .01) \) and NC \( (p < .01) \) groups, and that the ADHD sx group reported higher childhood symptomatology than the NC group \( (p < .05) \). Notably, ADHD sx and NC participants who had WURS scores over 46 were excluded from the current analysis and, thus, differences with the ADHD dx group were expected. Groups were also significantly different on the CAARS-S:L E subscale (inattention), \( F(2,75) = 100.53, p < .01 \), the CAARS-S:L F subscale (hyperactivity/impulsivity), \( F(2,75) = 36.28, p < .01 \), and the CAARS-S:L G subscale (combined), \( F(2,75) = 107.13, p < .01 \). As the equal variances assumption may have been violated in all three cases \( (p < .01) \), post-hoc Dunnett T3 tests were run. Dunnett T3 tests indicated that the ADHD dx \( (all \ p < .01) \) and ADHD sx \( (all \ p < .01) \) groups reported higher current symptomatology than the NC group, but that the two ADHD groups did
not differ from each other (all $p > .05$). It should be mentioned that ADHD sx and ADHD dx participants only qualified for the study if they scored above a $t$-score of 65 and 60 on at least one ADHD subscale, respectively, while NC participants were excluded if any subscale scores exceeded a $t$-score of 55.

**Parent-Reported ADHD Symptoms**

Groups were significantly different on the CAARS-O:SV A subscale (inattention), $F(2,75) = 114.31, p < .01$, the CAARS-O:SV B subscale (hyperactivity/impulsivity, $F(2,75) = 28.81, p < .01$, and the CAARS-O:SV C subscale (combined), $F(2,75) = 88.47, p < .01$. The equal variances assumption was only violated on the CAARS-O:SV B subscale, $F(2,75) = 18.71, p < .01$. A post-hoc Dunnett T3 test on the CAARS-O:SV B subscale showed that the ADHD dx group had higher parent-reported current ADHD symptomatology than the ADHD sx ($p < .01$) and NC ($p < .01$) groups, but that the ADHD sx and NC groups did not differ from each other ($p > .05$). Bonferroni-corrected posttests on the CAARS-O:SV A and C subscales demonstrated that the ADHD dx group had higher parent-reported current ADHD symptomatology than the ADHD sx ($p < .01$) and the NC ($p < .01$) groups, yet the NC and ADHD sx groups were not different from each other ($p > .05$). These patterns of differences were expected given the nature of the selection criteria. In the current study, ADHD dx participants only qualified if they scored above a $t$-score of 57 on at least one ADHD subscale, while ADHD sx and NC participants were disqualified if they scored above a $t$-score of 60 or 55 on at least one ADHD subscale, respectively.