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EFFECTS OF INTERNALIZING/EXTERNALIZING COMORBIDITY ON ONLINE
SOCIAL COMMUNICATION IN CHILDREN WITH ATTENTION
DEFICIT/HYPERACTIVITY DISORDER

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ABSTRACT

Objective: Both internalizing and externalizing comorbid disorders are associated with ADHD. Both types of comorbidity have been shown to negatively impact social skills in different ways. Children with ADHD and internalizing comorbidity tend to be more withdrawn in social situations, while children with ADHD and externalizing comorbidity tend to be more aggressive. This project aims to investigate whether or not these same social skill deficits and/or problems extend into a more modern form of technological communication. **Methods:** Children with and without ADHD participated in a simulated chat room task for which responses were coded and given a skill level and categorized (e.g., prosocial, off-topic, hostile, no category, etc). One parent and one teacher filled out questionnaires in order to assess the child's social skills, behaviors, thoughts/feelings, and symptoms of ADHD. Self-report measures of depression and anxiety were administered to the children. **Results:** Children with ADHD had more symptoms of depression and anxiety, more conduct problems, and worse social skills than non-ADHD controls as reported by parents and child self-report (CDI and MASC). However, no significant differences were found between children with and without ADHD on overall skill level in the in the simulated Chat Room task. There was also no significant relationship between internalizing/externalizing problems and social skills in the Chat Room task. **Conclusion:** Results of this study support previous research that finds higher levels of internalizing and externalizing comorbidity and social skill deficits in children with ADHD, although these children were still within the normative range of functioning and level of comorbid symptoms. While results involving the Chat Room task were insignificant, improvement upon limiting factors of this project can hopefully lead to the development of more accurate assessments of the relationship between comorbidity with ADHD and technological social interactions.

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INTRODUCTION

ADHD

Attention deficit hyperactivity disorder (ADHD) is a rather prevalent disorder among children. Affecting a significant portion of the child population, ADHD is also highly comorbid with many other psychological disorders. Research has indicated that this combination of disorders can complicate the diagnostic and treatment process by either masking or exacerbating diagnoses. The cause of ADHD remains unknown, and findings surrounding potential etiologies are inconsistent. Despite the uncertainty of the cause of ADHD, effective treatments have been implemented, although efficacy and outcomes can fluctuate between patients and severities.

Symptomatology

Central symptoms exhibited by those with ADHD are hyperactivity, impulsivity, and difficulties in remaining attentive (Buchmann, Gierow, Reis, & Haessler, 2011). The diagnostic criteria for ADHD, according to the DSM-5, states that a diagnosis can only occur if there are at least six symptoms of inattention, at least six symptoms of hyperactivity or impulsivity, or a combination of symptoms of both inattention and hyperactivity/impulsivity. Symptoms must also occur before the age of twelve and must be present in at least two settings. Moreover, symptoms must interfere with functioning in some way and may not occur at the same time as a psychotic disorder, such as schizophrenia (American Psychiatric Association, 2013). A diagnosis of ADHD is typically given based on information provided by caregivers in the home along with teachers at school (Kernberg & Yeomans, 2013). ADHD can also be diagnosed as one of three subtypes. The three types are predominantly inattentive, predominantly hyperactive-impulsive, or a combination of the two and are determined by the occurrence of symptoms. The prevalence of ADHD in

children is quite high. The worldwide prevalence of ADHD in children is estimated to be about 8-12 % (Biederman & Faraone, 2005). The American Psychiatric Association also reports that ADHD is more often diagnosed in males than in females, with the ratio being approximately 4:1 (Neece, Baker, Cmic, & Blancher, 2012).

Children with ADHD are at a heightened risk for many behavioral, social, emotional, and academic problems (Barkley, DuPaul, & McMurray, 1990). Due to the inability to sustain attention, children with ADHD tend to exhibit low academic performance (Neece et al., 2012). When compared to controls, children with ADHD are more often required to repeat a grade and to be placed in special education classes. Moreover, conduct problems and heightened aggression are also highly common. Teacher reports indicate that children with ADHD are more disruptive and noisy than their non-ADHD counterparts, and they tend to have more difficulty in social relationships with peers (Barkley et al., 1990). Undoubtedly, ADHD causes numerous problems in everyday functioning for children who have the disorder.

Etiology

Despite all of the existing data surrounding ADHD, there is still no proven cause of the disorder. Much of the research surrounding the cause of ADHD involves neurological theory. Nonetheless, research has yet to pinpoint one area in which an abnormality can account for all symptoms of ADHD (Biederman & Faraone, 2005). One of the potential causes was examined by Bledsoe and Pliszka (2013) in which the relationship between the anterior cingulate cortex and symptom severity in children was assessed. The anterior cingulate cortex is a brain region that plays an important role in self-regulation and executive control (Bledsoe & Pliszka, 2013). Through the utilization of neuroimaging, it was determined that children with ADHD exhibited a significant decrease in cortical thickness of the right rostral anterior cingulate cortex. Because this area is associated with regulation and control, it is believed that the behavioral deficits exhibited in those with ADHD are due to the unusual thinness of this brain area (Bledsoe & Pliszka, 2013).

Another brain region known as the salience network (comprised of the dorsal anterior cingulate cortex and bilateral insulae) is believed to play a role in developing appropriate behavioral responses (Ham, Leff, de Boissezon, Joffe, & Sharp, 2013). The bilateral insulae are proposed to help distinguish between important information and irrelevant stimuli (Lopez-Larson et al., 2012). A recent study found that children with ADHD have a reduced bilateral insulae volume. These findings could explain how or why children with ADHD are so easily distracted. Because the area of the brain that is involved in sorting through stimuli is reduced, it makes sense that individuals with this reduction would have a difficult time paying attention to important stimuli (Lopez-Larson et al., 2012). With research constantly leading to new discoveries surrounding the potential causes of ADHD, there is also opportunity to find potential treatments as well.

Treatments

Currently, the most common form of treatment for children with ADHD is medication (Spencer et al., 1996). There is some controversy surrounding the use of psychiatric medication in children, however research shows that stimulant medications are effective for most children. Previous response rates to stimulant medication have been found to be about 70% (Spencer et al., 1996). The two most widely used stimulant medications are methylphenidate and amphetamine. These two medications function by facilitating the transmission of dopamine and norepinephrine (Biederman & Faraone, 2005). While stimulant medications reduce symptoms of ADHD including increased motor activity, impulsivity, and inattentiveness, they have also been associated with improved academic performance, on-task behavior, and social function (Spencer et al., 1996). There are, however, many children who do not respond to or have adverse side effects to stimulant medication, so alternate treatment methods such as nonstimulant medication and psychotherapy exist (Spencer et al., 1996). However, lower efficacy and side effects of nonstimulant medications are a cause for decreased popularity. Psychotherapy techniques such as

behavior modification and cognitive-behavioral therapy have been shown to be effective in ADHD symptom reduction. However, depending on individual differences of each patient, this method of treatment may be most effective when coupled with medication (Biederman & Faraone, 2005). Despite the treatments that exist for symptoms of ADHD, many of these problems continue into adulthood as well.

Long-term Outcomes

Recent research indicates that ADHD persists into adulthood in approximately 75% of people with the disorder (Wilens et al., 2002). Symptoms of ADHD, such as distractibility and inattentiveness, are present throughout adulthood for many individuals (Wilens, Biederman, & Spencer, 2002). A history of ADHD within the family and/or the comorbidity of a psychiatric disorder in childhood increase the probability that the disorder will persist into adulthood (Wilens et al., 2002).

The presence of ADHD in childhood is known to place individuals at an increased risk for the development of psychopathology and dysfunction in adulthood. One of the most frequent problems of dysfunction in adults with ADHD surrounds delinquent behaviors (Jensen et al., 1997). Another problem that can result from childhood ADHD is an increased risk for the development of depression. Particularly, the hyperactive symptoms of ADHD are a strong predictor of the onset of major depressive disorder in adulthood (Wilens et al., 2002). Depression can cause numerous social and functional impairments including negative view of self, isolation, loneliness, and the inability to form and/or maintain relationships (Rubin, Coplan, & Bowker, 2009). Moreover, the presence of childhood ADHD can also lead to substance abuse in adolescence and/or adulthood (Wilens et al., 2002). This process tends to be progressive, in that individuals typically use cigarettes around the ages of 17-22, then move onto alcohol, and then drugs (Wilens et al., 2002).

Social Relationships

Strong social networks in childhood constitute a critical aspect of development, and absence of such networks can lead to many problems, including future pathologies (Rubin, Coplan & Bowker 2009). Social adjustment issues such as aggressive behavior, loneliness, withdrawal, or isolation often stem from the lack of positive interactions with peers. This creates a circular relationship in that these types of behaviors make children less likely to be accepted by peers, but this lack of acceptance then exacerbates these problems (Rubin, Coplan & Bowker 2009). Conduct problems are an example of problematic behaviors that may arise due to poor or nonexistent peer bonds in childhood. Aggressive children, specifically, have difficulties with this, as aggressive behaviors coupled with continuous maltreatment from peers create a realm of maladjustment that continues into later childhood and adolescence (Ladd 2006). It has also been documented that individuals who were unpopular as children are more likely than their counterparts to be discharged from the military due to conduct problems (Gottman, Gonso, and Rasmussen, 1975). Other antisocial behaviors such as substance abuse and delinquent behaviors can also stem from the lack of strong social networks in childhood (Parker et al., 1995).

