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Attention abilities, media exposure, school performance, personality, and aggression

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Attention abilities, media exposure, school performance, personality, and aggression

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CHAPTER 1: INTRODUCTION

A 19-year-old man was arrested in Tulsa, Oklahoma, and charged with five recent murders, including one man who was killed and then robbed of $3 (Suber, 2007). In Marietta, Georgia, a couple was convicted of child abuse that led to the death of their 8-year-old son (Pordum, 2007). A female astronaut was arrested in Florida for the assault and attempted kidnapping of another woman whom she reportedly believed to be a rival for her romantic interests in another astronaut (CNN.com, 2007). Our society is faced on a daily basis with shocking acts of aggression and violence such as these. When people hear of such events, they are often driven to find some meaning in the acts through explanations of why the aggressive behavior occurred. Social and behavioral scientists have likewise devoted considerable energy to identifying and untangling the causes of aggression. The causes identified and studied by psychologists range from proximal (e.g., gang activity) to distal (e.g., neighborhood crime, family size), and from individual characteristics (e.g., low intelligence, lack of self-control) to situational (e.g., access to weapons) (Satcher, 2001). Consistent in these scientific investigations is the fact that the predictors of aggression operate in a probabilistic fashion, predisposing individuals to behave aggressively. Each aggression relevant variable contributes to the ability of scientists to explain and predict aggressive acts. Despite the substantial number of relevant variables identified already (see Satcher, 2001), there remain more that have yet to be fully explored.

One variable that should be further integrated into the research on aggression is attention. Attention can refer to several different processes or resources. Within cognitive psychology, attention is divided into different processes, including selective attention, divided attention, and sustained attention (Matlin, 2002). Central to all of these forms of attention is the idea that some information is processed more than other information

(Johnston & Dark, 1986). Within clinical psychology, the word attention appears in the context of disorders, such as attention deficit/hyperactivity disorder (ADHD). In this context, attention appears to relate more to the maintenance of long term focused processing or goal directed behavior (Barkley, 1997). Individuals who are less able to focus their attention on a single target might tend to act more impulsively, perhaps lashing out aggressively in situations of provocation. If a causal association between individual differences in attention and aggression is identified, more questions would be raised. Why would attention capacities and processes influence aggression? Which type of attention is most related to aggression? Despite the shared use of the term "attention," it is possible that the different conceptualizations from cognitive and clinical psychology are based on largely distinct processes and abilities, only some of which are relevant to aggression. Alternatively, these processes may relate to aggression in different ways. The present study begins to clarify the relations between attention related measures coming from these distinct psychological fields. In order to address the associations between media exposure, the different attention related variables, and aggression, it is useful and practical to first measure a variety of these variables simultaneously in a cross-sectional correlational design and determine which of these variables are related in potentially causal ways. This can be suggestive of the potential roles that these processes and abilities play in aggressive behavior.

The following review of the literature presents findings relevant to media exposure, attention, aggression, and school performance. First, theory and findings relevant to antisocial behavior and personality are presented, particularly aggression, but also including psychopathy and forgivingness. The findings of violent media effects on aggression are briefly reviewed. Theory and research on the different conceptualizations of attention are presented, including the evidence of an association between media exposure and some types

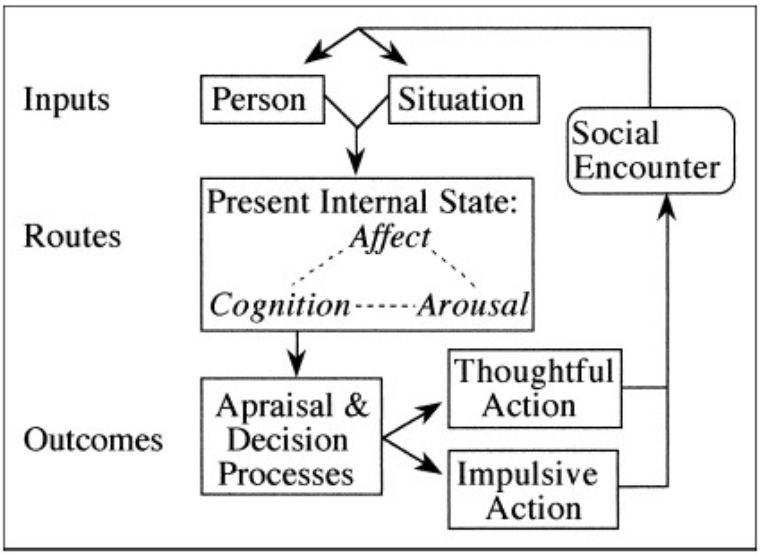
of attention as well as an association between attention abilities and aggression. Evidence of a negative association between media exposure and school performance is presented in light of the potential involvement of certain attention processes. Research findings of impulsivity and self-control as they relate to aggression are presented, as these personality traits potentially overlap with some forms of attention. Finally, research relating self-esteem and narcissism is presented in order to develop the understanding of these traits as predictors of aggression.

Antisocial Behavior and Personality

General Aggression Model. Although several theories have been created to explain aggression, the General Aggression Model (GAM; e.g., Anderson & Bushman, 2002a; Carnagey & Anderson, 2003) is useful in that it integrates several of the processes described in older, more specific theories that have been used to explain aggression, such as the Excitation Transfer Model or Cognitive Neoassociationism (Zillman, 1971; Berkowitz, 1989). According to GAM, personal characteristics interact with situational variables to determine an individual's present internal state (see Figure 1 for a single episode representation of GAM). Personal characteristics can range from demographic characteristics such as age or sex to individual differences in personality, such as a hostile attribution bias. It also includes cognitive abilities, such as those relating to attention. Situational factors include any aspects of the situation that might influence the individual's behavior, such as aggressive cues or frustrating events.

These input variables determine the individual's present internal state, which consists primarily of three inter-related concepts: affect, cognition, and arousal. These concepts not only influence behavior individually, but also collectively through their influence on each other. For example, a behavioral script for physical fights might become activated (cognition)

Figure 1. The General Aggression Model (single-episode) adapted from Anderson & Bushman (2002a).



and subsequently lead to increases in the individual's feelings of hostility and anger (affect), leading to an aggressive response to the current situation. The same aggressive behavior might result from different types of internal processes. A person might react aggressively if that person's behavioral script for interpersonal violence is first primed and the person is then provoked. Likewise, increases in physiological arousal due to playing a sport might be misattributed to the provocative actions of another individual, causing the person to lash out aggressively. In some situations, there are cues indicating that the action which served as a provocation was less severe and intentional than it was perceived to be. If a person is able to attend to fewer environmental cues, that person should be more likely to react to provocation with an aggressive response.

Based on the individual's internal state, an immediate appraisal of the situation is made. The appraisal process can lead to some type of behavior. That behavior may be impulsive or, given sufficient time, cognitive resources, and motivation, a person might

reappraise the situation and follow a more thoughtful course of action. Of course aggression does not always result from impulsive action and non-aggressive behavior does not always result from thoughtful processes. A person could engage in some form of instrumental aggression after careful appraisal of a situation even when that person's initial appraisal did not predispose aggressive action. However, it seems that modern societies tend to deliberately provide more negative consequences than positive consequences for the majority of aggressive behavior, and consequently thoughtful appraisal should make aggressive action less likely most of the time. Individuals who, in a situation of potential aggression, lack the capacity to attend to both situationally relevant information as well as potential negative consequences for aggression may be more likely to behave aggressively. It is plausible then that lower ability with some type of attention would lead a person to tend to react impulsively in situations of potential conflict, leading to an overall increase in aggressive actions.

The action resulting from the decision processes, which may or may not be aggressive, may produce a change in the social encounter. The outcome could reinforce or punish the individual's behavior, thus exerting an influence on the input variables of future encounters. Social rejection due to aggressive behavior might lead to greater association with other aggressive individuals who reward such aggressive behavior (a situational influence), while being rewarded with compliance or respect for aggressive behavior might contribute to the development of an aggressive personality (a personal characteristic).

Thus, aggression can be explained in the short term through the influence of personal and situational input variables on an individual's affect, cognition, and/or arousal, resulting in appraisal processes that produce an aggressive action. Long term increases in aggression tend to result from repeated aggressive encounters, which might make aggressive behavioral scripts more easily accessible, change the situations an individual tends to be in, or

desensitize a person to aggression and violence. As suggested above, within the perspective of GAM, individual differences in attentional ability could produce aggression either through the present internal state (e.g., by making the individual miss cues that would lead to a situation being perceived as less provocative) or through the subsequent decision making processes (e.g., by making impulsive decisions more likely).

Psychopathy. Psychopathy is characterized by highly antisocial behavior, aggression, deceitfulness, impulsiveness, irresponsibility, and insensitivity to the suffering of others (DeLisi, 2005). It is typically used as a categorical designation in abnormal psychological and criminological contexts. Those criminals who are identified as psychopaths tend to be highly aggressive and likely to reoffend. However some researchers have argued for the possibility of measuring a "protopsychopathic interpersonal philosophy" in general populations (e.g., undergraduates) as a continuous measure (Levenson, Kiehl, & Fitzpatrick, 1995). Such a continuous measure is highly relevant to the present study as such psychopathic tendencies represent a pattern of antisocial behavior that may be associated with aggression in the general population just as psychopathy seems to be associated with aggression in criminal populations. In relation to GAM, certain attributes of psychopathy would be predicted to be associated with greater aggression (e.g., insensitivity to suffering of others is conceptually similar to desensitization to violence). Consistent with this hypothesis, a study of female undergraduates demonstrated that those students who were identified as impulsive-aggressive were higher in psychopathy than impulsive only, aggressive only, or non-impulsive/aggressive students (Crawley & Martin, 2006). Higher levels of primary psychopathy have also been associated with fewer perceived negative consequences for aggressive acts (Ferrigan, Valentiner, & Berman, 2000). Primary psychopathy is associated with callousness and deceitfulness, whereas secondary psychopathy is associated with a

pattern of impulsive antisocial behavior (Levenson et al., 1995). Psychopathy may be useful for expanding the range of antisocial behaviors captured by aggression measures.

Forgivingness. Forgivingness is defined as an individual tendency to forgive the transgressions of others (Berry, Worthington, O'Connor, Parrott, & Wade, 2005). Given the role of such transgressions as provocations for aggression, GAM would predict trait forgivingness to be inversely related to aggression. This prediction was supported by a cross-sectional study in a high school student sample (Anderson, Gentile, & Buckley, 2007). Trait forgivingness showed a significant negative association with anger, hostility, verbal aggression, physical aggression, and violent behavior.

Media Violence and Aggression

One of the variables to receive considerable research attention by social psychologists and others as a potential cause of aggression is exposure to media violence. Over the past several decades, researchers have found evidence supporting this causal link, first through the study of violent television and films, and more recently in research of violent video games (Anderson et al., 2003). Meta-analyses have found consistent effects with television, film, music, and video game violence in increasing aggression (e.g., Anderson & Bushman, 2002b). These effects emerge from research whether the design used is cross-sectional, longitudinal, field experimental, or laboratory experimental. The video game violence research has demonstrated, consistent with GAM, that the short term increase in aggression can result through the influence of aggressive cognition, aggressive affect, or arousal (Anderson & Bushman, 2001). The long term effects of media violence can be due to mechanisms such as increased accessibility of aggressive scripts or desensitization to violence.

Attention and other Cognitive Abilities

Dual processes of attention. Many theories have developed within both social and cognitive psychology that suggest two distinct types of mental processes (Evans, 2008). These two distinct types of processes tend to share a number of common features. One type, labeled System 1, tends to be responsible for fast, effortless, automatic, and unintentional processing. The other type, System 2, tends to be involved in slower, conscious, logical, inhibitory processing. System 1 is thought to be modular, whereas System 2 is a single relatively flexible processing system. The accumulated evidence supporting these dual process theories has led some researchers to posit basic evolutionary and biological distinctions between these systems, suggesting a broad range of potential application for dual processing models. Though these dual processing theories do not explicitly refer to attention (arising instead from reasoning, decision-making, and social cognition literatures) they may be useful to apply to the present examination of attention in the context of media effects and aggression.

Despite the shared use of the term "attention" in cognitive psychology and clinical psychology, the operationalizations of attention used in these disciplines may reflect the assessment of distinct processes and abilities. In cognitive psychology, attention is typically measured in performance tasks (e.g., Eriksen & Eriksen, 1974; Green & Bavalier, 2003). Response time or accuracy are calculated for responses that are relatively rapid (often less than two seconds). Such processing speeds seem to suggest a prominent role of System 1 processing in the performance of such tasks, though some amount of System 2 processing may still occur in that time. The clinical psychological use of attention, on the other hand, seems to involve slower processes working on goal directed behavior over a period of minutes or hours and continually inhibiting inappropriate behaviors (Kessler et al., 2005; Barkley, 1997). These processes seem to be much more heavily dependent on System 2

processing, though System 1 processing may still be involved. To the extent that the types of attention from distinct research traditions are based on processing in separate systems, they may show different patterns of associations with media exposure and aggression related variables. The viability of a dual processing explanation for attention is an empirical question. The present study provides one test for such a theoretical framework. Though the attention measures in this study may be framed in other theoretical terms (e.g., selective attention, sustained attention), the dual processing theoretical framework may prove useful in guiding the interpretation of results.

Attention in relation to aggression. Various cognitive abilities, including attention, have been associated with aggression, primarily through research conducted within the framework of abnormal psychology. In such studies, aggression is sometimes studied as a marker for other constructs such as conduct disorder, conduct problems, antisocial personality disorder, or psychopathy, rather than as an outcome measure in itself (e.g., Seguin, Boulerice, Harden, Tremblay, & Pihl, 1999; Seguin, Nagin, Assaad, & Tremblay, 2004). However, because such antisocial behavior phenomena are closely related to aggression (i.e., aggression is a prominent symptom or facet of all of these constructs), the findings of those studies are still highly suggestive of associations to be expected with measures solely based on aggressive behavior.

A recent meta-analysis was conducted of all studies relating antisocial behavior (including measures such as diagnosis of psychopathy, conduct disorder, and antisocial personality disorder) to tests of executive functioning (cognitive ability relating to planning, volition, effective performance, and purposive action). This meta-analysis found individuals in the antisocial behavior group to be .62 standard deviations lower on measures of executive function than the control group (Morgan & Lilienfeld, 2000). Another meta-analysis focused

on a construct referred to as 'hyperactivity-impulsivity-attention' (HIA), which is defined by the co-occurrence of symptoms of hyperactivity, impulsivity, and attentional problems. This review found HIA problems to be related to conduct problems (Waschbusch, 2002).

One recent longitudinal study found working memory ability to be inversely related to physical aggression in adolescents, even when ADHD diagnoses, intelligence, and general memory were statistically controlled (Seguin et al., 1999). Of greater relevance to the current research, this study found ADHD to also be strongly associated with aggression. In a follow up study with the same sample, both physical aggression and hyperactivity were related to lower levels of working memory, even after controlling for general memory and intelligence (Seguin et al., 2004). This is consistent with evidence from other studies indicating that ADHD is associated with lower levels of various types of cognitive functioning such as response inhibition, working memory, and listening comprehension (McInnes, Humphries, Hogg-Johnson, & Tannock, 2003; Oosterlaan, Logan, & Sergeant, 1997).

ADHD is characterized by varying levels of somewhat distinct traits: inattentiveness, hyperactivity, and impulsivity (Barkley, 1997). It is not entirely clear which trait(s) among these is related to aggression and the relative strength and routes of those associations. One study of girls between the ages of 6 and 12 showed ADHD diagnosis to be associated with higher levels of both overt (verbal and physical) and relational aggression (Zalecki & Hinshaw, 2004). In this study, ADHD diagnosis was categorized as ADHD-Inattentive and ADHD-Combined. Those girls who had an ADHD-Combined diagnosis showed more aggression than the ADHD-Inattentive girls (who were in turn more aggressive than controls). However, even in this case, the categorizations by subtype do not lend themselves to easy comparisons of the association between specific personality traits and aggression. Although this study might be taken to suggest a role of both hyperactivity and inattentiveness

in contributing to aggression, it could also be that the ADHD-Combined group was different from the ADHD-Inattentiveness group on another trait (even hypothetically demonstrating greater inattentiveness), which produced the higher levels of aggression for the ADHD-Combined group. Also, despite the longitudinal designs used in some of these studies (e.g., Seguin et al., 1999; Seguin et al., 2004; Zalecki & Hinshaw, 2004), the designs were generally not constructed in ways that reveal the development of aggressiveness as a function of personality traits or disorders.

Types of attention. It would be valuable to translate cognitive and clinical measures of attention to a common terminology to clarify the association between specific types of attention (e.g., selective attention and sustained attention) and aggression. Selective attention is the differential processing of more than one source of information presented simultaneously (Johnston & Dark, 1986). Selective attention has been empirically related to ADHD, but the findings are conflicting. For example, children diagnosed with ADHD had slower reaction times and committed more errors in a Stroop (1935) task, described by the authors as measuring selective attention (Kilic, Sener, Kockar, & Karakas, 2007). In another study, ADHD children and control children showed a similar pattern of brain activation (as measured by fMRI) during a visual conjunction search task measuring selective attention, but a different pattern of activation during go/no go task measuring inhibition (Booth et al., 2005). This may indicate that differences between ADHD and non-ADHD children are particularly related to inhibition, rather than selective attention. The Stroop task used by Kilic et al. seems to involve inhibition as well. For example, when participants must name the text color but have processed the written color word, they must inhibit saying the written color word. Yet another study found that ADHD and control children did not differ on a visual cueing task measuring selective attention, though the ADHD children performed more poorly

on a Continuous Performance Test measuring sustained attention (Barry, Klinger, Lyman, Bush, & Hawkins, 2001). Despite these inconsistent findings, a selective attention task could be useful in identifying specific attention capacities' association with media exposure and aggression.

One task that can measure selective attention is the Eriksen flanker task (Eriksen & Eriksen, 1974). In this task, a target stimulus (e.g., a letter) is presented with irrelevant distractor stimuli that can either be consistent with the target (e.g., the same letter), inconsistent with the target (e.g., a different letter that is sometimes a target), or neutral with respect to the target (e.g., a different letter that is never a target). Participants must identify the target stimulus, but processing of inconsistent distractors can interfere with performance leading to slower reaction times and more errors on inconsistent trials.

Another type of attention relevant to ADHD is sustained attention: maintaining performance on tasks requiring continuous vigilance (Pasini, Paloscia, Alessandrelli, Porfirio, & Curatolo, 2006). For example, Pasini et al. identified differences in sustained attention between individuals with ADHD and controls using a computerized Continuous Performance Test. On this test, a single letter was presented every 1, 2, or 4 seconds. Participants clicked the mouse every time a letter other than “X” was presented. Those with ADHD-Combined and ADHD-Inattentive diagnoses performed more poorly on this task.

