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ACTION CONTROL ORIENTATION: MODERATING EFFECTS ON OUTCOMES IN  
CHILDREN WITH ATTENTION DEFICIT/HYPERACTIVITY DISORDER.

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## ABSTRACT

**Objective:** ADHD is often associated with deficits in executive functioning, academic achievement, and social-emotional well-being. Action Control Orientation refers to one's level of goal direction and persistence along a continuum of *action* to *state* orientation. Having an *action* orientation indicates persistence when faced with tough decisions or failure experiences, while *state* orientation indicates hesitation or rumination. The current project explores whether Action Control Orientation might moderate a range of outcomes in children with and without ADHD. **Methods:** 102 children with ADHD and 107 non-ADHD controls completed the Action Control Questionnaire (ACQ) and a comprehensive neurological battery. One parent and one teacher of each child completed questionnaires about the child. Parents also completed a clinical interview and a version of the ACQ about their child. **Results:** Moderating relationships were only found in terms of Parent Report AOF with depression and Child Report AOF with aggression. Results indicate that Action Control Orientation predicts the outcome experiences of children above and beyond that of ADHD status in areas of social skills and anxiety, depression, and aggression symptoms. **Conclusion:** These findings suggest that Action Control Orientation may be a useful tool designing treatments for children with ADHD; teaching children action-oriented skills could improve their experiences and outcomes.

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## Introduction

### *Attention Deficit/Hyperactivity Disorder*

Recent estimates place the prevalence of Attention Deficit/ Hyperactivity Disorder as effecting between 5-10% of children. (Faraone et al., 2003, Polanczyk & Rhode, 2007) Attention Deficit/Hyperactivity Disorder (ADHD) is characterized by a significant inability to focus and/or control motor movements with these problems occurring in at least two different life scenarios. There are two broad categories of symptoms currently recognized by the Diagnostic and Statistical Manual (IV-TR) published by the American Psychiatric Association in 2000: inattentive and hyperactive/impulsive. There are three subtypes to ADHD that more clearly define the symptomatology of the effected individual within these categories. The Primarily Inattentive Subtype (P-I) is identified by more internally based behaviors such as consistently making careless mistakes, appearing not to listen when others speak, appearing unable to follow directions, frequent disorganization and loss of property, and appearing distracted or forgetful. The Primarily Hyperactive-Impulsive (P-HI) Subtype is identified by clinically significant levels of fidgeting, an inability to remain seated, inappropriate running and climbing, acting as though “driven by a motor,” and talking excessively. The Combined Subtype is applied when full criteria are met for both the P-HI and P-I subtypes (The American Psychiatric Association, 2000).

Boys are more frequently referred for Attention Deficit/ Hyperactivity Disorder than girls, and overall the ratio of diagnoses between genders is 3:1 (Barkley, 1998). Although typically diagnosed in childhood, ADHD is considered to have a persistent life course. Biederman, et al. (2006) found that when tested for the disorder in young adulthood, 58% of children with ADHD still met diagnostic criteria. Additionally, ADHD maintains relatively high

rates of comorbidity (Cohen et al., 1993; Wilens, Biederman, & Spencer, 2002) Specifically, Eiraldi, Power, & Nezu (1997) have found that in groups of children who meet criteria for the Combined Subtype of ADHD that 44% have Oppositional Defiant Disorder and 48% have Conduct Disorder. Additionally, children in the Primarily Inattentive Subtype were found to experience elevated rates of Depression and Anxiety (Eiraldi, Power, & Nezu, 1997). This higher frequency of comorbid disorders has been demonstrated to follow ADHD populations into their adult lives as well (Biederman et al., 2006).