Coupled with a lack of social acceptance usually comes peer victimization. However, children with social adjustment issues may not be accepted/may be victimized for different reasons (Rubin, Coplan & Bowker 2009). Children with problems of aggression may be rejected or victimized because they evoke conflict through confrontations with others. On the other hand, children who are socially isolated or withdrawn are normally unaccepted or victimized either because they seem socially different from other children, or they appear as easy targets to their peers (Rubin, Coplan & Bowker 2009). This then increases the behaviors of aggression and/or withdrawal, making the problem continuous (Ladd 2006). Similarly, low social interaction also leads to maladaptive attitudes such as negative self-regard, low self-esteem, and social anxiety. These types of thoughts and/or feelings also continue the cycle of social dysfunction by building up as rejection occurs, and in turn increasing rejection even further (Ladd 2006).

Strong social networks and interactions in childhood also set the foundation for subsequent relationships later in life. Positive social relationships early on have a vital role in the ability to develop and maintain positive relationships throughout development and the life span (Cacioppo 2002). Unfortunately, it is often difficult to break this cycle of dysfunction as the characteristics that may cause a child to lack strong social networks are only exacerbated through the absence of positive interactions. This can be seen in all types of dysfunction (aggression, withdrawal, isolation, etc) and is quite problematic for future relationships (Ladd, 2006).

Moreover, children with ADHD are at an increased risk for problems with peer relationships (Crowe, Beauchamp, Catroppa, & Anderson, 2011). Teachers often describe children with ADHD as loud, disruptive, disorganized, irresponsible, and immature. Children with ADHD also tend to exhibit other antisocial behaviors which consist of lower self-control, increased impulsivity, and aggression (Barkley et al., 1990). However, when ADHD is coupled with commonly comorbid externalizing and internalizing disorders, these problems of social dysfunction can be influenced even further.

Internalizing Comorbidity- Depression and anxiety

One of the biggest problems surrounding ADHD is its high comorbidity rate. ADHD has been found to have general comorbidity with numerous disorders. Such disorders include language delay, delayed motor skills, reading and math difficulties, learning disorders, conduct disorder/oppositional defiant disorder, and anxiety disorders (Barkley, 2012). The combination of ADHD and internalizing disorders, such as anxiety and depression is rather high. The comorbidity rate between ADHD and anxiety disorders was estimated to be roughly 25% (Biederman et al., 1991). These types of disorders contribute to social deficits in a cyclical nature. In other words, many of the behaviors that add to social skill deficits will be reinforced and/or exacerbated by the lack of positive peer relations due to such deficits (Rubin, Coplan, & Bowker, 2009).

Children who have depression tend to be socially withdrawn or isolated from peers (Deater-Deckard, 2001). However, research also indicates that social withdrawal and/or peer rejection is often predictive of depression or depressive symptoms later in life (Ladd 2006). Moreover, research has shown that positive social interactions are beneficial in reducing depressive symptoms (Chan 2012). Interestingly, Altmann and Gotlib (1988) found that children with depression had numerous failed attempts at forming social bonds despite a greater number of attempts than their non-depressed counterparts. This indicates that although depression can be a result of poor social interaction in childhood, it can also prevent positive relationships from being formed as well.

In addition to depression, other pathologies can both result from and contribute to poor social networks in childhood. Anxiety and forms of social phobia are quite common among children who lack strong peer relations due to withdrawal (Deater-Deckard, 2001). Although these problems are less prominent in early childhood, they can negatively impact peer relations later on in development (Ladd, 2006). As withdrawn behavior becomes more evident to peers, these children tend to begin to experience more rejection, which worsens the already-existing anxiety. This increased anxiety then contributes to even more withdrawal, adding to the circular relationship (Rubin, Coplan & Bowker 2009). Moreover, it has been documented that withdrawn behavior in childhood is predictive of anxiety disorders in adolescence (Prior, Smart, Sanson, & Oberklaid 2000). Likewise, social inhibition during childhood also places children at an increased risk for the development of social phobia in adolescence (Hayward et al., 1998).

Externalizing Comorbidity- CD and ODD

One of the most common comorbidities exists between ADHD and conduct disorder (CD). Previous research has indicated that the prevalence of CD coupled with a diagnosis of ADHD ranges from 42.7% to 93.0% (Jensen, Martin, & Cantwell, 1997). The added presence of a disorder that contributes to heightened aggression can cause many more problems for children

or adolescents with ADHD. The combination of ADHD and CD has been linked to a much higher rate of school expulsions and/or suspensions along with a greater risk for deviant behavior outside of the home or school (Jensen et al., 1997). Similarly, Costello, Mustillo, Erkanli, Keeler, & Angold (2003) found that there is an increased risk for the later development of oppositional defiant disorder (ODD) in children with ADHD. This relationship between ADHD and ODD is also responsible for an increase in deviant behavior compared to children with ADHD alone (Jensen et al., 1997).

CD and ADHD are both individually debilitating to social interaction in childhood, but when joined together the effects can be rather detrimental (Booster, DuPaul, Eiraldi, & Power, 2012). Children with ADHD and a comorbid diagnosis of CD and/or ODD are reported by their parents and teachers to exhibit more off-task behaviors than their counterparts with only ADHD. Moreover, these children have been rated as demonstrating more verbal aggression in addition to increased overall aggression (Abikoff et al., 2002). Parent and teacher reports also indicate that children with an externalizing comorbid disorder have less developed and/or adaptive social skills than those with ADHD alone (Booster, DuPaul, Eiraldi, & Power, 2012).

This combination of aggressive behavior coupled with an already existing propensity for social deficits can be extremely damaging to peer relationships. It is likely that children with ADHD and an externalizing comorbid disorder will be rejected by peers (Deater-Deckard, 2001). This rejection is often caused by their increased aggression and hostile behavior towards peers. These children are also more likely to have conflictual relationships with peers in that they are more likely to get into trouble and less likely to treat others fairly (Deater-Deckard, 2001). An extension to peer rejection is increased victimization experienced by those with ADHD and an externalizing behavior disorder as opposed to those with only ADHD (Humphrey, Storch, & Geffken, 2007). Likewise, children with an externalizing disorder and ADHD are significantly

more depressed than their ADHD-only counterparts in middle childhood, plausibly because of their decreased social functioning and acceptance by peers (Ostrander, Crystal, & August, 2006).

Because this type of comorbidity consists of two very problematic characteristics (e.g., heightened aggression and decreased social functioning) both the short-term and long-term outcomes can be rather harmful. As discussed earlier, increased aggression can put individuals at risk for delinquent and maladaptive behavior in adolescence and adulthood (Wilens et al., 2002). Social deficits in childhood are often responsible for much of the social maladjustment and/or pathologies experienced in adulthood (Rubin, Coplan & Bowker 2009). Therefore, when these two aspects are joined together the effects are exacerbated, and the dysfunction is increased (Booster, DuPaul, Eiraldi, & Power, 2012)

Modern Social Interaction

The way in which individuals, especially children, communicate with each other is becoming increasingly technological. It is estimated that children spend nearly eight hours of each day utilizing some form of media (Rideout, Foehr, and Roberts, 2010). One of the most common media outlets used by children ages 8 to 18 is the internet (Rideout, Foehr, and Roberts, 2010). Not only has the capacity of the internet increased for children within this age range, but the accessibility has increased as well. Increased speeds, online television shows, and social media have all impacted the growth of internet usage in children. Moreover, the number of households with the internet along with the number of children who own laptops and have internet access in their bedrooms has increased over the past few years as well (Rideout, Foehr, and Roberts, 2010).

However, the findings pertaining to the impact that this has on social skill development are mixed. Research indicates that internalizing problems associated with social relationships with peers can either remain or be alleviated through online communication (Bonetti, Campbell, & Gilmore, 2010; Mikami et al., 2010). For example, Bonetti, Campbell, and Gilmore (2010)

found that children who were lonely discussed more personal topics when communicating online than did their non-lonely counterparts. It was also found that socially anxious children communicate much less online than those who are lonely (Bonetti, Campbell, & Gilmore, 2010). Additionally, Pea et al. (2010) found that online communication was associated with more negative outcomes and feelings than face-to-face communication in girls ages eight to twelve. Interestingly, Mikami et al. (2010) found that the nature of peer interactions was extended from face-to-face interactions to online communication in that peer-reported negativity in friendships yielded negativity in online relationships as well (fewer “friends” online, fewer comments, etc).

Conversely, when communicating online, externalizing problems associated with peer relationships can remain similar to those in face-to-face communication, or they can be exacerbated (Grigg, 2010; Burton, Florell, & Wygant 2013). Nearly one in seventeen boys and girls ages 10 to 17 have reported being threatened or harassed online (Finkelhor, Mitchell, & Wolak, 2000). This has raised many questions about the phenomenon of “cyber-bullying” including whether or not the aggression exhibited online is equivalent to in-person aggression (Kowalski, Limber & Agatstson, 2008). Defined more broadly, Grigg utilizes the term “cyber-aggression” which encompasses any “intentional harm delivered by the use of electronic means to a person or group of people irrespective of their age, who perceive(s) such acts as offensive, derogatory, harmful, or unwanted” (Grigg, 2010). In general, the children who normally exhibit aggressive behaviors also tend to exhibit such behaviors online. Similarly, those that tend to be victimized in person are typically targeted online as well (Burton, Florell, & Wygant 2013). The concept of anonymity is also an important factor of online aggression in that children may be more likely to partake in aggressive behaviors if their identity is unknown (Grigg, 2010).

These findings are very interesting in that they suggest online communication may be a positive outlet for certain types of social dysfunction but not for others. Results suggest that children who experience loneliness from peer relationships will feel more comfortable online,

while children who are experiencing withdrawal due to anxiety will carry that anxiety into online communication as well (Bonetti, Campbell, & Gilmore, 2010; Mikami et al., 2010). Additionally, research indicates aggressive acts that are typically present in face-to-face interactions can be brought into an online setting as well and may even be worse or more likely with the added anonymity (Grigg, 2010; Burton, Florell, & Wygant 2013)

Hypotheses

This current project aimed to investigate whether negative impacts caused by both internalizing and externalizing disorders that are commonly comorbid with ADHD would extend to a modern setting of communication: online interaction. The hypotheses were as follows:

- 1) Children who have difficulties with internalizing (i.e., anxiety/depression) and children who have difficulties with externalizing (i.e., oppositional defiance/conduct disorder) problems, regardless of ADHD, will have poorer online communication skills as indexed by performance on a simulated chat room task (i.e., type of response, number of responses).
- 2) Children with ADHD will have poorer online communication skills than children without ADHD.
- 3) Children with ADHD and elevated anxiety/depression will exhibit more withdrawal in online interaction. Specifically, they will have a decreased level of engagement than typically developing children without an elevated level of internalizing symptoms.
- 4) Children with ADHD and elevated oppositional/conduct problems will exhibit more negative interactions online. Specifically, they will make more off-topic or hostile responses in comparison to typically developing children without an elevated level of externalizing problems.

METHODS

Participants

This study sample consisted of 471 children between the ages of 8 and 12 both with and without a history of attention problems. The average age of the sample was 9.63 years, with the average age of controls being 9.62 and the average age of children with ADHD being 9.63. The ethnic distribution of the sample was 77.8% Caucasian/Non-Hispanic, 6.11% African-American, 3.40% Caucasian/Hispanic, 0.81% African American/Black Hispanic, 0.97% Other Hispanic, 1.46% Asian, 0.16% Other, 6.81% of a mixed race, and 1.94% who did not disclose their race or ethnicity. The breakdown consisted of 190 children in the control group and 281 children in the ADHD group. Of the control group, 79 were male and 111 were female. Of the ADHD group, 183 were male and 98 were female. Participants were recruited from State College and the local surrounding communities through a variety of methods including flyers, letters, and a research database specific to The Pennsylvania State University.

Consent and Compensation

Before any data was collected, parents signed a consent form allowing their child to participate in the study. In addition to this, parents signed a release of information form which gave children's teachers permission to answer questionnaires pertaining to the child participant. Before beginning the DISC-IV and any other questionnaires completed in the lab, parents signed a consent form. Children also gave assent before beginning any tasks in the lab. Teachers were compensated with a \$10 gift card, and parents also received a \$10 gift card if they were screened out after the questionnaire phase. If participants were screened out after the first lab visit, they received a \$30 gift card, and if they completed both of the visits, they received a \$100 gift card.

Screening/Data Collection Procedure

Participants were deemed eligible/ineligible through a multi-level process consisting of three phases. The first phase included a collection of basic demographic information and an evaluation of the children's basic health and medical functioning through a parent interview via phone. The presence of a pervasive developmental disorder, a neurological disorder, or intellectual disability resulted in the child being screened out from the study as to maintain an average cognitive ability among participants. Moreover, if children were taking any stimulant medication for attention problems, they were asked to stop taking the medication 24-48 hours before participating in the study as to eliminate any confounding effects of medication on the child's performance. Additionally, children who were taking psychiatric or anti-seizure medication such as Abilify, Prozac, and Lithium were ineligible for the study due to possible effects of medication on performance. Children were also deemed ineligible if a sibling previously participated in the study.

The second phase of the study included a set of questionnaires that were sent to the both the child's parent and teacher. These questionnaires assessed the child's thoughts, feelings, and behaviors and included the ADHD Rating Scale-IV, Behavior Assessment Scale for Children-Second Edition (BASC-2), the Conners Rating Scales Revised, and the Social Skills Rating System (SSRS).

The ADHD Rating Scale-IV was used to assess the symptomatology of ADHD according to the DSM-IV criteria. The ADHD RS-IV is an 18-item Likert scale questionnaire that assesses children's behavior pertaining to ADHD on a basis of "never," "sometimes," "often," and "very often." This rating scale also distinguishes between symptoms of inattentiveness and hyperactivity/impulsivity (Pappas, 2006). The BASC-2 was used to obtain parent and teacher report of a range of behavioral and emotional problems in children through a Likert scale in which behaviors were indicated as occurring "never," "sometimes," "often," or "always" (Nugent et al., 2013). The Conners Rating Scales Revised (CRS-R) consists of a Likert scale in which

responses range from “not true at all,” “just a little true,” “pretty much true,” and “very much true,” and was used to evaluate behavior problems and psychosocial functioning (Conners, Sitarenios, Parker, & Epstein, 1997). Lastly, the SSRS was used to assess the child’s overall social functioning through a Likert scale with responses that consist of “never,” “sometimes,” and “very often” The teacher-specific SSRS also contained 9 additional questions in which the teacher was asked to rate the child’s academic performance in a range from “lowest 10%” to “highest 10%” (Lee et al., 2007).

With the results of these questionnaires, children were determined to be initially either ADHD or control status. In order to be determined as potentially ADHD, children had to have parent or teacher report on the ADHD-RS-IV of at least three symptoms of inattention, at least three symptoms of hyperactivity/impulsivity, or greater than two symptoms in each category of both inattention and hyperactivity/impulsivity. In addition, the BASC-2 and CRS-R were used to determine if children were potentially ADHD. Specifically, the BASC-2 clinical scales of hyperactivity, aggression, conduct problems, and attention problems were used. The CRS-R clinical scales of oppositional problems, cognitive/attention problems, the ADHD index, and the DSM-IV total were also used. In order to be deemed as potentially ADHD, there must be at least one parent and one teacher report yielding a T-score greater than or equal to 61 on the specified clinical scales.

Likewise, children were classified as control status if parent and teacher report on the ADHD-RS-IV consisted of fewer than three symptoms of inattention, fewer than three symptoms of hyperactivity/impulsivity, or fewer than three symptoms in each category of both inattention and hyperactivity/impulsivity. In addition, in order for children to be classified as control status, all aforementioned screen indices on the BASC-2 and CRS-R must have a T-score less than or equal to 58. Moreover, if a child of control status has high academic competence (a T-score

greater than or equal to 111), they are screened out in order to obtain consistency among cognitive ability of participants.

Once children were screened in as potentially ADHD or control, they were brought into the lab for two, three-hour visits. During these visits, children completed an extensive neuropsychological battery of tests. Additionally, children completed self-report measures of depression and anxiety which included the Multidimensional Anxiety Scale for Children (MASC) and the Children's Depression Inventory (CDI).

While the child completed the various tasks, the parent completed the Diagnostic Interview Schedule for Children Version Four (DISC-IV). This DISC-IV is a structured interview that is designed to assess a range of psychiatric disorders that may be present in children and adults (Shaffer et al., 1999). The computerized interview allows parents to identify emotional and behavioral tendencies of their child over periods of one month, six months, one year, and the child's whole life (Shaffer et al., 1999). Parents also completed forms on their child's developmental and treatment history.

After the first visit, a final status of ADHD is determined through the same measure of teacher report on the ADHD-RS-IV and through parent-report on the DISC-IV. In order to be given a diagnosis of ADHD, there must be at least six symptoms endorsed in either sub-category of ADHD (i.e., inattentive/hyperactive) on the parent DISC-IV or teacher ADHD-RS-IV. Children are ineligible for a second visit to the lab if their diagnosis is inconsistent with their initial ADHD classification. For example, if children who are initially control have greater than two symptoms on either the teacher ADHD-RS-IV or parent DISC-IV, they are screened out. Moreover, if controls have an IQ greater than 115, or controls and children with ADHD have an IQ less than or equal to 80, they are screened out as to maintain consistency among the cognitive ability of participants.

Internalizing Symptoms

The total scores from the CDI and MASC were used to assess internalizing symptoms of depression and anxiety, respectively. Additionally, the internalizing index of the parent BASC-2, which includes indices of depression, anxiety, and somatization, was used to identify children with ADHD who also had a high number of internalizing symptoms.

Externalizing Symptoms

Likewise, in order to assess externalizing symptoms, the externalizing index of the parent BASC-2, which includes indices of hyperactivity, aggression, and conduct problems, was used to identify children with ADHD who also had a high number of externalizing symptoms. Only the indices of aggression and conduct problems were examined for this particular project.

Social Interaction

Social interaction was assessed through a chat room task in which children participated in a simulated, on-line chat with four computerized peers (Mikami, Huang-Pollock, Pfiffner, McBurnett & Hangai, 2007). During the task, which lasted approximately 20 minutes, children were informed that they would need to help their peers plan a birthday party for one of the simulated children in the chat room. The program was designed to follow a specific conversation pattern but was also designed to respond, to an extent, to what the participant typed (Mikami, et al., 2007).

After the task, children were asked a series of questions such as “what kind of foods would the birthday kid like to have at the party?” or “how old will the birthday kid be?” (Mikami, et al., 2007). After scoring (responses were scored as correct, partially correct, or incorrect), a team of undergraduate research assistants coded the transcript of the computer conversation. Items that were measured through coding include total number of responses, total number of one-word responses, total number of hostile responses, total number of prosocial responses, and total number of off-topic responses. The skill-level of each response was also coded (0-2 scoring system), along with an overall score of social functioning which was based on how often the child

joined in, how much the child treated the computer kids as real peers, and how well the child's responses corresponded with the conversation. In order to assess the child's social interaction for this project, the overall score of social functioning, the overall score of how well the child joined in and, the total number of off-topic and hostile responses were used.

Data Analysis

In order to examine the relationship between skill level of social interaction and internalizing and externalizing symptoms that frequently co-occur with ADHD, a regression analysis and a one-way ANOVA were used. The independent variables were internalizing symptoms (i.e., anxiety/depression), externalizing symptoms (i.e., oppositional defiance/conduct disorder), and ADHD status. The dependent variables were social skills, as measured by: overall engagement in the task, overall ability to follow the simulated conversation, and the average skill level in the chat room task. In order to conduct the analyses, an internalizing variable consisting of an average of T-scores from the CDI, MASC, and internalizing index of the parent BASC-2 was created. Similarly, an externalizing variable consisting of an average of T-scores from the aggression and conduct problems indices on the parent BASC-2 was also created. An ADHD status variable derived from the DISC-IV was used to differentiate control and ADHD status. In order to operationalize performance in the Chat Room task, the average skill variable, the "join-in" (level of engagement), and total off-topic and hostile response variables were utilized. If the proposed hypotheses were true, the results would be expected as follows:

- 1) There will be a main effect of internalizing/externalizing symptomatology on skill such that the more elevated the internalizing/externalizing symptoms are, the lower the skill exhibited in online communication (i.e., reduced engagement in the task, inability to following conversation, and fewer overall responses). See Figure 1.
- 2) There will be a main effect of group on skill in that controls will always exhibit better skill in the simulated chat room than children with ADHD. See Figure 2.

- 3) There will be a main effect of internalizing symptomatology in which the more elevated the symptoms of anxiety/depression, the fewer number of overall responses a child will exhibit. Further, there will be a significant interaction in which the relationship between internalizing symptomatology and social skill will be stronger for children with ADHD than non-ADHD controls. See Figure 3.
- 4) There will be a main effect of externalizing symptomatology in which the more elevated the symptoms of oppositional defiance/aggression a child displays, the greater the number of off-topic and hostile responses the child will exhibit. Further, there will be a significant interaction in which the relationship between externalizing symptomatology and the number of off-topic or hostile responses will be stronger for children with ADHD than non-ADHD controls. See Figure 4.

RESULTS

Multiple differences were found between children with ADHD and those without. Results can be seen in Table 1. IQ differed significantly based on the presence/absence of ADHD with the control group having an average IQ of 110.13 and the ADHD group having an average IQ of 105.08 [$F(1,289)=10.88, p<0.01$]. Furthermore, the number of inattentive and hyperactive/impulsive symptoms differed significantly based on ADHD status with children in the control group exhibiting an average of 0.65 inattentive symptoms and an average of 0.33 hyperactive/impulsive symptoms and the ADHD group exhibiting an average of 7.79 inattentive symptoms and an average of 5.43 hyperactive/impulsive symptoms [$(F(1,469)=2.957.64, p<0.01), (F(1,469)=618.44, p<0.01)$]. Children with ADHD were shown to be significantly more depressed than control children [$F(1,312)=44.37, p<0.01$]. Relatedly, children with ADHD were significantly more anxious than controls [$F(1,310)=4.87, p=0.03$]. Children with ADHD also exhibited significantly more internalizing symptoms from the internalizing index of the parent BASC-2 than controls [$F(1,469)=93.57, p<0.01$]. In terms of externalizing symptoms, children with ADHD were significantly more aggressive than controls [$F(1,469)=190.46, p<0.01$]. Children with ADHD also exhibited significantly more conduct problems than controls [$F(1,469)=11.87, p<0.01$]. Lastly, children with ADHD demonstrated significantly worsened social skills according to the SSRS than did controls [$F(1,168)=88.32, p<0.01$].

Hypothesis 1: Correlation of Internalizing/Externalizing Variable and Average Skill Variable

There was no main effect of internalizing/externalizing symptoms on skill level in the chat room task [$(\Delta r^2=0.00, p=0.83), (\Delta r^2=0.03, p=0.13)$]. Therefore, elevated internalizing (depression/anxiety) and/or externalizing symptoms (aggression/conduct problems) did not result in a decreased skill level in online communication. Results can be seen in Table 2.

Hypothesis 2: Online skill level based on presence/absence of ADHD

The ADHD status variable and the average skill variable from the chat room task were submitted to a one-way Analysis of Variance. Results can be found in Table 1. There was no significant difference between controls and ADHD on skill level in the chat room task [$F(1,81)=2.31, p=0.13$]. In other words, controls did not exhibit better skill than those with ADHD in the simulated Chat Room task.

Hypothesis 3: Correlation of Internalizing Variable and Level of Engagement

There was no main effect of internalizing symptoms on the level of engagement in the chat room task ($\Delta r^2=0.01, p=0.46$). Therefore, the level of internalizing symptoms (depression/anxiety) did not influence the amount of engagement in the simulated Chat Room task. Results of the correlation can be found in Table 2. Moreover, there was no significant interaction between the extent to which the child was engaged in the task and the presence of ADHD [$F(1,83)=2.23, p=0.14$]. In other words, had there been a main effect of internalizing symptoms, the presence of ADHD would not have resulted in a greater decrease of engagement. Results can be found in Table 1.

Hypothesis 4: Correlation of Externalizing Variable and Off-topic/Hostile Responses

There was no main effect of externalizing symptoms on the number of off-topic and hostile responses [$(\Delta r^2=0.02, p=0.21), (\Delta r^2=0.03, p=0.10)$]. In other words, the level of externalizing symptoms (aggression/conduct problems) did not result in an increase of off-topic and hostile responses. Results of the correlation can be found in Table 2. Moreover, there was no significant interaction between the number of off-topic and hostile responses and the presence of ADHD [$(F(1,83)=0.13, p=0.72), (F(1,83)=0.97, p=0.33)$]. Therefore, had there been a main effect of externalizing symptoms, the presence of ADHD would not have resulted in a greater increase of off-topic and hostile responses. Results can be found in Table 1.

DISCUSSION

Summary

This project aimed to investigate the relationship between internalizing and externalizing comorbid disorders with ADHD and social skill deficits online. Internalizing comorbidity is associated with withdrawn behavior, while externalizing comorbidity is associated with aggressive behavior. Both types of comorbidity can negatively impact social skills (Rubin, Coplan, & Bowker, 2009; Deater-Deckard, 2001). Therefore, this project intended to explore whether or not these specific deficits (i.e., withdrawal, aggression) extend into modern forms of communication (e.g., texting, email, chat rooms, etc).

This study utilized a very large sample that was primarily Caucasian (77.8%). This is highly consistent with the United States population, which is 77.89% Caucasian (US Census, 2012). The argument could be made that the lack of racial and/or ethnic diversity within the study sample is limiting. However, research indicates that ADHD diagnoses are much more prevalent among Caucasian children than among African-American children (Miller & Nigg, 2008). Furthermore, this study sample is highly representative of the United States population (US Census, 2012).

In terms of socioeconomic status (SES), the median income of this sample was \$61,000-70,000. This is inconsistent with the general population of the United States which has a median income of \$51,371 (US Census, 2012). Therefore, this sample may be less representative of the United States population in terms of SES. Similar to race/ethnicity, SES seems to have an effect on ADHD. The prevalence of ADHD symptoms is significantly higher in children from low-SES families (Pineda et al., 1999). Likewise, children from low-SES families tend to have lower socioemotional functioning. In other words, these children have higher levels of internalizing and externalizing problems and more peer relations problems (McLoyd, 1998). However, while the

median income of this sample is slightly higher than the national median income, neither income level indicates low-SES. Therefore, it is likely that these differences would not account for any insignificance in the relationship between internalizing/externalizing comorbidities and social skills. Moreover, an increase in the number of internalizing/externalizing problems and the number of social skill deficits based on SES is not necessarily indicative of an increase in the degree or presence of the relationship between the two.

In this sample, children with ADHD had lower IQs than those without ADHD. This is consistent with previous research documenting lower intellectual functioning and poorer performance of children with ADHD on the WISC-R (Faraone et al., 1993). However, their IQs were still well within the average range. Children with ADHD also had more symptoms of depression, anxiety, and conduct problems than their peers without ADHD. This is consistent with previous research surrounding comorbidity with ADHD which finds that mood disorders co-occur with ADHD in 15-75% of cases, anxiety disorders co-occur with ADHD in 25% of cases, and conduct problems co-occur in 42.7-93% of cases (Biederman et al., 1991; Jensen et al., 1997).

However, in this sample, the number of internalizing/externalizing symptoms comorbid with ADHD was still within the average range. This could potentially account for the lack of significance in the relationship between internalizing/externalizing comorbidity and social skills online. In other words, because the children did not actually have an elevated level of comorbid symptoms, the relationship of comorbidity with ADHD and social skills may not have been visible.

Also consistent with existing literature, children with ADHD were rated by parents as having significantly worse social skills on the parent-rated SSRS than those without ADHD.

However, social skills deficits did not extend into the simulated chat room task. There were no significant differences between controls and children with ADHD on the overall skill

level in the Chat Room task. There were also no significant differences between controls and those with ADHD on the level of engagement or the number of hostile and off-topic responses. Moreover, there was no significant relationship between the presence of internalizing and externalizing symptoms on the level of engagement and the number of hostile and off-topic responses in the Chat Room task.

These results suggest that while children with ADHD have a greater number of social skill deficits and tend to have more symptoms of internalizing and externalizing comorbid disorders (i.e., depression, anxiety, and aggression); these deficits were not seen in an online setting (the Chat Room task). This could be due to the fact that neither internalizing/externalizing symptoms nor ADHD predict social skill deficits online. Because ADHD and internalizing/externalizing comorbidity are highly interrelated, it is possible that this relationship accounted for the lack of findings in both hypotheses 1 and 2.

These findings may also be due to a multitude of limiting factors. First, the coded Chat Room data yielded very few responses that were rated as hostile and off-topic. This is most likely a contributor to the lack of significance in the relationship between externalizing symptoms and hostile and/or off-topic responses. Second, the argument could be made that participants did not have a real conversation because they were aware that their peers in the Chat Room task were not real. However, due to the novelty of the task, interest levels and engagement tend to be quite high (Mikami, et al., 2007). Moreover, when analyzing the coded Chat Room data, it was rather infrequent to find children that were disengaged from the task or who did not treat the task realistically.

Although participants treated the Chat Room task as if it were a real task, this does not mean that the Chat Room task accurately mimicked actual online or technological interactions with peers. For example, because the computer kids only had a limited number of set responses, they could not always respond to a child's statement or question in an accurate way (e.g., "cool"

in response to a question). Similarly, the computerized program may not be able to recognize certain aspects of a child's response, such as typos, catch phrases, or jargon. This could possibly hinder the flow of conversation that would likely be uninterrupted in an actual interaction with peers (i.e., in a real chat room or text conversation). Further, even though the typing speed of the child was accounted for prior to beginning the task, if a child was particularly slow when typing, the computer kids would often prompt the child with a new statement or question before the child could finish his or her response to the previous statement/question. This is another factor that is unlikely to occur in an actual online interaction with peers as real children will probably wait for the child's response before responding themselves.

While the Chat Room task has been shown to be fairly accurate in reflecting the face-to-face social skills of a child, it is unknown as to how accurately it reflects the nature of an online communication with peers. In other words, it is difficult to determine if the miscommunications, typos, or slow response time would hamper the conversation with real peers. Therefore, further investigation surrounding such technical difficulties and/or effects within online communication is needed in order to best examine the relationship between comorbid symptoms and social skills online.

Limitations

Both parent report and self-report measures were used in the analyses of this project. The depression (CDI) and anxiety (MASC) measures were completed by the child during the lab visit, while the internalizing and externalizing measures (parent BASC-2) and the social skills rating form (SSRS) were completed by the parent (BASC-2 completed prior to lab visit, SSRS completed during lab visit). Previous research has shown that agreement between parents and children surrounding psychological disorders of the child is often rather low, especially for ADHD. Parents are much more likely to report symptoms of ADHD in children ages 9-11, and they are more likely to indicate that a problem exists and that there is a higher need for services.

Findings vary for parent/child report of depression and anxiety such that parents tend to report more impairment in relation to depression, while children report more impairment in relation to anxiety (Jensen et al., 1999). This discrepancy between parent report of internalizing symptoms (parent BASC-2) and child self-report (CDI and MASC) may contribute to the null findings of this study by inaccurately predicting the number of internalizing symptoms. Likewise, a similar discrepancy may have occurred for parental-perceived social skills. For example, parents may have over-reported social skill deficits on the SSRS, resulting in a heightened (and in turn, unrealistic) expectation of social skill deficits in the Chat Room task.

However, it is important to note that the diagnostic process of ADHD within this sample is likely very accurate. Because children with an ADHD status were found to have significantly more inattentive and hyperactive/impulsive symptoms than controls, it can be presumed that the diagnostic process is able to accurately predict the presence of ADHD. Even though teacher reports on the pre-screening measures were collected, and such reports have been shown to indicate higher ratings of ADHD symptoms than parental reports, maternal reports have been shown to be highly accurate and reliable in predicting an ADHD diagnosis (Amador-Campos, 2005; Faraone, Biederman, & Milberger, 1995). Discrepancies between parent and teacher ratings of ADHD are likely due to varied settings in which symptoms may manifest (i.e., a greater degree inattention and/or hyperactivity at school) (Amador-Campos, 2005).

Future Research

Research assessing the relationship between social skill deficits and online/technological communication must be conducted. Children are spending a significant amount of time each day engaging in technological utilization or communication (Rideout, Foehr, and Roberts, 2010). This could result in a reinforcement of maladaptive social skills as the problematic behaviors (e.g., withdrawal, aggression, etc) would continue outside of face-to-face peer interactions (Rubin, Coplan, & Bowker, 2009). While children with ADHD and/or ADHD with comorbid symptoms

did not seem to have greater impairment on the Chat Room task than children without ADHD or a comorbid disorder, it is unknown if this would change given the context of the online communication and/or the severity of comorbidity. Therefore, future research should focus on the relationship between clinically elevated symptoms of internalizing/externalizing comorbidity with ADHD and/or diagnosed comorbid disorders and social skills online to obtain the best understanding of this relationship.

Conclusion

Results of this study support previous research that finds higher levels of internalizing and externalizing comorbidity and social skill deficits in children with ADHD, although these children were still within the normative range of functioning and level of comorbid symptoms. While results involving the Chat Room task were insignificant, improvement upon limiting factors of this project can hopefully lead to the development of more accurate assessments of the relationship between comorbidity with ADHD and technological social interactions.

FIGURES AND TABLES



Figure 1. Effects of internalizing/externalizing problems on skill level in online communication

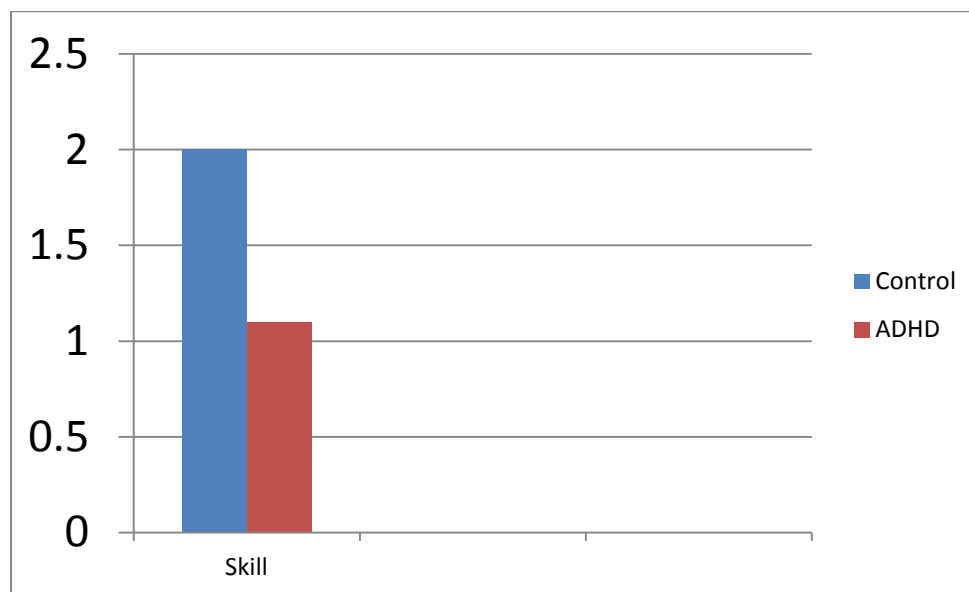


Figure 2. Effects of ADHD on social communication online

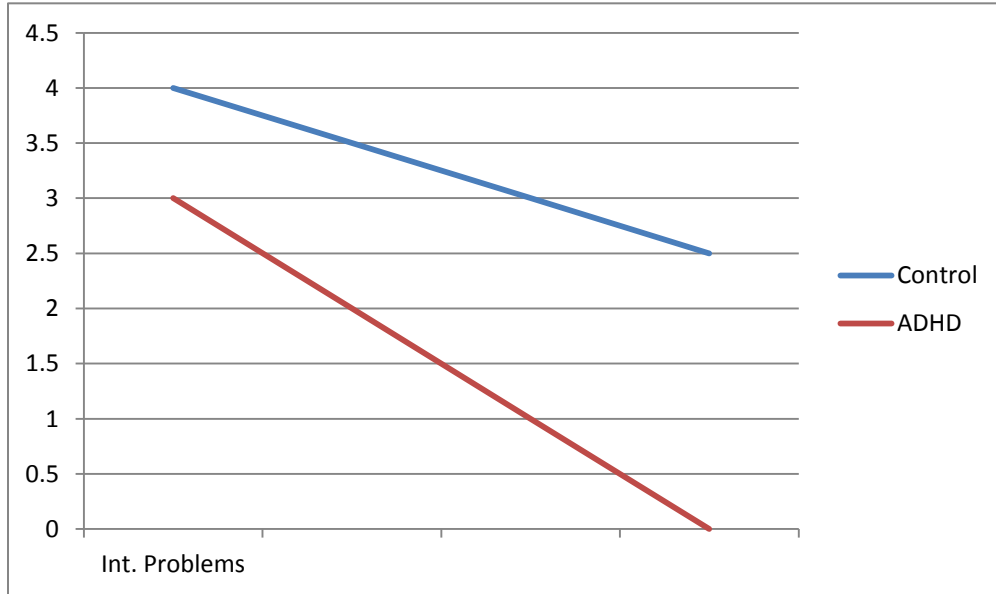


Figure 3. Effects of ADHD with elevated internalizing problems on online engagement

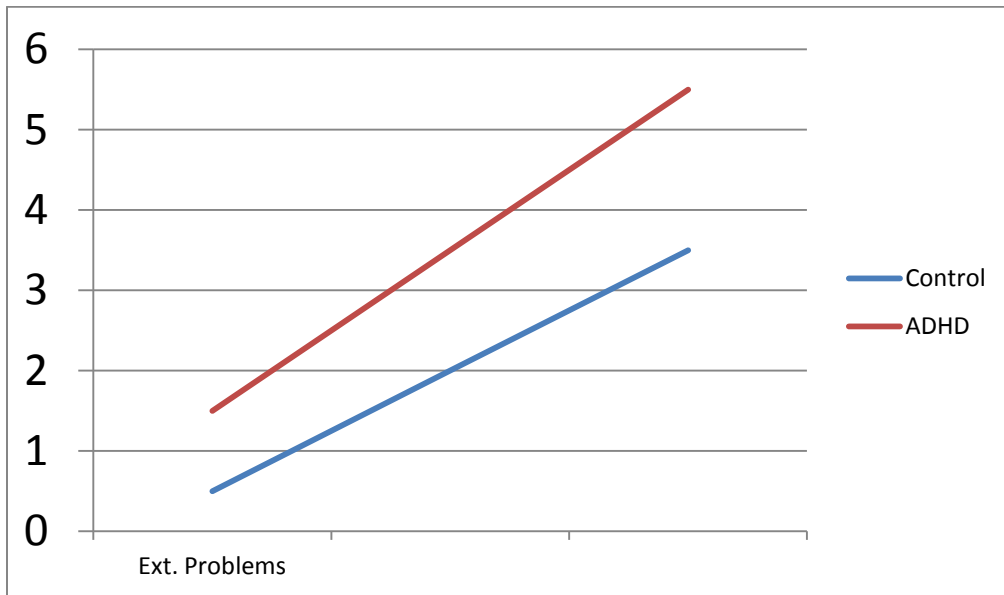


Figure 4. Effects of ADHD with elevated externalizing problems on off-topic and hostile responses in chat room

Table 1. Means Comparing ADHD and Control Groups

	ADHD			Control			<i>F</i>
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	
IQ	150	105.08	14.39	141	110.13	11.45	$F(1, 289) = 10.88, p < 0.01, \eta^2 = 0.36$
Inatt sxs	281	7.79	1.58	190	0.65	1.07	$F(1, 469) = 2957.64, p < 0.01, \eta^2 = 0.86$
Hyp/ Imp sxs	281	5.43	2.78	190	0.33	0.62	$F(1, 469) = 618.44, p < 0.01, \eta^2 = 0.57$
CDI Total	192	48.77	9.24	122	42.57	5.62	$F(1, 312) = 44.37, p < 0.01, \eta^2 = 0.13$
MASC Total	191	53.56	11.41	121	50.87	8.87	$F(1, 310) = 4.87, p = 0.03, \eta^2 = 0.02$
Parent BASC-2 Int.	281	56.94	13.95	190	45.96	8.61	$F(1, 469) = 93.57, p < 0.01, \eta^2 = 0.17$
Parent BASC-2 Agg.	281	56.93	12.06	190	44.42	3.98	$F(1, 469) = 190.46, p < 0.01, \eta^2 = 0.29$

Table 2. Pearson Correlations between Internalizing/Externalizing Symptoms and Chat Room Performance

Predictor	Avg. Skill	Join In	# of off-topic responses	# of hostile responses
	Δr^2	Δr^2	Δr^2	Δr^2
Internalizing				
<i>(CDI, MASC, parent BASC-2 internalizing index)</i>	0.00	0.01	--	--
Externalizing				
<i>(parent BASC-2 aggression and conduct problems indices)</i>	0.03	--	0.02	0.03
*p < .05, **p < .01, ***p < .001				

BIBLIOGRAPHY

- Abikoff, H. B., Jensen, P. S., Arnold, L. E., Hoza, B., Hechtman, L., Pollack, S., . . . Wigal, T. (2002). Observed classroom behavior of children with ADHD: Relationship to gender and comorbidity. *Journal of Abnormal Child Psychology*, *30*, 349-359. Retrieved October 28, 2013, from the Web of Science Database.
- Altmann, E. O., & Gotlib, I. H. (1988). The social behavior of depressed children: An observational study. *Journal of Abnormal Child Psychology*, *16*(1), 29-44. Retrieved October 4, 2012, from <http://www.springerlink.com/content/v8ht747134445238/>
- Amador-Campos, J. A., Forns-Santacana, M., Guardia-Olmos, J., & Pero-Cebollero, M. (2006). DSM-IV Attention Deficit Hyperactivity Disorder Symptoms: Agreement Between Informants in Prevalence and Factor Structure at Different Ages. *Journal of Psychopathology and Behavioral Assessment*, *28*(1), 23-32. Retrieved March 18, 2014, from the Web of Science database.
- American Psychiatric Association, (2013). *Diagnostic and statistical manual of mental health disorders: DSM-5* (5th ed.). Washington, DC: American Psychiatric Publishing.
- Barkely, R., DuPaul, G.J., McMurray, M.B. (1990). Comprehensive Evaluation of Attention Deficit Disorder With and Without Hyperactivity as Defined by Research Creiteria. *Journal of Counseling and Clinical Psychology*, *58* (6), 775-789. Retrieved August 27, 2013, from the Web of Science database.
- Barkley, R. A. (2012). Distinguishing Sluggish Cognitive Tempo From ADHD in Children and Adolescents: Executive Functioning, Impairment, and Comorbidity. *Journal of Clinical*

- Child & Adolescent Psychology*, 42(2), 161-173. Retrieved July 17, 2013, from the Web of Science database.
- Biederman, J., & Faraone, S. V. (2005). Attention-deficit hyperactivity disorder. *Lancet*, 366, 237-248. Retrieved September 2, 2013, from the Web of Science database.
- Biederman, J., Petty, C., Spencer, T., Woodworth, K., Bhide, P., Zhu, J., et al. (2013). Examining the nature of the comorbidity between pediatric attention deficit/hyperactivity disorder and post-traumatic stress disorder. *Acta Psychiatrica Scandinavica*, 128, 78-87. Retrieved July 18, 2013, from the Web of Science database.
- Bledsoe, J. C., & Pliszka, S. R. (2013). Anterior Cingulate Cortex and Symptom Severity in Attention-Deficit/Hyperactivity Disorder. *Journal of Abnormal Psychology*, 122(2), 558-565. Retrieved July 17, 2013, from the Web of Science database.
- Bonetti, L., Campbell, M. A., & Gilmore, L. (2010). The Relationship of Loneliness and Social Anxiety with Children's and Adolescents' Online Communication. *Cyberpsychology, Behavior, and Social Networking*, 13(3), 279-287. Retrieved November 13, 2013, from the Web of Science database.
- Booster, G. D., DuPaul, G. J., Ricardo, E., & Power, T.J. (2010). Functional Impairments in Children with ADHD: Unique Effects of Age and Comorbid Status. *Journal of Attention Disorders*, 16(3), 179-189. Retrieved October 27, 2013, from the Web of Science database.
- Buchmann, J., Gierow, W., Reis, O., & Haessler, F. (2011). Intelligence moderates impulsivity and attention in ADHD children: An ERP study using a go/nogo paradigm. *World Journal of Biological Psychiatry*, 12(1), 35-39. Retrieved March 31, 2013, from the Web of Science database.
- Burton, A. K., Florell, D., & Wygant, D. B. (2013). The Role of Peer Attachment and Normative Beliefs about Aggression on Traditional Bullying And Cyberbullying. *Psychology in the*

- Schools*, 50(2), 103-115. Retrieved November 24, 2013, from <http://onlinelibrary.wiley.com.ezaccess.libraries.psu.edu/doi/10.1002/pits.21663/abstract>
- Cacioppo, J. T. (2002). Social Neuroscience: Understanding the Pieces Fosters Understanding the Whole and Vice Versa. *American Psychologist*, 57(11), 819-831. Retrieved October 4, 2013, from the Web of Science database.
- Census Bureau Homepage. (n.d.). *Census Bureau Homepage*. Retrieved March 10, 2014, from <http://www.census.gov/>
- Chan, S. M. (2012). Early Adolescent Depressive Mood: Direct and Indirect Effects of Attributional Styles and Coping. *Child Psychiatry & Human Development*, 43(3), 455-470. Retrieved October 8, 2012, from <http://www.springerlink.com/content/222178624v674444/>
- Conners, K. C., Sitarenios, G., Parker, J. D., & Epstein, J. N. (1998). The Revised Conners ' Parent Rating Scale (CPRS-R) : Factor Structure , Reliability , and Criterion Validity. *Journal of Abnormal Child Psychology*, 26(4), 257-268. Retrieved November 20, 2013, from http://download.springer.com.ezaccess.libraries.psu.edu/static/pdf/161/art%253A10.1023%252FA%253A1022602400621.pdf?auth66=1385178075_009091ba32f8c0ed43cd1d1a0f76ed70&ext=.pdf
- Costello, E. J., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence and Development of Psychiatric Disorders in Childhood and Adolescence. *Archives of General Psychiatry*, 60, 837-844. Retrieved September 2, 2013, from the Web of Science database.
- Crowe, L., Beauchamp, M., Catroppa, C., & Anderson, V. (2011). Social function assessment tools for children and adolescents: A systematic review from 1988 to 2010. *Clinical*

Psychology Review, 31, 767-785. Retrieved September 5, 2013, from the Web of Science database.

Deater-Deckard, K. (2001). Annotation: Recent Research Examining The Role Of Peer Relationships In The Development Of Psychopathology. *Journal of Child Psychology and Psychiatry*, 42(5), 565-579. Retrieved October 27, 2013, from the Web of Science database.

Faraone, S. V., Biederman, J., Lehman, B. K., Spencer, T., et al. (1993). Intellectual performance and school failure in children with attention deficit hyperactivity disorder and in their siblings.. *Journal of Abnormal Psychology*, 102(4), 616-623. Retrieved March 19, 2014, from <http://dx.doi.org/10.1037/0021-843X.102.4.616>

Faraone, S., Biederman, J., & Milberger, S. (1995). How Reliable are Maternal Reports of their Childrens Psychopathology-One-Year Recall of Psychiatric Diagnoses of ADHD Children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 34(8), 1001-1008. Retrieved March 18, 2014, from the Web of Science database.

Finkelhor, D., Mitchell, K. J., & Wolak, J. (2000). Online Victimization: A Report on the Nation's Youth. *National Center for Missing & Exploited Children*, 1, 1-60. Retrieved November 13, 1924, from <http://eric.ed.gov/?id=ED442039>

Gioia, G. A., Isquith, P. K., Guy, S. C., & Kenworthy, L. (2000). TEST REVIEW Behavior Rating Inventory Of Executive Function. *Child Neuropsychology (Neuropsychology, Development and Cognition: Section C)*, 6(3), 235-238. Retrieved November 24, 2013, from <http://dx.doi.org/10.1076/chin.6.3.235.3152>

- Gottman, J., Gonso, J., & Rasmussen, B. (1975). Social Interaction, Social Competence, and Friendship in Children. *Child Development, 46*(3), 709-718. Retrieved October 4, 2012, from <http://www.jstor.org/stable/1128569?seq=1>
- Grigg, D. W. (2013). Cyber-Aggression: Definition and Concept of Cyberbullying. *Australian Journal of Guidance and Counseling, 20*(2), 143-156. Retrieved November 24, 2013, from <http://web.ebscohost.com.ezaccess.libraries.psu.edu/ehost/pdfviewer/pdfviewer?sid=452f52c9-1a82-4c22-953e-c5538adf2e6b%40sessionmgr13&vid=2&hid=28>
- Ham, T., Leff, A., Boissezon, X. d., Joffe, A., & Sharp, D. J. (2013). Cognitive Control and the Salience Network: An Investigation of Error Processing and Effective Connectivity. *The Journal of Neuroscience, 33*(16), 7091-7098. Retrieved September 2, 2013, from <http://www.jneurosci.org/content/33/16/7091>
- Hayward, C., Killen, J. D., Kraemer, H. A., & Taylor, C. B. (1998). Linking Self-Reported Childhood Behavioral Inhibition to Adolescent Social Phobia. *American Academy of Child and Adolescent Psychiatry, 37*(12), 1308-1316. Retrieved November 12, 2013, from the Web of Science database.
- Humphrey, J. L., Storch, E. A., & Geffken, G. R. (2007). Peer victimization in children with attention-deficit hyperactivity disorder. *Journal of Child Health Care, 11*, 248-260. Retrieved October 28, 2013, from the Web of Science database.
- Jensen, P. S., Martin, D., & Cantwell, D. P. (1997). Comorbidity in ADHD: Implications for Research, Practice, and DSM-V. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*(8), 1065-1079. Retrieved September 2, 2013, from the Web of Science database.
- Jensen, P., Rubio-Stipec, M., Canino, G., Bird, H., Dulcan, M., Schwab-Stone, M., et al. (1999). Parent and child contributions to diagnosis of mental disorder: Are both informants

always necessary?. *Journal of the American Academy of Child and Adolescent Psychiatry*, 38(12), 1569-1579. Retrieved March 18, 2014, from the Web of Science database.

Johnston, C., & Mash, E. J. (2001). Families of Children With Attention-Deficit/Hyperactivity Disorder: Review and Recommendations for Future Research. *Clinical Child and Family Psychology Review*, 4(3), 183-207. Retrieved March 12, 2014, from the Web of Science database.

Kernberg, O. E., & Yeomans, F. E. (2013). Borderline personality disorder, bipolar disorder, depression, attention deficit/hyperactivity disorder, and narcissistic personality disorder: Practical differential diagnosis. *Bulletin of the Menninger Clinic*, 77(1), 1-22. Retrieved March 31, 2013, from <http://web.ebscohost.com/ehost/detail?sid=61cd6e1b-8a47-44e0-999e-bdcce084fd9c%40sessionmgr104&vid=1&hid=108&bdata=JnNpdGU9ZWwhvc3QtbGl2ZQ%3d%3d#db=a9h&AN=86195898>

Kowalski, R. M., Limber, S., & Agatston, P. W. (2008). Current Research on Cyber Bullying. *Cyber bullying: bullying in the digital age* (pp. 67-88). Malden, MA.: Blackwell Pub..

Ladd, G. W. (2006). Peer Rejection, Aggressive or Withdrawn Behavior, and Psychological Maladjustment from Ages 5 to 12: An Examination of Four Predictive Models. *Child Development*, 77(4), 822-846. Retrieved September 5, 2013, from the Web of Science database.

Lopez-Larson, M. P., King, J. B., Terry, J., McGlade, E. C., & Yurgelun-Todd, D. (2012). Reduced insular volume in attention deficit hyperactivity disorder. *Psychiatry Research: Neuroimaging*, 204, 32-39. Retrieved July 17, 2013, from the Web of Science database.

- McLoyd, V. C. (1998). Socioeconomic Disadvantage And Child Development.. *American Psychologist*, 53(2), 185-204. Retrieved March 19, 2014, from the Web of Science database.
- Meinzer, M. C., Lewinsohn, P. M., Pettit, J. W., Seeley, J. R., Gau, J. M., Chronis-Tuscano, A., et al. (2013). Attention-deficit/hyperactivity disorder in adolescence predicts onset of major depressive disorder through early adulthood. *Depression and Anxiety*, 30, 546-553. Retrieved July 18, 2013, from the Web of Science database.
- Mikami, A. Y., Huang-Pollock, C. L., Pfiffner, L. J., McBurnett, K., & Hangai, D. (2007). Social Skills Differences Among Attention-Deficit/Hyperactivity Disorder Types In A Chat Room Assessment Task. *Journal of Abnormal Child Psychology*, 35(4), 509-521. Retrieved November 20, 2013, from the Web of Science database.
- Mikami, A. Y., Szwedo, D. E., Allen, J. P., Evans, M. A., & Hare, A. L. (2010). Adolescent Peer Relationships and Behavior Problems Predict Young Adults' Communication on Social Networking Websites. *Developmental Psychology*, 46(1), 46-56. Retrieved November 13, 2013, from <http://search.proquest.com.ezaccess.libraries.psu.edu/docview/614510070/fulltextPDF?accountid=13158#>
- Miller, T. W., Nigg, J. T., & Miller, R. L. (2009). Attention deficit hyperactivity disorder in African American children: What can be concluded from the past ten years?. *Clinical Psychology Review*, 29(1), 77-86. Retrieved March 19, 2014, from <http://www.sciencedirect.com.ezaccess.libraries.psu.edu/science/article/pii/S0272735808001384#>
- Neece, C. L., Baker, B. L., Cmic, K., & Blancher, J. (2012). Examining the Validity of ADHD as a Diagnosis for Adolescents with Intellectual Disabilities: Clinical Presentation. *Journal*

of *Abnormal Child Psychology*, 41, 597-612. Retrieved July 18, 2013, from the Web of Science database.