Impulsivity and Self-Control

In GAM, impulsivity figures prominently in the decision making process, suggesting an important theoretical role for this trait in aggressive behavior. Certain types of aggression should be more likely to occur when an individual's internal state (e.g., angry) combines with this tendency to act impulsively and a situation in which aggression is possible. There is also some empirical reason to believe that impulsivity is one of the most important ADHD-related

factors in determining aggressive behavior. For example, in a study of ADHD, conduct disorder, and relationship aggression in young and middle aged adults, the link between these variables was completely mediated by verbal impulsivity (i.e., a tendency to interrupt others or blurt things out inappropriately; Theriault & Holmberg, 2001).

Beyond its importance as one of the central traits of ADHD, impulsivity has also been studied as a unique predictor of aggression. A study of British convicted offenders (both violent and non-violent), undergraduates, and other members of the general public showed violent offenders to be higher in all types of impulsivity than non-offenders, and higher than non-violent offenders in terms of motor and cognitive impulsivity (Smith, Waterman, & Ward, 2006). Impulsivity has also been associated with higher trait levels of physical aggressiveness, verbal aggressiveness, and anger (Vigil-Colet & Codorniu-Raga, 2004).

Self-control is the ability to alter the self to meet the needs of the environment (Tangney, Baumeister, & Boone, 2004). According to Tangney et al., self-control has been associated with a variety of positive outcomes such as academic performance, psychological adjustment, perspective taking, and better interpersonal relationships. Poor self-control has also been associated with a variety of negative outcomes, including juvenile delinquency, substance abuse, crime, antisocial behavior, anger, and physically and verbally aggressive behavior. A longitudinal study of young children (from two to three years of age) showed that self-control was related to the ability to regulate anger, suggesting anger as a potential route by which self-control influences aggressive behavior (Kochanska, Murray, & Harlan, 2000). Personality constructs such as impulsivity and self-control may prove useful for comparing various attention measures, given their theoretical and empirical association with attention deficits. Within a dual processing framework, impulsivity and self-control may prove to depend most heavily on System 2 processing (impulsivity reflecting a lack of

System 2 processing).

Media effects on Attention

Media exposure and attention deficits. A recent topic in media studies is the association between media exposure (especially in childhood) and ADHD and attention problems, which may prove particularly relevant in the present examination. Several cross-sectional studies have found an association between media exposure and attention problems. Levine and Waite (2000) had fourth and fifth grade students complete a one week television diary. The amount of time spent watching television was inversely related to teacher reports of the ability to pay attention in school, but not to parent ratings and classroom observations of attention or a Stroop color and word test of attention. Ozmert, Toyran, and Yurdakok (2002) found a positive association between television viewing in second and third grade students and attention problems assessed with the Childhood Behavior Checklist (Achenbach, 1992). A more recent study examined television viewing in preschool age children in relation to parent and teacher reports of inattention, impulsivity, hyperactivity, and a behavioral measure of hyperactivity (Miller et al., 2006). Early television viewing was related to teacher ratings of inattentive and hyperactive behaviors as well as to the behavioral measure of hyperactivity. These findings were also replicated in a cross-sectional study of 9-10 grade students (Chan & Rabinowitz, 2006), which revealed an association between time spent playing console and internet video games and self-reported inattention and ADHD symptoms. Greater levels of television viewing have also been found between 4- to 9-year-old children diagnosed with ADHD compared to same age control children who do not meet the criteria for ADHD diagnosis (Acevedo-Polakovich, Lorch, & Milich, 2007). A recent examination found that early television viewing (30 to 33 months of age) and concurrent television viewing (5.5 years of age) were associated with attention problems reported on the

Child Behavior Checklist (Mistry, Minkovitz, Strobino, & Borzekowski, 2007).

Some studies using longitudinal designs have also revealed evidence of a link between media exposure and later attention problems. An examination of children's television viewing behavior showed that the amount of television viewing in the first three years of life predicted attentional problems (as reported by parents) at ages 6-8 (Christakis, Zimmerman, DiGiuseppe, & McCarty, 2004). This association remained significant even when a wide range of demographic and experiential factors (e.g., age, sex, cognitive stimulation, urban/rural residence) were statistically controlled. A recent study showed that television viewing at ages 5-11 predicted attention problems (based on self, parent, and teacher reports) at ages 13-15 (Landhuis, Poulton, Welch, & Handcox, 2007). This effect remained significant even after several factors including gender and attention problems in early childhood were statistically controlled. Zimmermann and Christakis (2007) found that viewing non-educational television (both violent and non-violent) before age three was associated with subsequent attention problems, but time spent viewing educational television was not related to subsequent attention problems. Johnson, Cohen, Kasen, and Brook (2007) found that frequent television viewing in early adolescence (ages 14 and 16) was associated with subsequent attention problems and lower educational achievement in early adulthood (age 22) even when prior cognitive difficulties and family characteristics were controlled. Despite this recent evidence of a link between media exposure and attention problems, some researchers have not found support for this link. The results from a Danish sample of children did not show a link between television exposure and attention problems (Obel et al., 2004). A study of the television viewing of children found the amount of television viewing in kindergarten to be weakly (non-significantly) associated with ADHD symptoms in the first grade (Stevens & Mulsow, 2006). Given the findings of Zimmermann and Christakis (2007),

some of these null results might be due to the failure to distinguish between educational and non-educational television.

Though some of the researchers (e.g., Christakis et al., 2004) have hypothesized that the media exposure-ADHD link may be due to excessive synaptic pruning during sensitive periods of development, the precise nature of this association is not yet clear. It is also possible that exposure to television or video games that contain rapid changes provides practice at shifting attention quickly based on auditory or visual cues that automatically draw attention. At the same time, such media may provide very little practice with the sort of volitional attention control that seems to be required in other contexts such as school work. It is plausible that violent media, especially violent video games, are more strongly related to ADHD than other forms of media. Violent media tends to model impulsive behavior (with violent video games reinforcing that behavior as well), and repeated exposure to such media could lead to the development of an impulsive decision making style and contribute to the development of attention/hyperactivity problems. Given the extensive research literature associating media violence with aggression and the new and growing research associating ADHD with media exposure, it seems plausible that part of the attention-aggression association might be explained by differences in violent media exposure. However, such an association may prove to be difficult to establish, as total screen time is often highly confounded with amount of violent media exposure (e.g., Anderson et al., 2007).

Total media exposure has also been implicated in poorer school performance. Those who spend more time watching television and films and playing video games tend to get poorer grades in school (Anderson & Dill, 2000; Anderson et al., 2007; Gentile, Lynch, Linder, & Walsh, 2004; Johnson et al., 2007). This negative association between media exposure and school performance may be due to a displacement effect (i.e., every hour per

week spent watching television/films or playing a video game is an hour that will not be spent on school work or reading for pleasure) but it is also possible that attention problems resulting from media exposure contribute to the association.

Media exposure and attention improvements. Video game playing has been associated with improvements in certain visual performance tasks for years. For example, playing Tetris was found to improve reaction times on mental rotation and spatial visualization tasks (Okagaki & Frensch, 1994). One specific line of research on video game improvements in visual task performance is the study of specific types of video games that improve certain aspects of attention. Specifically, these studies have focused on the effect of action video games on visual selective attention. Green and Bavalier (2003) found that action video game players performed better on several tasks of visual attention. High action video game players were able to process more items than non-action video game players in a flanker task. In this task, participants identified a target shape in the presence of consistent or inconsistent distractor shapes. Difficulty was also manipulated by adding additional potential target shapes. The flanker effect was used as a measure of leftover attentional resources based on the rationale that distractors would be processed when the task involving the targets did not use all of an individual's attentional resources. Action video game players showed more leftover resources by exhibiting a flanker compatibility effect even on the difficult version of the task for which non-action video game players showed no flanker compatibility effect (presumably because they were exhausting their resources on the task involving the target stimulus). In an enumeration task that required participants to count the number of squares present in a briefly presented visual display, action video game players were able to identify more target squares. In a useful field-of-view task, participants were required to identify a target among distractors. The targets appeared at varying distances from the center

of visual focus. Action video game players were better able to process targets further from the center of visual focus, indicating a larger useful field-of-view. Action video game players also showed a shorter attentional blink. Attentional blink refers to the difficulty that occurs in processing two stimuli presented in rapid succession (e.g., 200 ms apart) because some of the processing of the first stimulus is still occuring and thus interferes with processing of the second stimulus (Green & Bavalier, 2003). The attentional blink task required participants to identify targets among two successive stimuli. Action video game players were better able to identify the second stimulus. Further, experimentally assigning non-video game player participants to play an action video game for 10 sessions led to an improvement in enumeration, useful field-of-view, and attentional blink recovery compared to control participants. A follow-up study revealed that the advantage of action video game players in enumeration was due to improved serial counting, rather than instantly perceiving the number of items (a process known as subitizing; Green & Bavalier, 2006). Castel, Pratt, and Drummond (2005) found that video game players and non-video game players showed similar inhibition of return, but the video game players had faster response times in both easy and difficult visual search tasks. Green and Bavalier (2007) more recently found that action video game players showed less effects of visual crowding of distractors on task performance. Feng, Spence, and Pratt (2007) found in an experiment that playing an action video game for 10 hours increased the useful field-of-view for non-video game players. This was especially true for women, whose performance on the useful field-of-view task became more similar to that of the men after video game play.

Speculation about media effects on attention. At first glance, the findings coming from the two lines of research (media exposure on attention problems/ADHD and action video game exposure on visual attention) may seem contradictory. However, it might be

explained by a shift in selective attention strategy. The improvements from action video games tend to be improvements in the ability to quickly search for and process multiple visual stimuli. The attention problems in the context of the early media— ADHD link appear to be more related to difficulty in sustaining attention on a single stimulus, maintaining goal directed behavior, or ignoring irrelevant stimuli. Note, for example, that the "improved" performance on the flanker task used by Green and Bavalier (2003) was assessed by the finding of a flanker effect for action video game players when the flanker task was so difficult that the non-action video game players lacked the attentional resources to process the flanker stimuli. This suggests greater attention capacity for action video game players, but the greater capacity is being inferred from the amount of leftover resources dedicated to processing irrelevant stimuli. In other words, in a difficult processing task action video game players processed irrelevant distractors, but non-action video game players did not. Exposure to certain types of media (e.g., action video games) might teach a biasing distribution of attentional resources toward processing multiple visual stimuli in rapid succession, rather than focusing on an individual stimulus.

Self-esteem and Narcissism

The relations between self-esteem, narcissism, and aggression have been debated in recent years. The traditional view that low self-esteem is associated with aggression was questioned by a review of the research literature demonstrating that perceived threat to favorable but unstable self-views, rather than low self-esteem, was more common in aggressive individuals (Baumeister, Smart, & Boden, 1996). It is argued that the group of high self-esteem individuals is heterogenous, some displaying high levels of aggression and others displaying very low aggression (Baumeister, Bushman, & Campbell, 2000). Neither high nor low self-esteem should be a particularly useful in predicting aggression on their own

due to the wide variability in the aggression of high self-esteem individuals. Two constructs have been hypothesized as distinguishing factors between the highly aggressive and the non-aggressive individuals within the high self-esteem category: stability of self-esteem and narcissism. One study revealed that the extremes found within the high self-esteem group were distinguished by the stability of their self-esteem (Kernis, Grannemann, & Barclay, 1989). Those whose self-esteem varied considerably over the course of repeated measurements were more angry and hostile.

Another experimental study supported the hypothesis that narcissism is a better predictor of aggression than level of self-esteem (Bushman & Baumeister, 1998). Kernis (2001) described unstable high self-esteem and narcissism as partially overlapping constructs. These constructs are similar in that both represent a fragile type of self-esteem that can produce hostility when threatened, though narcissism is distinct in that it describes inflated self-esteem and perceived superiority. Despite the shift towards such proposed alternatives, other researchers have continued to pursue the low self-esteem aggression connection. One study demonstrated that high self-esteem related to lower levels of trait aggressiveness, wheras narcissism related to higher levels of trait aggressiveness (Donnellan et al., 2005). Though these authors interpreted this finding as evidence that low self-esteem predicts aggression, the positive correlation found between narcissism and self-esteem obfuscates the self-esteem aggression link. This result does not necessarily contradict the position advocated by Baumeister et al. (2000), depending on the representation of the different subtypes of high self-esteem individuals in the sample. As this was measured in an undergraduate sample, many of the highly aggressive, high self-esteem individuals may have been indirectly screened out through incarceration (Baumeister et al., 1996). Thus, an overall negative association between self-esteem and aggression is not necessarily evidence that low

self-esteem, rather than narcissism, is the more important determinant of aggression.

Hypotheses

Guided by previous research and theory, several predictions were made for the present study.

- **Hypothesis 1:** It is predicted that higher levels of current overall screen time (i.e., time spent watching television and films and playing video games) will be associated with poorer selective attention (based on a flanker task and a Continuous Performance Test), poorer sustained attention (based on a Continuous Performance Test), self-reported attention problems (based on past diagnosis and current symptoms), lower self-reported self-control, and greater hyperactivity (based on a Continuous Performance Test and self-reported symptoms) and self-reported impulsivity.
- **Hypothesis 2:** The association will be stronger between video game exposure and these attention related constructs than the television/film association.
- **Hypothesis 3:** Violent media exposure may account for unique variance in the attention related measures beyond overall screen time.
- **Hypothesis 4:** Because considerable past research on media effects on attention problems have postulated particular vulnerabiltiy to media exposure in early childhood (e.g., Christakis et al., 2004; Zimmerman & Christakis, 2007), it was predicted that self-reported past screen time may account for unique variance in attention related outcomes beyond current screen time (relatively higher screen time at earlier ages being associated with more attention problems).
- **Hypothesis 5:** Total media violence exposure will be associated with greater antisocial behavior and personality (higher trait aggression, more frequent aggressive and violent behaviors, lower forgivingness, and greater psychopathy).

- **Hypothesis 6:** Behavioral attention ability and self-reported attention problems, hyperactivity, self-control and impulsivity will be related to greater antisocial behavior and personality.
- **Hypothesis 7:** The attention and hyperactivity related measures will partially mediate the association between media violence exposure and antisocial behaavior.
- **Hypothesis 8:** Total media exposure will be negatively associated with grade-point average.
- **Hypothesis 9:** The attention and hyperactivity related measures will also partially mediate the association between total media exposure and GPA.
- **Hypothesis 10:** Greater narcissism will be associated with antisocial behavior and this narcissism-antisocial behavior link will be stronger than the self-esteem-aggressive/violent behavior link.

CHAPTER 2: METHOD

The participants in the present study were 211 undergraduate students (127 female, 84 male) recruited from the research participant pool in introductory psychology courses at Iowa State University. The mean age of participants was 19.75 (*SD* = 2.19). Participants received two course credits for their participation, which typically lasted 60-75 minutes.

Procedure

Participants were recruited for the study through the online sign-up system (see Appendix for SONA posting form). After arriving at the laboratory, they read and signed an informed consent document (see Appendix for the informed consent document). Next they were shown to a cubicle, where they completed the Integrated Visual and Auditory Continuous Performance Test (IVA CPT) and a modified version of the Eriksen flanker task. Participants then completed a series of questionnaires measuring media exposure, impulsivity, trait aggression, self-esteem, trait forgivingness, narcissism, psychopathy, ADHD symptoms, demographic characteristics, aggressive/violent behaviors, and substance use (in that order) through Survey Monkey, an online survey website, on the same computer. Finally, participants were fully debriefed, thanked for their participation, and dismissed.

Measures

Attention and Hyperactivity. Several measures of attention and hyperactivity were used. Participants completed a computerized Integrated Visual and Auditory Continuous Performance Test (IVA CPT; Sandford & Turner, 2006), a measure of sustained attention, selective attention, and small motor hyperactivity. The primary task in this test was to click the mouse when the number "1" is presented visually or auditorily, but withhold response when the number "2" is presented. Participants had 1.5 seconds to respond to each stimulus. Only one stimulus (either auditory or visual) was presented at a time. Visual stimuli were

always presented in the same location, and auditory stimuli were presented to both ears over headphones. This task took 15 to 20 minutes to complete, including a warm-up period with verbal instructions over the headphones and a brief (one minute) cool down period.

This task included 500 test trials divided into five sets of 100 trials. Each set included a "frequent" block of 50 trials with more targets than non-targets (e.g., "1111211112...") and a "rare" block of 50 trials containing more non-targets than targets (e.g., "2221222122..."). Thus participants had to change their response set throughout the test. A "prudence" score is calculated from the frequent blocks and a "vigilance" score is calculated from the rare blocks. Vigilance and prudence together are intended by the test designers to reflect **selective attention**. The mean reaction times in the first two sets (200 trials) is also compared to performance in the last two sets (200 trials) to form a measure of "stamina," which relates to problems in sustaining attention. A "consistency" score (based on general reliability and response time variability) was used to measure staying on task. The total variability of processing speed for correct responses was used to create a "focus" score. Stamina, consistency, and focus together are intended to reflect **sustained attention**. Off task behaviors with the mouse (multiple clicks, clicking during instructions, anticipatory clicks, and holding the mouse button down) were used as a measure of **small motor hyperactivity**. The mean reaction time of all correct trials or "speed" was also recorded. In clinical application of the IVA CPT, participants receive an Attention Quotient score based on vigilance, focus, and speed scores and a Response Control Quotient score based on prudence, consistency and stamina scores. The IVA Continuous Performance Test has demonstrated greater than 90% concurrent validity with other measures of ADHD (Sandford, Fine, & Goldman, 1995). The selective attention and sustained attention scores were used in the present study given their greater conceptual relevance to specific types of attention that were

of interest.

A modified version of the Eriksen flanker task was used as another measure of attention (Eriksen & Eriksen, 1974; Gratton, Coles, & Donchin, 1992). This task took approximately eight minutes including the time spent reading the written instructions. Participants pressed one of two keys on the keyboard (“S” or “H”) in response to the brief presentation (150 ms) of a target letter on the screen. Additional flanker 'noise' letters, which were either congruent or incongruent with the target letter, were presented to the sides of the letter. Specifically, the target letter 'H' could be presented as “HHHHH” or “SSHSS,” while the target letter 'S' could be presented as “SSSSS” or “HHSHH.” After the presentation of the letters, participants had another 1850 ms to respond by identifying the target letter. A fixation cross was continually displayed in the location directly below the target letter. This fixation cross turned red 500 ms before each trial to let the participant know that they should get ready. The mean reaction time of correct responses for each participant on consistent flanker trials (“SSSSS” or “HHHHH”) was subtracted from the mean reaction time inconsistent flanker trials (“SSHSS” or “HHSHH”) to create a measure of the flanker compatibility effect (inconsistent trials taking more time to respond). Past research in children (e.g., Jonkman et al., 1999) has demonstrated that those diagnosed with ADHD show a larger difference between congruent and incongruent flanker stimuli than non-ADHD controls. This finding suggests that this task might be useful in identifying differences in selective attention associated with ADHD.

The World Mental Health-Composite International Diagnostic Interview Adult ADHD Self-Report Scale was used to measure participants' self-reported ADHD symptoms (Kessler et al., 2005; scale in Appendix). This scale consists of 18 questions about attention and hyperactivity related experiences, such as “how often do you have difficulty keeping

your attention when doing difficult or boring work?" Participants responded to each question on a five-point scale, ranging from "very often" to "never." The overall scale showed good internal reliability (coefficient alpha = .891) in the present sample. This questionnaire is divided into two subscales, inattention and hyperactivity/impulsivity. These subscales also demonstrated good internal reliability in the present study (coefficient alphas of .854 and .806 for the attention and hyperactivity subscales, respectively) and were strongly correlated, $r(157) = 0.628$. As a further outcome measure of attention and/or hyperactivity, participants were asked whether they had ever been diagnosed with an attention disorder.

Media Exposure. Participants completed the General Media Habits Questionnaire (Adult Version; e.g., Gentile et al., 2004; scale in Appendix). This questionnaire includes items measuring the current screen time (television, films, computer and video games) as well as past screen time (relative to current screen time). Violent media exposure was also assessed by obtaining participants' three favorite television shows, films, and video games, along with ratings of how often they viewed each show/film or played each game and how much violent content was in each.

Self-control. Self-control was assessed with the Brief Self-Control Scale (Tangney et al., 2004; scale in Appendix). This is a 13-item measure of an individual's ability to exert control over his or her behavior in order to meet the needs of their environment (e.g., "I am able to work effectively toward long term goals"). These items are rated on a five point scale ("not at all" to "very much"). This scale has demonstrated high internal reliability (coefficient alphas of .83 and .85 in the original studies) and retest reliability (.87 in a three week test-retest). The present study found similarly high internal reliability (coefficient alpha = .850).

Impulsivity. In order to assess impulsivity, participants completed the Barratt

Impulsiveness Scale, BIS-11 (Patton et al., 1995; scale in Appendix). This is a 30-item scale that is composed of a variety of statements, for which participants must indicate "rarely/never," "occasionally," "often," or "almost always/always." This scale contains six subscales: attention, motor impulsiveness, self-control, cognitive complexity, perseverance, and cognitive instability. The coefficient alpha demonstrated among the original undergraduate sample was .82. The present study replicated the finding of a high total scale internal reliability (coefficient alpha = .838). The subscales showed varying degrees of internal reliability (coefficient alphas of .757 [attention], .616 [motor impulsiveness], .748 [self-control], .429 [cognitive complexity], .242 [perseverance], and .533 [cognitive instability]). Consequently, overall BIS-11 scale scores were used in subsequent analyses, though the pattern of correlations with the other attention related measures was consistent across all of the subscales (all significant *r*s in the same direction).

Trait Aggressiveness. Participants also completed the Aggression Questionnaire, a 29-item scale assessing individual differences in aggressiveness (Buss & Perry, 1992; scale in Appendix). Each item is a statement of aggressive behavior, thoughts, or feelings, such as "if somebody hits me, I hit back," which participants rated in terms of how characteristic it is of them on a five-point scale ("extremely uncharacteristic of me" to "extremely characteristic of me"). This questionnaire is composed of four subscales: physical aggression, verbal aggression, anger, and hostility. The physical aggression subscale is conceptually the most closely related to aggressive/violent behavior. This scale showed an overall test-retest correlation of .80 in the original research (Buss & Perry, 1992). The internal reliability of this scale in the present study was excellent (coefficient alpha = .919). The subscales also showed good reliability (coefficient alphas: .865 [physical], .788 [verbal], .812 [anger], and .861 [hostility]).

Self-esteem. Self-esteem scores were based on the Rosenberg Self-Esteem Scale (RSE), a scale that consists of 10 statements about their self-regard, such as "I feel that I have a number of good qualities" (Rosenberg, 1965; scale in Appendix). Participants rated their agreement or disagreement ("strongly disagree," "disagree," "agree," or "strongly agree") with each statement. This scale has shown test-retest correlation of .88 in a sample of college students. The present study found the RSE to have good internal reliability (coefficient alpha = .879).

Narcissism. The Narcissistic Personality Inventory (revised; NPI) was completed (Raskin & Terry, 1988; scale in Appendix). This inventory consists of 40 statements referring to personal qualities, behaviors, feelings, and desires, for example "I insist upon getting the respect that is due me." Participants indicated "true" or "false" for each statement. These items load onto seven different components: authority, self-sufficiency, superiority, exhibitionism, exploitativeness, vanity, and entitlement. The authors report a coefficient alpha of .83 for this scale. The present study also found good internal reliability for this scale (coefficient alpha = .842), however the subscales showed inconsistent internal reliability (coefficient alphas: .747 [authority], .436 [self-sufficiency], .381 [superiority], .601 [exhibitionism], .640 [exploitativeness], .542 [vanity], and .293 [entitlement]) so subsequent analyses of narcissism are based on overall NPI scores.

Trait Forgivingness. Individual differences in forgivingness were assessed with the Trait Forgiveness Scale (TFS), a 10-item measure of an individual's proneness to forgive others (Berry et al., 2005; scale in Appendix). Participants indicated their agreement or disagreement with 10 different statements about forgiving (e.g., I try to forgive others even when they don't feel guilty for what they did) on a five-point scale ("strongly disagree" to "strongly agree"). The authors of this scale reported a coefficient alpha of .74 among the

original undergraduate sample. In the present sample, the internal reliability of the TFS was good (coefficient alpha = .834).

Psychopathy. Psychopathy was assessed with the Self-Report Psychopathy Scale (Levenson et al., 1995; scale in Appendix). This scale consists of 26 statements relating to antisocial disposition, (e.g., "people who are stupid enough to get ripped off usually deserve it") which the participants rated on a four point scale ("strongly disagree" to "strongly agree"). Items are divided into two subscales: primary psychopathy and secondary psychopathy which demonstrated coefficient alphas of .82 and .63, respectively. The present study found the overall Self-Report Psychopathy Scale and the subscales to have adequate internal reliability (coefficient alpha: .876 [overall], .861 [primary], .706 [secondary]).

Demographics and Personal Experiences. Several demographic characteristics were measured: participant gender, age, number of siblings, and socio-economic status (SES; scale in Appendix). SES was calculated by combining the standardized scores of the average parental education and yearly parental income. Personal experiences consisted of parental use of physical discipline, personal and family history of learning disability diagnoses and attentional/hyperactivity disorder diagnoses (along with age at diagnosis), and number of semesters of college completed. Measuring semesters of college completed by participants was used to determine whether some of the hypothesized associations are attenuated in more advanced students among whom the more poorly adjusted, highly aggressive individuals have possibly dropped out. There was no evidence that semesters of college completed was related to aggressive behavior, $r(187) = -0.003$ or the attention/hyperactivity measures, rs < .13, ps > .05.

Aggression/Violence and Substance Use. Questions selected from the National Youth Survey's delinquency items were used as a measure of aggressive and violent behavior

(Elliot, Huizinga, & Ageton, 1985; scale in Appendix). Each item asked the participant to report how many times in the past year they committed a specific aggressive act (e.g., "thrown objects [such as rocks or bottles] at cars or people"). These items have been demonstrated to correlate with other aggression relevant variables in a high school student sample (Anderson et al., 2007). Two of these items showed no variability in the present sample (no students reported having engaged in them) and these items were dropped from the scale. These items were "been involved in gang fights" and "hit or threatened to hit an instructor or professor at school." The aggression and violent behavior items from this measure were skewed (most participants did not report any of the behaviors), so the response to each of the remaining eight items was standardized and the sum of the standardized responses to these items was subjected to a logarithmic transformation to compute a total National Youth Survey violence score. The standardized items showed moderate internal reliability (coefficient alpha = .682). Participants were reminded that their responses on this questionnaire are anonymous.

CHAPTER 3: RESULTS

Preliminary Analyses

Attention. Multiple measures of attention, hyperactivity, and related concepts were used in this study: **selective attention** (measured by the IVA Continuous Performance Test and the Eriksen flanker task incompatibility effect), **sustained attention** (measured by the IVA Continuous Performance Test), **hyperactivity** (measured by the IVA Continuous Performance Test and the hyperactivity subscale of the WMH-CIDI Adult ADHD Self-Report Scale), **impulsivity** (measured by the Barratt Impulsivity Scale-11), and **self-control** (measured by the Brief Self-Control Scale). In order to empirically evaluate the relatedness of these measures, Pearson correlation coefficients were calculated between all measures of attention related variables. This could potentially be used to support combining some of these measures for the purpose of testing the stated hypotheses. In cases in which it is theoretically or empirically justified, combining measures is desirable in order to reduce the danger of capitalizing on chance by conducting many tests of the same hypothesis. The results of this analysis are reported in the correlation matrix in Table 1.

These results suggest strong independence of some of these measures and strong interrelatedness of other measures (individual correlation coefficients vary between $|r| = 0.007$ and $|r| = 0.754$). These results leave the meaning of the IVA Continuous Performance Test outcomes unclear, as the selective attention scores, sustained attention scores, and hyperactive events are all unrelated to self-reported past diagnosis of an attention disorder ($|rs| < .04$, $p > .05$). Though the IVA scores for sustained attention and hyperactive events showed small correlations with the Self-Reported ADHD hyperactivity symptoms in the expected directions (rs of -0.169 and 0.191, ps $< .05$, respectively), all other IVA scores were unrelated to Self-Reported ADHD attention and hyperactivity symptoms. Further, the IVA

Table 1. Correlation coefficients of attention, hyperactivity, impulsivity, and self-control measures.

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1 Diag	-							
2 SRAtt	0.390 ***	-						
3 SRHyp	0.253 **	0.628 ***	-					
4 IVASel	0.015	0.051	0.113	-				
5 IVASus	0.007	0.052	0.169 *	0.580 ***	-			
6 IVAHE	0.030	0.115	0.191 *	0.383 ***	0.354 ***	-		
7 FLANK	0.161 *	0.094	0.071	0.053	0.012	0.044	-	
8 BIS-11	0.261 ***	0.754 ***	0.636 ***	0.013	0.032	0.094	-0.040	-
9 BSCS	0.257 ***	0.631 ***	0.528 ***	0.024	0.055	0.119	0.046	0.666 ***

1. Diagnosis: Self-reported past diagnosis of an attention disorder, 2. Self-Report ADHD Symptom Measure (attention subscale), 3. Self-Report ADHD Symptom Measure (hyperactivity subscale), 4. IVA Continuous Performance Test selective attention score (reverse coded), 5. IVA Continuous Performance Test sustained attention score (reverse coded), 6. IVA Continuous Performance Test number of hyperactive events, 7. Flanker task – Difference in the mean RT of inconsistent flanker trials and consistent flanker trials, 8. Barratt Impulsiveness Scale, 9. Brief Self-Control Scale (reverse coded).
+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Continuous Performance Test selective attention score was unrelated to the incompatibility effect on the Eriksen flanker task ($r = 0.053$, $p > .05$), which was theoretically also a measure of selective attention. The flanker compatibility effect is also difficult to interpret, as it shows only a small correlation with past diagnosis of attention disorder ($r = 0.161$, $p < .05$), but is otherwise unrelated to all other attention, hyperactivity, impulsivity, and self-control measures (rs < 0.10, ps $> .05$). Given the unexpectedly weak correlations between many of these theoretically related measures, exploratory factor analyses were performed to determine an empirically supported factor pattern of the attention, hyperactivity, impulsivity, and self-control measures.

Varimax (orthogonal) and Harris-Kaiser (oblique) exploratory factor analyses were conducted on past attention disorder diagnosis; Self-Reported ADHD attention and hyperactivity symptoms; IVA selective attention scores, sustained attention scores, and

Table 2. Varimax rotated factor pattern for attention, hyperactivity, impulsivity, and self-control measures.

	Factor 1	Factor 2	Factor 3
1. SRAtt	**0.90076**	-0.01902	0.04964
2. BIS-11	**0.87466**	-0.06176	-0.10530
3. BSCS	**0.84427**	0.04422	-0.03976
4. SRHyp	**0.82873**	-0.17474	0.08603
5. Diag	**0.48088**	-0.01933	0.05218
6. IVASel	-0.01289	**0.86892**	0.00372
7. IVASus	0.03394	**0.83535**	0.07301
8. IVAHE	0.16125	**0.67158**	-0.08765
9. FLANK	0.04107	-0.01455	**0.99043**

1. Self-Report ADHD Symptom Measure (attention subscale), 2. Barratt Impulsivity Scale, 3. Brief Self-Control Scale (reverse coded), 4. Self-Report ADHD Symptom Measure (hyperactivity subscale), 5. Diagnosis: Self-reported past diagnosis of an attention disorder, 6. IVA Continuous Performance Test selective attention score (reverse coded), 7. IVA Continuous Performance Test sustained attention score (reverse coded), 8. IVA Continuous Performance Test number of hyperactive events, 9. Flanker task – Difference in the mean RT of inconsistent flanker trials and consistent flanker trials.

number of hyperactive events; flanker compatibility effect; Barratt Impulsivity Scale scores; and Brief Self-Control Scale scores. Both Varimax and Harris-Kaiser factor analyses generated the same three factor pattern for these measures (see Table 2 for the Varimax rotated factor pattern).

The rotated factor pattern suggested one factor that consists of the attention and hyperactivity self-report measures (past attention disorder diagnosis, Self-Reported ADHD attention symptoms, and Self-Reported ADHD hyperactivity symptoms) as well as the self-report personality trait measures of impulsivity and self-control. A second factor consisted of the IVA Continuous Performance Test scores (selective attention, sustained attention, and hyperactive events). The Eriksen flanker task incompatibility effect scores loaded onto a third factor. On the basis of these factor analyses, the measures of attention, hyperactivity, impulsivity, and self-control were standardized (z transformed) and combined to form a

single score representing Factors 1, 2, and 3. Factor 1 was created by combining the standardized scores for past attention disorder diagnosis, Self-Report ADHD attention symptoms, Self-Report ADHD hyperactivity symptoms, the Brief Self-Control Scale, and the Barratt Impulsiveness Scale-11. Factor will be referred to as self-reported attention/hyperactivity. Factor 2 was created by combining the standardized scores from the IVA CPT selective attention subscale (reverse coded), the IVA CPT sustained attention subscale (reverse coded), and the IVA CPT hyperactive events. Factor 2 will be referred to as IVA Continuous Performance Test attention/hyperactivity. Factor 3 is based on the standardized scores from the flanker effect of the Eriksen flanker task, and will be referred to as the flanker compatibility effect or flanker effect. Each attention/hyperactivity related hypothesis was tested by standardizing and combining the variables from each of the three factors.

Antisocial behavior and personality. Several measures relating to antisocial and aggressive behavior were used in the present study: aggressive behavior (the Aggression Questionnaire – including physical, verbal, anger, and hostility subscales), violent behavior (National Youth Survey violence subscale), trait forgivingness (Trait Forgivingness Scale), and primary psychopathy (Self-Report Psychopathy Scale primary psychopathy subscale). Correlation coefficients were calculated between these measures in order to examine the relatedness of these measures. These correlations are reported in Table 3.

The correlations between these measures are moderate to large (individual correlation coefficients vary between $|r| = 0.203$ and $|r| = 0.622$) and in all cases in the theoretically predicted direction (all positively related, with forgivingness reverse coded). Given the consistently significant associations between these measures, there may be an underlying pattern of behavior for all of these measures. However, it is not clear based on the zero order

Table 3. Correlation coefficients of aggression, violence, forgivingness, and primary psychopathy measures.

	1	2	3	4	5	6	7
1. BPAQ:P	-						
2. BPAQ:V	0.566 ***	-					
3. BPAQ:A	0.584 ***	0.622 ***	-				
4. BPAQ:H	0.337 ***	0.458 ***	0.597 ***	-			
5. NYSV	0.426 ***	0.260 ***	0.238 ***	0.214 **	-		
6. TFS	0.319 ***	0.350 ***	0.365 ***	0.446 ***	0.223 **	-	
7. LSRPS:P	0.476 ***	0.203 **	0.292 ***	0.259 ***	0.397 ***	0.297 ***	
8. LSRPS:S	0.482 ***	0.365 ***	0.477 ***	0.486 ***	0.346 ***	0.452 ***	0.587 ***

1. Buss-Perry Aggression Questionnaire: Physical aggression subscale, 2. Buss-Perry Aggression Questionnaire: Verbal aggression subscale, 3. Buss-Perry Aggression Questionnaire: Anger subscale, 4. Buss-Perry Aggression Questionnaire: Hostility subscale, 5. National Youth Survey violence items score, 6. Trait Forgivingness Scale (reverse coded), 7. Levenson's Self-Report Psychopathy Scale: Primary Psychopathy subscale, 8. Levenson's Self-Report Psychopathy Scale: Secondary Psychopathy subscale.
+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

correlations that all of these measures should be combined to form the aggressive behavior outcome measure, so exploratory factor analyses were conducted on these measures.

Varimax (orthogonal) and Harris-Kaiser (oblique) exploratory factor analyses were conducted based on the Aggression Questionnaire subscales (physical, verbal, anger, and hostility), the National Youth Survey violence subscale, the Trait Forgivingness Scale, and the Self-Report Psychopathy Scale (Primary and Secondary Psychopathy subscales). Both factor analyses generated the same two factor pattern (see Table 4 for the Harris-Kaiser rotated factor pattern). The rotated factor pattern generated in these analyses suggested one factor (Antisocial Factor 1) based on Levenson's Self-Report Psychopathy Scale (primary and secondary subscales), the National Youth Survey violence subscale, and the Buss-Perry Aggression Questionnaire (physical aggression subscale). A second factor (Antisocial Factor 2) was generated including three of the Buss-Perry Aggression Questionnaire subscales

Table 4. Harris-Kaiser rotated factor pattern for aggression, violence, forgivingness, and psychopathy measures.

	Factor 1	**Factor 2**
1. LSRPS:P	**0.93991**	0.16593
2. NYSV	**0.79372**	-0.08354
3. LSRPS:S	**0.58143**	0.30040
4. BPAQ:P	**0.47089**	0.40415
5. BPAQ:A	-0.10546	**0.91958**
6. BPAQ:H	-0.11328	**0.83196**
7. BPAQ:V	0.04477	**0.81377**
8. TFS	0.15406	**0.55136**

1. Levenson's Self-Report Psychopathy Scale: Primary Psychopathy subscale, 2. National Youth Survey violence subscale score, 3. Levenson's Self-Report Psychopathy Scale: Secondary Psychopathy subscale, 4. Buss-Perry Aggression Questionnaire: Physical aggression subscale, 5. Buss-Perry Aggression Questionnaire: Anger subscale, 6. Buss-Perry Aggression Questionnaire: Hostility subscale, 7. Buss-Perry Aggression Questionnaire: Verbal aggression subscale, 8. Trait Forgiveness Scale (reverse coded).

(verbal, anger, and hostility) and the Trait Forgiveness Scale. Antisocial Factor 1 seems to be most strongly related to overt, physical aggression. Interestingly, both psychopathy subscales loaded more strongly on Antisocial Factor 1. Antisocial Factor 2 appears to relate to an anger/hostility related personality trait. Because some measures loaded highly on more than one factor (e.g., the Buss-Perry Physical aggression subscale loaded at 0.471 on Antisocial Factor 1 and 0.404 on Antisocial Factor 2), factor scores were computed based on each Antisocial factor from the Harris-Kaiser factor analysis. Because Antisocial Factor 1 is most closely related to physical aggression, this factor score was used in the tests of aggression hypotheses, though the direction (positive or negative) of correlations was the same for Antisocial Factor 1 and Antisocial Factor 2 (see Table 5).