The impact of Attention Deficit/ Hyperactivity Disorder on the life of a child extends beyond these immediate problem behaviors. Children with ADHD are particularly prone to deficits in executive functioning, a category of impairment that includes problems with inhibition, one's ability to plan ahead, and working memory capacity. Deficiencies in these Executive Functioning categories are often associated with academic impairments of poor grades and a higher probability of being held back and repeating grades (Biederman et al., 2004). Higher rates of learning disabilities, special education, and tutoring have also been found in ADHD populations and children's performances on measures from the Wechsler Intelligence Scale for Children (WISC) are on average lower than their unaffected peers. (Faraone et al., 1993; Fischer et al., 1990, Seidman et al., 2005) Beyond academic performance, Antshel et al. (2008) have also found that children with ADHD experience lower levels of functionality during social interactions and exhibit significantly more behavior problems in school than children without the disorder.

Despite exhibiting similar behaviors and average outcomes, not all children with ADHD have the same experience at home, in school, and within themselves. There are several risk factors in the environment that can worsen outcomes; high risk family and home environments

that involve severe conflict, parents with criminal associations and mental health issues, low socio-economic status, or time spent in foster care are all associated with lower IQ levels for children who have attention problems (Biederman et al., 1995). Additionally, children with ADHD generally report having less social support from friends and family, but those that do often perform better academically than their low support counterparts (Demaray & Elliot, 2001).

Internal protective factors do exist for children with ADHD that can ease their exhibition of symptoms. In particular, children who have both ADHD and a high IQ are less likely to engage in behavioral problems such as smoking or drinking, even if they have a comorbid behavior disorder (Antshel et al., 2008).

There are also aspects of a child's temperament and self-concept that may negatively affect his or her outcomes. Children with Attention Deficit/Hyperactivity Disorder have been shown to view themselves as more skilled than they actually are in areas of their greatest deficit, whether it be social, behavioral, or academic; which indicate they may hold inaccurate views of themselves in relation to the world (Gerdes, 2004). Several studies have also found evidence that young children with ADHD experience less goal-directed persistence (Wilcutt et al., 2005; Martinussen et al., 2005, Mariani & Barkley, 1997) and lower academic achievement (Biederman, 2004). A study conducted by Hoza et al. (2001) found that boys with ADHD do not progress as far during tasks such as those on the WISC and are also more likely to give up on the task before their time limit has officially run out. These boys also indicated more of a belief in "luck" in regard to their performances than typical children. Overall, it has been found that children with attention problems describe more frustration during tasks than unaffected children (Hoza, et al. 2001, Milich & Okazaki, 1991).

### *Action Control Orientation*

Action Control Orientation is a concept developed by Dr. Julius Kuhl that is designed to measure an individual's goal-direction and persistence. There are three subscales to the full version of the Action Control Scale (ACS), each of which measures a slightly different characteristic for which an individual receives a separate score

The first scale is the Action Orientation Failure-Related (AOF) Scale, which measures a person's ability to relax themselves during stressful situations and persist in their initial goals even after experiencing failure (Kuhl & Kazen, 1994) It can also be considered a scale that measures a person's thought Preoccupation v. Disengagement because State Oriented individuals would find themselves preoccupied by their thoughts regarding the failure, where as Action Oriented individuals would more easily be able to disengage these thoughts (Kuhl & Kazen, 1994). A second scale is referred to as an Action Orientation Decision-Related (AOD) Scale, which measures an individual's ability to self-motivate and follows through on performing a task that they originally intended to complete. This scale can also be thought of as a Hesitation v. Initiative scale. State Oriented individuals would hesitate to initiate, where Action Oriented individuals would be more decisive in their actions (Kuhl & Kazen, 1994). There is additionally a third referred to as the Action Orientation Performance-Related (AOP) Scale. This essentially measures the extent to which a person is involved in an activity without their attention falling on anything else. For purposes of this study, a shortened form of the Action Control Scale (ACS-90) will be used which excludes the third sub-scale.

Consistent with past research, it has recently been found in non-clinical populations that people with an Action Orientation are generally better at relaxing under pressure and keeping their negative affect in check (Koole & Fockenberg, 2011). There is also evidence to support that



a person's Action Control Orientation does in fact impact their performance in a variety of life experiences, regardless of how they perceive their abilities (Diefendorf, 2004). More specifically, