

ABSTRACT

Does Viewing Bullying Violence Affect the Allocation of Attention in Young Adults?

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The purpose of the current study was to experimentally test the relationship between symptoms of inattention and vicarious experiences of bullying. The research questions of the current study were: 1) Can vicarious bullying induce symptoms of inattention?; 2) What happens to inattention after multiple exposures to vicarious bullying?; and 3) Are there sex differences in inattention after exposure to bullying experiences? The participants were graduate and undergraduate students from a private university with a 0.2% diagnosis rate of attention-deficit/hyperactivity disorder. Participants viewed four videos with three depicting scenarios of bullying, and after each video, the Stroop test was used to assess inattention. Heart rate was also assessed following each video. After finishing participation in the video phase of the experiment, participants completed a demographic survey, a bullying experiences survey, and the *Screenner for Inattentive Symptoms*. The findings indicated exposure to vicarious bullying led to an increase in symptoms of inattention. The effects appeared to be cumulative, such that with additional exposure to vicarious bullying, a participant's symptoms of inattention increased. The heart rate of participants appeared to mirror the symptoms of inattention, with heart rate increasing over the course of the experiment. There were no

significant differences in reaction to vicarious bullying by sex. Implications of the findings include the need to assess experiences with bullying when diagnosing ADHD inattentive.

Does Viewing Bullying Violence Affect The Allocation Of Attention In Young Adults?

by

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CHAPTER ONE

Introduction

Traditional bullying research has demonstrated its negative effects on numerous outcomes in both its victims and perpetrators (Kumpulainen, 2008). The aim of the present research is to study its effect on attention in young adults. Specifically, the objective of this study is to examine the effect of how viewing bullying can alter the allocation of attention in a standard attention task. If a negative effect is observed, this presents implications for the diagnosis of attention disorders and specifically the need to assess background experiences as a part of assessments for attention.

Background of the Problem

Correlation and descriptive studies have established a relationship between Attention-Deficit/Hyperactivity Disorder (ADHD) and bullying (Unnever & Cornell, 2003; Kumpulainen et al., 1998). These correlation studies indicate that ADHD increases the likelihood of becoming both a bully and a victim, but the causal direction of this relationship cannot be confirmed through correlation research designs. To investigate causality in the relationship, the symptoms of inattention must be studied experimentally. If symptoms of inattention can be manipulated through an experimental design, then the current assumption of ADHD having a primarily genetic or biological basis may need to be addressed.

Research on the etiology of ADHD has focused primarily on genetic and biological causes. The definition of ADHD is based on behavioral symptoms of hyperactivity, impulsivity, and inattention, but finding a genetic or biological link for all

three classes of symptoms has been challenging (APA, 2000). It has been suggested that the three separate classes of systems may represent overlapping distributions of separate disorders, and this may account for the discrepancies found in the etiological research (Milich, Balentine, & Lynam, 2001). Separating etiological research for each class of symptoms may clarify the symptoms that can be accounted for by environmental influences and from those that are under genetic influence.

The presence of comorbid disorders makes it even more difficult to determine the etiology of ADHD. The *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (DSM-IV-TR; APA, 2000) specifies that other mental disorders that could account for the symptoms of ADHD must be eliminated prior to assigning a diagnosis of ADHD; however, research on the diagnostic procedures used by primary care physicians indicates this criteria is not followed in at least 25% of diagnosed cases (APA, 2000; Chan, Hopkins, Perrin, Herrerias, & Homer, 2005). Failure to utilize this criterion consistently could lead to incorrect diagnoses and ineffective treatments, a problem which would further complicate research on the role of environmental and genetic influences on symptoms of ADHD.

One environmental influence that could contribute to the development of ADHD is bullying experiences. Bullying affects 15-70% of the international school age population, 30% of the school age population in the United States, and has also been found to occur in colleges and the workplace (King, Wold, Tudor-Smith, & Harel, 1994; US Department of Education, 1999; Vega & Comer, 2005). Those involved in bullying are typically classified as bullies, bully/victims, victims, bystanders and uninvolved by the majority of researchers. Each group may suffer different psychological responses and

may demonstrate symptoms analogous to ADHD (Kumpulainen, 2008). Furthermore, research has indicated that persons with ADHD appear to be classified as bully/victims and victims, but are less likely to be classified as bullies (Bacchini, Affuso, & Trotta, 2008).

Some symptoms noted in bully/victims and victims are similar to symptoms of individuals with ADHD; this raises the question of the temporal relationship between the two. Bully/victims are often considered provocative victims, meaning these victims may exhibit behaviors that make them targets of bullying such as relentless touching of another person or using socially inappropriate behaviors (Carney & Merrell, 2001). Pure victims are more likely to be considered submissive and may be targeted because of an introverted personality or lack of social support. Both bully/victims and pure victims display social anxiety, depression, inability to concentrate, and symptoms of inattention (Ma, 2001). Similarly, individuals diagnosed with ADHD also exhibit symptoms of inattention, an inability to concentrate, and may suffer from both anxiety and depression as a comorbid disorder. It is difficult to determine whether the symptoms common to ADHD and bullying occur due to the bullying or as a manifestation of an underlying neuropsychological disorder.

Statement of the Problem

The similarity of symptoms between ADHD and bully/victims or bullies has been established through prior research (Ma, 2001), but the direction of the causal relationship has yet to be determined. If symptoms of inattention can be provoked by an experience with bullying, vicarious or otherwise, then environmental and situational influences on attention must be considered when the ADHD symptoms appear. Prior research has not

attempted to establish the causality of symptoms of inattention and has only provided evidence of the relationship by retrospective studies and correlation designs. An experimental analysis of the development of symptoms of inattention may help eliminate some of the heterogeneity among samples of individuals with ADHD by providing an alternate explanation for the etiology of this class of symptoms.

Purpose of the Study

Since the relationship between ADHD and bullying experiences has been established through prior research, the current study represents a logical extension of this line of research. Therefore, the present study aims to 1) investigate whether bullying can induce symptoms of inattention; 2) examine the effects of multiple exposures to bullying on the symptoms of inattention; and 3) examine sex differences as a control variable and a moderator variable following exposure to bullying experiences.

Significance of the Problem

Considering the numbers of individuals diagnosed with ADHD and the impact this diagnosis has on educational outcomes, questions about the development of symptoms need to be answered. If bullying can be linked to the development of symptoms of inattention, then it is possible that individuals experiencing bullying may need a diagnosis other than ADHD. The findings from this study have the potential to help establish a possible etiology for symptoms of inattention and highlight the need for gathering extensive background information, such as exposure to bullying and other forms of violence, when making a diagnosis of ADHD. The implications also extend to the treatment of ADHD, especially when the disorder is diagnosed in an individual with a history of experiencing interpersonal violence like bullying.

Research Questions and Hypotheses

The current study will address three primary research questions. The first research question addresses the effects of vicarious experiences of bullying on symptoms of inattention. It is hypothesized that vicariously experiencing bullying will cause participants to exhibit more symptoms of inattention as measured by attentional interference on the Stroop test (Stroop, 1935). The second research question addresses the effects of multiple exposures of vicarious bullying on symptoms of inattention. As the level of violence in the vicarious bullying experiences increases and as the participant watches more bullying experiences, the level of inattention symptoms will also increase. The last research question addresses sex differences in effects of vicarious bullying on attention symptoms by using participants' sex as both a control and moderator variable. It is hypothesized that males and females will show different effects when exposed to vicarious bullying experiences. Prior research indicates males are more often diagnosed with ADHD, but in bullying situations, females tend to be victimized more often. For males, initial symptoms of inattention may be higher, and the treatment effects may be less obvious; however, the opposite pattern should occur for females and treatment effects should be more obvious.

CHAPTER TWO

Literature Review

Prior research has established a connection between bullying and ADHD. The salient research for both topics will be reviewed in order to provide a discussion of the commonalities. The literature review will begin with prior research on the relationship between bullying and ADHD. Then, ADHD will be discussed in detail, including the diagnostic criteria, etiology, and comorbidities. The literature on bullying will be discussed and then the psychological outcomes related to bullying will be compared with the symptoms of ADHD.

The Relationship Between Bullying and ADHD

Individuals with ADHD often have difficulty negotiating social situations, which may place them at increased risk for bullying victimization; however, many studies have suggested that the impulsivity and hyperactivity associated with ADHD may also predispose these individuals to bullying behaviors (Unnever & Cornell, 2003). The social status associated with learning disabilities and behavioral disabilities may also contribute to the victimization of persons with ADHD as mental disorders are classified as hidden disabilities (Smart, 2009). Hidden disabilities, such as mental disorders, provide less visual cues for explaining a pattern of behaviors when compared to a visible disability. Non-disabled peers may perceive socially inappropriate behaviors and interactions as a choice made by the individual with a hidden disability rather than as symptoms of a disorder (Smart, 2009).

Impulsivity, a common correlate of ADHD and bullying, has been implicated as a factor that may contribute to some of the social issues experienced by persons with ADHD (Barkley, 1998; Olweus, 1993). Impulsivity may provide the link between bullying and ADHD because impulsivity often occurs in conjunction with hyperactivity in ADHD and is a common correlate of bullying behaviors (Unnever & Cornell, 2003). Individuals with combined ADHD that includes impulsivity have been shown to suffer more social problems than children with inattention or hyperactivity alone (Spira & Fischel, 2005). Early studies concluded ADHD and conduct disorder share a high comorbidity rate, 30% to 50%, and the symptoms of conduct disorder, such as impulsivity and social aggression, may be another manifestation of ADHD in these cases (Biederman, Newcorn, & Sprich, 1991). In relation to bullying, it has been suggested that individuals who choose to bully may actually have a highly developed theory of mind, allowing manipulation of the emotions of others without any typical, empathetic reactions (Spira & Fischel, 2005).

Research has indicated bullies typically come from homes where discipline is harsh and family conflict level is high, a contributor to the formation of a cycle of violence (Bandura, 1996; Olweus, 1997). The link between home climate and manipulation of emotions may help illuminate the connections between ADHD and bullying. It appears bullies may understand the consequences of their behavior but may not feel the same level of responsibility for reparations as prosocial children (Spira & Fischel, 2005).

Early studies hypothesized this link between bullying and hyperactivity (Olweus, 1993), but more recent studies have found that bullies' psychological profiles are not

commensurate with a diagnosis of ADHD (Holmberg & Hjern, 2008). Retrospective and correlation studies have found that, despite the connection between impulsivity and aggression, a diagnosis of ADHD is not necessarily related to bullying behaviors but appears to correspond with profiles of bully/victims and victims (Holmberg & Hjern, 2008; Unnever & Cornell, 2003; Bacchini et al., 2008). Persons with ADHD were twice as likely to be victims in a study by Unnever and Cornell (2003), but low self-control was not a significant factor in victimization; this calls into question the role of impulsivity in inducing bullying behaviors. This connection may be more important for males, as other studies have demonstrated the link between bullying and ADHD may differ by sex (Nansel et al., 2001). For example, females are more likely to be bullied by both females and males, while males are generally only bullied by other males (Nansel et al., 2001). The implication of this sex difference is that males are twice as likely to be diagnosed with ADHD as females and three times more likely to be involved in bullying situations (Nieman, 2011; CDC, 2003; Biederman et al., 2002).

As prior research has demonstrated a link between bullying and ADHD, further understanding of this link is only possible through an examination of both factors. Research using correlation analysis indicates individuals diagnosed with ADHD also experienced more victim and bully/victim situations, which leads to questions about how these diagnoses are made and the psychological profiles of persons with ADHD.

Attention-Deficit/Hyperactivity Disorder

Attention-Deficit/Hyperactivity Disorder (ADHD) is a common neuropsychological disorder that affects approximately 5-8% of the population (Mayes, Bagwell, & Erkulwater, 2008). ADHD is currently the most commonly diagnosed

mental disorder for persons under age 18 and has been designated as the most researched pediatric mental disorder (Mayes et al., 2008). It was originally conceptualized as a disorder of excess motor activity only affecting children, but with the introduction of the DSM-III (APA, 1980) the definition was extended to include symptoms of inattention. This addition of inattention led to the introduction of research into adult ADHD and with this new population, questions about changes in symptoms that may occur during maturation became a topic of interest.

Diagnostic Criteria for ADHD

The DSM-IV-TR (APA, 2000) specifies two classes of symptoms: one for ADHD hyperactivity/impulsivity and another for ADHD inattentive. The corresponding symptoms for each class are shown in Table 1. To reach diagnostic significance, an individual must exhibit six of the nine symptoms in a single class or in both classes. The symptoms must occur across at least two settings and interfere significantly with the individual's life activities for at least six months (APA, 2000). Individuals presenting with symptoms in only one setting are diagnosed as "premorbidity" or may be considered to have situational ADHD (Mannuzza, Klein, & Mouton, 2002). Other complications for less than threshold, or premorbidity ADHD, include the sources used to gather the information, effects of student's insubordination on teacher ratings, and halo effects (Mannuzza et al., 2002). These may complicate the diagnosis of a student and lead to different symptoms reported across settings, or what may be referred to as "situational" ADHD (Purper-Ouakil, Wohl, Mouren, & Gorwood, 2004). Research on premorbidity or situational ADHD is not as prevalent as research on ADHD meeting the diagnostic criteria.

The symptoms of ADHD, situational or full diagnostic, are typically classified into three categories: hyperactivity, impulsivity, and inattention. The categories of hyperactivity and impulsivity fall under the class of ADHD hyperactive/impulsive, so the nine items in this class are divided between the two different types of symptoms. The class for ADHD inattentive contains nine items and therefore receives more weight in any diagnosis using the DSM-IV-TR (APA, 2000) system.

An individual may present with only one class of symptoms resulting in a pure diagnosis or may show symptoms of inattention as well as hyperactivity and impulsivity, which would be classified as combined. Children are most often diagnosed with ADHD-combined, but with maturity, the symptoms of hyperactivity often decline (Kieling et al., 2010). A physician determines the exact diagnosis based on behavioral checklists completed by individuals who interact most with the patient. For diagnostic purposes, ADHD-combined and ADHD-hyperactivity/impulsivity represent the most commonly diagnosed categories and present with more unique symptoms when compared to ADHD-inattentive (Hervey, Epstein, & Curry, 2004). Since these overt symptoms (i.e., hyperactivity/impulsivity) decline with maturity, a diagnosis outside of childhood may be more difficult to make, a situation confounded by the current age of onset criteria for symptoms.

A diagnosis of ADHD is one of the only medical diagnoses conferred without an invasive medical test. Checklists for diagnostic decisions in children are typically completed by a parent or guardian and a teacher, but adults are typically diagnosed on the basis of self-report (Zucker, Morris, Ingram, Morris, & Bakeman, 2002). Unfortunately, the concordance between self-report of children and adult ratings range from low to

moderate, making the diagnostic decisions using this format even more questionable (Jensen et al., 1999; Loeber, Green, Lahey, & Stouthamer-Loeber, 1991). As adult opinions carry more weight in diagnostic decisions, this could have a significant impact on the number of diagnosed children. The relative weight given to symptoms of inattention in most diagnostic checklists may also be problematic given the lowered inter-rater reliability found among items in this domain (Zucker et al., 2002). Far greater weight is attributed to symptoms of inattention in the diagnostic criteria, but the medical definitions of the disorder specify it as a disorder of behavioral inhibition (Spencer, Biederman, & Mick, 2007). Since the disorder is primarily considered a failure in behavioral inhibition, it is problematic that the diagnostic criteria contain more items related to a secondary characteristic of the disorder such as inattention.

Very few assessments provide a direct measure of the behavioral symptoms of ADHD. The behavioral checklists rely on observation and provide a subjective evaluation of symptoms. The checklists are standardized, but the rating of these behaviors is highly subjective because the definition of normal behaviors is not standardized. The behavior that is considered normal in one setting with one population may be considered atypical in another setting. An alternative way to measure symptoms of attention and behavioral inhibition is through the Stroop test (Stroop, 1935).

The Stroop test produces an interference phenomenon that is resistant to practice effects, objectively measurable and large in effect size (Homack & Riccio, 2004). The interference that results from selective attention and behavioral inhibition occurs when the participant must choose to attend to a specific stimulus, the color of print, and inhibit an automatic response, reading a printed word. First introduced in 1935 as a part of John

Ridley Stroop's dissertation project, the Stroop test has continued to be a topic of research and a reliable test of attention as evidenced by its use in studies of ADHD and cognitive control in both children and adults (King, Colla, Brass, Heuser, & von Cramen, 2007; Homack & Riccio, 2004). Stroop's original 1935 article was also the most cited article in the *Social Sciences Citation Index* from 1974 to 1990 (MacLeod, 1992). The Stroop test measures automatic processes against controlled processes and assesses attentional control exerted over multidimensional stimuli (Stroop, 1935).

Table 1. *Diagnostic Criteria for each class of ADHD symptoms*

Hyperactive/Impulsive Criteria	Inattentive Criteria
Often fidgets with hands or feet or squirms in seat.	Often does not give close attention to details or makes careless mistakes in schoolwork, work, or other activities.
Often gets up from seat when remaining in seat is expected.	Often has trouble keeping attention on tasks or play activities.
Often runs about or climbs when and where it is not appropriate (adolescents or adults may feel very restless).	Often does not seem to listen when spoken to directly.
Often has trouble playing or enjoying leisure activities quietly.	Often does not follow instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions).
Is often "on the go" or often acts as if "driven by a motor."	Often has trouble organizing activities.
Often talks excessively.	Often avoids, dislikes, or doesn't want to do things that take a lot of mental effort for a long period of time (such as schoolwork or homework).
Often blurts out answers before questions have been finished.	Often loses things needed for tasks and activities (e.g., toys, school assignments, pencils, books, or tools).
Often has trouble waiting one's turn.	Is often easily distracted.
Often interrupts or intrudes on others (e.g., butts into conversations or games).	Is often forgetful in daily activities

Clarification of the Stroop effect and the utility of the Stroop test for measuring attention requires an explanation of associated vocabulary. Automatic processes, such as reading of color words in the Stroop test, do not require attention for participants with extensive reading practice and can be completed without attentional control under ordinary circumstances. Driving a car and listening to the radio is an automatic process until the driving conditions become treacherous, such as would occur during a thunderstorm. When the rain becomes intense, driving becomes a controlled process and requires attention. At this point, most drivers would turn off the radio in order to focus attention on the task of driving. For the Stroop test, reading is an automatic process that has been perfected through extensive practice, but when the task switches to retrieval of a color name, the automatic process of reading must be inhibited or suppressed (Stroop, 1935). The effort required to inhibit an automatic response and use a controlled process produces interference, which is measured as reaction time (King et al., 2007).

On the Stroop test, individuals with ADHD show a greater increase in reaction time, a larger number of errors, and slower overall reading time when compared to individuals without ADHD (Rucklidge & Tannock, 2002). Studies show that individuals with ADHD have slower overall reaction times and demonstrate a greater interference effect when attempting to inhibit a preplanned response, such as reading in the Stroop test (Rucklidge & Tannock, 2002; Castellanos & Tannock, 2002). In addition, the use of stimulant medication, which has been attributed to improved behavioral inhibition and increased academic performance in persons with ADHD, was also shown to decrease reaction time in the color naming task on the Stroop test for this population (Langleben et al., 2006). Performance by individuals with ADHD on stimulant medication appeared

more like the performance of individuals without ADHD. The Stroop test has also been shown to discriminate between adults with and without ADHD by means of performance speed and error rate, a finding attributed to a reduced ability to control interference (King et al., 2007).

Despite the Stroop test's utility in discriminating between persons with and without ADHD, the majority of physicians diagnose ADHD based on an oral interview and behavioral checklist (PPP, 2007). Family practice physicians appear to use the behavioral checklists more than any other diagnostic method for ADHD while psychiatrists often give a battery of assessment including the Stroop test (PPP, 2007). Unfortunately, the majority of cases of ADHD are diagnosed by family practice physicians, which also means most of cases of ADHD are diagnosed through behavioral checklists (Rushton et al., 2004). The behavior checklist adds a measure of subjectivity to the diagnosis because the checklist is referenced by behavior considered inappropriate in a particular setting; however, the checklist does not provide a specific, operationalized definition for levels of inappropriate behavior. The lack of a definition leaves the respondent the freedom to decide what constitutes appropriate and inappropriate behavior in a given situation.

The prevalence of ADHD is tied to the diagnostic definition and measures being utilized; however, the age of onset criterion in childhood has been a constant throughout the multiple revisions of both the DSM and *International Classification for Diseases* (IDC; World Health Organization [WHO], 1992). Age of onset has been criticized in the case of adult ADHD as an unnecessary impediment for diagnosis (Kieling et al., 2010). The age of onset criterion is set arbitrarily at age 7, but when using the diagnostic criteria

in a retrospective manner to establish symptom onset, this cut-off becomes problematic (Kieling et al., 2010; Henry, Moffitt, Caspi, Langley, & Silva, 1994). The problem arises because age of onset criteria presupposes a biological etiology by requiring appearance of symptoms in childhood and eliminating a developmental trajectory through adulthood as is allowed in the majority of mental disorders. Total cases diagnosed before age 18 account for 80-90% of the diagnosed cases, so the prevalence of childhood and adult ADHD are not comparable (Wilens, Faraone, & Biederman, 2004). Fewer cases of ADHD are diagnosed in adulthood because the age of onset criterion requires retrospective evaluations; however, ADHD symptoms that develop in response to environmental stimuli may begin after age seven and meet all other diagnostic criteria. These cases may be as impaired as cases meeting the age of onset criterion, but this criterion will prevent these cases from receiving a diagnosis or treatment.

Etiology of ADHD

The etiology of ADHD continues to be a topic of research because the genesis of the symptoms should be directly tied to the diagnostic criteria. Heterogeneity of the disorder complicates findings related to biological and environmental genesis of the disorder. Samples used for studies investigating the etiology of ADHD contain all three subtypes: combined, hyperactivity/impulsivity, and inattention; however, recent studies have questioned whether the three subtypes represent a single disorder or separate disorders with unique neuropsychological signatures (Milich et al., 2001). In addition, the compounding factor of familial environments cannot be removed from the proband studies showing a disposition to genetic transmission of the disorder (Faraone, Biederman, & Friedman, 2000). To further understand the etiology of ADHD, studies

need to be conducted on all three subtypes separately, as the environmental or biological prerequisites of each subtype may differ.

Studies indicate ADHD may be a heritable disorder, or the predisposition for development of the disorder may be heritable through a candidate gene sequence (Li, Sham, Owen, & He, 2006). Specifically, risk genes controlling dopamine receptors have been identified as a possible source for biologically caused ADHD; however, these studies generally have low sample sizes which may make findings less generalizable (Ogdie et al., 2003). Adoption and twin studies report heritability estimates for ADHD between 60% and 90%, but these are isolated studies that have not been replicated with larger, more diverse samples. Additional twin studies conducted on diverse samples verify a strong heritability of ADHD by using individual differences to analyze the continuum of symptoms among over 10,000 children (Neuman et al., 2001; Thapar, Harrington, & McGuffin, 2001). Furthermore, none of the included studies evaluated environmental criteria such as exposure to interpersonal violence (Levy, Hay, McStephen, Wood, & Waldman, 1997; Smalley, 1997; Faraone & Doyle, 2001; Neuman et al., 2001; Thapar, Harrington, & McGuffin, 2001).

The connection between ADHD symptoms of inattention, dopamine regulation, and memory suggests ADHD may share a genetic basis or predisposition with other mental disorders like depression and anxiety (Li et al., 2006). Studies suggest multiple pathways for the development of ADHD such that environmental insults, like exposure to toxins or lack of reinforcement for appropriate behaviors, may lead to the development of some symptoms while genetics may account for other symptoms (Thorell, 2007). The lack of a clear genetic or biologic etiology prevents the formation of a more homogenous

definition for the disorder and may account for much of the heterogeneity found among ADHD samples and treatment studies (Furman, 2005; Nigg, Willcutt, Doyle, & Sonuga-Barke, 2005). If the disorder can be divided into 3 separate disorders, then the treatment and etiology research may be able to focus on the aspects connected to the separate subtypes and provide a clearer direction for the field of ADHD research.

Comorbidity in ADHD

The presence of comorbidities further complicates diagnosing ADHD. The DSM-IV-TR (APA, 2000) specifies that a diagnosis of ADHD may only be made if the symptoms are not present due to another mental disorder. Since many of the comorbid disorders share symptoms with ADHD, physicians making the diagnosis must rely on information gathered from subjective, behavioral checklists. For example, one of the most common comorbid disorders with ADHD is generalized anxiety disorder (Biederman et al., 2002). Anxiety disorders have been found in close to a third of individuals diagnosed with ADHD, and the rate of comorbidity increases with the age of the sample finally peaking at close to 50% in adulthood (Biederman et al., 2002; MTA Cooperative Group, 1999; Jensen et al., 2001). Comorbidity of posttraumatic stress disorder (PTSD) and ADHD was found to be 12% in adults in a recent national study (Kessler et al., 2010). Symptom exacerbation tends to occur in unstructured settings or in situations requiring intense cognitive control (Rowland, Lesesne, & Abramowitz, 2002). Anxiety also appears to exacerbate symptoms, and individuals susceptible to social anxiety may demonstrate additional symptoms mimicking ADHD (PPP, 2007). Extreme stress and hypervigilance due to a history of abuse have both been implicated for causing symptoms in clinical trials that may mimic ADHD (Furman, 2005). The stress and

hypervigilance could be from cumulative effects of negative life events, family circumstances, or unexpected, traumatic disruptions (Rydell, 2010).

Little reliable demographic information on ADHD prevalence is available, so questions about demographic distributions along with socioeconomic variables or familial circumstances are difficult to address (Rowland et al., 2002). It has even been hypothesized that ADHD may represent overlapping distributions of different disorders, which would explain the heterogeneity seen in many samples (Nigg et al., 2005). Diagnoses should eliminate the possibility of a comorbid disorder, and the primary disorder should be determined through a thorough medical and psychological screening (PPP, 2007); however, this is a guideline that is not often followed (Chan et al., 2000).

Wide variations have been reported regionally by primary care physicians in diagnostic criteria utilized for ADHD (Chan et al., 2000). In a study of pediatricians who diagnose ADHD, only 25% of the physicians surveyed used all five diagnostic criteria in the DSM-IV-R when committing a diagnosis to a patient (Rushton et al., 2004). For example, the DSM-IV-TR specifies five types of criteria for a diagnosis: the symptoms found in Table 1, the age of onset, number of settings required for a diagnosis, a level of impairment in functioning, and the exclusionary criterion about eliminating other mental disorders. The majority of physician followed the diagnostic criterion specifying the presence of six of the nine symptoms as well as the indication specifying the symptoms that must be present in at least two settings; however, the exclusionary criterion was used by less than a fourth of the physicians (Rushton et al., 2004). The same study reported great variation about diagnostic procedures by specialty, which leads to questions about the specific criteria that are used and the legitimacy of the diagnoses made with limited

criteria. Diagnoses for all mental disorders involve a certain amount of subjectivity, and ADHD in particular may be susceptible to individual opinions about what constitutes normal childhood behavior (Mayes et al., 2008). Diagnoses in adulthood and diagnoses of ADHD Inattentive may be even more subjective than ADHD Hyperactivity/Impulsivity or the combined type because the primary symptoms of inattention are more difficult to recognize and less overt when compared to symptoms of either hyperactivity or impulsivity (Biederman et al., 2002).

Symptoms related to a diagnosis of ADHD may make peer relations strained and could lead to bullying situations (Bacchini et al., 2008). When ADHD presents as comorbid with anxiety, the risk for bullying increases significantly (Kumpulainen et al., 1998). Correlation studies have established a relationship between ADHD and bullying; however, to the author's knowledge, the causal direction of the relationship has never been investigated experimentally. In addition, the causal link investigated through cross-sectional designs leaves questions about the etiology of both processes (Holmberg & Hjern, 2008). ADHD appears to be a predictor for both being a victim and a bully (Bacchini et al., 2008); however, other research has found that the ADHD and bullying connection differed by sex. In Bacchini et al.'s (2008) study, males with a diagnosis of ADHD were more likely to be a bully, and females with ADHD were more likely to be a victim.

Bullying

Bullying is a form of interpersonal violence characterized by an imbalance of power and reoccurring victimization of an individual (Monks & Smith, 2006). Bullying can occur in many forms including but not limited to physical, verbal, social or cyber

(Wang, Iannotti, Luk, & Nansel, 2010). The forms of bullying may be divided into relational bullying, such as social exclusion or spreading rumors, and direct bullying, which often involves an element of physical confrontation. Individuals involved in bullying have often been classified into five separate groups: bullies, bully/victims, victims, bystanders, and uninvolved. Studies investigating sex differences according to bullying type or involvement have been inconclusive (Wang et al., 2010; Nieman, 2011; Batsche & Knoff, 1994; Carney & Merrell, 2001).

National and international studies show bullying may be on the rise and is currently the most prevalent form of violence in school age populations (Batsche & Knoff, 1994; Carney & Merrell, 2001; US Department of Education, 2011). It has been estimated that from 15–70% of students internationally have experienced bullying in some form (King et al., 1994; US Department of Education, 1999). In the United States, approximately 30% of students are involved in some type of bullying (US Department of Education, 2011). For students, bullying appears to be most prevalent in the middle school years with a decline in occurrence during the high school years (Nolin, Davies, & Chandler, 1996; Nansel et al., 2001). Bullying is also prevalent in adult populations, often considered workplace bullying, making this form of interpersonal violence particularly salient in studies of psychological functioning (Vega & Comer, 2005). Bullying in the workplace does not appear to follow trajectories of age or sex like bullying during the school years (Tehrani, 2004; Mikkelsen & Einarsen, 2002).

Victims of Bullying

Being a victim of bullying is predictive of psychiatric disorders in adulthood (Kumpulainen, 2008). Various researchers have found that victims often lack social

skills, which then creates the victim situation, and this cycle is robust over time (Carney & Merrell, 2001). Victims are generally classified as either submissive or provocative victims suggesting different social mechanisms may be at work in selecting each kind of victim (Carney & Merrell, 2001). Submissive victims tend to react with crying or shame, and provocative victims are considered victims who elicit attention through negative behavior; regardless of classification, both types tend to have low self-esteem. The psychological impact on the victim of bullying may last beyond the attacks and lead to the development of specific psychiatric disorders such as generalized anxiety disorder and social phobias (Olweus, 1997; Ma, 2001). Among a group of individuals diagnosed with social phobias, 92% reported a history of serious teasing and bullying, but more importantly, this group had a significantly lower age of onset for diagnosis of social phobia when compared with groups reporting less experiences of bullying or teasing (McCabe, Antony, Summerfeldt, Liss, & Swinson, 2003). The earlier age of onset emphasizes the role of experiencing bullying and teasing in the development of neuropsychological disorders.

The frequency of bullying also contributes to the magnitude of impact. Victims of chronic bullying, or continuous bullying, exhibited scores on the *Impact of Event* scale comparable to rape victims (Mikkelsen & Einarsen, 2002). The *Impact of Event* scale is used to measure response to trauma, such as avoidance and intrusion and is often included in assessments of Post-traumatic Stress Disorder (Turner & Lee, 1998). Many researchers have compared bullying to domestic violence in that it is chronic and creates a power gap between the perpetrator and the victim (Tehrani, 2004). Those who experience bullying report being further ostracized by peers or having experienced a loss

of social status which may lead to a cycle of victimization and vulnerability (Nansel et al., 2001). Once the cycle starts, victims may not be able to escape except through extreme means.

Bully/Victims of Bullying

Victims may also be involved in bullying others and individuals in this category, often referred to as bully/victims, may suffer the most devastating psychological outcomes. A study conducted by the Center for Disease Control and Prevention (CDC) found that bully/victims were three times more likely to consider suicide when compared with pure victims and were also four times more likely to engage in self-destructive behavior like cutting (Nieman, 2011). Bully/victim status has also been linked to physical illnesses, injury, and elevated somatic complaints in school children as well as increased visits to the school nurse resulting in missed educational opportunities (Vernberg, Nelson, Fonagy, & Twemlow, 2011). Bully/victims are generally rated as more dislikeable by peers when compared to either pure bullies or pure victims and are prone to elevated scores on measures of depression and aggression (Veenstra et al., 2005). The unique characteristics associated with the bully/victim category suggests this group needs additional study (Solberg, Olweus, & Endresen, 2007).

Bullies in Bullying

Pure bullies are often depicted as aggressive and less socially developed when compared to peers, but recent research has questioned this image. Unlike bullies and bully/victims, pure bullies often exhibit low levels of social anxiety and may be popular with classmates (Smokowski & Kopasz, 2005). Some studies have even found bullies make friends more easily than other children, and this link requires further examination

(Nansel et al., 2001). Bandura (2002) proposed that bullies may adjust cognitions associated with behavior through moral disengagement, or in other words, the bully understands the behavior is wrong but justifies it through reconstructing the event or comparing to a peer's worse behavior. In an empirical study of bullies, victims, and helpful bystanders, bullies appeared to be more willing to morally disengage than either victims or helpful bystanders, but they did not show less social cognitions overall (Gini, 2006).

Pure bullies may show average achievement in early grades, but during adolescence, bullies appear to achieve less than average and develop a negative opinion of school (Smokowski & Kopasz, 2005). The cumulative effect of bullying over time may lead to changes in the bully's opinion of school as well as increased psychological impact. Adults who were bullies in middle and high school are at increased risk for substance abuse, family violence, and development of mental health problems (Nieman, 2011). Development of bullying behaviors has been linked to gang involvement, family circumstances, such as single-parent homes and harsh discipline tactics (Olweus, 1993).

Bystanders in Bullying

Individuals who witness bullying but do not become directly involved are considered bystanders (Rivers, Poteat, Noret, & Ashurst, 2009). Bullying may have a significant impact on the psychological well-being of victims, victim/bullies, bullies, and bystanders. Studies report increased anxiety, depression, decreased concentration, lower self-esteem for victims, bully/victims and bystanders as well as an increased risk for suicide (O'Moore, 2000). The impact may last into adulthood and eventually become manifested as inability to take action and a general feeling of being unsafe (Hazler,

1994). For bystanders, the choice to participate, intervene, or ignore bullying may be linked to the psychological impact experienced. The impact of intervening may include fear of becoming a victim while witnessing, but not intervening may lead to anxiety, inferiority, and shame (Rivers et al., 2009). Research has indicated that bystanders who witness repeat acts of bullying may experience as much psychological distress as a victim or bully/victim (Jeffrey, 2004). Bystanders provide an audience for bullies, and the presence of the audience may cause bullying behaviors to escalate (Rivers et al., 2009). Studies have found that bystanders are present at 85% of bullying scenes but intervene only 10% of the time, and the impact of bystanders relates to frequency of bullying incidents (Jeffrey, 2004). As bystanders witness and do not intervene, the bully becomes socially reinforced for the negative behavior, and the bystanders become desensitized to the violence (Jeffrey, 2004).

The relationship between bullying and ADHD has been demonstrated in the literature. Since bullying and ADHD represent significant issues for both school aged and young adult population, the relationship between the two may have significant educational impact. Bully/victims, victims, and bystanders demonstrate symptoms analogous to ADHD, such as difficulty concentrating and inattention. These individuals also demonstrate increased levels of anxiety, which is known to occur as a frequent comorbid disorder with ADHD.

Summary of Relevant Literature

Current research on the etiology of symptoms of ADHD focuses on genetic and biological factors, but neglects to investigate environmental stimuli. The research on etiology of ADHD has been inconclusive, and the lack of definitive results is generally

accounted for by the heterogeneity of the samples in the studies. Since ADHD can be diagnosed as ADHD inattentive, ADHD hyperactivity/impulsivity, or ADHD combined, it has been assumed that the symptoms for all three diagnostic groups share an etiology; however, it is possible that these three diagnostic groups actually represent separate disorders and have different etiologies.

Since bullying and ADHD appear to be closely related in correlation studies and bullying appears to cause or exacerbate some symptoms similar to those observed in individuals with a diagnosis of ADHD, it is logical to examine this relationship through experimental designs.

Importance of Current Study

The current study is the first to investigate the relationship between the development of symptoms related to ADHD through an experimental method involving bullying. The design allows causal interpretations related to ADHD symptom development due to the temporal relationship between the bullying stimuli and the assessment of inattention. Most studies of bullying and ADHD symptoms cannot determine a causal direction of symptoms because these studies rely on retrospective evaluations of both bullying and ADHD (Mikkelsen & Einarsen, 2002).

The results of the current study may raise questions about the current diagnostic procedures surrounding ADHD. The DSM-IV-TR (APA, 2000) specifies the elimination of other diagnoses prior to assigning a diagnosis of ADHD, but studies have indicated that this protocol is not commonly followed (Mayes et al., 2008). Investigation of violence exposure prior to assigning a diagnosis of ADHD may be necessary to rule out alternative diagnoses and develop a treatment plan based on the primary disorder.

Victims of low level and high level violence, particularly bullying, may require a different treatment and diagnostic protocol. Discovering the etiology of symptoms in disorders diagnosed through behavioral checklists rather than medical tests may require additional assessments beyond what is currently used (Ravin & Boal, 1989).

CHAPTER THREE

Method

Participants

The participants were 150 undergraduate college students attending a large, private university in central Texas. Participants were recruited through undergraduate and graduate classes. The mean age of the sample was 22.8 (5.2) years and 25% male and 75% female. The classification of the sample was as follows: 4% freshman, 24% sophomore, 10% junior, 23% senior, and 39% graduate students. Of the 150 participants, 0.2% had a prior diagnosis of ADHD. All participants were current students in the university, a process which required the submission of standardized test scores from either the Scholastic Aptitude Test (SAT) or the American College Testing (ACT). No further information on cognitive abilities was collected.

To determine the appropriate sample size, a power analysis was conducted with an alpha level of .05 and an effect size of .20. To achieve a power of .80 with a repeated measures design where the correlation between testing was $r = .60$, a sample size of 196 was indicated. Additional participants beyond 196 will increase the power, which may be necessary because the size of effects from the current treatment is unknown. As a precaution, the effect size used in the power analysis was set between low and medium sized effect according to Cohen (1988). As the experiment progressed, a reduction in sample size was sought due to the magnitude of the effect size. The sample was reduced

to 150, as power at this sample size exceeded the settings of the *a priori* power analysis and a clear trend emerged from the data.

Research Design

A within subjects, repeated measures research design was used in the current study. Participants viewed three videos of varying intensity of bullying (the independent variable) with a measure of inattention following each episode (the dependent variable). Participants were randomly assigned to three different treatment order groups determined by a Latin-square method. The Latin-square method was selected as a means to address the possible order effects of viewing the bullying episodes. The within subjects design with random assignment to treatment order groups controlled for possible order effects and other threats to internal validity, such as maturation, mortality, differential selection of participants, and selection-maturation interaction (Gay, Mills, & Airasian, 2009).

Experimental Treatment: The Independent Variable

Three videos demonstrating increasingly intense scenarios of bullying were created for the current study; an additional video depicting typical social interaction was also included to establish a baseline assessment on the dependent variable, inattention. Transcripts of all bullying videos are included in Appendix A. The same actors/actresses were used for each set of bullying videos in order to promote identification with the victims of bullying (Bandura et al., 1963). The actors/actresses were current graduate students in the school psychology program at the university who volunteered their participation.

A separate set of bullying videos were created for males and female participants as prior research on modeling and the effects of vicarious learning has demonstrated an

effect of sex on both mechanisms (Bandura, Ross, & Ross, 1963; Bandura, 1996).

Identification with the model was crucial for identification to occur in vicarious learning situations, and care was taken to match the victims in the scenarios to the participants of the study (Bandura et al., 1963). The goal was to have the participants identify with the victims depicted in the bullying videos. Scenarios depicting female bullying included three White female actresses. The tallest female was selected to act the role of the bully; the next tallest female played the role of a bystander, and the smallest female played the role of the victim. The selection of the tallest female to play the bully was made with the idea that her stature would add to her level of intimidation of the victim.

Bullying videos for male participants included a male Chinese American student and White male students. Again, physical stature was used similarly to the female actresses. The smallest White student was selected as the victim, the Chinese American student as the bystander, and the tallest, oldest male student acted the role of the bully. Consistent with the social cognitive theory, the actor and actress playing the bully were not punished for his/her bullying behaviors by bystanders but rather reinforced for their actions by the bystanders' reactions and the lack of intervention from an authority figure (Bandura, 1996).

The initial, or baseline video, was seen first and demonstrated a socially acceptable form of interaction between college students. All six actors and actresses were included in this single, introductory scene. The baseline scenario was set in a typical college classroom, and actors/actresses were depicted dividing tasks necessary to complete a group project. Actors/actresses were given an outline of the scene but

encouraged to improvise dialog in an effort to increase the ecological validity of the scenario.

The other three videos contained scenes of increasingly intense bullying. One of the three videos contained a low intensity verbal bullying scene (i.e., verbal insults) using the same actors/actresses from the baseline video. A second bullying video of relatively moderate intensity used verbal insults with limited physical violence (i.e., pushing the victim). A third and final bullying video depicted social exclusion and direct physical violence to the bullying. The victim in all three bullying videos was the same actor/actress in order to promote identification between the participants and the actor/actress, and information on the victim actors'/actress' choices may be found in the second paragraph of the experimental treatment. The verbal insults used in the video were taken from the *Olweus Bully/Victim Questionnaire* (Olweus, 1996).

Measures

Four separate measures were used in the current study: a demographic questionnaire, the Stroop test for assessing attention, the *Screening for Inattention Symptoms- College* (SIS-C, Sulak, 2011), and a bullying survey. A measure of heart rate was also ascertained as a means to track the level of participants' anxiety.

Assessing Attention with the Stroop test

The Stroop test, first proposed in 1935, has become a popular index of attention because the effect is large and reliable (Macleod, 1992). The Stroop test measures selective attention and response inhibition by creating interference between the automatic process of word reading and the controlled process of color naming (Kilic, Sener, Kockar, & Karakas, 2007). For example, a participant is shown a word, such as "RED,"

in either black print, red print or another color (e.g., blue), and the participant must say the word. Reliability for all three Stroop tasks were found to be reliable for children ($r > .80$), and factor analyses demonstrated scores on the Stroop test loaded on the same factor as the Digit Span and Similarities subtests of the *Weschler Adult Intelligence Scale* (WAIS) (Homack & Riccio, 2004). Mean effect size found in a meta-analysis on the sensitivity and specificity of the Stroop test for ADHD differentiation was $d = -0.75$, which according to Cohen (1988), could be considered between a medium and large effect size (Homack & Riccio, 2004). Validity studies have demonstrated the Stroop test differentiates between adult samples with ADHD and without ADHD by means of errors and latency (King et al., 2007). The Stroop test also differentiates between participants with frontal lobe damage resulting in decreased executive functions and typically functioning participants (Demakis, 2004).

Traditional Stroop tests include three parts: a word task, a color task, and a word-color task (Homack & Riccio, 2004). Participants are asked to read each task card aloud as quickly as possible and with as few errors as possible. The verbal response with stimuli cards was chosen for the Stroop test because this format elicits the largest interference scores, which can be interpreted as a failure of selective attention and behavioral inhibition (Ikeda, Hirata, Okuzumi, & Kokubun, 2010). A measurement of errors and time is recorded for each task. Interference, as evidenced by selective attention and cognitive flexibility, is calculated comparing the difference between the word and color score to the word-color score; however, other researchers advocate calculating a ratio (color-word: color) (Homack & Riccio, 2004). In the current project both difference and ratio were calculated as a measure of interference. The interference

score from the Stroop test was used as the dependent variable, which is symptoms of inattention. Each iteration of the Stroop test takes approximately five minutes. Testing materials for the Stroop test are located in Appendix B.

Screeners for Inattention Symptoms

The Screener for Inattention Symptoms – C (SIS-C; Sulak, 2011) was constructed using the DSM-IV-TR criteria for ADHD inattentive (APA, 2000). The criteria for ADHD inattentive was used to create 90 items that reflected manifestation of the criteria in a college setting, such as “I day dream during lectures.” It was field-tested with 120 college age participants and was shown to differentiate between individuals with a diagnosis of ADHD and those without a diagnosis. Reliability for the total score was $\alpha = .93$ and ranged from $\alpha = .79-.89$ for the subscales. Factor analysis supported a six-factor structure for the SIS-C with the following subscale emerging as factors: attention, listening behavior, persistence, personal organization, accountability, and material organization.

The SIS-C is a self-report instrument administered online and designed to identify symptoms of inattention specific to college populations. Responses are in a Likert scale format ranging from Never to Often and are related to the frequency of the participant’s experiencing the symptom indicated by the item. Data is collected by assigning a weight to each Likert response, such that Never receives a weight of four and Often receives a weight of zero for items that are unlikely to occur in individuals with symptoms of inattention. Some items are reverse coded to eliminate response set. The administration of the SIS-C takes approximately 10 minutes. The results of the SIS-C were used to

support the results of the Stroop test since both instruments are a measure of attention, or inattention. The SIS-C is located in Appendix B.

Bullying Survey

The survey used to assess bullying behaviors is an adaptation of a survey used to measure cyberbullying (Aoyama, Saxon, & Fearon, 2011, in press). Questions were adapted to include information about verbal bullying, physical bullying, relational bullying, and social exclusion. Some items measuring cyberbullying were retained because the information in the questions appeared to fit the context of the current study. Before the traditional bullying section begins, a definition of bullying as defined by Olweus (1996) in the *The Revised Olweus Bully/Victim Questionnaire* is provided. A similar definition was given before the section on cyberbullying. The final version of the survey contains 21 items. Reliability information was collected during the current study.

The bullying measure was administered online. Each item was rated according to the frequency of occurrence and corresponding weights were assigned to each response. The response “No, never happened” was assigned a zero and the response “Yes, several times a week” was assigned a four. The administration of the bullying survey took approximately 10 minutes. The bullying survey is included in Appendix B.

Heart Rate

Heart rate was assessed using a wristwatch/heart monitor. The device was worn by the participant throughout the experiment and produced output of heart beats per minute.

Procedure

An initial pilot study was conducted to resolve issues related to timing, organization, and logistics of all research design aspects. Twelve volunteer participants were recruited for the pilot study and were asked to complete a mock-version of the experiment. The pilot study exposed logistical problems with the procedures and allowed for changes that will enhance treatment fidelity in the final study. No data derived from the pilot study was included in the final data set.

Following Institutional Review Board approval and the pilot study, participants for the current study were recruited through undergraduate and graduate classes with the possible incentive of extra credit in one of their courses. Participants were asked to schedule appointments with the primary investigator for 20-minute individual sessions. The primary investigator had the participant complete informed consent and Stroop measures in an isolated office with little distractions. Videos of bullying were shown on a computer with audio, while the Stroop test was conducted with a paper and pencil presentation using cards of stimuli. Heart rate was assessed with a SmartHealth wristwatch/heart rate monitor. The primary investigator conducted all individual sessions and recorded all the data. The demographic survey, SIS-C, and the bullying survey were completed online at the participants' convenience following the viewing of bullying videos and Stroop test administration. See Appendix A for testing materials.

The participants were randomly assigned to one of three bullying video orders. Participants were assigned an identification number from one to 200 based on the order of arrival for testing. A random number generator was used to assign all participant identification numbers to a video order. All video sequences began with the initial video

of appropriate social interactions using all six actors/actresses. The baseline Stroop test followed. The Stroop test involved reading a card with the color words printed in black, reading a card with the color words printed in color, and naming the colors of print on a third card. For each card, the total time used to perform the task and the number of errors were recorded on the participant data recording sheet. The data recording sheets are located in Appendix B.

As described above, participants were randomly assigned to one of three experimental conditions (i.e., order of bullying videos). The three experimental conditions had a different order of bullying intensity video presentation for the presenting bullying scenarios. After each video, heart rate was assessed and participants completed a Stroop test, resulting in three sets of Stroop data related to the experimental conditions. With multiple iterations of the Stroop test, a practice effect may occur. Previous studies found a practice effect of $d = .14$ for test/retest with persons with a diagnoses of multiple sclerosis (Portaccio et al., 2010). No other studies investigating the practice effect of the Stroop test were found.

Data were collected on participant data recording sheets. During testing, the primary investigator recorded errors and time of performance on a recording sheet for each participant, and a copy of this document may be found in Appendix A. The Stroop test took less than five minutes per testing situation, and the test was administered four times. Following the viewing of all four videos and the four Stroop tests each participant completed a demographic questionnaire, the SIS-C, and a bullying survey online (Aoyama et al., 2011, in press). See Appendix B for the demographic form, SIS-C, and bullying survey.

Data Analysis

Analysis of variance (ANOVA) was used to look for main effects of treatment order on symptoms of inattention. Nonsignificant results indicating a non-order effect for video order allowed the next phase of analyses.

Analysis of covariance (ANCOVA) controlling for sex was used to examine the effect of the bullying stimulus videos on symptoms of inattention. Power and effect size was provided with the analysis. Mauchley's test of sphericity assessed the assumption of homogeneity of variance, and the epsilon value determined the appropriate correction to the degrees of freedom. The ANCOVA main effects addressed the first research question in the current study by showing if vicarious experiences of bullying had an effect on symptoms of inattention.

When significant main effect for stimulus on inattention were found, then tests of within-subject contrasts were used to determine whether differences existed between attention symptoms at each level of video stimuli. The cumulative effect of the video stimulus was examined through Sidak pairwise comparisons. The pairwise comparisons addressed the second research question because the results of the Sidak are able to show the cumulative effects of viewing the videos. The Sidak was selected because it reduces the power of the analysis less than the Bonferoni (Field, 2005). *A priori* repeated contrasts tested the difference between the baseline attention score and the attention score after presentation of each level. Repeated contrasts are appropriate with nonorthogonal contrasts as occur in repeat measures, and a repeat contrast compares each level of treatment to the previous level. Other exploratory analyses were conducted using the responses from the bullying survey.

Sex differences in the effects of bullying on symptoms of inattention were first assessed through ANCOVA. Sex was entered as a covariate, and the analysis did not produce a main effect for the interaction between sex and treatment. A significant F value for the interaction may indicate the treatment main effects differ by sex, and within-subject contrasts should indicate the direction and trajectory of the differences by sex.

Changes in heart rate were assessed through repeat-measures ANOVA. As with sex differences, within-subject contrasts should indicate the direction and trajectory of the heart rate over the course of the experiment. Pairwise comparisons using a Sidak correction were used to test the changes in heart rate between specific time points.

In addition, principal components analysis was used to establish factors in the bully survey. The factors were then tested for reliability using Cronbach's alpha.

CHAPTER FOUR

Results

The results related to the original research questions are addressed in this section. The first research question addressed the effects of vicarious bullying on symptoms of inattention, and it was hypothesized that exposure to vicarious bullying would result in higher levels of inattention. The second research question addressed the effects of exposure to vicarious bullying over the course of the experiment or time. It was hypothesized that more exposure to vicarious bullying would lead to greater increases in the symptoms of inattention, or a cumulative negative effect, over time. The third research question addressed the effects of vicarious bullying on symptoms of inattention by sex, and it was hypothesized that males would have higher initial levels of inattention measured through interference at the baseline, but females would display a greater negative change in inattention over time. Each research question is addressed separately in the results below; however, overlap in the analyses may occur and care is taken to avoid redundancy.

To address the research questions, analysis of variance (ANOVA) and analysis of covariance (ANCOVA) were used. Participants were randomly assigned to three unique orders of bullying videos to control effects due to viewing order. To determine if the order of viewing affected symptoms of inattention, an ANOVA was conducted on two dependent measures of inattention, *difference* and *ratio*, at each time point. Both types of scores are used in the literature for the Stroop test; however, the ratio score is reported to

have higher sensitivity to changes in interference (Lansbergen, Kenemans, & Engeland, 2007). A difference score is the score for the time required to read a list of color words after being subtracted from the time required to name the print color of a word during the same trial. For example, using the following equation, Time for naming printed color word list – Time for reading list of color words = Interference, a student with a printed color list time of 32.6 seconds and a reading list time of 14.3 seconds would have an interference score of 18.3 seconds. This represents the additional time required to switch from the automatized task of reading a word to the less automatized task of saying the printed color of a word. A ratio score is a quotient of the time required to read a list of color words divided by the time required to name the print color of a word. For example, using the following equation, Time for reading list / Time for printed color list = Interference, the previous student with a printed color list time of 32.6 seconds and a reading list time of 14.3 seconds would have an interference score of 0.44. A lower ratio score indicates greater interference and as such, an interference score of 0.44 would indicate a high level of interference. Thus, inattention was operationalized as scores on *difference* and *ratio* for each subject.

Test for Video Order Effects

Before addressing the research questions, a one-way ANOVA by order of bullying video presentation was conducted to assess the potential order effects of video order on symptoms of inattention (i.e., on difference and ratio scores). Two ANCOVAs were conducted to address the effects on symptoms of inattention over time. The time variable for the first ANCOVA represented difference scores on baseline to time 3, while the second ANCOVA used ratio scores from baseline to time 3. Sex was used as a

between subjects factor as it is a dichotomous, fixed variable and therefore not appropriate as a covariate. The Statistical Package for Social Sciences (SPSS) requires a distinction between factors and covariates when using the repeat measures analytical procedures; however, both are used to remove a variable's variance from the analysis. To use a variable as a covariate in SPSS, it must be measured on a ratio or interval scale, and sex is categorical. As such, sex was used as a between-factor variable and treated in the analysis as a traditional covariate. Since sex could not be controlled, ANCOVA allowed the effects of sex to be modeled. In this case, modeling simply implies showing the mathematical relation to the other variables. Findings for the test of video order effects are shown in Table 2.

Table 2. *Tests (ANOVA) for video order effects*

Scores	<i>F</i> ratio
Difference Scores	
Baseline	$F(2, 147) = 0.39, p = .676$
Time 1	$F(2, 147) = 2.40, p = .094$
Time 2	$F(2, 147) = 0.57, p = .566$
Time 3	$F(2, 147) = 0.34, p = .715$
Ratio Scores	
Baseline	$F(2, 147) = 0.22, p = .803$
Time 1	$F(2, 147) = 1.32, p = .272$
Time 2	$F(2, 147) = 1.78, p = .173$
Time 3	$F(2, 147) = 0.03, p = .997$

Note. Difference scores are defined as time required to read a list of color words after being subtracted from the time required to name the print color of a word during the same trial. Ratio scores represent the quotient of the time required to read a list of color words divided by the time required to name the print color of a word.

The results of the one-way ANOVA for both ratio and difference calculations of interference indicated the order in which bullying videos were viewed did not significantly affect symptoms of inattention. If video presentation order affected symptoms of inattention, it would imply a need to analyze each video order group

separately. The null hypothesis of no difference between the video order groups was not rejected as all significance values exceed $p < .05$.

Descriptive Statistics for Experimental Conditions

Descriptive statistics for the experimental conditions, total and by male and female, are shown in Table 3. For interpretation, the higher the mean on the difference score, the greater the interference; a lower mean ratio score indicates greater interference.

Table 3. *Descriptive statistics for difference and ratio scores*

Scores	Mean (SD)		
	Total (N=150)	Male (n=34)	Female (n=116)
Difference Scores			
Baseline	12.88 (2.96)	13.22 (3.25)	12.78 (2.88)
Time 1	13.25 (3.20)	13.81 (3.80)	13.08 (3.00)
Time 2	13.28 (2.76)	13.72 (2.60)	13.15 (2.80)
Time 3	13.00 (2.93)	13.47 (3.39)	12.86 (2.79)
Ratio Scores			
Baseline	1.80 (0.46)	1.68 (0.53)	1.84 (0.43)
Time 1	1.67 (0.36)	1.62 (0.32)	1.69 (0.37)
Time 2	1.62 (0.32)	1.60 (0.31)	1.62 (0.32)
Time 3	1.61 (0.33)	1.59 (0.33)	1.62 (0.33)

Note. Numbers represent the amount of time calculated as interference. For difference scores, interference is calculated as time required to read a list of color words after being subtracted from the time required to name the print color of a word during the same trial. Ratio scores represent the quotient of the time required to read a list of color words divided by the time required to name the print color of a word.

Research Question 1: What are the Effects of Vicarious Bullying on Symptoms of Inattention?

As the effect for video viewing order was not significant, ANCOVA was conducted on both sets of scores allowing sex as a between subject factor. ANCOVA was utilized because it allows analysis of group difference while removing variance related to an uncontrollable variable, such as sex. Dichotomous variables such as sex are used as between subject factors rather than covariates because a dichotomous variable

cannot be linearly related to the dependent variable and does not meet the necessary criteria of continuous for a covariate. Using sex as a between subject factor divided the sample by sex and tested the effect of viewing vicarious bullying with and without the variance due to sex. The within subjects results of the ANCOVA for simple difference and ratio scores are shown in Table 4. The Huynh-Feldt correction was applied to the degrees of freedom for both ANCOVAs due to an epsilon value greater than .75 as suggested by Field (2009). The Huynh-Feldt correction adjusts the degrees of freedom to compensate for the lack of sphericity, or the lack of homogeneity among the variances of the differences between repeat measures. For instance, the difference between baseline and time 1 may have a larger variance than the difference between time 1 and time 2; therefore indicating a lack of sphericity.

Table 4. *Results of ANCOVA by Difference and Ratio Scores*

Scores	<i>F</i> ratio
Difference Scores	
Time	$F(2.93, 389.76) = 2.15, p = .093$
Time X Sex	$F(2.93, 389.76) = 0.15, p = .926$
Ratio Scores	
Time	$F(2.59, 389.89) = 8.97, p = .000$
Time X Sex	$F(2.59, 389.89) = 1.87, p = .147$

Note. Difference scores are defined as time required to read a list of color words after being subtracted from the time required to name the print color of a word during the same trial. Ratio scores represent the quotient of the time required to read a list of color words divided by the time required to name the print color of a word.

The results of the ANCOVA suggested the difference score was not as sensitive as the ratio scores in detecting changes in interference over time (Lansbergen et al., 2007). It was hypothesized that viewing the vicarious bullying scenarios would cause greater symptoms of inattention, and the null hypothesis of no difference in symptoms of

inattention was rejected for the ratio scores across time, $F(3, 2.59) = 8.97, p = .000, \omega^2 = .09$. According to Kirk (2008), this effect size is considered between medium and large. The null hypothesis of no difference in symptoms of inattention over time was not rejected for the difference scores. The remaining results presented will be using the ratio scores only unless otherwise indicated. According to the ratio scores, inattention appeared to worsen over time, or during the course of viewing the vicarious bullying scenarios. The *post hoc* power analysis indicated a power to detect effects of .99, which exceeds the power used to determine the initial sample size, indicating the effects of vicarious bullying on inattention (i.e., ratio) may be larger than originally hypothesized. It appears viewing of vicarious bullying situations may cause an increase in symptoms of inattention, and the effect size of the change may be greater than hypothesized. In other words, more exposure to vicarious bullying led to worse symptoms of inattention.

The results of the SIS-C were used to corroborate the findings of the ratio scores. The SIS-C was designed to measure symptoms of pervasive inattention in college age populations and as such, scores with the current sample should not reflect persistent inattention. The SIS-C has six factors: attention, material organization, organization, accountability, persistence, and listening. Individuals with attention issues score low on each factor, but the current sample scored at or above the 50th percentile on all factors with the exception of material organization. Descriptive statistics associated with the SIS-C are reported in Table 5. Correlations between factor scores on the SIS-C and measured interference by ratio and difference scores were not significant, indicating the current samples' scores depicting interference were not related to the scores on the SIS-C.

The lack of relationship supported the lack of attention issues displayed by the sample outside of the experimental condition.

Table 5. *Descriptive statistics for SIS-C*

	Means (SD)	Maximum Score	Minimum Score
Factor	Total (N=127)		
Attention	17.44 (4.5)	24.00	6.00
Material organization	51.20 (18.5)	60.00	15.00
Organization	15.65 (3.2)	20.00	5.00
Accountability	8.34 (2.4)	12.00	3.00
Persistence	16.26 (2.3)	20.00	5.00
Listening	9.84 (1.5)	12.00	3.00

Note. Numbers represent average scores on scales. Higher scores indicate less symptoms of inattention.

Research Question 2: Are the Effects of Vicarious Bullying Cumulative Over Time?

It was hypothesized that the effects of viewing the vicarious bullying videos would be cumulative and increasingly negative over time. Within subject contrasts suggested a linear effect of time over the course of the experiment with interference at baseline being significantly lower than at time 3, $F(1, 148) = 17.99, p = .000, \omega^2 = .03$, and as such, the null hypothesis of no change in interference over time was rejected. An effect size of $\omega^2 = .03$ represents a small to medium effect (Kirk, 2008). The pairwise comparison with a Sidak correction between baseline and all other time points was significant to at least $p < .05$; however, pairwise comparisons between the levels of treatment were not significant suggesting an initial spike in inattention with the presentation of the first bullying scenario regardless of viewing order or sex. Pairwise comparisons between baseline and time 3 demonstrated an increase in interference of .16, $p < .001$, indicating a significant increase in inattention after cumulative exposures to

vicarious bullying. Examination of the graph in Figure 1 shows the trajectory of the ratio scores over the course of the experiment, which includes a plateau of the ratio scores for females at time point 2 to 3. The findings indicate symptoms of inattention increased negatively over time and were cumulative.

Research Question 3: Do the Effects of Vicarious Bullying Differ by Sex?

The effect of time by sex was not significant suggesting a lack of interaction between sex and time. It was hypothesized males would display more initial interference and females would have a greater change in interference over time. As displayed in Table 3, the resulting F was not significant, which indicates the null hypothesis of no difference between sexes was not rejected. The sample sizes for males and females differed, and under violations of the assumption homogeneity of variance, uneven sample sizes reduce the robustness of the ANCOVA. Levene's test of homogeneity of variance indicated the null hypothesis of no difference in variance across groups was upheld. In this case, uneven sample sizes will not bias the resulting F statistic. The means per sex shown in Table 2 indicated some differences in scores at each time point, but the differences may be attributable to chance. The trend according to the ratio scores indicated males appear to show more interference at each time point and also begin with a higher level of interference. For example, females at baseline have an average level of interference of 1.84 compared to the male baseline interference of 1.68. In the case of ratio scores, lower numbers indicate more interference. Interference score across time by sex are shown in Figure 1 and the trend appeared to support the initial hypothesis of males starting the experiment with more interference, but females displaying a greater change in interference across time.

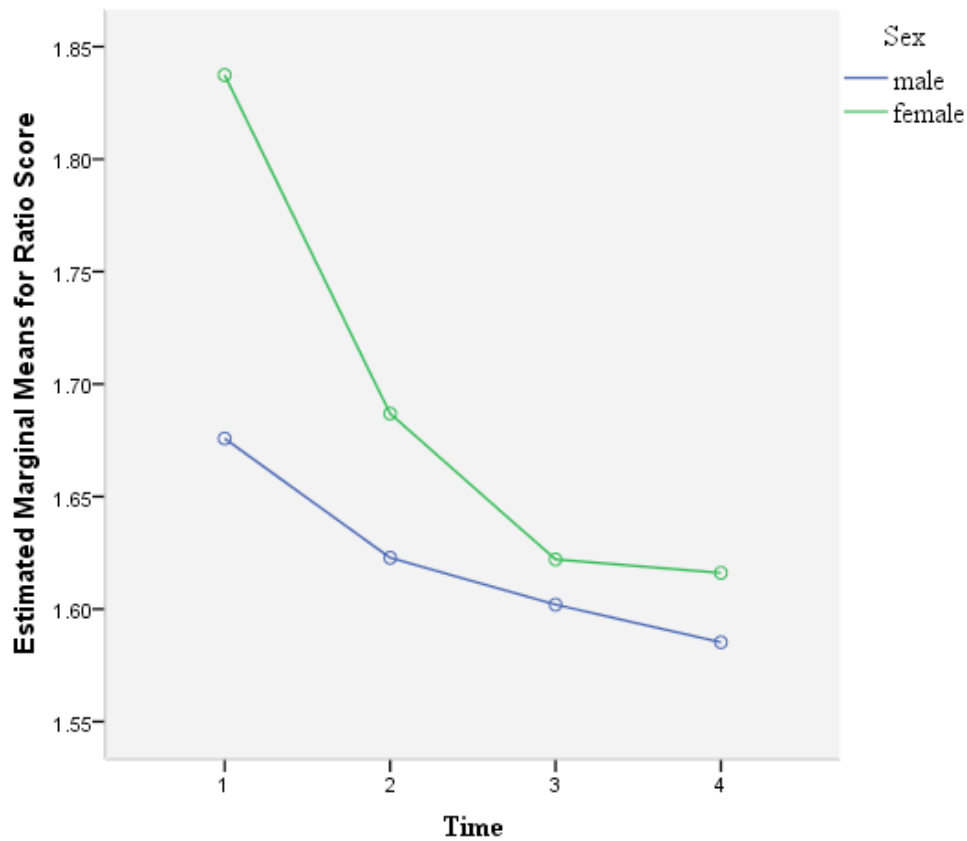


Figure 1. Participant ratio interference scores across time by sex

Analysis of Biometric and Behavioral Measures

To explore the possible causes for the initial change in inattention from baseline to time one, a biometric measure, heart rate, was compared with the results of the Stroop test. Specifically, these comparisons focused on the heart rate of an individual and the speed and errors for the color word naming task, or the task used to measure interference. Descriptive statistics for participant heart rate, total and by male and female, are shown in Table 6.

Table 6. *Descriptive statistics for participant heart rate*

Heart Rate	Mean (SD)		
	Total (N=150)	Male (n=34)	Female (n=116)
Baseline	82.79 (15.05)	78.15 (14.03)	84.15 (15.13)
Time 1	84.12 (14.56)	80.32 (14.41)	85.23 (14.48)
Time 2	85.21 (14.33)	80.82 (14.95)	86.49 (13.95)
Time 3	86.04 (14.51)	79.38 (14.17)	88.00 (14.08)

Note. Numbers represent heart rate per minute as measured by an external heart monitor.

A within subjects repeat measures ANOVA with heart rate as the dependent variable indicated a significant increase in heart rate for all participants across time, $F(2.77, 413.34) = 7.07, p = .000$. The null hypothesis of no change in heart rate across time was rejected. As the Mauchley's test of sphericity was violated with an $\epsilon = .87$, a Huynh-Feldt correction was applied to the degrees of freedom as suggested by Field (2009). Heart rate demonstrated a linear trend over the course of the experiment, $F(1, 149) = 16.35, p = .000$, with an average initial heart rate for participants of 84.54 and an ending heart rate of 86.04. Pairwise comparisons indicated a difference of -3.25 from baseline to time 3, $p = .001, r = .30$. This effect size is considered medium (Cohen, 1988). Follow-up correlations demonstrated time for the color word naming task was related to heart rate at each time point to at least $p < .05$ and errors on the task were correlated to heart rate for baseline and time 1 to at least $p < .05$. Figure 2 displays the line graph of average participant heart rate over the course of the experiment.

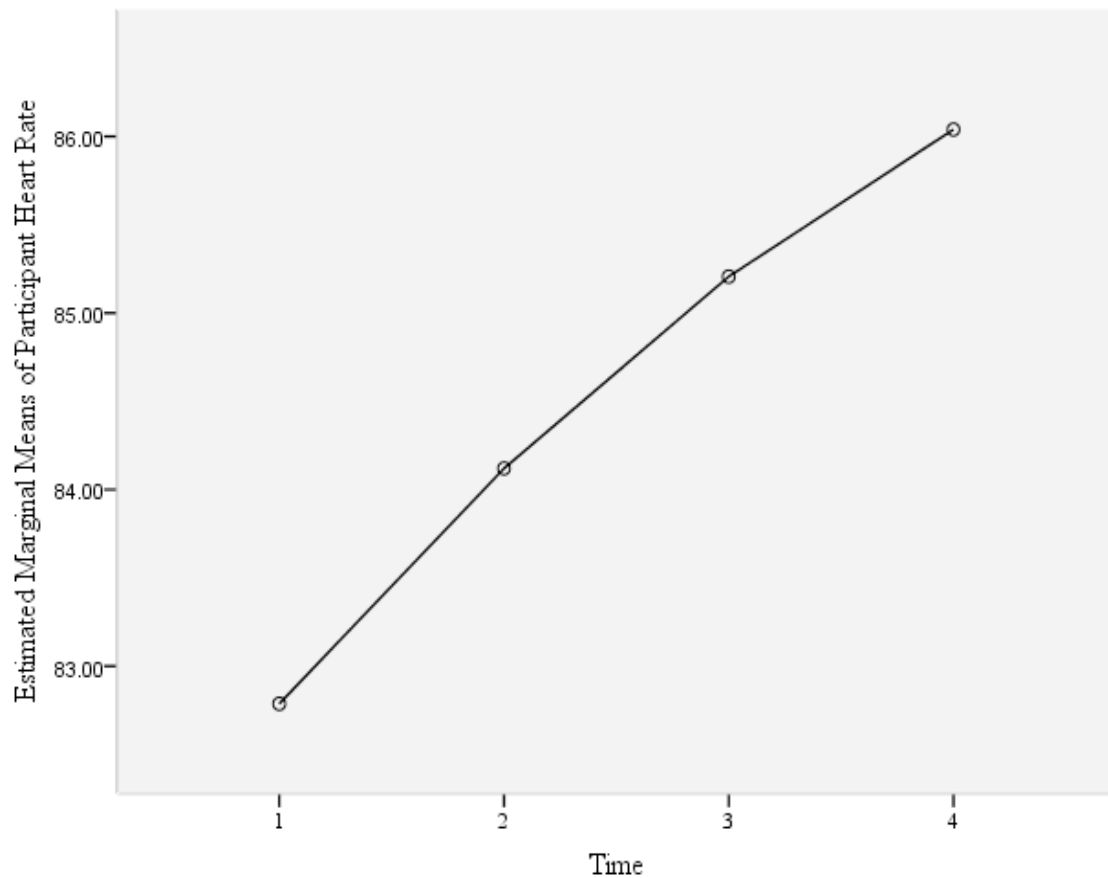


Figure 2. Trend of participant heart rate over time

Reliability Analysis of Bully Scale

As no prior psychometric analysis has been conducted on the scale used to measure experiences of bullying, it was undertaken as part of the current study. The 21 item scale was first analyzed using principal components analysis with promax rotation as it was likely the factors in the scale were correlated. The Kaiser-Meyer-Olkin value of $KMO = .63$ indicates a mediocre sample size and range for this type of analysis and as such the results that follow should be verified through additional studies (Field, 2009). The Bartlett's test of sphericity indicated the R-matrix was not an identity matrix and

relationships existed between at least some of the variables, $\chi^2 (210) = 756.42, p < .001$. With a value of KMO $> .50$ and a significant Bartlett's Test of Sphericity, the decision was made to report the values of the principal component analysis. Six components had eigenvalues over Kaiser's criterion of 1, with these six factors explaining 60% of the variance within the scale. The scree plot supported retaining five of the components, and after examining the content of component six, the decision was made to only retain five components. The final solution of five components explains 54% of the variance. Table 7 displays the loading values of the rotated solution. The components retained include: component 1 representing a pure bully, component 2 representing a pure victim, component 3 representing a bully/victim, component 4 representing a relational bully/victim, and component 5 representing a cyberbully. The reliability of the components and the scale calculated using Cronbach's α are reported in Table 7. Given the poor psychometric qualities of the instrument, it was not used in additional analyses.

Summary of Results

The analyses addressed the three research questions of the current study. According to the results of the initial ANOVA, video viewing order did not significantly affect symptoms of inattention. The ANCOVA indicated a linear, cumulative effect of vicarious bullying on symptoms of inattention by a significant increase of interference (as measured by ratio scores) across time. It appeared the effect was similar for the sexes. Analysis of heart rate appeared to support anxiety as a possible cause of the increase in interference.

Table 7. *Rotated solution for principal components analysis using promax rotation on bully scale*

Item	Component				
	1	2	3	4	5
Have you bullied someone physically in the past 3 months?	.868				
Have you abused or insulted someone verbally in the past 3 months?	.700				.364
Have you bullied someone through obscene gestures in the past 3 months?	.604			.433	
Have you logged onto a friend's IM and/or SNS account and pretended to be them in the past 3 months?	.509				
Has someone bullied you through obscene gestures in the last 3 months?		.782			
Has someone abused or verbally insulted you in the last 3 months?		.649			.333
Has someone bullied you through social exclusion in the last 3 months?	-.359	.637			
Has someone teased or made fun of you in the last 3 months?		.560			
Have you taken a picture/video of someone and posted it online without that person's explicit permission in the last 3 months?			.909		
Have you teased someone or made fun of them in the last 3 months?	.526		.587		
Has someone take a private email, IM, or text message you sent them and forwarded it to someone else or posted it where others could see it in the last 3 months?			.524		
Has someone taken a photo you sent through private email, IM, or text message and forwarded it to someone else or posted it where others could see it in the last 3 months?				.733	
Have you spread false rumors about another student and tried to make others dislike them in the last 3 months?				.687	
Has someone bullied you physically in the last 3 months?				.584	
Have you bullied someone through social exclusion in the last 3 months?					.722
Have you forwarded a private email, IM, or text message to someone else or posted it where others could see it in the last 3 months?					.574
How often have you taken part in cyberbullying another student in the past 3 months?					.573
Reliability statistics of individual scales	$\alpha = .66$	$\alpha = .60$	$\alpha = .65$	$\alpha = .44$	$\alpha = .33$

Note. Numbers reflect loading of item on a specific component. As some items loaded on multiple factors, all loading of the rotated solution were reported. The alpha values in the final row of the table represent the reliability of individual components of the scale and the reliability of the Bullying Survey was $\alpha = .65$.

CHAPTER FIVE

Discussion

The current study was designed to assess whether exposures to vicarious bullying situations could induce inattention, or ADHD-like symptoms in college-age adults. The sample for the current study had a low level of ADHD diagnoses (0.2%) and scores within the average range on a measure of inattention, the SIS-C, after the close of the experiment. There are multiple implications of experimentally manipulating symptoms of inattention in a sample of typical college students. If an individual's attention is negatively affected by vicariously viewing bullying: (1) bullying might play an important role in the inducement of attention problems, and given the prevalence of bullying exposure, it raises the importance of addressing bullying, especially in learning and workplace settings; (2) attention problems in individuals can appear ADHD-like, and this highlights the necessity of exploring bullying and other environmental causes to attention problems; (3) males and females have been shown to react differentially to the effects of bullying; if this is the case, sex differences must be considered when assessing environmental causes to attention problems; (4) finally, a diagnosis of ADHD without the inclusion of environmental causes could lead to erroneous diagnoses of ADHD and possible over diagnoses of the disorder. The findings in the current study support some environmental causes for situational attention problems and may add to the literature on the intersection of bullying and ADHD. In addition, the current findings add to the literature on the psychological impact of bullying on bystanders by drawing connections

between exposure to bullying, increased heart rate, and heightened symptoms of inattention.

Behavioral manifestations of individuals with ADHD correlate with symptoms of bullying, but past research has focused primarily on these behavioral connections without addressing some of the physiological connections (Timmermanis & Wiener, 2011).

Bullying, whether in the workplace or in the schools, typically occurs for seven different purposes: the bully reacts to deviance in another, the bully is negotiating social status, the bully is disturbed and acting out psychologically, the bully is seeking revenge, the bully is bored, or the bully is seeking to fulfill the will of peers (Thornberg, 2010).

ADHD has been linked to social aggression, such as the acts described in our bullying scenarios above (Zalecki & Hinshaw, 2004). The links with social aggression may provide clues for the behavioral connection but may leave unexplained many of the psychological and physiological variables existing at the intersection of ADHD and bullying.

Past research on the intersection of bullying and ADHD utilized retrospective and correlation designs to illustrate a behavioral connection between the two variables (Unnever & Cornell, 2003; Kumpulainen et al., 1998; Ma, 2001; Bacchini et al., 2008). According to this research, individuals with a diagnosis of ADHD are more likely to be involved in bullying, both as a victim and a bully (Unnever & Cornell, 2003). A connection has been drawn between the symptoms of hyperactivity and impulsivity and the likelihood of being a bully as these symptoms seem to be connected to lowered self-control (Spira & Fischel, 2005). On the other hand, some studies have found a connection between symptoms of inattention and victimization (Unnever & Cornell,

2003; Spira & Fischel, 2005). It has also been suggested that the patterns associated with bullying, victimization, and ADHD may differ by sex. Males are typically diagnosed with ADHD twice as often as females; this means more males diagnosed with ADHD exist and can be associated with bullying, but if the ratio of male to female ADHD is applied to bullying, males would be twice as likely to be involved in bullying situations (Nieman, 2011). It turns out that males may be involved in bullying situations three times as often as females (Vega & Comer, 2005). Additionally, findings indicate that males typically are involved in same sex bullying whereas females are involved in bullying situations with both sexes (CDC, 2003; Nieman, 2011). These correlational studies offer indications of bullying patterns but are insufficient to develop causal mechanisms for the relationship between sex, ADHD, and bullying. Our study extends this literature by testing causal hypotheses.

Attention-Deficit/Hyperactivity Disorder

ADHD represents the most commonly researched and diagnosed neurological disorder for individuals under 18 years of age (Mayes et al., 2008). ADHD is also the only neurological disorder diagnosed on behavioral manifestations measured through observational scales alone (Zucker et al., 2002). As ADHD appears comorbid with a variety of disorders, diagnostic criteria specifies that alternative diagnoses must be eliminated before conferring a diagnosis of ADHD; however, studies of physicians have shown that this criteria is not often honored (Rushton et al., 2004). As ADHD is primarily a behavioral neurological disorder, pure measurements like the Stroop test, which measures interference between automatic and controlled responses, may add

additional diagnostic information beyond what is available through observation checklists.

One of the most common comorbid disorders with ADHD is generalized anxiety, a common psychological response to witnessing bullying or being a bullying victim (Biederman et al., 2002; Kumpulainen et al., 1998). Additionally, increased levels of anxiety have been associated with perpetration of bullying, especially when the perpetrator is attempting to assert dominance or establish authority (Espelage & Swearer, 2003). Brain or neural imaging provides clues about the connection between ADHD, anxiety, and bullying. During neural imaging, the anterior cingulate cortex (ACC) appears to support executive function, especially with regards to attention, conflict resolution, and impulse control (Kilic, Sener, Kockar, & Karakas, 2007). Previous research has suggested that the ACC is involved in both cognitive and emotional processing with the dorsal area primarily processing cognitive information and the rostral area processing emotional information (Bishop, Duncan, Brett, & Lawrence, 2004). The problem with this model occurs when a task involves both types of processing, such as would occur in repeated episodes of bullying. The implications of this cortical conflict will be discussed in regards to the current research questions. First, the definition of bullying will be briefly revisited.

What is Bullying?

Bullying definitions vary, but the most common elements include interpersonal violence, an imbalance of power between victim and aggressor, and repetition of the violence (Monks & Smith, 2006). Individuals involved in bullying may be classified into five categories: victim, victim/bully, bully, bystander, and uninvolved (Gumpel, 2008).

The bystander is the least researched of all bullying categories, but this group constitutes 50% to 85% of those involved in bullying (Gumpel, 2008). National statistics indicate bullying is on the rise among school age populations, and recent studies have focused on the prevalence of bullying among adults in the workplace (US Department of Education, 2011; Vega & Comer, 2005).

Many of the psychological implications of bullying are related to the participant's role in the aggression. For example, victims and bully/victims appear to suffer from an increased risk of anxiety disorder, social phobias and suicide when compared with individuals from the other bullying categories (McCabe et al., 2003; Nieman, 2011). Pure bullies, or those who do not function as victims, appear to be at an increased risk for substance abuse and domestic violence (Neiman, 2011). Bullies also tend to be more impulsive than individuals not involved in bullying; impulsivity helps establish a connection between bullying and ADHD (Gumpel & Sutherland, 2010). Less research has been conducted on the psychological impact on bystanders, but it appears bystanders may suffer from increased anxiety as well as decreased ability to concentrate (O'Moore, 2000).

Students in schools witness bullying even if they are not directly involved in the aggression (Craig, Pepler, & Atlas, 2000). As shown by Gumpel (2008), 50% to 85% of the individuals involved in bullying are bystanders or witnesses to the violence. The large number of individuals functioning as bystanders and the anxiety it causes within them creates a need to research this group specifically in order to understand the psychological and educational impact of witnessing bullying. The current study was designed to address the gap in the literature regarding the relationship between symptoms

of ADHD and bullying, but it also addresses the impact of bullying on bystanders. The findings are discussed in the context of our three separate but related research questions.

Research Question 1: Does Vicarious Bullying Induce Symptoms of Inattention?