Media exposure. A weekly television/film exposure score was computed for each participant by taking the amount of time spent watching television or films on an average

week day (Monday through Friday) during all of the four reported time periods ("6 AM – Noon," "Noon – 6 PM," "6 PM – Midnight," and "Midnight – 6 AM") multiplied by five and adding the amount of time spent watching television or films on weekend days (Saturday and Sunday) over the same four time periods multiplied by two. Similarly, a weekly video game exposure score was computed for each participant by computing the amount of time spent playing video games on an average weekday across the four specified time periods multiplied by five and adding the amount of time spent playing video games on weekends over those four time periods multiplied by two. Total media exposure was calculated by adding weekly television/film exposure and weekly video game exposure together.

Violent television exposure was computed by multiplying the violence rating (from 1 to 7) that the participant reported for each of their three favorite television shows by the rating of how frequently they watch this show (from 1 to 7) and adding the resulting numbers together for these three television shows. Similarly, film violence exposure was computed by multiplying the violence rating (from 1 to 7) that the participant reported for each of their three favorite three favorite films by the rating of how frequently they watch this film (from 1 to 7) and adding the resulting numbers together for these three films. Video game violence exposure was computed by multiplying the violence rating (from 1 to 7) that the participant reported for each of their three favorite three favorite video games by the rating of how frequently they play that game (from 1 to 7) and adding the resulting numbers together for these three video games. If a participant listed fewer than three for any of these types of media, a value of zero was entered for the media violence exposure of the missing television show/film/video game (based on the assumption that those who report fewer than three favorite instances of a particular medium tend to be exposed to that medium less than those who report three). Total media violence exposure was computed by adding the television

violence exposure score, the film violence exposure score, and the video game violence exposure score together. The zero order correlation coefficients between the key predictor and outcome variables are presented in Table 5. These correlations show that television/film exposure, video game exposure, television/film violence exposure, and video game violence exposure are all correlated, raising the concern of multicollinearity when these variables are used as predictors in the same model.

Media Exposure and Self-reported Attention/Hyperactivity

Hypothesis 1: Greater media exposure is associated with poorer self-reported attention/hyperactivity. The findings of the association between media exposure and self-reported attention/hyperactivity are summarized in Tables 6 and 7. A general linear model was computed testing the prediction of self-reported attention/hyperactivity based on total media exposure, sex, and the total media exposure by sex interaction. The total media exposure by sex interaction was not a significant predictor of self-reported attention/hyperactivity ($t = 0.17$, $p > .10$, *partial* $r(127) = 0.015$), so this interaction was dropped from the models (though the sex main effect was retained as a covariate). Total media exposure was a significant predictor of self-reported attention/hyperactivity, $t(127) = 3.44$, $p < .001$, *partial* $r(127) = 0.291$. Higher amounts of media exposure were associated with greater attention problems, hyperactivity, and impulsivity. Sex was not uniquely related to self-reported attention/hyperactivity, $t(127) = -0.68$, $p > .10$, *partial* $r(127) = -0.060$.

Hypothesis 2: Video game exposure is more strongly associated with self-reported attention/hyperactivity than television/film exposure. A general linear model was computed testing the prediction of self-reported attention/hyperactivity based on

Table 5. Correlation coefficients for media exposure, media violence, attention/hyperactivity, self-esteem, narcissism, physical aggression, hostility, socioeconomic status, GPA, and sex.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. TST	-														
2. TVE	0.856 ***	-													
3. VGE	0.676 ***	0.202 **	-												
4. TMV	0.487 ***	0.294 ***	0.507 ***	-											
5. TVFV	0.431 ***	0.338 ***	0.336 ***	0.910 ***	-										
6. VGV	0.407 ***	0.131 +	0.587 ***	0.802 ***	0.483 ***	-									
7. ATSR	0.290 ***	0.196 *	0.292 ***	0.220 *	0.163 +	0.229 **	-								
8. IVA	0.088	0.143 *	-0.041	-0.027	0.048	-0.128 +	0.132	-							
9. FLNK	0.036	-0.013	0.088	0.175 *	0.114	0.157 *	0.056	0.038	-						
10. RSE	-0.066	0.027	-0.165 *	-0.038	-0.013	-0.060	-0.480 ***	-0.038	-0.138 +	-					
11. NPI	0.158 *	0.265 ***	-0.080	0.217 **	0.210 **	0.151 *	0.057	0.214 **	0.154 *	0.262 ***	-				
12. AG1	0.326 ***	0.306 ***	0.181 *	0.344 ***	0.321 ***	0.265 ***	0.510 ***	0.091	0.099	-0.108	0.412 ***	-			
13. AG2	0.171 *	0.150 +	0.109	0.140 +	0.123	0.119	0.383 ***	0.033	0.126	-0.326 ***	0.258 **	0.517 ***	-		
14. SES	0.059	-0.020	0.142 +	0.087	0.065	0.094	0.135	0.076	-0.011	-0.088	0.150 +	0.259 **	0.101	-	
15. GPA	-0.319 ***	-0.281 ***	-0.209 **	-0.125 +	-0.050	-0.195 **	-0.389 ***	-0.036	0.046	0.017	0.056	-0.297 ***	-0.045	0.028	-
16. SEX	0.289 ***	0.072	0.448 ***	0.554 ***	0.415 ***	0.579 ***	0.050	-0.052	0.127 +	0.026	0.084	0.300 ***	0.076	0.047	-0.233 **

1. Total screen media exposure (television, films, video games), 2. Weekly television and film exposure, 3. Weekly video game exposure, 4. Total media violence exposure, 5. Television and film violence exposure, 6. Video game violence exposure, 7. Self-reported Attention/Hyperactivity, 8. IVA CPT Low Attention ability/Hyperactivity, 9. Flanker task – flanker compatibility effect, 10. Rosenberg Self-Esteem Scale, 11. Narcissistic Personality Inventory, 12. Aggression Factor 1: Aggressive behavior and Psychopathy, 13. Aggression Factor 2: Anger, Hostility, Verbal Aggression, and Low Forgivingness, 14. Socioeconomic Status (parents), 15. Grade Point Average from previous semester, 16. Sex (female = 0, male = 1).
$+ p < .10$, $* p < .05$, $** p < .01$, $*** p < .001$. Individual *N*s for correlation coefficients range from 114 to 210.

television/film exposure, video game exposure, sex, the television/film exposure by sex interaction, and the video game exposure by sex interaction. Neither media exposure by sex interaction was significant (ts < 0.9, ps > .10) so the interaction terms were dropped from the model, though the sex main effect was retained as a covariate. Video game exposure was a significant predictor of self-reported attention/hyperactivity when television/film exposure and sex were statistically controlled, $t(126) = 3.15$, $p < .001$, *partial* $r(126) = 0.269$. Greater video game exposure was associated with more attention problems, hyperactivity, and impulsivity. Television exposure and sex were not significantly related to self-reported attention/hyperactivity, $t(126) = 1.21$, $p > .10$, *partial* $r(126) = 0.107$ and $t(126) = -1.34$, $p > .10$, *partial* $r(126) = -0.118$, respectively.

Hypothesis 3: Violent media exposure uniquely predicts self-reported attention/hyperactivity when total media exposure is statistically controlled. A general linear model was computed testing the prediction of self-reported attention/hyperactivity based on total media exposure, violent media exposure, sex, and the violent media exposure by sex interaction. The violent media exposure by sex interaction was not significant, $t(125) = -0.92$, $p > .10$, *partial* $r(125) = -0.082$, so it was dropped from the model but the sex main effect was retained as a covariate. Total media violence and sex were not significant unique predictors of self-reported attention/hyperactivity, $t(126) = 1.63$, $p > .10$, *partial* $r(126) = 0.143$ and $t(126) = -1.39$, $p > .10$, partial $r(126) = -0.122$, respectively. Total media exposure remained a significant predictor when total media violence and sex were statistically controlled, $t(126) = 2.65$, $p < .01$, *partial* $r(126) = 0.229$.

Based on the differences found for television/films and video games for Hypothesis 2, two additional general linear models were computed. The first general linear model tested the prediction of self-reported attention/hyperactivity based on television/film exposure,

Table 6. The associations of media predictors and self-reported attention/hyperactivity based on general linear modeling, part 1.

Predicting SR-Attention/Hyperactivity	**Beta**	**Partial r**	**Model R^2**
Hypothesis 1			0.08737 **
Total Media Exposure	0.296622	0.291 ***	
Sex	-0.06228	-0.060	
Hypothesis 2			0.10941 **
Television/film Exposure	0.10974	0.106	
Video Game Exposure	0.31023	0.267 **	
Sex	-0.13269	-0.117	
Hypothesis 3a			0.10631 **
Total Media Exposure	0.24348	0.269 **	
Media Violence Exposure	0.16659	0.143	
Sex	-0.14419	-0.122	
Hypothesis 3b			0.05106 +
Television/film Exposure	0.16548	0.156 +	
Television/film Violence Exposure	0.11923	0.111	
Sex	-0.02445	-0.022	
Hypothesis 3c			0.11249 **
Video Game Exposure	0.27954	0.229 **	
Video Game Violence Exposure	0.14736	0.122	
Sex	-0.19626	-0.160 +	

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

television/film violence exposure, the television/film violence exposure by sex interaction and sex. The second general linear model tested the prediction of self-reported attention/hyperactivity based on video game exposure, video game violence exposure, the video game violence exposure by sex interaction and sex. In both models, the media violence exposure by sex interaction was non-significant ($|ts| < 1.2$, $ps > .10$), so the interactions were dropped from the model, though the sex main effect was retained as a covariate. In the first model, self-reported attention/hyperactivity was marginally significantly predicted by

television/film exposure, t(126) = 1.78, p = .077, *partial* r(126) = 0.156. In the second model, video game exposure significantly predicted self-reported attention/hyperactivity, t(126) = 2.65, p < .01, *partial* r(126) = 0.229. Sex was also a marginally significant predictor of self-reported attention/hyperactivity in this model, t(126) = -1.83, p = .070, *partial* r(126) = -0.160. In these two models, television/film violence exposure and video game violence exposure were not significant unique predictors of self-reported attention/hyperactivity, |ts| < 1.4, ps > .10. Indicating a lack of support for Hypothesis 3 in this analysis as well.

Hypothesis 4: Past media exposure uniquely predicts self-reported attention/hyperactivity when current media exposure is statistically controlled. A general linear model was computed testing the prediction of self-reported attention/hyperactivity based on total media exposure, change from past media exposure, sex, and the change from past media exposure by sex interaction. The change from past media exposure by sex interaction was non-significant, t(124) = 1.10, p > .10, *partial* r(124) = 0.098, so the interaction term was dropped from the model (though the sex main effect was retained as a covariate). The main effect of change from past media exposure failed to significantly predict self-reported attention/hyperactivity, t(125) = -0.82, p > .10, *partial* r(125) = 0.073. The model predicting self-reported attention/hyperactivity problems from total media exposure (current), change in media exposure, and sex was significant, F(3,125) = 4.27, p < .01.

Based on the results of Hypothesis 2, two additional general linear models were computed. The first model used current television/film exposure, change from past television/film exposure, and sex as predictors of self-reported attention/hyperactivity. In the first model, television/film exposure was a significant predictor of self-reported attention/hyperactivity, t(125) = 2.20, p <.05, *partial* r(125) = 0.192. The overall model did

Table 7. The associations of media predictors and self-reported attention/hyperactivity based on general linear modeling, part 2.

Predicting SR-Attention/Hyperactivity	**Beta**	**Partial r**	**Model R^2**
Hypothesis 4a			0.09298 **
Total Media Exposure	0.33211	0.295 ***	
Change in Media Exposure	-0.07979	-0.073	
Sex	-0.06465	-0.061	
Hypothesis 4b			0.04183
Television/film Exposure	0.22703	0.192 *	
Change in Television/film Exposure	-0.01250	-0.052	
Sex	0.02719	0.027	
Hypothesis 4c			0.10924 **
Video Game Exposure	0.39764	0.325 ***	
Change in Video Game Exposure	-0.11761	-0.106	
Sex	-0.14187	-0.126	

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

not significantly predict self-reported attention/hyperactivity, $F(3,125) = 1.82$, $p > .10$. The second model used current video game exposure, change from past video game exposure, and sex as predictors of self-reported attention/hyperactivity. In the second model, video game exposure was a significant predictor of self-reported attention/hyperactivity, $t(125) = 3.86$, $p < .001$, *partial* $r(125) = 0.325$. This model significantly predicted self-reported attention/hyperactivity, $F(3,125) = 5.15$, $p < .01$. In these models, the change from past television/film exposure and change from past video game exposure variables were not uniquely signficant, $|ts| < 1.3$, $ps > .10$. These findings do not support Hypothesis 4.

Media Exposure and IVA Continuous Performance Test Attention/Hyperactivity

Hypothesis 1: Greater media exposure is associated with poorer IVA Continuous Performance Test Attention/Hyperactivity. The findings of the association between media exposure and IVA Continuous Performance Test attention/hyperactivity are summarized in

Tables 8 and 9. A general linear model was computed testing the prediction of IVA Continuous Performance Test attention/hyperactivity based on total media exposure, sex, and the total media exposure by sex interaction. The total media exposure by sex interaction was not a significant predictor of IVA Continuous Performance Test attention/hyperactivity ($t(197) = -1.42$, $p > .10$, *partial* $r(197) = -0.100$), so this interaction was dropped from the model (though the sex main effect was retained as a covariate). Total media exposure was not a significant predictor of IVA Continuous Performance Test attention/hyperactivity, $t(198) =$

Table 8. The associations of media predictors and IVA Continuous Performance Test attention/hyperactivity based on general linear modeling, part 1.

Predicting IVA CPT Attention/Hyperactivity	**Beta**	**Partial r**	**Model R^2**
Hypothesis 1			0.01563
Total Media Exposure	0.12107	0.114	
Sex	-0.08406	-0.081	
Hypothesis 2			0.03043
Television/film Exposure	0.16915	0.165 *	
Video Game Exposure	-0.06253	-0.054	
Sex	-0.03560	-0.032	
Hypothesis 3a			0.01756
Total Media Exposure	0.14033	0.122 +	
Violent Media Exposure	-0.05880	0.044	
Sex	-0.05717	0.048	
Hypothesis 3b			0.02860
Television/film Exposure	0.14818	0.140 *	
Television/film Violence Exposure	0.03703	0.032	
Sex	-0.07609	-0.069	
Hypothesis 3c			0.01987
Video Game Exposure	0.04395	0.035	
Video Game Violence Exposure	-0.18132	-0.130 +	
Sex	0.03259	0.026	

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

1.62, $p > .10$, *partial* $r(198) = 0.114$. The main effect of sex on IVA Continuous Performance Test attention/hyperactivity was also non-significant, $t(198) = -1.14$, $p > .10$, *partial* $r(198) = -0.081$.

Hypothesis 2: Video game exposure is more strongly associated with IVA Continuous Performance Test Attention/Hyperactivity than television/film exposure. A general linear model was computed testing the prediction of IVA Continuous Performance Test attention/hyperactivity based on television/film exposure, video game exposure, sex, the television/film exposure by sex interaction, and the video game exposure by sex interaction. The television/film exposure by sex interaction and the video game exposure by sex interaction were not significant ($|ts| < 1.5$, $ps > .10$), so these interaction terms were dropped from the model (though the sex main effect was retained as a covariate). Television exposure was a significant predictor of IVA Continuous Performance Test attention/hyperactivity, $t(197) = 2.36$, $p < 0.05$, *partial* $r(197) = 0.165$. Greater television exposure was associated with worse attention and more hyperactive events on the IVA Continuous Performance Test. Neither video game exposure nor sex were related to IVA Continuous Performance Test attention/hyperactivity, $t(197) = -0.76$, $p > .10$, *partial* $r(197) = -0.054$, and $t(197) = -0.45$, $p > .10$, *partial* $r(197) = -0.032$, respectively.

Hypothesis 3: Violent media exposure uniquely predicts IVA Continuous Performance Test Attention/Hyperactivity when total media exposure is statistically controlled. A general linear model was computed testing the prediction of IVA Continuous Performance Test attention/hyperactivity based on total media exposure, violent media exposure, sex, and the violent media exposure by sex interaction. The violent media exposure by sex interaction was not significant, $t(196) = -1.32$, $p > .10$, *partial* $r(196) = 0.094$, so this term was dropped from the model (though the sex main effect was retained as a covariate).

Though media violence exposure and sex were not significant predictors of IVA Continuous Performance Test attention/hyperactivity, $t(197) = -0.62$, $p > .10$, *partial* $r(197) = -0.044$, and $t(197) = -0.67$, $p > .10$, *partial* $r(197) = -0.048$, respectively, including total media violence in the model made total media exposure a marginally significant predictor of IVA Continuous Performance Test attention/hyperactivity, $t(197) = 1.73$, $p = 0.084$, *partial* $r(197) = 0.122$. Thus, there was a trend of media exposure being associated with worse attention and hyperactivity on the IVA Continuous Performance Test when controlling for total media violence. The model of total media exposure, media violence exposure, and sex did not significantly predict IVA Continuous Performance Test attention/hyperactivity, $F(3,197) = 1.17$, $p > .10$.

Based on the differences found for television/films and video games for Hypothesis 2, two additional general linear models were computed testing the prediction of IVA Continuous Performance Test attention/hyperactivity. The first model used television/film exposure, television/film violence exposure, sex, and the television violence exposure by sex interaction as predictors. The second model used video game exposure, video game violence exposure, sex, and the video game violence by sex interaction as predictors. The television/film violence exposure by sex interaction and the video game violence exposure by sex interaction terms were non-significant, ts < 0.8, ps $> .10$, and were dropped from the model (though the sex main effect was retained as a covariate in both models). In the first model, television exposure predicted performance on the IVA Continuous Performance Test, $t(195) = 1.99$, $p < .05$, *partial* $r(195) = 0.140$. This indicates that television/film exposure was associated with worse IVA Continuous Performance Test attention/hyperactivity. Neither television/film violence exposure nor sex were significant unique predictors in the first model, $|t\text{s}| < 1$, ps $> .10$. In the second model, video game violence was a marginally

significant predictor of IVA Continuous Performance Test attention/hyperactivity, $t(197) = -1.84$, $p = .068$, *partial* $r(197) = -0.130$. This trend is in the opposite direction of what was expected (video game violence exposure was marginally associated with better attention and less hyperactivity on the IVA Continuous Performance Test). Neither video game exposure nor sex were significant unique predictors in the second model, $|ts| < 0.5$, $ps > .10$. Further exploratory analysis of the zero order correlations between video game violence exposure and the component scores of the IVA Continuous Performance Test revealed that video game violence was most strongly related to stamina (the difference in reaction time between the first 200 trials and the last 200 trials), $r(203) = 0.238$, $p < .001$, but was also significantly related to consistency (the variability in reaction times), $r(204) = 0.138$, $p < .05$.

Hypothesis 4: Past media exposure uniquely predicts IVA Continuous Performance Test Attention/Hyperactivity when current media exposure is statistically

Table 9. The associations of media predictors and IVA Continuous Performance Test attention/hyperactivity based on general linear modeling, part 2.

Predicting IVA CPT Attention/Hyperactivity	**Beta**	**Partial r**	**Model R^2**
Hypothesis 4a			0.03242 +
Total Media Exposure	0.18015	0.162 *	
Change in Media Exposure	-0.06667	-0.063	
Sex	-0.11973	-0.119 +	
Hypothesis 4b			0.04550 *
Television/film Exposure	0.20706	0.193 **	
Change in Television/film Exposure	-0.01076	-0.048	
Sex	-0.08986	-0.094	
Hypothesis 4c			0.00522
Video Game Exposure	-0.01517	0.011	
Change in Video Game Exposure	-0.04895	-0.043	
Sex	-0.03498	-0.031	

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

controlled. A general linear model was computed testing the prediction of IVA Continuous Performance Test attention/hyperactivity based on total media exposure, change from past media exposure, sex, and the change from past media exposure by sex interaction. The change from past media exposure by sex interaction was non-significant, $t(194) = -0.67$, $p > .10$, partial $r(194) = -0.048$, so the interaction term was dropped from the model (though the sex main effect was retained as a covariate). The main effect of change from past media exposure failed to significantly predict IVA Continuous Performance Test attention/hyperactivity, $t(195) = -0.89$, $p > .10$, *partial* $r(195) = -0.063$. Two additional general linear model were computed predicting IVA Continuous Performance Test attention/hyperactivity. The first model used current television/film exposure, change from past television/film exposure, and sex as the predictors. This model significantly predicted IVA Continuous Performance Test attention/hyperactivity, $F(3,196) = 3.11$, $p < .05$. The second model used current video game exposure, change from past video game exposure, and sex as predictors. This model did not significantly predict IVA Continuous Performance Test attention/hyperactivity, $F(3,196) = 0.34$, $p > .10$. In these two models, change from past television/film exposure and change from past video game exposure were not uniquely signficant, $|ts| < 0.7$, $ps > .10$.

Media Exposure and the Flanker Compatibility Effect

Preliminary statistics. Consistent with previous research (Eriksen & Eriksen, 1974; Gratton et al., 1992), participants were able to identify targets with consistent flankers (M = 437.13 ms, SD = 66.08 ms) more quickly than targets with inconsistent flankers (M = 477.42 ms, SD = 73.71 ms), $t(206) = 17.50$, $p < .001$. Similarly, participants had more correct responses for consistent flankers (M = 95.64%, SD = 7.20%) than for inconsistent flankers (M = 91.96%, SD = 12.38%), $t(206) = 4.259$, $p < .001$. The difference in reaction time

between the inconsistent and consistent flanker trials (M = 40.29 ms, SD = 33.13 ms) is the flanker compatibility effect.

Hypothesis 1: Greater media exposure is associated with a larger flanker effect. The findings of the association between media exposure and the flanker compatibility effect are summarized in Tables 10 and 11. A general linear model was computed testing the prediction of the flanker compatibility effect based on total media exposure, sex, and the total media exposure by sex interaction. The total media exposure by sex interaction was not a significant predictor of the the flanker compatibility effect, $t(200) = 1.42$, $p > .10$, *partial* $r(200) = 0.100$, so this interaction was dropped from the model (though the sex main effect was retained as a covariate). Total media exposure was not a significant predictor of the flanker compatibility effect, $t(201) = -0.07$, $p > .10$, *partial* $r(201) = -0.005$. The main effect of sex on the flanker compatibility effect was marginally significant, $t(201) = 1.80$, $p = 0.074$, *partial* $r(201) = 0.126$. Males showed a trend towards a greater flanker compatibility effect than females. This trend indicates less selective attention among males than females.

Hypothesis 2: Video game exposure is more strongly associated with the flanker effect than television/film exposure. A general linear model was computed testing the prediction of the flanker compatibility effect based on television/film exposure, video game exposure, sex, the television/film exposure by sex interaction, and the video game exposure by sex interaction. The television/film exposure by sex interaction was marginally significant, $t(198) = 1.82$, $p = 0.071$, *partial* $r(198) = 0.128$, but the video game exposure by sex interaction was not significant, $t(198) = -0.68$, $p > .10$, *partial* $r(198) = -0.048$, so it was dropped from the model (though the sex main effect was retained as a covariate). Video game exposure, television exposure, and sex all failed to predict the flanker compatibility effect, $|t\text{s}| < 1.5$, $p\text{s} > .10$. However, the television exposure by sex interaction was marginally

Table 10. The associations of media predictors and the flanker compatibility effect based on general linear modeling, part 1.

Predicting Flanker Compatibility Effect	**Beta**	**Partial r**	**Model R^2**
Hypothesis 1			0.01682
Total Media Exposure	-0.00519	-0.005	
Sex	0.13169	0.126 +	
Hypothesis 2			0.03432
Television/film Exposure	-0.03361	-0.033	
Video Game Exposure	0.03342	0.028	
Sex	0.11790	0.107	
Television/Film Exposure × Sex	0.15550	0.121 +	
Hypothesis 3a			0.04221 *
Total Media Exposure	-0.02302	-0.023	
Media Violence Exposure	0.09989	0.089	
Sex	0.11123	0.109	
Hypothesis 3b			0.03634 +
Television/film Exposure	-0.02473	-0.027	
Television/film Violence Exposure	0.04452	0.045	
Sex	0.14361	0.152 *	
Hypothesis 3c			0.02788
Video Game Exposure	-0.01603	-0.013	
Video Game Violence Exposure	0.13556	0.098	
Sex	0.05851	0.048	

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

significant, $t(199) = 1.72$, $p = 0.086$, *partial* $r(199) = 0.121$. The association between television and film exposure and the flanker compatibility effect was not significant for males, $t(79) = 1.50$, $p > .10$, *standardized* $\beta = 0.056$, or for females, $t(123) = -1.18$, $p > .10$, *standardized* $\beta = -0.261$. This trend suggests that males who are exposed to more television and films showed a greater flanker compatibility effect. The unique effects of television/film exposure, video game exposure, and sex remained non-significant when this interaction was

not included in the model, |*t*s| < 1.5, *p*s > .10. Given the lack of a priori hypotheses of predictor by sex interactions and the number of such interactions tested in the present study, the interpretations made based on this marginal interaction should be very limited without further replication.

Hypothesis 3: Violent media exposure uniquely predicts the flanker effect when total media exposure is statistically controlled. A general linear model was computed testing the prediction of the flanker compatibility effect based on total media exposure, violent media exposure, sex, and the violent media exposure by sex interaction. The violent media exposure by sex interaction was marginally significant, $t(198) = 1.66$, $p = 0.098$, *partial* $r(198) = 0.117$, and was dropped from the model (though the sex main effect was retained as a covariate). Total media exposure, violent media exposure, and the sex main effect were all non-significant predictors of the flanker compatibility effect, |*t*s| < 1.6, *p*s > .10.

Based on the differences found for television/films and video games for Hypothesis 2, two additional general linear model was computed testing the prediction of the flanker compatibility effect: the first based on television/film exposure, television/film violence exposure, sex, and the television violence exposure by sex interaction and a second model with video game exposure, video game violence exposure, sex, and the video game violence by sex interaction. Both the television violence exposure by sex interaction and the video game violence by sex interaction terms were non-significant, |*t*s| < 1.7, *p*s > .10, and were dropped from the models, though the sex main effect was retained as a covariate in both cases. In the first model, sex significantly predicted the flanker compatibility effect, $t(199) = 2.17$, $p < .05$, *partial* $r(199) = 0.152$. Males showed a larger flanker compatibility effect than females. Neither television/film exposure nor television/film violence exposure were

significant unique predictors in the first model, $|ts| < 0.7$, $ps > .10$. The overall model was a marginally significant predictor of flanker compatibility effect, $F(3,199) = 2.50$, $p = .061$. In the second model, video game exposure, video game violence exposure, and sex all failed to significantly predict the flanker compatibility effect, $|ts| < 1.5$, $ps > .10$. The overall model did not significantly predict the flanker compatibility effect, $F(3,200) = 1.91$, $p > .10$.

Hypothesis 4: Past media exposure uniquely predicts the flanker effect when current media exposure is statistically controlled. A general linear model was computed testing the prediction of the flanker compatibility effect based on total media exposure, change from past media exposure, sex, and the change from past media exposure by sex interaction. The change from past media exposure by sex interaction was non-significant, $t(197) = -0.46$, $p > .10$, *partial* $r(197) = 0.033$, so the interaction term was dropped from the model (though the sex main effect was retained as a covariate). The main effect of change

Table 11. The associations of media predictors and the flanker compatibility effect based on general linear modeling, part 2.

Predicting Flanker Compatibility Effect	**Beta**	**Partial r**	**Model R^2**
Hypothesis 4a			0.02460
Total Media Exposure	-0.04574	-0.039	
Change in Media Exposure	0.10411	0.095	
Sex	0.12725	0.121 +	
Hypothesis 4b			0.01963
Television/film Exposure	-0.05752	-0.050	
Change in Television/film Exposure	0.01358	0.058	
Sex	0.12528	0.124 +	
Hypothesis 4c			0.02787
Video Game Exposure	-0.00860	-0.006	
Change in Video Game Exposure	0.10929	0.099	
Sex	0.12109	0.108	

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

from past media exposure failed to significantly predict the flanker compatibility effect, $t(198) = 1.35$, $p > .10$, *partial* $r(198) = 0.095$. The overall model was not significant, $F(3,198) = 1.66$, $p > .10$. Two additional general linear models were computed predicting flanker compatibility effect: the first model using current television/film exposure, change from past television/film exposure, and sex as predictors, and the second model using current video game exposure, change from past video game exposure, and sex as predictors. Change from past television/film exposure and change from past video game exposure were not significant unique predictors in these models, $|t\text{s}| < 1.5$, $p\text{s} > .10$. Neither model significantly predicted flanker compatibility effect, $F\text{s} < 2$, $p\text{s} > .10$.

Support for Media and Attention Hypotheses

Hypothesis 1 (total media exposure is related to worse attention and greater hyperactivity) received partial support: greater total media exposure was associated with self-reported attention/hyperactivity but not IVA Continuous Performance Test attention/hyperactivity or the flanker compatibility effect. Hypothesis 2 (Video game exposure will be a stronger predictor of attention than television/film exposure) received limited support. Video games were uniquely related to self-reported attention/hyperactivity and television was not uniquely related to self-reported attention/hyperactivity. However, television was related to IVA Continuous Performance Test attention/hyperactivity and video games were not uniquely related to performance on the IVA Continuous Performance Test. Hypothesis 3 (violent media exposure may account for unique variance in attention beyond total media exposure) was not supported. Video game violence exposure was actually marginally associated with improved performance on the IVA Continuous Performance Test. Hypothesis 4 (early media exposure may account for unique variance in attention beyond total media exposure) was not supported, but the reason for this is ambiguous. It is possible

that participants could not accurately recall their past media exposure or that past media exposure contributes nothing beyond current media exposure in predicting attention. Further, total media exposure was moderately correlated with change in media exposure, $r(208) = .418$, $p < .001$, and the models predicting self-reported attention/hyperactivity and IVA Continuous Performance Test attention/hyperactivity were significant (marginally in the case of the IVA CPT) so it is possible that multicollinearity decreased the ability of change in media exposure to predict unique variance in attention in these cases.

Media Violence Exposure-Aggression Associations

Hypothesis 5: Media violence exposure is associated with greater antisocial behavior/aggression. A general linear model was computed predicting antisocial behavior (Antisocial Factor 1) based on total media violence, sex, and the total media violence by sex interaction. The media violence exposure by sex interaction term was non-significant, $t(165) = -1.47$, $p > 0.10$, *partial* $r(165) = -0.113$, and was dropped from the model (the sex main effect was retained as a covariate). The main effect of total media violence exposure was a significant predictor of antisocial behavior, $t(165) = 2.94$, $p < .01$, *partial* $r(183) = 0.222$. Sex was a marginally significant predictor of antisocial behavior, $t(165) = 1.81$, $p = .072$, *partial* $r(183) = 0.139$. Greater exposure to media violence was associated with higher levels of antisocial behavior and there was a trend toward males demonstrating more antisocial behavior than females. To further test the media violence exposure association with antisocial behavior, a general linear model was computed with socio-economic status (SES), sex, and the SES by sex interaction included as covariates. The SES by sex interaction was not a significant unique predictor of antisocial behavior ($t[123] = 0.28$, $p > .10$, *partial* $r[123] = 0.025$), so it was dropped from the model, though the sex main effect was retained as a covariate. SES and sex were both significant unique predictors of antisocial behavior, $t(123)$

= 2.78, $p < .01$, *partial* $r(123) = 0.242$ and $t(123) = 2.11$, $p < .05$, *partial* $r(123) = 0.186$. Higher SES was associated with more antisocial behavior. Media violence exposure remained a significant predictor of antisocial behavior after controlling for sex and SES, $t(123) = 2.05$, $p < .05$, *partial* $r(123) = 0.181$. Hypothesis 5 was supported by these results.

Because the Self-Report Psychopathy Scale has not been used in past research on media violence effects, a repeated measures analysis of covariance was conducted assessing total media exposure, media violence exposure, and sex as predictors of primary and secondary psychopathy (treated as repeated measures). The between subjects results revealed a significant unique effect of total media exposure on psychopathy, $F(1,181) = 8.89$, $p < .01$, *partial* $r(181) = 0.216$, and a marginally significant unique effect of sex, $F(1,181) = 3.43$, $p = .066$, *partial* $r(181) = 0.136$. High media exposure was associated with greater psychopathy, and males tended to have higher psychopathy scores than females. Total media violence did not uniquely predict psychopathy, $F(1,181) = 1.03$, $p > .10$, *partial* $r(181) = 0.075$. The within subjects results yielded no significant main or interaction effects, Fs < 1, ps > .10. These results suggest that overall exposure to screen media is associated with greater primary and secondary psychopathy, though due to the multicollinearity of total media exposure and media violence exposure (see Table 5) conclusions about the comparative associations of total media and violent media content with psychopathy should be made with caution.

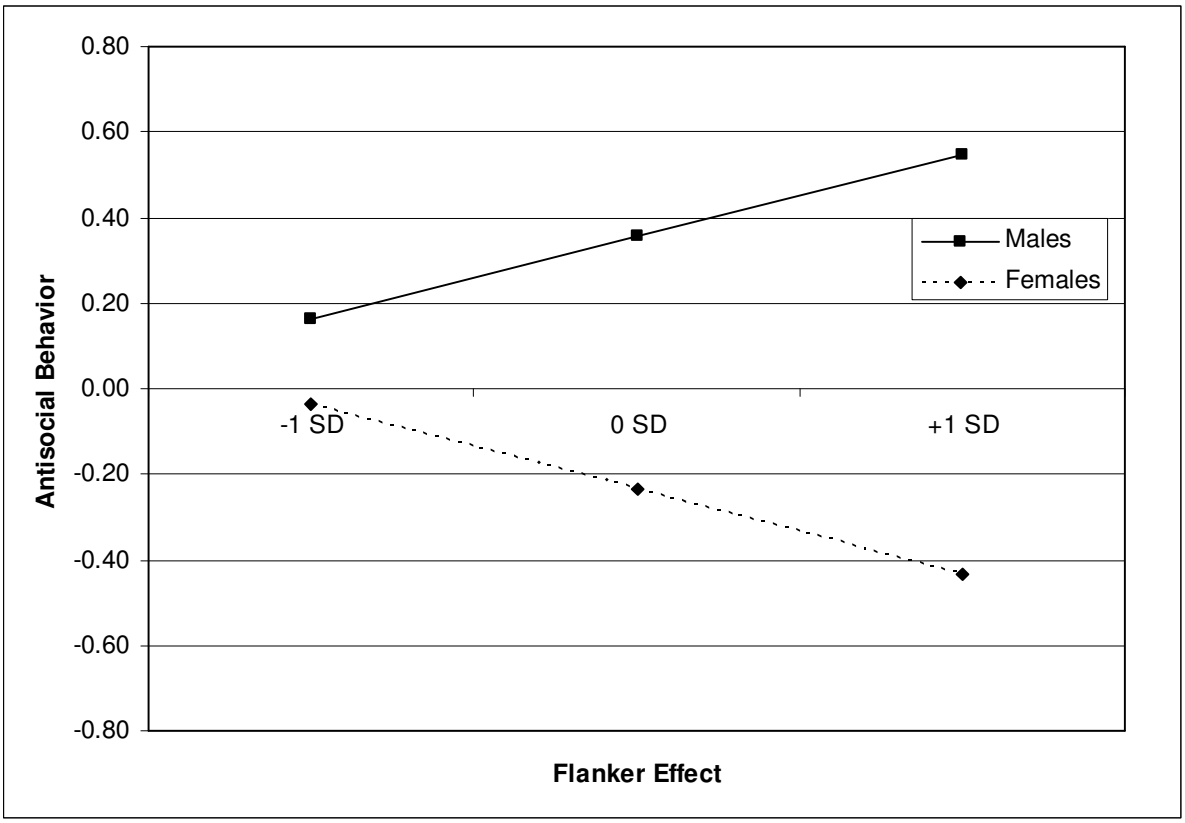
Attention-Aggression Associations

Hypothesis 6: Attention, hyperactivity, impulsivity, and self-control relate to antisocial behavior. Three general linear models were computed predicting aggression (Antisocial Factor 1). The first model predicted aggression based on self-reported attention/hyperactivity, sex, and the self-reported attention/hyperactivity by sex interaction. The second model predicted aggression based on IVA Continuous Performance Test

attention/hyperactivity, sex, and the IVA Continuous Performance Test attention/hyperactivity by sex interaction. The third model predicted aggression based on flanker compatibility effect, sex, and the flanker effect by sex interaction. The self-reported attention/hyperactivity by sex interation and the IVA Continuous Performance Test by attention/hyperactivity by sex interaction did not approach significance, $|t\text{s}| < 1.2$, $p\text{s} > .10$, so the interaction terms were dropped from these models, though the sex main effect was retained as a covariate. In the third model, the flanker effect by sex interaction was marginally significant, $t(161) = 1.95$, $p = .053$, *partial* $r(161) = 0.151$, so this interaction effect was retained (dropping it did not substantially affect the flanker effect or sex effects on antisocial behavior.

In the first model, both self-reported attention/hyperactivity and sex were significant predictors of antisocial behavior, $t(111) = 6.39$, $p < .001$, *partial* $r(116) = 0.517$, and $t(111) = 2.54$, $p < .05$, *partial* $r(111) = 0.233$, respectively. In the second model, sex significantly predicted antisocial behavior and IVA Continuous Performance Test attention/hyperactivity was marginally associated with aggression, $t(160) = 4.27$, $p < .001$, *partial* $r(160) = 0.319$, and $t(160) = 1.68$, $p = .095$, partial $r(160) = 0.131$, respectively. In the third model, sex was significantly associated with antisocial behavior, $t(161) = 3.77$, $p < .001$, *partial* $r(161) = 0.284$. The flanker compatibility effect by sex interaction was marginally significant, $t(161) = 1.95$, $p = .053$, *partial* $r(161) = 0.151$ (see Figure 2 for the interaction effect). The association between the flanker compatibility effect and antisocial behavior was not significant for females, $t(101) = -0.48$, $p > .10$, *standardized* $\beta = -0.198$. The association between the flanker compatibility effect and antisocial behavior was marginally significant for males, $t(61) = 1.67$, $p = .099$, *standardized* $\beta = 0.194$. This indicates that males with a larger flanker effect showed a trend towards higher antisocial behavior. The main effect of flanker compatibility

Figure 2. The association of flanker compatibility effect and antisocial behavior for males and females in standard deviation units.



effect was not uniquely related to antisocial behavior, $t(161) = -0.40$, $p > .10$, *partial* $r(161) = -0.031$. Given the lack of a priori hypotheses of predictor by sex interactions and the number of such interactions tested in the present study, the interpretations made based on this marginal interaction should be very limited without further replication. These results provide moderate support for Hypothesis 6. Poorer self-reported attention/hyperactivity and IVA Continuous Performance Test attention/hyperactivity were both associated with greater antisocial behavior, though this association was only marginal with the IVA Continuous Performance Test attention/hyperactivity.

The Media Exposure-antisocial behavior Association Mediated by Attention

Hypothesis 7: Attention/hyperactivity will partially mediate the media violence exposure antisocial behavior relation. Three z' product of coefficients tests of mediation were conducted with total media violence as the predictor and antisocial behavior (Antisocial Factor 1) as the outcome variable. This test of mediation has demonstrated superior statistical power relative to the traditional causal steps tests of mediation, and does so without inflating the type I error rate based on Monte Carlo simulations (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). In the first model, self-reported attention/hyperactivity was the mediator. Self-reported attention/hyperactivity significantly mediated the association between media violence exposure and antisocial behavior, $z' = 2.327$, $p < .05$. Media violence exposure remained a significant predictor of antisocial behavior after statistically controlling for self-reported attention/hyperactivity, indicating that this is partial mediation, $t(111) = 2.59$, $p < .05$, *partial* $r(111) = 0.238$ (see Figure 3 for the path model). In the second model, IVA Continuous Performance Test attention/hyperactivity was the mediator. IVA Continuous Performance Test attention/hyperactivity did not significantly mediate the media violence exposure antisocial behavior link, $z' = -0.373$, $p > .05$. In the third model, the flanker compatibility effect was the mediator. The flanker compatibility effect did not significantly mediate the media violence exposure antisocial behavior link, $z' = 0.688$, $p > .05$. Hypothesis 7 received partial support from these mediation tests. Self-reported attention/hyperactivity mediated the association between media violence exposure and antisocial behavior, however IVA Continuous Performance Test attention/hyperactivity and the flanker compatibility effect did not.

Media Exposure-GPA Association

Hypothesis 8: Total media exposure is associated with lower GPA. A general linear model was computed predicting GPA based on total media exposure, sex, and the total

Figure 3. Path model of the association between media violence exposure and antisocial behavior mediated by self-reported attention/hyperactivity problems.

media exposure by sex interaction. The interaction of total media exposure and sex was not significant so it was dropped from the model, $t(175) = 0.68$, $p > .10$, *partial* $r(175) = 0.051$, though sex was retained as a covariate. Both total media exposure and sex significantly predicted GPA, $t(176) = -3.64$, $p < .001$, *partial* $r(176) = -0.264$, and $t(176) = -2.03$, $p < .05$, *partial* $r(176) = -0.151$, respectively. Higher amounts of total media exposure was associated with lower GPA and males had lower GPA than females. The finding of a media exposure GPA link supports Hypothesis 8.

Hypothesis 9: The total media exposure GPA link is partially mediated by attention, hyperactivity, and impulsivity. Three z' product of coefficients tests of mediation were conducted with total media exposure as the predictor and GPA as the outcome variable. In the first model, self-reported attention/hyperactivity was the mediator. Self-reported attention/hyperactivity significantly mediated the media exposure GPA link, z'

= -2.447, $p < .05$. Total media exposure remained a significant predictor of GPA even when self-reported attention/hyperactivity was statistically controlled, $t(111) = -2.85$, $p < .01$, *partial* $r(111) = 0.260$, indicating that self-reported attention/hyperactivity is only a partial mediator of the total media exposure GPA link (see Figure 4 for the path model). In the second model, IVA Continuous Performance Test attention/hyperactivity was the mediator. IVA Continuous Performance Test attention/hyperactivity was not a significant mediator of the media exposure GPA association, $z' = -0.133$, $p > .05$. A third model tested the flanker compatibility effect as a mediator of the media exposure-GPA association. The flanker compatibility effect was not a signficant mediator of the media exposure GPA association, $z' = 0.423$, $p > .05$. The hypothesis that attention mediates the media exposure association with GPA received partial support. Self-reported attention, hyperactivity, and impulsivity appear to partially mediate this association, but IVA Continuous Performance Test

Figure 4. Path model of the association between total media exposure and grade-point average mediated by self-reported attention/hyperactivity problems.

attention/hyperactivty and the flanker compatibility effect did not.

Self-Esteem and Narcissism Associations to Aggression

Hypothesis 10: Narcissism is a stronger predictor of antisocial behavior than self-esteem. A general linear model was computed predicting antisocial behavior based on narcissism, self-esteem, sex, the narcissism by sex interaction, and the self-esteem by sex interaction. Neither sex interaction was significant ($|ts| < 0.8$, $ps > .10$) so the interaction terms were dropped from the model but the sex main effect was retained as a covariate. Narcissism ($t[140] = 6.14$, $p < .001$, *partial* $r[140] = .459$), self-esteem ($t[140] = -2.83$, $p < .05$, *partial* $r[140] = 0.232$), and sex ($t[140] = 3.78$, $p < .001$, *partial* $r[140] = 0.303$) were all significant predictors of antisocial behavior. Higher narcissism, lower self-esteem, and being a male were associated with greater antisocial behavior. The partial correlation of narcissism and antisocial behavior (*partial* $r[140] = 0.459$) is moderate to strong, whereas the partial correlation between self-esteem and antisocial behavior (*partial* $r[140] = 0.232$) is in the small to moderate range, providing some support for Hypothesis 10.

CHAPTER 4: DISCUSSION

Media Exposure and Attention

Self-reported attention/hyperactivity showed several associations with media exposure. Overall, greater amounts of media exposure were associated with worse self-reported attention and hyperactivity. Further analysis revealed that self-reported attention/hyperactivity was more strongly associated with exposure to video games than television or film. However, there was some evidence that exposure to violent television shows and films was associated with worse self-reported attention and hyperactivity as well.

The IVA Continuous Performance Test scores of attention and hyperactivity were not strongly related to total media exposure, but they were related to television and film exposure. Those who spend more time watching television and films performed worse on the IVA Continuous Performance Test.

Video game violence exposure was marginally related to slightly better performance on the IVA Continuous Performance Test. This may be due to greater stamina (i.e., less decline in reaction times over time) among the frequent players of violence video games. The observed advantage in stamina may be due to the fact that, as a computerized performance task, the IVA CPT has considerable similarity to violent video games. For individuals who frequently play fast-paced video games for an hour of more, a 15-20 minute computer task may not seem very demanding. Given the marginal statistical significance, further evidence is required to make strong conclusions about this association.

Though media exposure was generally unrelated to the flanker compatibility effect, there were trends suggesting that males who view more television and films and are exposed to more media violence show a larger flanker compatibility effect. This trend means that for males, viewing television and films and media violence is associated with less selective

attention. Overall, the present study did not provide strong evidence that selective attention, as measured by the flanker task, is related to media exposure or self-reported attention problems.

Associations between media exposure and attention or hyperactivity measures seemed to emerge most clearly in self-report measures that are closely related to diagnostic criteria of attention disorders or personality dimensions that are conceptually relevant to attention disorders. There were some weakly supportive results with the IVA CPT, a computerized task intended to measure attention/hyperactivity, as well.

These results are generally consistent with the findings of researchers who have examined the link between media exposure and the clinical type of attention and hyperactivity problems in children and early adolescents. This could mean that certain forms of media exposure are leading to changes in clinical attention and hyperactivity that either continue to influence young adults or that the effects of earlier media exposure on the clinical type of attention/hyperactivity problems last into young adulthood. It is also possible that such attention and hyperactivity problems cause individuals to spend more time with screen media as Acevedo-Polakovich et al. (2007) suggest. Some third variable that was not measured in the present study might also explain the association between media exposure and the clinical type of attention and hyperactivity problems. Due to the cross-sectional correlational design of the present study, it is not possible to rule out such alternative explanations for these results. However, other evidence does exist in the form of longitudinal studies of media exposure that suggests a causal effect of media exposure on clinical attention/hyperactivity problems (e.g., Johnson et al., 2007; Landhuis et al., 2007). This study makes a novel contribution primarily in revealing evidence for an association between certain types of media exposure and certain types of attention in an undergraduate sample that is

considerably older than those participants typically studied in relation to media effects on attention problems. Further, it appears that at least one cognitive psychological measure of attention (selective attention) reflects a distinct construct that is not strongly associated with such media exposure related deficits in attention.

Though the word "attention" is used in multiple theoretically distinct constructs, such as selective attention, divided attention, and sustained attention as well as attention disorders, the findings of this study indicate that a more precise use of terminology in research on attention related phenoma is necessary. In this study, it was inappropriate to combine the various attention measures into a single meaningful construct in order to test the hypotheses for several reasons. The associations between the various attention measures varied greatly. Past diagnosis of an attention disorder, present ADHD symptoms, self-control and impulsivity were all moderately to strongly associated. The flanker task was not strongly related to any of the other attention related measures. The IVA Continuous Performance Test was designed as a tool for aiding in the diagnosis and assessment of ADHD, yet it was unrelated to past diagnosis of attention disorders (zero order correlations between IVA Continuous Performance Test outcomes and past diagnosis of attention disorders did not exceed .03). This lack of an association might be explained if those who received a diagnosis of an attention disorder had been treated for their attention problems and therefore no longer performed worse on the IVA Continuous Performance Test. However, that explanation is not a satisfactory account for the failure of the IVA to relate to the WMH-CIDI Adult ADHD Self-Report Scale, a questionnaire also designed as a screening tool for ADHD (Kessler et al., 2005). It seems that the IVA Continuous Performance Test did not capture some of the meaningful differences in attention problems. The ADHD Self-Report Scale was associated with both past diagnosis of ADHD and personality constructs, such as self-control, that are

theoretically related to ADHD but the IVA Continuous Performance Test was not associated with either (Barkley, 1997). In light of the dual processing theories of cognition (see Evans, 2008), this finding may be due to the nature of the IVA CPT. This task is dependent on a series of rapid reaction times as well as maintaining task orientation over a period of 15 minutes. The IVA CPT may depend on some combination of System 1 and System 2 processes, whereas the attention disorders (as measured by past diagnosis and self-reported attention/hyperactivity symptoms) as well impulsivity and self-control could be primarily dependent on System 2 processing and the flanker task could be primarily related to System 1 processing.

Further, it is not clear that the conceptual labels used by the creators of the IVA Continuous Performance Test for the types of attention measured collectively by certain scales is theoretically or empirically justified. For example, it was claimed that the vigilance (based on responding to targets in the rare blocks) and prudence (based on withholding response from the non-targets in the frequent blocks) scores together reflect selective attention. These scores seem to be dependent on the individual's ability to either change his or her response set (withhold response when one has been responding frequently or respond when one has been withholding response) or simply have enough control to override any response set to meet the task demands. This does not seem to measure selective attention in the same sense that the Eriksen flanker task does. Selective attention was defined as the differential processing of two or more sources of information. In the IVA Continuous Performance Test, only one stimulus (visual or auditory) is ever presented at a time, so it does not seem that different amounts of processing resources can be devoted to more than one source of information in this task. The “selective attention” outcome from the IVA seems to be both theoretically and empirically distinct from a more traditional selective attention

measure such as the Eriksen flanker task. In the flanker task, a target letter and flanker letters are presented simultaneously and the amount of attentional resources or time used in the processing of the flanker letters can influence the extent to which incompatible flanker letters impair performance. Despite the attempt to use a shared conceptual language, the term selective attention does not seem to reflect the same thing in the IVA Continuous Performance Test and the Eriksen flanker task. In the absence of more apparent conceptual relations between the attention and hyperactivity related measures, the present study used the empirical relations between these measures as the basis for organization. Though the meaning of the IVA CPT remains somewhat unclear, the differences emerging between the self-reported attention/hyperactivity measures and the flanker task are consistent with a dual process model of attention.

Media Violence and Antisocial Behavior

The findings of this study in relation to media violence and antisocial behavior are consistent with the extensive body of research linking media violence exposure to higher levels of aggression. The participants in this study who consume more media violence are more likely to engage in antisocial behavior (even extreme forms such as violence). Again, the cross-sectional design prevents strong causal conclusions from this study, but many experimental and longitudinal studies of media violence have provided evidence that media violence exerts a causal influence on aggression (Gentile, 2003). Media violence exposure was also associated with greater psychopathy. Media violence exposure may contribute to the protopsychopathic personality traits assessed by this scale, or even psychopathy in general. Further data, including longitudinal data, are needed to conclusively test this potentially causal association.

Another issue addressed in this study was whether various forms of attention,

hyperactivity, and impulsivity mediate the observed association between media violence and aggression. The self-reported attention/hyperactivity measure and the IVA Continuous Performance Test measures of attention and hyperactivity were associated with antisocial behavior (though the association was weak for the IVA Continuous Performance Test). There was a trend towards males with a larger flanker effect having greater antisocial behavior. These results may suggest a role of both System 1 and System 2 attention processes in antisocial behavior, though the results are most clear with the self-reported attention/hyperactivity measures, indicating a more consistent association between System 2 and antisocial behavior. The results of the mediation analyses showed that attention disorder diagnosis, self-reported attention and hyperactivity symptoms, impulsivity, self-control (but not the scores from the IVA Continuous Performance Test or the flanker compatibility effect) partially mediated the media violence antisocial behavior association. This finding is interesting, as it suggests that cognitive processes that are not explicitly related to aggressive thoughts, expectations, beliefs, and perceptual biases may be involved in media violence effects on antisocial behavior. Over time exposure to violent media may change the way an individual processes stimuli and makes decisions, indirectly increasing the likelihood of behaving aggressively. This would mean that experience may produce long term changes in the likelihood of aggression at the decision making stage of GAM.

Media Exposure and GPA

Time spent watching television, films, and playing video games was associated with poorer grades in the previous semester. Regardless of the mechanisms involved in this association, it is noteworthy. However, the present study addressed the possibility that the media exposure-GPA link is due to more than merely the displacement of time that could be spent studying. A mediation analysis revealed that attention disorder diagnosis, self-reported

attention and hyperactivity symptoms, impulsivity, and self-control (but not IVA Continuous Performance Test scores or the flanker compatibility effect) mediated the association between media exposure and GPA. These findings suggest that watching television and films and playing video games leads to changes in self-reported attention and hyperactivity and that this leads to poorer grades. It seems that the conscious, control based processing of System 2, as opposed to the more automatic processing measured in tasks such as the flanker task, is a more likely intervening mechanism. For example, spending a lot of time consuming stimulating media with rapid visual and auditory transitions for years might make the processing of less stimulating information in books or university classrooms more difficult, leading to less learning and more disengagement from such educational tasks.

Self-Esteem and Narcissism

The association between self-esteem, narcissism, and aggression is a complex one. Despite the fact that highly narcissistic individuals tend to have high self-esteem, narcissism is positively related to aggression and self-esteem is negatively related to aggression. The present study found, as expected, that narcissism was a stronger predictor of aggressive behavior than self-esteem. This finding is consistent with the explanation of Baumeister et al. (1996) that aggression is not so much a result of low self-esteem as it is a result of threatened high self-esteem. Threatened high self-esteem would be expected to occur more when the self-esteem is unrealistically inflated (i.e., narcissism; Baumeister et al., 1996; Baumeister et al., 2000).

Future Directions

Recent research on the topic of media effects on attention can be divided into two very separate bodies of work: the effect of action video game exposure on visual attention and processing (e.g., Green and Bavalier, 2003) and the effect of media exposure (especially

television) on attention problems (e.g., Christakis et al., 2004). The findings of both lines of research are convincing, yet they seem to find media affecting attention in opposite directions. Does media exposure improve attention or hurt it? The answer might depend on the type of attention examined. If these research traditions are primarily measuring System 1 and System 2 attention processing, respectively, it might explain the divergent effects observed in these two areas of research. Perhaps a single effect can explain both findings: exposure to certain types of media might lead to a shift in an individual's attention abilities or strategies: multiple targets are perceived quickly and visual searches are faster yet at the same time it becomes more difficult to exert controlled processing of a single relatively unchanging target and goal directed behavior. The scientific understanding of media effects on attention would be greatly aided by studies able to show simultaneous improvements and declines within a single sample in separate tasks measuring different types of attention as a result of media exposure.

Alternatively, it is also possible that different types of media (or different characteristics of all types of media) are responsible for these two distinct effects. For example, passive viewing of screen media (especially television and film) might lead to more problems in the control based, sustained attention whereas exposure to active media (especially video games) could lead to improvements in processing speed and capacity of visual attention. The present study found similar effects for television, film, and video game exposure on the various measures of attention, so it seems unlikely that the critical feature determining whether media leads to improvement or detriment is something as simple as type of media (e.g., television vs. video games). Television, film, and video game exposure were all associated with worse attention ability, impulsivity, or hyperactivity problems based on the self-report measures of attention and in some cases the IVA CPT as well. Whether the

differences in the associations of different types of media in the present study resulted by chance or are due to systematic differences in the associations of media and various types of attention will best be addressed by future research. The different pattern of results observed for television and video games in the present study provides reason to measure and analyze different forms of media separately in future research.

Other media properties may be worth exploring further for their potential role in influencing attention. Media content is one of these properties. The present study found violent content to be associated to some differences in attention related variables independently of total media exposure. Zimmermann and Christakis (2007) found that non-educational television exposure (but not educational television exposure) was associated with later attention problems. These and other aspects of content may be important in determining what effects media has on its consumers. Filming techniques such as shot length (i.e., long, fixed shots from a single perspective vs. brief shots from rapidly shifting perspectives) might be relevant to the changes in the allocation of attentional resources. The way in which media are used may also be relevant to their effects. For example, using two or more types of media at once (e.g., listening to music while playing a video game) might lead to changes in attention beyond the effect of exposure to just one type of media at a time.

Future research on possible media effects should utilize a wider variety of cognitive tasks to identify which abilities are most related to media exposure and/or aggression. Some potentially valuable tasks that could be utilized in future research include the Stroop task (measuring selective attention), the Iowa Gambling Task (measuring inhibition), and the digit symbol substitution task (measuring general intelligence). As System 1 is conceived of as a modular system, it is possible that other System 1 based performance tasks than the flanker task would be related to media exposure. It might also be beneficial to develop a performance

task that more clearly measures System 2 processing. This might be done by incorporating aspects of the educational environments that individuals with ADHD find more challenging into the task. Rather than rapid processing of many stimuli, differences in performance on a task requiring several minutes of focused attention to complete in the presence of distractors might prove useful.

Finally, in order to establish the causal nature of media effects on attention, research designs other than the sort of cross-sectional design used in the current study are necessary. Longitudinal designs would not only rule out alternative explanations for the associations (e.g., those with poor attention simply have a greater preference for screen media), but would have the ability to test some additional hypotheses. For example, the question remains whether the media effects on the various attention variables are restricted to media exposure very early in life during some critical period or if the effects can continue throughout the lifespan. A longitudinal design could test for long term media effects occuring in late adolescence and adulthood. Experimental designs in which media exposure is manipulated would provide the strongest evidence of a causal association between media exposure and attention. The minimal amount of media exposure needed to produce a change in attention is not clear. Green and Bavalier (2003) found changes in visual attention after 10 sessions of playing a video game, suggesting that media effects on attention might emerge in a relatively short amount of time.

CHAPTER 5: REFERENCES

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APPENDIX

SONA POSTING FORM

The SONA IRB administrator MUST have a copy of this form before you send an activation request.

PRINCIPAL INVESTIGATOR (*Faculty Supervisor*): Edward Swing, B.A. (Craig Anderson, Ph.D.)

RESEARCHERS: Edward Swing, Craig Anderson

STUDY NAME & NUMBER: Personality and Cognitive Ability

BRIEF ABSTRACT: This study examines how various personality measures and life experiences relate to performance on computer tasks.

DETAILED DESCRIPTION (*Must be exactly as approved by IRB*):
This study is concerned with how different types of people perform on certain cognitive computer tasks. We are interested in how a variety of personality factors and life experiences (including media usage) may relate to that performance. You will be asked to complete various questionnaires and complete two computer tasks.

ELIGIBILITY REQUIREMENTS: This study can only be completed once. You must be 18 years old or older to participate.

DURATION (*Minimum 50min.):* 90 minutes

CREDITS: 2

PREPARATION:

IRB APPROVAL CODE:

IRB APPROVAL EXPIRATION:

IS THIS AN ONLINE STUDY? No

Informed Consent Document

Title of the Study: Personality and Cognitive Ability

Investigators: Craig Anderson, Ph.D.

This is a research study. You must be at least 18 years of age to participate. You are invited to be in a research study examining personality, life experience, behaviors and cognitive performance variables. As indicated on your course syllabus, participation in research studies is one of the options for obtaining experimental credit in your course. We ask that you take your time in reading this document and ask questions at any time.

Introduction

This study is concerned with how different types of people perform on certain cognitively based computer tasks. We are interested in how a variety of personality factors and life experiences (especially media usage) may relate to that performance. We are not concerned with the performance of a particular person, but rather this study is concerned with assessing the performance of *groups* of people. You are being invited to participate in this study because you are a student in Psychology 101, 230, or 280.

Procedure

Participation in this study is voluntary. If you agree to be in this study, it will take approximately 60-90 minutes. You will receive two credit points participating. To complete this study, we will ask you to do the following things:

You will first be asked to complete two computer tasks measuring your cognitive abilities. In the first computer task, you will click the mouse as fast as possible in response to a series of auditory and visual stimuli for 15 minutes. In the second computer task, you will press the correct key when visual stimuli are presented on the screen.

Once you have completed the computer tasks, you will complete questionnaires assessing different aspects of your media habits, personality, attitudes, demographic characteristics, behaviors, and life experiences. You may skip any questions which you are not comfortable answering.

Risks

This study does not pose any foreseeable risks to you. However, if you feel uncomfortable with the tasks, you can stop immediately with no penalty and you will receive credit for your time. Also, you may skip any questions which you are uncomfortable with answering.

Benefits

If you participate in this study, you will receive two extra credit points. Also, you will receive first hand knowledge on how psychological research is conducted, which will complement information from your psychology class. It is hoped that the information gained in this study will benefit society by improving the understanding of the relationship between attitudes, personality, life experience, behaviors, and cognitive ability.

Costs and Compensation
There will not be any costs to you for participating in this study, except for your time spent in the laboratory. This study will take 60-90 minutes of your time, for which you will electronically receive two credit points even if you choose to discontinue participation in the study.

Participant Rights

Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. If you decide to leave the study early, it will not result in any penalty or loss of benefits to which you are otherwise entitled.

Confidentiality
Records identifying participants will be kept confidential and will not be made publicly available. Federal government regulatory agencies and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis.
These records may contain private information.

Your data will be identified by an arbitrary identification number. Only the research team will have access to the data which will be stored in a locked office. The data will be retained for approximately two years. If the results are published, your identity will remain confidential.

Questions or Problems
You are encouraged to ask questions at any time during this study. For further information about the study contact Edward Swing at 294-2335 or eswing@iastate.edu or Craig Anderson at 294-0283 or caa@iastate.edu. If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, Janice Canny, (515) 294-4566, IRB@iastate.edu, or Director, Diane Ament, (515) 294-3115, Office of Research Assurances, Iowa State University, Ames, Iowa 50011.

****

You may or may not choose to participate in this study. If you choose to participate, please read the following statement and acknowledge your voluntary consent by providing your name, your signature, and today's date.

I hereby consent to my participation in this experiment (Experiment #175). I have been informed and understand the purposes and procedures of this study. I understand that my participation is completely voluntary and that I am free to withdraw consent and discontinue participation at anytime without

losing credit. I agree to participate in this experiment as described above.

Signature of Participant

Date

___ Check here if you would like to receive a written copy of this consent form at the conclusion of the study.

****

FOR EXPERIMENTER TO COMPLETE:

I certify that the participant has been given adequate time to read and learn about the study and all his/her questions have been answered. It is my opinion that the participant understands the purpose, risks, benefits and the procedures that will be followed in this study and has voluntarily agreed to participate.

_____

Signature of Investigator or Person Obtaining Consent **Date**

ID: _____

General Media Habits Questionnaire (Adult version)

FAVORITE MEDIA QUESTIONNAIRE

Do not open this survey until you have read all the instructions.

INSTRUCTIONS:

- This survey is mostly about television, movies/videos, and video games. When we ask about video games, we mean any games you play on computer, on video game consoles (such as Nintendo), on hand-held game devices (such as Gameboys), or in video arcades.

- Please answer each question in order and do not look ahead.

- On most questions, all you need to do is select ONE response – whichever one comes closest to your answer. It's important that people tell us the truth when they answer the questions. If you really don't want to answer a particular question, please leave it blank rather than making up an answer.

- On some questions, there are arrows that tell you to go to a certain question based on your answer. Please answer each question in order, and do not skip ahead unless there is an arrow that tells you to.

  Example: Have you ever owned a dog?

  ❑ Yes ➔ **GO TO QUESTION A**

  ❑ No ➔ **SKIP TO QUESTION B**

1. What are your three favorite television shows?
   a. Title #1:_____

How often do you watch this show?	**Rarely:** 1 2 3 4 5 6 7 **:Often**
How violent is this show?	**No violence:**1234567**:Extremely violent**
How often do characters tease each other or say sarcastic things in this show?	**Never:** 1 2 3 4 5 6 7 **:Often**
How often are people helping each other or being nice in this show? (*Circle one*)	**Never**: 1 2 3 4 5 6 7 :**Often**

   b. Title #2:_____

How often do you watch this show?	**Rarely:** 1 2 3 4 5 6 7 **:Often**
How violent is this show?	**No violence:**1234567**:Extremely violent**
How often do characters tease each other or say sarcastic things in this show?	**Never:** 1 2 3 4 5 6 7 **:Often**
How often are people helping each other or being nice in this show? (*Circle one*)	**Never**: 1 2 3 4 5 6 7 :**Often**

   c. Title #3:_____

How often do you watch this show?	**Rarely:** 1 2 3 4 5 6 7 **:Often**
How violent is this show?	**No violence:**1234567**:Extremely violent**
How often do characters tease each other or say sarcastic things in this show?	**Never:** 1 2 3 4 5 6 7 **:Often**
How often are people helping each other or being nice in this show? (*Circle one*)	**Never**: 1 2 3 4 5 6 7 :**Often**

2. What are your three favorite movies/videos/DVDs?
   a. Title #1:_____

How often do you watch this movie?	**Rarely:** 1 2 3 4 5 6 7 **:Often**
How violent is this movie?	**No violence:**1234567**:Extremely violent**
How often do characters tease each other or say sarcastic things in this movie?	**Never:** 1 2 3 4 5 6 7 **:Often**
How often are people helping each other or being nice in this movie? (*Circle one*)	**Never**: 1 2 3 4 5 6 7 :**Often**

   b. Title #2:_____

How often do you watch this movie?	**Rarely:** 1 2 3 4 5 6 7 **:Often**
How violent is this movie?	**No violence:**1234567**:Extremely violent**

How often do characters tease each other
or say sarcastic things in this movie? **Never:** 1 2 3 4 5 6 7 **:Often**

How often are people helping each other or being nice in this movie? (*Circle one*) **Never**: 1 2 3 4 5 6 7 :**Often**

c. Title #3:_____

How often do you watch this movie? **Rarely:** 1 2 3 4 5 6 7 **:Often**

How violent is this movie? **No violence:**1234567**:Extremely violent**

How often do characters tease each other
or say sarcastic things in this movie? **Never:** 1 2 3 4 5 6 7 **:Often**

How often are people helping each other or being nice in this movie? (*Circle one*) **Never**: 1 2 3 4 5 6 7 :**Often**

How often do you play video games? (*Mark one*.)

- ❑ Almost every day
- ❑ About 4 or 5 times a week
- ❑ About 2 or 3 times a week
- ❑ About once a week ➔ **CONTINUE WITH #4**
- ❑ A couple of times a month
- ❑ About once a month
- ❑ Less than once a month
- ❑ I never play video games ➔ **SKIP TO #25**

3. For how many years have you been playing video games? _____years

4. When you play video games, for how long do you usually play at one sitting?
_____minutes

5. What are your three favorite video games?

a. Title #1:_____

How often do you play this game? **Rarely:** 12 34 56 7 **:Often**

How violent is this game? **No violence:**1234567**:Extremely violent**

How often do characters tease each other
or say sarcastic things in this game? **Never:** 1 2 3 4 5 6 7 **:Often**

How often are people helping each other or being nice in this game? (*Circle one*) **Never:** 1 2 3 4 5 6 7 **:Often**

b. Title #2:_____

How often do you play this game? **Rarely:** 12 34 56 7 **:Often**

How violent is this game? **No violence:**1234567**:Extremely violent**

How often do characters tease each other
or say sarcastic things in this game? **Never:** 1 2 3 4 5 6 7 **:Often**

How often are people helping each other or being nice in this game? (*Circle one*) **Never:** 1 2 3 4 5 6 7 **:Often**

c. Title #3:_____

How often do you play this game? **Rarely:** 1 2 3 4 5 6 7 **:Often**

How violent is this game? **No violence:**1234567**:Extremely violent**

How often do characters tease each other
or say sarcastic things in this game? **Never:** 1 2 3 4 5 6 7 **:Often**

How often are people helping each other or being nice in this game? (*Circle one*) **Never:** 1 2 3 4 5 6 7 **:Often**

6. Do you understand the computer and video game ratings (such as E, T, or M)?

❑ Yes, all of them ❑ Some of them ❑ No

7. Do you sometimes try to limit your own playing?

❑ Yes ❑ No ➔ If yes, are you successful in limiting yourself?

❑ Yes ❑ No ❑ Sometimes

(Please circle the appropriate letter next to each question)

	Yes	**No**	**Sometimes**	**Don't Know**
8. Do you download video games from the Internet?	Y	N	S	DK
9. Do you ever play so much that it interferes with your homework?	Y	N	S	DK

10. On a scale of 1 to 10, how much violence do you like to have in video games? (*Circle one*)

No Violence: 1 2 3 4 5 6 7 8 9 10 **:Extreme Violence**

11. Compared to two or three years ago, how much violence do you like to have in video games?

❑ A lot more than two or three years ago
❑ A little more
❑ About the same amount
❑ A little less
❑ A lot less than two or three years ago
❑ Don't know

12. Compared to other college students of the same sex, do you believe that you are more or less affected by the violence in the video games you play?

❑ A lot less affected ❑ About the same as others ❑ A lot more affected

❑ A little less affected ❑ A little more affected ❑ I never play violent video games

13. Compared to other college students of the same sex, do you believe that you are more or less affected by the violence in the TV and movies you watch?

❑ A lot less affected ❑ About the same as others ❑ A lot more affected
❑ A little less affected ❑ A little more affected ❑ I never watch violent TV/movies

(Please circle the appropriate letter next to each question)	**Yes**	**No**	**Don't Know**
14. Have you played video games as a way of escaping from problems or bad feelings?	Y	N	DK
15. Do you become restless or irritable when attempting to cut down or stop playing video games?	Y	N	DK
16. Have you ever done poorly on a school assignment or test because you spent too much time playing video games?	Y	N	DK
17. Do you own your own video games?	Y	N	DK
18. Do you need to spend more and more time and/or money on video games in order to achieve the desired excitement?	Y	N	DK
19. Over time, have you become more preoccupied with playing video games, studying video game playing, or planning the next opportunity to play?	Y	N	DK
20. Have you ever lied to family or friends about how much you play video games?	Y	N	DK
21. Have you ever felt angry and played video games to release your anger?	Y	N	DK
22. Have you ever committed illegal/unsocial acts such as theft from family, friends, or elsewhere in order to get video games?	Y	N	DK
23. Do you have any friends that you would say are "addicted" to video games?	Y	N	DK
24. Have you ever felt like you were addicted to video games?	Y	N	DK

25. How often do you buy or rent new games?

❑ More than once a week ❑ About once a month ❑ About once a year
❑ About once a week ❑ Every couple of months ❑ Less than once a year
❑ About every two weeks ❑ A couple of times a year ❑ I never buy or rent new games

26. How often do you watch MTV?
❑ Almost every day ❑ About once a week ❑ I almost never watch MTV
❑ About 2-3 times a week ❑ A couple times a month ❑ I never watch MTV

27. How often do you watch wrestling on TV?
❑ Almost every day ❑ About once a week ❑ I almost never watch wrestling
❑ About 2-3 times a week ❑ A couple times a month ❑ I never watch wrestling

28. On average, how many *minutes* a day do you spend reading for pleasure? _____**minutes**

29. On average, how many *hours* a day do you spend listening to music (radio, CDs, tapes, MTV, etc)? _____ hours

30. On a typical week day (Monday through Friday), for how many *hours* do you **watch TV/videos** during each of the following times? *(Please write numbers in the spaces below.)*

6 am - Noon	**Noon - 6 pm**	**6 pm - Midnight**	**Midnight - 6 am**
_____ hours/day	_____ hours/day	_____ hours/day	_____ hours/day

31. On a typical weekend day (Saturday or Sunday), for how many *hours* do you **watch TV/videos** during each of the following times? *(Please write numbers in the spaces below.)*

6 am - Noon	**Noon - 6 pm**	**6 pm - Midnight**	**Midnight - 6 am**
_____ hours/day	_____ hours/day	_____ hours/day	_____ hours/day

32. On a typical school day (Monday through Friday), for how many *hours* do you **play video games** during each of the following times? *(Please write numbers in the spaces below.)*

6 am - Noon	**Noon - 6 pm**	**6 pm - Midnight**	**Midnight - 6 am**
_____ hours/day	_____ hours/day	_____ hours/day	_____ hours/day

33. On a typical weekend day (Saturday or Sunday), for how many *hours* do you **play video games** during each of the following times? *(Please write numbers in the spaces below.)*

6 am - Noon	**Noon - 6 pm**	**6 pm - Midnight**	**Midnight - 6 am**
_____ hours/day	_____ hours/day	_____ hours/day	_____ hours/day

34. How much do you currently **watch TV/videos** compared to **Much less** **About the same** **Much** the amount you watched *before school age* (ages 0-4)? 1 2 3 4 5 **More**
35. How much do you currently **watch TV/videos** compared to **Much less** **About the same** **Much** the amount you watched in *elementary school* (ages 5-9)? 1 2 3 4 5 **More**
    How much do you currently **watch TV/videos** compared to **Much less** **About the same** **Much** the amount you watched in *middle school* (ages 10-13)? 1 2 3 4 5 **More**
36. How much do you currently **watch TV/videos** compared to **Much less** **About the same** **Much** the amount you watched in *high school* (ages 14-18)? 1 2 3 4 5 **More**
37. How much do you currently **play video games** compared to **Much less** **About the same** **Much**

the amount you watched *before school age* (ages 0-4)? 1 2 3 4 5 **More**

38. How much do you currently **play video games** compared to **Much less** **About the same** **Much**
the amount you played in *elementary school* (ages 5-9)? 1 2 3 4 5 **More**

How much do you currently **play video games** compared to **Much less** **About the same** **Much**
the amount you played in *middle school* (ages 10-13)? 1 2 3 4 5 **More**

How much do you currently **play video games** compared to **Much less** **About the same** **Much**
the amount you played in *high school* (ages 14-18)? 1 2 3 4 5 **More**

Do you have a TV in your own room? ❑ Yes ❑ No

39. When you were in high school, did you have a TV in your own room? ❑ Yes ❑ No

40. Do you play video games in your own room? ❑ Yes ❑ No

41. When you were in high school, did you play video games in your own room? ❑ Yes ❑ No

42. Do you own a hand-held videogame player (such as Gameboy or PSP)? ❑ Yes ❑ No

43. What types of extra-curricular activities do you participate in regularly? (*Mark all that apply.*)

❑ Team sports ❑ Music ❑ Church or religious activities

❑ Individual sports ❑ Drama ❑ Other (*Specify:*_____)
❑ Clubs ❑ Part-time job

44. In the past year, about how many times have you attended church or religious services?

❑ Never ❑ About once a month ❑ More than once a week
❑ Once or twice ❑ 2 or 3 times a month
❑ Several times ❑ About once a week

45. Have you been in a physical fight in the past year? ❑ Yes
❑ No

Brief Self-Control Scale

Using the scale provided, please indicate how much each of the following statements reflects how you typically are.

	Not at all				**Very Much**
1. I am good at resisting temptation.	1	2	3	4	5
2. I have a hard time breaking bad habits.*	1	2	3	4	5
3. I am lazy.*	1	2	3	4	5
4. I say inappropriate things.*	1	2	3	4	5
5. I do certain things that are bad for me, if they are fun.*	1	2	3	4	5
6. I refuse things that are bad for me.	1	2	3	4	5
7. I wish I had more self-discipline.*	1	2	3	4	5
8. People would say that I have iron self-discipline.*	1	2	3	4	5
9. Pleasure and fun sometimes keep me from getting work done.*	1	2	3	4	5
10. I have trouble concentrating.*	1	2	3	4	5
11. I am able to work effectively toward long-term goals.	1	2	3	4	5
12. Sometimes I can't stop myself from doing something, even if I know it is wrong.*	1	2	3	4	5
13. I often act without thinking through all the alternatives.*	1	2	3	4	5

* These items are reverse scaled.

Barratt Impulsivity Scale

DIRECTIONS: People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and put an X on the appropriate circle on the right side of this page. Do not spend too much time on any statement. Answer quickly and honestly.

	O	O	O	O
	Rarely/Never	Occasionally	Often	Almost Always/Always
1	I plan tasks carefully.* C	O	O	O	O
2	I do things without thinking. B	O	O	O	O
3	I make-up my mind quickly. B	O	O	O	O
4	I am happy-go-lucky. B	O	O	O	O
5	I don't "pay attention." A	O	O	O	O
6	I have "racing" thoughts. F	O	O	O	O
7	I plan trips well ahead of time.* C	O	O	O	O
8	I am self controlled.* C	O	O	O	O
9	I concentrate easily.*A	O	O	O	O
10	I save regularly.* D	O	O	O	O
11	I "squirm" at plays or lectures. A	O	O	O	O
12	I am a careful thinker.* C	O	O	O	O
13	I plan for job security.* C	O	O	O	O
14	I say things without thinking. C	O	O	O	O
15	I like to think about complex problems.* D	O	O	O	O
16	I change jobs. E	O	O	O	O
17	I act "on impulse." B	O	O	O	O
18	I get easily bored when solving thought problems. D	O	O	O	O
19	I act on the spur of the moment. B	O	O	O	O
20	I am a steady thinker.* A	O	O	O	O
21	I change residences. E	O	O	O	O
22	I buy things on impulse. B	O	O	O	O
23	I can only think about one thing at a time. E	O	O	O	O
24	I change hobbies. F	O	O	O	O
25	I spend or charge more than I earn. B	O	O	O	O
26	I often have extraneous thoughts when thinking. F	O	O	O	O
27	I am more interested in the present than the future. D	O	O	O	O
28	I am restless at the theater or lectures. A	O	O	O	O
29	I like puzzles.* D	O	O	O	O
30	I am future oriented.* E	O	O	O	O

* These items are reverse scored.

A: Attention subscale, B: Motor Impulsiveness subscale, C: Self-control subscale

D: Cognitive Complexity subscale,E: Perseverance subscale,F: Cognitive Instability subscale

Rosenberg Self-Esteem Scale

Instructions: Below is a list of statements dealing with your general feelings about yourself. If you strongly agree, circle **SA**. If you agree with the statement, circle **A**. If you disagree, circle **D**. If you strongly disagree, circle **SD**.

1.	On the whole, I am satisfied with myself.	**SA**	**A**	**D**	**SD**
2.	At times, I think I am no good at all.*	**SA**	**A**	**D**	**SD**
3.	I feel that I have a number of good qualities.	**SA**	**A**	**D**	**SD**
4.	I am able to do things as well as most other people.	**SA**	**A**	**D**	**SD**
5.	I feel I do not have much to be proud of.*	**SA**	**A**	**D**	**SD**
6.	I certainly feel useless at times.*	**SA**	**A**	**D**	**SD**
7.	I feel that I'm a person of worth, at least on an equal plane with others.	**SA**	**A**	**D**	**SD**
8.	I wish I could have more respect for myself.*	**SA**	**A**	**D**	**SD**
9.	All in all, I am inclined to feel that I am a failure.*	**SA**	**A**	**D**	**SD**
10.	I take a positive attitude toward myself.	**SA**	**A**	**D**	**SD**

*These items are reverse scored.

Narcissistic Personality Inventory

Instructions: Please indicate your assessment of these statements by circling "true" or "false."

1. I have a natural talent for influencing people. A **True False**
2. Modesty doesn't become me. D **True False**
3. I would do almost anything on a dare. D **True False**
4. I know that I am good because everybody keeps telling me so. C **True False**
5. If I ruled the world it would be a much better place. G **True False**
6. I can usually talk my way out of anything. E **True False**
7. I like to be the center of attention. D **True False**
8. I will be a success. A **True False**
9. I think I am a special person. C **True False**
10. I see myself as a good leader. A **True False**
11. I am assertive. A **True False**
12. I like to have authority over other people. A **True False**
13. I find it easy to manipulate people. E **True False**
14. I insist upon getting the respect that is due me. G **True False**
15. I like to display my body. F **True False**
16. I can read people like a book. E **True False**
17. I like to take responsibility for making decisions. B **True False**
18. I want to amount to something in the eyes of the world. F **True False**
19. I like to look at my body. F **True False**
20. I am apt to show off if I get the chance. D **True False**
21. I always know what I am doing. B **True False**
22. I rarely depend on anyone else to get things done. B **True False**
23. Everybodylikes to hear my stories. E **True False**
24. I expect a great deal from other people. F **True False**
25. I will never be satisfied until I get all that I deserve. F **True False**
26. I like to be complimented. C **True False**
27. I have a strong will to power. G **True False**
28. I like to start new fads and fashions. D **True False**
29. I like to look at myself in the mirror. F **True False**
30. I really like to be the center of attention. D **True False**
31. I can live my life in any way I want to. B **True False**
32. People always seem to recognize my authority. A **True False**
33. I would prefer to be a leader. A **True False**
34. I am a born leader. A **True False**
35. I am going to be a great person. B **True False**
36. I can make anybody believe anything I want them to. E **True False**
37. I am more capable than other people. B **True False**
38. I wish somebody would someday write my biography. C **True False**
39. I get upset when people don't notice how I look when I go out in public. D **True False**
40. I am an extraordinary person. C **True False**

A: Authority subscale, B:Self-sufficiency subscale, C: Superiority subscale, D: Exhibitionism subscale, E: Exploitativeness subscale, F: Vanity subscale, G: Entitlement subscale

Buss-Perry Aggression Questionnaire

Please rate each of the following items in terms of how characteristic they are of you. Use the following scale for answering these items.

1	2	3	4	5
Extremely Uncharacteristic Of Me				**Extremely Characteristic Of Me**

_____1 I tell my friends openly when I disagree with them. V

_____2 I am sometimes eaten up by jealousy. H

_____3 Once in a while I can't control the urge to strike another person. P

_____4 I flare up quickly but get over it quickly. A

_____5 At times I feel I have gotten a raw deal out of life. H

_____6 Given enough provocation, I may hit another person. P
_____7 When frustrated, I let my irritation show. A
_____8 If somebody hits me, I hit back. P
_____9 I often find myself disagreeing with people. V
_____10 Other people always seem to get the breaks. H

_____11 I get into fights a little more than the average person. P
_____12 I sometimes feel like a powder keg ready to explode. A

_____13 If I have to resort to violence to protect my rights, I will. P
_____14 I am an even-tempered person.* A

_____15 I wonder why sometimes I feel so bitter about things. H

_____16 When people annoy me, I may tell them what I think of them. V

_____17 Some of my friends think I'm a hothead. A

_____18 There are people who pushed me so far that we came to blows. P
_____19 I know that "friends" talk about me behind my back. H
_____20 Sometimes I fly off the handle for no good reason. A
_____21 I can think of no good reason for ever hitting a person.* P

_____22 I can't help getting into arguments when people disagree with me. V

_____23 I am suspicious of overly friendly strangers. H

_____24 I have trouble controlling my temper. A

_____25 I have threatened people I know. P

_____26 I sometimes feel that people are laughing at me behind my back. H

_____27 My friends say that I'm somewhat argumentative. V

_____28 I have become so mad that I have broken things. P

_____29 When people are especially nice, I wonder what they want. H

*These items are reverse scored.
P: Physical Aggression subscale, V: Verbal Aggression subscale, A: Anger subscale, H: Hostility subscale

Trait Forgiveness Scale

Directions: Indicate the degree to which you agree or disagree with each statement below by using the following scale:

5 = Strongly Agree
4 = Mildly Agree
3 = Agree and Disagree Equally
2 = Mildly Disagree
1 = Strongly Disagree

_____ 1. People close to me probably think I hold a grudge too long.*

_____ 2. I can forgive a friend for almost anything.

_____ 3. If someone treats me badly, I treat him or her the same.*

_____ 4. I try to forgive others even when they don't feel guilty for what they did.

_____ 5. I can usually forgive and forget an insult.

_____ 6. I feel bitter about many of my relationships.*

_____ 7. Even after I forgive someone, things often come back to me that I resent.*

_____ 8. There are some things for which I could never forgive even a loved one.*

_____ 9. I have always forgiven those who have hurt me.

_____ 10. I am a forgiving person.

*These items are reverse scored.

Levenson's Self-report Psychopathy Scale

Instructions: Below is a list of statements dealing with opinions. Please circle the response that most accurately matches your agreement with each statement.

1. Love is overrated. S **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

2. For me, what's right is whatever I can get away with. P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

3. I find myself in the same kinds of trouble, time after time. S **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

4. My main purpose in life is getting as many goodies as I can. P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

5. I make a point of trying not to hurt others in pursuit of my goals.* P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

6. I quickly lose interest in tasks I start. S **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

7. People who are stupid enough to get ripped off usually deserve it. P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

8. Looking out for myself is my top priority. P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

9. I tell other people what they want to hear so that they will do what I want them to do. P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

10. I would be upset if my success came at someone else's expense.* P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

11. I often admire a really clever scam. P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

12. When I get frustrated, I often "let off steam" by blowing my top. S **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

13. I don't plan anything very far in advance. S **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

14. Before I do anything, I carefully consider the possible consequences.* S **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

15. I feel bad if my words or actions cause someone else to feel emotional pain.* P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

16. Even if I were trying very hard to sell something, I wouldn't lie about it.* P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

17. Cheating is not justified because it is unfair to others.* P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

18. I let others worry about higher values; my main concern is with the bottom line. P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

19. Success is based on survival of the fittest; I am not concerned about the losers. P

Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly

20. I am often bored. S **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**
21. I find that I am able to pursue one goal for a long time.* S **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**
22. In today's world, I feel justified in doing anything I can get away with to succeed. P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**
23. Making a lot of money is my most important goal. P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**
24. Most of my problems are due to the fact that other people just don't understand me. S **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**
25. I enjoy manipulating other people's feelings. P **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**
26. I have been in a lot of shouting matches with other people. S **Disagree Strongly, Disagree Somewhat, Agree Somewhat, Agree Strongly**

*These items are reverse scored.
P: Primary Psychopathy subscale, S: Secondary Psychopathy subscale

WMH-CIDI Adult ADHD Self-Report Scale

Instructions: Please circle the response for each question that is most accurate for the past six months.

1. How often do you make careless mistakes when you have to work on a boring or difficult project? I **Very Often, Often, Sometimes, Rarely, Never**
2. How often do you have difficulty keeping your attention when you are doing difficult or boring work. **Very Often, Often, Sometimes, Rarely, Never**
3. How often do you have difficulty concentrating on what people are saying to you, even when they are speaking to you directly? I **Very Often, Often, Sometimes, Rarely, Never**
4. How often do you have trouble wrapping up the fine details of a project, once the challenging parts have been done? I **Very Often, Often, Sometimes, Rarely, Never**
5. How often do you have difficulty getting things in order when you have to do a task that requires organization? I **Very Often, Often, Sometimes, Rarely, Never**
6. When you have a task that requires a lot of thought, how often do you avoid or delay getting started? I **Very Often, Often, Sometimes, Rarely, Never**
7. How often do you misplace or have difficulty finding things at home or work? I **Very Often, Often, Sometimes, Rarely, Never**
8. How often are you distracted by activity or noise around you? I **Very Often, Often, Sometimes, Rarely, Never**
9. How often do you have trouble remembering appointments or obligations? I **Very Often, Often, Sometimes, Rarely, Never**
10. How often do you fidget or squirm with your hands or your feet when you have to sit down for a long time? H **Very Often, Often, Sometimes, Rarely, Never**
11. How often do you leave your seat during meetings or other situations in which you are expected to remain seated? H **Very Often, Often, Sometimes, Rarely, Never**
12. How often do you feel restless or fidgety? H **Very Often, Often, Sometimes, Rarely, Never**
13. How often do you have difficulty unwinding or relaxing when you have time to yourself? H **Very Often, Often, Sometimes, Rarely, Never**
14. How often do you feel overly active and compelled to do things, like you were driven by a motor? H **Very Often, Often, Sometimes, Rarely, Never**
15. How often do you find yourself talking too much when you are in a social situation? H **Very Often, Often, Sometimes, Rarely, Never**
16. When you're in a conversation, how often do you find yourself finishing the sentences of the people that you are talking to, before they can finish them themselves? H **Very Often, Often, Sometimes, Rarely, Never**
17. How often do you have difficulty waiting your turn in situations when turn-taking is required? H **Very Often, Often, Sometimes, Rarely, Never**
18. How often do you interrupt others when they are busy? **Very Often, Often, Sometimes, Rarely, Never**

I: Inattention subscale, H: Hyperactivity subscale

Demographic and Life Experience Questionnaires

Demographics

Please answer the following questions as accurately as possible. If you a question does not apply to you, write "NA" in the blank.

_____ 1. What is your **current age** in years?

_____ 2. How many **semesters** of college have you completed?

_____ 3. How many siblings (**brothers or sisters**) do you have?

_____ 4. What was your **GPA** (on a four point scale) in the **previous semester**?

_____ 5. How many years of **education** has your **mother** received (e.g., "12" for a high school graduate)?

_____ 6. How many years of **education** has your **father** received (e.g., "12" for a high school graduate)?

_____ 7. What is your **parents'** approximate household **income** each year (in dollars)?

_____ 8. As a child, how many times each year did your **parents** use **physical discipline** (e.g., spanking or slapping) on you?

_____ 9. Have you ever been diagnosed with a **learning disability**?

_____ 10. If so, at what age(s) were you?

_____ 11. Have you ever been diagnosed with **attentional** or **hyperactivity disorder** (e.g., ADD or ADHD)?

_____ 12. If so, at what age(s) were you?

_____ 13. Have any of your family members ever been diagnosed with a **learning disability**?

_____ 14. If so, at what age(s) were they?

_____ 15. Have any of your family members ever been diagnosed with **attentional** or **hyperactivity disorder** (e.g., ADD or ADHD)?

_____ 16. If so, at what age(s) were they?

National Youth Survey (Delinquency items)

This questionnaire contains a number of questions about your behavior in the last year. Please answer all of the questions as accurately as you can. Do not try to look good or bad. All of the information you provide is totally confidential and will not be shown to anyone other than the research team. You can leave any questions you are uncomfortable answering blank, though complete responses are very valuable to our research.

For each question, indicate your best estimate of how often you did the described behavior in the last year.

How many times in the last year have you:

_____ 1. purposely damaged or destroyed property belonging to your parents or other family members?

_____ 2. purposely damaged or destroyed property belonging to a school?

_____ 3. purposely damaged or destroyed property that did not belong to you (not counting family or school property)?

_____ 4. stolen (or tried to steal) a motor vehicle, such as a car or motorcycle?

_____ 5. stolen (or tried to steal) something worth more than $50?

_____ 6. knowingly bought, sold or held stolen goods (or tried to do any of these things)?

_____ 7. thrown objects (such as rocks, or bottles) at cars or people? *

_____ 8. lied about your age to purchase something; for example, lying about your age to buy liquor?

_____ 9. carried a hidden weapon other than a plain pocket knife? *

_____ 10. stolen (or tried to steal) things worth $5 or less?

_____ 11. attacked someone with the idea of seriously hurting or killing him/her? *

_____ 12. been paid for having sexual relations with someone?

_____ 13. been involved in gang fights? *

_____ 14. sold marijuana or hashish (“pot,” “grass,” “hash”)?

_____ 15. cheated on school tests?

_____ 16. hitchhiked where it was illegal to do so?

_____ 17. stolen money or other things from your parents or other members of your family?

_____ 18. hit or threatened to hit a professor at school? *

_____ 19. hit one of your parents? *

_____ 20. hit other students? *

_____ 21. been loud, rowdy, or unruly in a public place (disorderly conduct)?

_____ 22. had (or tried to have) sexual relations with someone against their will? *

_____ 23. used force (strong-arm methods) to get money or things from other students? *

_____ 24. used force (strong-arm methods) to get money or things from non-students? *

_____ 25. avoided paying for things (such as movies, subway rides, or food)?

_____ 26. been drunk in a public place?

_____ 27. stolen (or tried to steal) things worth between $5 and $50?

_____ 28. broken into a building or a vehicle (or tried to break in) to steal something or just to look around?

_____ 29. begged for money or things from strangers?

_____ 30. made obscene telephone calls, such as calling someone and saying dirty things?

used:

_____ 31. alcoholic beverages (beer, wine, hard liquor)?

_____ 32. marijuana--hashish (“grass,” “pot,” “hash”)?

_____ 33. hallucinogens (“LSD,” “Mescaline,” “Peyote,” “Acid”)?

_____ 34. amphetamines (“Uppers,” “Speed,” “Whites”)?

_____ 35. barbituates (“Downers,” “Reds”)?

_____ 36. heroin (“Horse,” “Smack”)

_____ 37. cocaine (“Coke”)

* Violence subscale

Debriefing statement

Thank you very much for your participation. The information we provided you about the study in the beginning of the study was true, however it was not complete. If participants knew exactly what we were measuring and what we expected to find, some of them might respond in ways that they think would help us. Others might deliberately try to do the opposite of what we expect. We were interested in natural behavior, so the specifics of what we were measuring was left deliberately vague.

The first computer task you completed was a measure of sustained attentional ability and hyperactivity. The second computer task you completed was also intended to measure your attention. The questionnaire measuring your media habits was intended to measure specific aspects of your media usage, such as the amount of media you consume as well as the level of violence in the media you consume. The personality measures you completed assessed a variety of traits: self-control, impulsivity, self-esteem, narcissism, aggressiveness, trait forgiveness, psychopathy, and attention-deficit and hyperactivity symptoms.

The purpose of all of these measures was to discover how people's attentional abilities (as measured on the computer tasks) relate to aggression, as well as a variety of other variables which were selected because of previous associations with aggressive behavior in research. We expect that low attentional ability is related to higher levels of aggression, possibly through it's association with personality factors like impulsivity and media violence exposure.

We want to remind you that there are no correct answers or behaviors in this study. In addition, we are not interested in the responses of particular individuals, but groups of individuals. Because of the way the data are coded, there is no way for us to know how you personally answered the questions. Your responses will be analyzed as part of a large group. We want to assure you that your answers are completely confidential.

Furthermore, some of the questionnaires used asked questions of a very personal nature. It is possible that these questions could have brought up past memories and caused emotional discomfort. This is a very natural reaction. If you experienced any feelings similar to those just described, you may want to consider visiting the Student Counseling Center. It is located at 2223 Student Services Building & the phone number is 294-5056.

Finally, I would appreciate it if you didn't tell anyone about this study, so our future participants will behave as naturally as you did. Do you have any questions or comments? If you have any future questions, feel free to contact the principal investigators Edward Swing (294-2335; eswing@iastate.edu) or Dr. Craig Anderson (294-0283; caa@iastate.edu). If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, Janice Canny, (515) 294-4566, IRB@iastate.edu, or Director, Diane Ament, (515) 294-3115, Office of Research Assurances, Iowa State University, Ames, Iowa 50011.