Nugent, K. L., Kline, E., Thompson, E., Schiffman, J., & Reeves, G. (2013). Brief Report Assessing psychotic-like symptoms using the BASC-2: adolescent, parent and teacher agreement. *Early Intervention in Psychiatry*, 7, 431-436. Retrieved November 20, 2013, from <http://onlinelibrary.wiley.com.ezaccess.libraries.psu.edu/doi/10.1111/eip.12019/pdf>

Ostrander, R., Crystal, D. S., & August, G. (2006). Attention deficit-hyperactivity disorder, depression, and self- and other assessments of social competence: A developmental study. *Journal of Abnormal Child Psychology*, 34, 773-787. Retrieved October 27, 2013, from the Web of Science Database.

Pappas, D. (2006). ADHD Rating Scale-IV: Checklists, Norms, And Clinical Interpretation. *Journal of Psychoeducational Assessment*, 24(2), 172-178. Retrieved November 20, 2013, from the Web of Science database.

Pea, R., Nass, C., Zhou, M., Meheula, L., Rance, M., Kumar, A., et al. (2012). Media Use, Face-to-Face Communication, Media Multitasking, and Social Well-Being Among 8- to 12-Year-Old Girls. *Developmental Psychology*, 48(2), 327-336. Retrieved November 13, 2013, from <http://search.proquest.com.ezaccess.libraries.psu.edu/docview/917851890/fulltextPDF?accountid=13158#>

Pineda, D., Ardila, A., Rosselli, M., Arias, B. E., Henao, G. C., Gomez, L. F., et al. (1999). Prevalence of Attention-Deficit/Hyperactivity Disorder Symptoms in 4- to 17-Year-Old Children in the General Population. *Journal of Abnormal Child Psychology*, 27(6), 455-462. Retrieved March 18, 2014, from the Web of Science database.

Prior, M., Smart, D., Sanson, A., & Oberklaid, F. (2000). Does Shy-Inhibited Temperament in Childhood Lead to Anxiety Problems in Adolescence?. *American Academy of Child and*

Adolescent Psychiatry, 39(4). Retrieved November 12, 2013, from the MD Consult database.

Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). GENERATION M 2 Media in the Lives of 8- to 18-Year-Olds. *A Kaiser Family Foundation Study, 1*. Retrieved November 13, 2013, from <http://kaiserfamilyfoundation.files.wordpress.com/2013/04/8010.pdf>

Rubin, K. H., Coplan, R. J., & Bowker, J. C. (2009). Social Withdrawal in Childhood. *Annual Review of Psychology*, 60, 141-171. Retrieved September 5, 2013, from the Web of Science database.

Rydell, A. (2010). Family factors and children's disruptive behaviour: an investigation of links between demographic characteristics, negative life events and symptoms of ODD and ADHD. *Social Psychiatry and Psychiatric Epidemiology*, 45(2), 233-244. Retrieved March 18, 2014, from the Web of Science database.

Schonberg, M. A., & Shaw, D. S. (10). Do the Predictors of Child Conduct Problems Vary by High- and Low-Levels of Socioeconomic and Neighborhood Risk?. *Clinical Child and Family Psychology*, 2(2007), 101-136. Retrieved March 18, 2014, from the Web of Science database.

Shaffer, D., Fisher, P., Lucas, C. P., Dulcan, M. K., & Schwab-Stone, M. E. (2000). NIMH Diagnostic Interview Schedule For Children Version IV (NIMH DISC-IV): Description, Differences From Previous Versions, And Reliability Of Some Common Diagnoses. *Journal of the American Academy of Child & Adolescent Psychiatry*, 39(1), 28-38. Retrieved November 20, 2013, from the Web of Science database.

- Spencer, T., Biederman, J., Wilens, T., Harding, M., O'Donnell, D., & Griffin, S. (1996).
Pharmacotherapy of Attention-Deficit Hyperactivity Disorder across the Life Cycle.
Journal of the American Academy of Child and Adolescent Psychiatry, 35(4), 409-432.
Retrieved September 2, 2013, from the Web of Science database.
- Van Horn, M. L., Atkins-Burnett, S., Karlin, E., Ramey, S. L., & Snyder, S. (2007). Parent
Ratings Of Children's Social Skills: Longitudinal Psychometric Analyses Of The Social
Skills Rating System.. *School Psychology Quarterly*, 22(2), 162-199. Retrieved
November 20, 2013, from the Web of Science database.
- Websterstratton, C. (1993). Strategies for Helping Early School-Aged Children with Oppositional
Defiant and Conduct Disorders - the Importance of Home-School Partnerships. *School
Psychology Review*, 22(3), 437-457. Retrieved September 5, 2013, from the Web of
Science database.
- Wilens, T. E., Biederman, J., & Spencer, T. J. (2002). Attention Deficit/Hyperactivity Disorder
Across the Lifespan. *Annual Review of Medicine*, 53, 113-131. Retrieved September 5,
2013, from the Web of Science database.
- Willcutt, E. G. (2012). The Prevalence of DSM-IV Attention-Deficit/Hyperactivity Disorder: A
Meta-Analytic Review. *Neurotherapeutics*, 9(3), 490-499. Retrieved March 18, 2014,
from the Web of Science database.

ACADEMIC VITA

Amy Balko
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Education:

The Pennsylvania State University, University Park, PA
The College of Liberal Arts, Schreyer Honors College
Bachelor of Science: Psychology: Biological and Evolutionary Science Option
Minor in Spanish
Honor's Thesis: *Effects of Internalizing/Externalizing Comorbidity on Online Social Communication in Children with Attention Deficit/Hyperactivity Disorder*

Honors and Awards:

Schreyer Honors College Academic Excellence Scholarship	August 2010-present
Dean's List, College of Liberal Arts	May 2011-present
Superior Academic Achievement Award	May 2011-present
Psi Chi: The International Honors Society in Psychology	November 2012-present
The Costello Family Scholarship in Psychology Honorable Mention	February 2014
Spanish Award	June 2010
Scholarship Award	June 2010
National Honors Society	May 2009

Relevant Experience:

The Child Attention and Learning Lab- Dr. Cynthia Huang-Pollock State College, PA
Research Assistant January 2012-Present

- Administered a comprehensive neuropsychological battery of tests (including subtests of the WISC-IV and WIAT-III) to children ages 8-12 with and without ADHD
- Conducted structured diagnostic interviews with parents (DISC-IV)
- Assisted in recruitment by screening participants via phone
- Conducted data entry and worked on a standardized data coding team
- Revamped the CAL Lab website

Friendship Group- Dr. Janet Welsh State College, PA
Friendship Group Coach August 2013-present

- Conducted group intervention sessions for children ages 8-9 with various behavioral problems/social deficits
- Implemented empirically based curriculum during weekly sessions (Bierman K., Greenberg M., & the CPPRG, 2012)

- Responsible for tailoring curriculum to best suit specific needs and/or levels of functioning of children

Anxiety and Sleep Disorders Lab- Dr. Brian Sharpless

State College, PA

Research Assistant

March 2013- May 2013

- Administered and scored psychological measures (IQ, anxiety symptoms)
- Assisted in data entry
- Witnessed diagnostic interviews of sleep paralysis

Feelings, Behavior, and Information Processing Lab- Dr. Karen Gasper

State College, PA

Research Assistant

August 2011-December 2011

- Administered computerized tasks assessing emotion and attitudes of college students
- Assisted in critiquing and creating measures to evaluate attitude/emotion

Professional Presentations:

Psi Chi National Honors Society Undergraduate Research Conference

Spring 2014

Volunteer Activities/Organizations:

Penn State IFC/Panhellenic Dance Marathon (THON)

State College, PA

August 2010-present

- Family Relations Chair for Psi Chi benefitting THON
 - Organized all interactions and visitations with our THON family
 - Managed family fund money
 - Arranged fundraisers through the year
- Rules and Regulations PASS Committee
 - Responsible for maintaining security through the Bryce Jordan Center during THON weekend
 - Monitored computerized system to allow guests in and out of the venue
 - Served as outfitting chair to 30 students
- Springfield THON
 - Member of an organization devoted to raising money for THON

Big Brothers Big Sisters

Tunkhannock, PA

September 2008- June 2009

- Provided support and encouragement to troubled youth
- Helped to foster adaptive communication/interpersonal skills
- Facilitated the relationship through a variety of activities such as games, homework assistance, or public outings