It was hypothesized that exposure to vicarious bullying situations would lead to an increase in symptoms of inattention as measured by the Stroop test. The hypothesis was based on prior research indicating a correlation between ADHD and experiencing bullying as well as findings indicating that episodes of bullying may lead to increased levels of anxiety. In the current study, two scores were calculated to represent the interference between naming a color of print and reading a word. The first score, a difference score, subtracts the time required to read a word list from the time required to name the print color of a word list. Prior research has indicated the difference score may not be sensitive to changes in interference, and as such, a ratio score was also calculated (King et al., 2007). The ratio score was calculated by dividing the time required to name the print color of a word by the time required to read a word list. The ratio scores indicated an increase in interference over the course of our experiment. Difference scores indicated a similar trend but did not reach significance, as predicted by the prior research. Our data corroborate this finding in the literature: attention interference when operationalized as a ratio score appears to be a more sensitive measure when compared to difference scores.

Findings indicate viewing bullying videos may cause symptoms of inattention to worsen regardless of order of viewing, and the symptoms increase and become stronger than we originally hypothesized. Prior research suggests symptoms of ADHD may predispose an individual to becoming a bully or experiencing bullying (Unnever &

Cornell, 2003); however, in the current experiment, inattention was manipulated as a result of viewing videos of bullying. The mechanisms behind vicarious bullying may be closer to the reactions of a bystander, but little research has been conducted on the psychological impact of bullying on bystanders. The impact of witnessing bullying has implications for school climate research and achievement since bullying is the most prevalent form of violence in schools (Orpinas & Horne, 2005). According to school climate research, academic achievement on a campus is related to student perception of order and discipline (Koth, Bradshaw, & Leaf, 2008).

Bystanders may assume a variety of roles during a bullying situation, and the inability to assume the role typical of the participant may have contributed to the increase in symptoms of inattention as well as the increase in heart rate discussed below. A bystander's choice to act during a bullying situation is related to the psychological impact associated with witnessing the event (Rivers et al., 2009). In the current experiment, each participant was forced to be a non-intervening bystander during repeated episodes of bullying. Prior research has indicated bystanders who are not able to intervene are more likely to experience anxiety, inferiority, and shame (Rivers et al., 2009).

In the current study, individuals were forced not to intervene due to circumstances and as such, a typically cited component associated with the proliferation of bullying was removed from the experimental conditions. Bullying in the workplace and in settings like schools has been blamed on social contagion, which is the process by which an individual bystander becomes part of the proliferation of violence (Olweus, 2001; Rigby, 2005; Salmivalli & Voeten, 2004). By not intervening, the bystander gives tacit permission to the bully, which is then interpreted by the bully as support for the behavior (Rigby,

2005). Such an interpretation could be thought of as a generalized form of Bandura's findings on modeling. In the modeling literature, a model of high social status who is rewarded for a negative behavior will be imitated more readily by those watching the behavior when compared with a model of high or low social status who is punished for negative behavior (Bandura, Ross, & Ross, 1963). In the case of bullying, the bystander's decision not to intervene reinforces the bully's negative behavior through a generalized form of vicarious learning. The lack of negative consequences imposed by a bystander vicariously reinforces the bully's behavior. The current study indicates situational symptoms of inattention could be a manifestation of environmental influences, such as the viewing of bullying videos.

Research Question 2: Does Vicarious Bullying Create a Cumulative Effect of Inattention?

It was originally hypothesized that cumulative exposure to vicarious bullying videos would cause symptoms of inattention to worsen, and the more violent the bullying perceived, the greater the impact exposure would have on symptoms of inattention. This hypothesis was justified by past research on the psychological impact of repeated episodes of bullying on bystanders and victims. Bystanders witnessing repeated episodes of bullying develop psychological symptoms, like anxiety, depression, and internalizing behaviors, similar in magnitude to the symptoms developed by victims (Bacchini et al., 2008).

The current findings indicate that more exposure to vicarious bullying violence worsens symptoms of inattention; additionally, heart rate over the course of the experiment mimics the increase in interference. The cumulative rise in heart rate as well as the cumulative increase in interference indicates that there may be a relationship

between anxiety and the response to the bullying videos. Prior research has indicated that the intensity, frequency, and duration of bullying is positively correlated with stress, or anxiety (Lutgen-Sandvik, Tracy, & Alberts, 2007).

Stress and anxiety may be related to many different psychological disorders and can function as a symptom or a causal mechanism for behaviors (APA, 2000). Typically, stress is defined as a response to repeated stimuli while anxiety is linked to anticipating the next stressor (Petrac, Bedwell, Renk, Orem, & Sims, 2009). Linking this to the current study, individuals experienced a repeated stimulus which could be considered stressful and with each episode of stress, participants responded by showing greater symptoms of inattention. Decreased cognitive performance, such as ability to maintain selective attention, in response to stress has been indicated by prior research in physiology as well as psychology. For example, elevated cortisol levels appeared to reduce prefrontal cortex functioning (PFC) in a study of acute anxiety and stress, the brain region typically associated with executive function (Petrac et al., 2009). Petrac et al.'s (2009) findings mirrored findings from studies using variables other than physiological responses such as Yerkes and Dodson's (1908) classic mice study on the inverted U distribution between anxiety and performance. Yerkes and Dodson (1908) demonstrated both high and low levels of anxiety actually impeded cognitive performance. In relation to the current findings on the cumulative nature of interference over repeated exposure to vicarious bullying, the initial spike in inattention after the first video with subsequent reduction in interference seems to match the inverted U hypothesis, but the continual increase in heart rate appears to be in conflict with such an explanation.

The difference between the current findings and Yerkes and Dodson's (1908) inverted U may be related to the strength of the negative stimulus and the greater ability of humans to override physiological responses to maintain a cognitive behavior as compared to mice. The mice in Yerkes and Dodson's (1908) experiment received a shock as a negative stimulus whereas the participants in the current study were only exposed to videos of bullying. The inverted U distribution formed by the symptoms of inattention in the current study could be attributed to habituation or greater executive function control, but it could just as easily be related to the stress induced by the stimuli. It should be noted that the behavioral response (interference) mirrored Yerkes and Dodson's (1908) findings while the physiological response (heart rate) did not.

An alternative explanation for the cumulative effect with the current population is taken from studies on the role of the anterior cingulate cortex (ACC) and the prefrontal cortex (PFC) in maintaining attention during frequent and infrequent threatening situations (Bishop et al., 2004). While the two sections of the ACC appear to process different elements of threat-related stimuli, the PFC appears to increase attention control to support the function of the ACC (Bishop et al., 2004). This pathway functions under low anxiety; however, during high anxiety, the pathway may not function properly (Mathews & Mackintosh, 1998). In the current study, the initial spike at time 1, or the first exposure to violence, may have been a result of the disruption of this pathway by induced anxiety, but as the experiment continued, the subsequent episodes of vicarious bullying may have allowed participants to gain cognitive control over the pathway and divert resources to the processing of information. The escalation of the heart rate over the course of exposure to vicarious bullying seems to support this type of explanation

because in spite of regaining some of the cognitive control over attention, participants were not able to return to a baseline level of attention by the experiments' end.

While the situational attention symptoms induced in the current study appear to mimic pervasive ADHD, the pattern of responses shown by the sample may also be indicative of their level of frontal lobe development and lack of a diagnosis of ADHD. ADHD has been hypothesized as a disorder of frontal lobes where the executive function skills related to behavioral inhibition are poorly developed (Arnsten, 2009). The prefrontal cortex, the anatomical structure associated with executive function skills, has shown neurobiological evidence for regulating and sustaining attention but also has shown to be susceptible to small changes in dopamine and noradrenaline (Arsten, 2009). The panic associated with the fight or flight response is caused by a release of noradrenaline which then leads to an increase in heart rate and blood pressure (LeBlanc & Ducharme, 2007). The significant rise in heart rate associated with exposure to the vicarious bullying situation in the current study may be linked to an increase in noradrenaline, especially since the participants also showed a disruption in executive function exhibited by the results of the Stroop test.

Although the participants in the current study did not have a diagnosis of ADHD, our data suggests that viewing bullying caused them to behave in a manner similar to individuals with the disorder. The proposed mechanism for this change or increase in symptoms of inattention is the increase in noradrenaline due to exposure of stress leading to an increased heart rate.

Research Question 3: Are There Sex Differences in Inattention After Exposure to Vicarious Bullying?

It was originally hypothesized that males and females would display different patterns of inattention in response to vicarious bullying. Males were hypothesized to have a higher initial level of inattention than females; however, females were hypothesized to show a greater overall effect of inattention from exposure to vicarious bullying scenarios. Males typically show greater symptoms of inattention as compared to females and are diagnosed with ADHD twice as often as females (Biederman et al., 2002).

Our findings indicate differences of inattention by sex, but the differences are not statistically significant. The trend of the data for both males and females follows the initial hypothesis (using ratio scores) with males showing a higher level of initial interference, or symptoms of inattention, and females displaying a greater overall change in symptoms of inattention. According to past research, males are more susceptible to symptoms of inattention as well as other manifestations of ADHD, and the current study offers minimal support for this sex difference (Mayes et al., 2008). The lack of statistically significant differences between the sexes is surprising given the robust body of literature depicting males as more likely to show symptoms of ADHD; however, in a study linking psychological outcomes to bullying and victimization, Dao et al. (2006) likewise found no differences according to sex on amount of victimization or anxiety and depression associated with the victimization.

The sample responded to the stimuli by displaying greater inattention over time, as depicted by the graph in Figure 1, but the female response appears to be forming an inverted U distribution as predicted by Yerkes and Dodson (1908). The line for males in

Figure 1 is less of an inverted U, but the sample of males was smaller and therefore may not be as representative of a continuum of effects of vicarious bullying when compared to the female sample. The heart rate for both sexes showed a positive linear trend, so both sexes were under the influence of the same physiological response; however, the female sample appeared to be able to override this emotional response in the current study to gain some cognitive control over attention. The current study did not show the statistically significant sex differences hypothesized by previous research but did indicate a trend by sex in the data.

General Conclusions

The results of the current study indicate a relation between bullying and inattention that may go beyond the correlation established in previous research. During the experiment, exposure to vicarious bullying appeared to cause symptoms of inattention to worsen as evidenced by Stroop scores indicating a greater degree of interference between controlled and automatic processes. Each additional exposure to vicarious bullying resulted in greater interference, and participants were unable to regain the attentional control exhibited at the baseline time point. Participant heart rate also rose during the experiment and may be indicative of a physiological response to the vicarious bullying episodes. The rise in heart rate and the increase in inattention occurred regardless of video presentation order, such that participants watching the least violent video showed the same reaction as participants watching the most violent video. No significant differences in heart rate or inattention were found between sexes, but females did experience a greater overall increase in inattention when compared with males.

Implications

Individuals with ADHD typically show slower than average reading times on the Stroop test (Rucklidge & Tannock, 2002). In the current experiment, participants showed a slowing of reading times and increased interference as they experienced more episodes of vicarious bullying. On assessments completed after the experiment, the sample scored within normal ranges for inattention. Our participants behaved like ADHD non-medicated individuals during bullying exposure, and this finding raises questions about the causal mechanism behind some symptoms of ADHD.

Diagnostic. A diagnostic implication of our findings on the causal mechanism for behavioral symptoms in ADHD include the addition of questions about experiences of bullying to the diagnostic criteria, especially among populations where bullying is known to be prevalent. Prior research has indicated that ADHD exclusion criteria, or investigating additional disorders or causes for symptoms, are rarely addressed by physicians, who also confer the majority of ADHD diagnoses (Chan et al., 2000; Rushton et al., 2004).

In addition, ADHD comorbidities increase in adulthood (Li et al., 2006). Anxiety is comorbid in about 50% of the cases, and PTSD is comorbid with ADHD in 12% of the adult population. The current study demonstrates a relationship between anxiety and inattention on a test used to discriminate between individuals with and without ADHD. The current findings are supported by findings from a previous study showing a clinical population of sexually abused patients presented symptoms mimicking ADHD, when the actual diagnoses in the patients was PTSD (Weinstein, Staffelbach, & Biggia, 2000). As such, the exclusion criterion may need explicit instructions to eliminate PTSD or

Generalized Anxiety disorder as the source of ADHD symptoms prior to conferring a diagnosis of ADHD. The implication is that misdiagnoses may add to the heterogeneity of the disorder and further complicate efforts to locate adequate treatments as well etiological evidence.

Another diagnostic implication includes a renewed look at the age of onset criterion, especially in adults exposed to traumatic experiences like bullying. The results of the current study show that individuals may develop symptoms of inattention, at least situational inattention, in response to environmental variables. Repeated exposure to traumatic experiences may lead to the development of attention issues in adulthood which means the patient is not eligible for a diagnosis of ADHD inattentive even if this is the best diagnosis for the condition. Other neuropsychological disorders, such as generalized anxiety disorder, demonstrate a developmental trajectory continuing into adulthood (Li et al., 2006; Thorell, 2007). When environmental causes are taken into consideration, the age of onset criterion of 7 years or before does not make much sense.

Heterogeneity of the disorder means it is possible that multiple etiologies exist. The results of the current study provide an example of situational ADHD caused by exposure to vicarious bullying which leads to questions about the existence of other types of stimuli that may lead to situational ADHD. Genetic etiologies may form one explanation, but the hypothesis of sensitivity to environmental stimuli by certain gene sequences may actually mean heightened sensitivity to development of situational ADHD under stress. Without proper diagnostic investigation, these cases may be diagnosed with ADHD but may not receive treatment for the underlying cause of the symptoms.

Frequency of Bullying and Trauma Response

Cumulative exposure to bullying appeared to result in increased symptoms of inattention in the current study. Past research has indicated a relationship between the frequency of bullying and the psychological impact such that individuals experiencing higher frequencies scored as high on the *Impact of Event* scale as victims of rape (Mikkelsen & Einarsen, 2002). Repeat exposure to bullying has also been compared to domestic violence because of the power gap developed between abuser and the abused (Tehrani, 2004). In workplace bullying, repetition is included in the definition, but the definitions of bullying in schools focus more on the coercion and imbalance of power as well as the detrimental effects associated with the behaviors (Wang et al., 2010).

Cumulative exposure to violence in childhood is linked to decreased values of self-reported health in adult, and it has been found that bystanders who experience multiple episodes of bullying may experience the same level of psychological distress as victims or victim/bullies (Boynton-Jarrett, Ryan, Berkman, & Wright, 2008; Jeffrey, 2004).

When taking all these findings into account, the best treatment for individuals who develop attention issues in response to trauma may differ from the typical treatment for individuals with symptoms of inattention.

Psychological Impact of Bullying on Bystanders

In the current study participants were bystanders to bullying, but they were unable to intervene in the violence. Past research indicates bystanders who do not intervene may develop feelings of shame, anxiety, and inferiority (Rivers et al., 2009). The participants in the current study may have experienced symptoms of anxiety manifested as elevated heart rate because the design of the experiment prevented any type of intervention in the

bullying. This reaction also contributed to decreased performance on the attention task (i.e., the Stroop test). Linking this finding to school climate research illustrates the importance of reducing the overall instance of bullying in schools because the majority of students, 85%, are involved in bullying as bystanders. If serving as a bystander can disrupt selective attention as it did in the current study then reducing the overall frequency of bullying in schools could have a positive impact on student achievement.

Limitations of Study

The limitations of the current study include the sample composition and the laboratory setting. The sample in the current study was primarily female, had few experiences with bullying and had a low incidence of preexisting attention disorders. In addition, the current participants were mostly undergraduate and graduate students in fields related to education which may have influenced behavior during the experiment. Participants were not randomly selected from the university population, and this may lead to differences between the sample and the average college student.

The setting of the current study limits the generalizations of the findings. The current study took place in a laboratory under controlled conditions, so the findings may not generalize to a more ecologically valid setting such as a classroom. The bullying scenarios were scripted to create a consistent experience between participants, and each sex was only exposed to bullying by the same sex. In the real world, bullying scenarios will not be homogenous by content or sex. In addition, attention measured through the Stroop test may not be the same as attention measured by time on task in a classroom. Translating the findings into a more ecologically valid setting may change the results.

The use of vicarious bullying through video presentations may also limit the generalizability of the findings. Long-term impact of the effects from the current study were not included and may differ from the long-term impact of viewing actual bullying.

Summary of Findings and Future Research Directions

In summary, the results of the current study indicate it is possible to experimentally manipulate symptoms of inattention through exposure to vicarious bullying. Findings indicate: (1) symptoms of inattention in a normal college sample increased with exposure to vicarious bullying; (2) the underlying mechanism for this increase may be attributed to anxiety manifested by increased heart rate; (3) the increase in heart rate and symptoms of inattention occurred in males and female and across all video viewing sequences; and (4) the cumulative exposure to vicarious bullying may result in greater impairment of attention.

Future research should expand on the findings from the current study. One limitation of the current study was the homogeneity of the sample so future research should replicate the study with additional, more diverse samples. Future work should also explore the relationship between anxiety, ADHD and bullying with additional, more sophisticated research designs and measures. For example, anxiety could be specially tested rather than using heart rate as a proxy for anxiety. Then, the role of anxiety in ADHD and bullying may be further clarified.

APPENDICES

Experiences of bullying

1. The purpose of this study is to examine attention and bullying in college populations. Results will be used to inform treatments for ADHD in college populations.

By completing this online survey, I am agreeing to participate voluntarily in the research project being conducted by Baylor University for the intended purpose of furthering knowledge about Attention-Deficit Hyperactivity Disorder and bullying.

This participation involves the completion of an online survey. Participation in the completion of the survey should take approximately ten minutes.

I understand that there are no foreseeable risks or discomforts associated with my participation beyond the risks of ordinary daily life. Benefits for participation may include an increased self-awareness. Should the need arise, Baylor Counseling Center Health Services is located on the second floor of the McLane Student Life Center. The phone number is 254-710-2467.

I understand that in completing this survey online that my responses will be kept confidential. While the researcher will do everything in his/her power to ensure that responses are anonymous and confidential, I also understand that participation in a survey over the Internet does not necessarily guarantee anonymity. As a web-based survey service, SurveyMonkey.com makes no guarantee as to the anonymity and confidentiality of responses. Once data is collected, only the researchers will have access to responses. Grouped results may be published in a professional journal(s). Upon the completion of the research project, data will be permanently deleted from any computer on which the data have been stored. Only the researchers will have access to any computer where data have been stored.

I understand that participation in this project is my choice and that there will be no penalty should I choose not to participate at any time in the process. I am acknowledging my informed consent by completing the online survey. By completing the online survey, I am showing that I have read and understand the informed consent process, and I agree to participate in this project.

If you have questions about the research project or if you would like to obtain information regarding the results of the study, you may contact:

Experiences of bullying

Terrill Saxon, Ph.D. or Tracey Sulak

One Bear Place #97301

Waco, TX 76798

Terrill_Saxon@baylor.edu or Tracey_Sulak@baylor.edu

(254) 710-6101

If you have any questions regarding your rights as a participant, or any other aspect of the research as it relates to you as a participant, please contact the Baylor University Committee for Protection of Human Subjects in Research, Dr. Michael E. Sherr, Chair, Baylor University, One Bear Place #97320, Waco, TX 76798. Dr. Sherr may also be reached at (254) 710-4483.

- ☐ yes, I would like to participate
- ☐ no, I would not like to participate

Experiences of bullying

Background information

2. Please indicate your sex.

- ☐ Male
- ☐ Female

3. Have you ever been diagnosed with attention-deficit/hyperactivity disorder (ADHD)?

- ☐ No
- ☐ Yes

4. Please enter your birthday.

Birthday

MM	DD	YYYY
<input type="text"/>	<input type="text"/>	<input type="text"/>

5. What is your current college classification?

- ☐ Freshman
- ☐ Sophomore
- ☐ Junior
- ☐ Senior

Experiences of bullying

ADHD information

6. Are you currently registered with the Office of Access, Learning and Accommodations?

- ☐ No
☐ Yes

7. Do you receive accommodations from the Office of Access, Learning, and Accommodations?

- ☐ No
☐ Yes

8. Are you currently taking medication for ADHD?

- ☐ No
☐ Yes

9. How old were you when you were diagnosed with ADHD? (Please enter a positive number.)

Age

10. Which kind of ADHD were you diagnosed with?

- ☐ ADHD Hyperactivity/impulsivity
☐ ADHD Inattentive
☐ ADHD Combined
☐ I don't know

Experiences of bullying

Definition of bullying

As a student in college you are being bullied when someone who is more powerful than you deliberately and repeatedly tries to hurt you by: (1) attacking you verbally, using harmful words or names; (2) attacking you physically; (3) making obscene gestures towards you; or (4) intentionally isolating you or excluding you from a social group."

11. Has someone spread rumors about you in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

12. Has someone teased you or made fun of you in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

13. Has someone teased you or made fun of you in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

14. Has someone abused or insulted you verbally in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

Experiences of bullying

15. Has someone bullied you physically (pushing, shoving, attempting to fight) in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

16. Has someone bullied you through obscene gestures in the last three months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

17. Has someone bullied you through social exclusion (deliberately leaving you out, creating situation where others do not acknowledge your presence) in the last three months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

18. Have you spread false rumors about another student and tried to make others dislike them in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

Experiences of bullying

19. Have you teased someone or made fun of them in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

20. Have you abused or insulted someone verbally in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

21. Have you bullied someone physically (pushing, shoving, attempting to fight) in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

22. Have you bullied someone through obscene gestures in the last three months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

Experiences of bullying

23. Have you bullied someone through social exclusion (deliberately leaving you out, creating situation where others do not acknowledge your presence) in the last three months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

Experiences of bullying

Cyberbullying

Before you start the survey, I would like to give you the definition and example of cyberbullying.

We say a student is being cyberbullied when another student or several other students

- Say mean and hurtful things or make fun of him or her or call him or her mean and hurtful names via email, text messages, instant messages (IM) and/or online.
- Completely ignore or exclude him or her from their group of friends or leave him or her out of things on purpose online.
- Tell lies or spread false rumors about him or her or try to make other students dislike him or her; and
- Do other hurtful things like that online.

24. Has someone taken a private email, instant message (IM), or text message that you sent them and forwarded it to someone else or posted it where others could see in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

25. Has someone sent you a threatening, upsetting, or/and aggressive e-mail , IM, or text messages in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

Experiences of bullying

26. Has someone posted embarrassing pictures/videos of you online without your permission in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

27. Has someone logged onto your IM and/or SNS (e.g., Myspace & facebook) account and pretended to be you in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

28. How often have you taken part in cyberbullying another student(s) in the last 3 months?

- ☐ Several times a week
- ☐ Once a week
- ☐ 2 to 3 times a month
- ☐ Only once or twice
- ☐ Never happened

29. Have you taken a picture/video of someone and posted it online without that person's explicit permission in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

Experiences of bullying

30. Have you sent an e-mail, IM, or text messages that may be considered threatening, upsetting, or/and aggressive in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

31. Have you logged onto a friend's IM and/or SNS (e.g., Myspace & facebook) account and pretended to be them in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

32. Have you forwarded a private e-mail, instant message (IM), or text message that someone sent to you or posted it where others could see in the last 3 months?

- ☐ Yes, several times a week
- ☐ Yes, once a week
- ☐ Yes, 2 to 3 times a month
- ☐ Yes, only once or twice
- ☐ No, never happened

Experiences of bullying

Survey of Academic Function

33. How often do the statements below apply to you?

	Never	Rarely	Occasionally	Often
I make errors in math problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I lose points on assignments due to missing details.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is difficult for me to finish assignments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find it difficult to pay attention for long periods of time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am easily distracted while studying.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
After reading for class, I do not remember the information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

34. How often do the following statements apply to you?

	Never	Rarely	Occasionally	Often
I tend to not finish things I start.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I complete my assignments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I lose points on assignments for not following instructions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I turn in assignments late.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I ask my professors for more time to complete assignments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I follow instructions for assignments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy for me to finish things I start.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My professors would say I am accountable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to finish tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Experiences of bullying

35. How often do the following statements apply to you?

	Never	Rarely	Occasionally	Often
People say that I do not listen to them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a hard time staying organized.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am persistent in tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I need verbal instructions written down.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am messy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am organized.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good listener.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organization is not important to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I miss details in conversations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I daydream when the instructor talks to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find lectures hard to follow	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Experiences of bullying

Survey of Academic Function

36. How often do these statements apply to you?

	Never	Rarely	Occasionally	Often
I lose my syllabus.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have developed a system for keeping track of class assignments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I misplace things I need for class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I lose assignments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I cannot find class materials when I need them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I lose important materials for class, such as my flashdrive, syllabus, or assignments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Experiences of bullying

37. Thank you for completing the bullying survey. If you would like to explain any of your answers or give additional information about experiences with bullying, please feel free to comment in the text box.

APPENDIX B: Stroop Materials

Protocol for Stroop test

Bold statements are read aloud.

Card 1 Color word only

This is a test of how fast you can read the words on this page. After I say begin, you are to read down columns starting with the first one (point to the leftmost column) **until you complete it** (run hand down the leftmost column) **and then continue without stopping down the remaining columns in order** (run your hand down the second column, then the third, fourth and fifth columns). **If you finish all the columns before I say “Stop”, then return to the first column and begin again** (point to the first column). **Remember, do not stop reading until I say “Stop” and read out loud as quickly as you can. If you make a mistake, I will say “No” to you. Correct your error and continue without stopping. Are there any questions?** Instructions may be repeated or paraphrased as often as necessary so that the subject understands what is to be done. Then continue. **Ready?....Then begin.** As the subject starts, begin a stopwatch.

Card 2 Color word reading speed

This is a test of how fast you can name the colors on this page. After I say begin, you are to read down columns starting with the first one (point to the leftmost column) **until you complete it** (run hand down the leftmost column) **and then continue without stopping down the remaining columns in order** (run your hand down the second column, then the third, fourth and fifth columns). **If you finish all the columns before I say “Stop”, then return to the first column and begin again** (point to the first column). **Remember, do not stop reading until I say “Stop” and read out loud as quickly as you can. If you make a mistake, I will say “No” to you. Correct your error and continue without stopping. Remember to name the colors out loud as quickly as you can. Are there any questions?** **Ready?....Then begin.** As the subject starts, begin a stopwatch.

Card 3 Color/word interference

I want you to name the color of the ink the words are printed in, ignoring the word that is printed in each item. For example, (point to the first item of the first column), **this is the first item: what would you say?** If the subject is correct, go on with the instructions. If incorrect, say: **“No, that is the word that is spelled there. I want you to say the color of the ink the word is printed in. Now** (pointing to the same item) **what would you say to this item? That’s correct** (point to second item), **what would the response be to this item?** If correct, proceed; if incorrect, repeat above as many times as necessary until the subject understands or it becomes clear that it is impossible to go on. **Good. After I say begin, you are to read down columns starting with the first one** (point to the leftmost column) **until you complete it** (run hand down the leftmost column) **and then continue without stopping down the remaining columns in order** (run your hand down the second column, then the third, fourth and fifth columns). **If you finish all the columns before I say “Stop”, then return to the first column and begin again** (point to the first column). **Remember, do not stop reading until I say “Stop” and read out loud as quickly as you can. If you make a mistake, I will say “No” to you. Correct your error and continue without stopping. Are there any questions? Then begin.** Time the participant with a stopwatch.

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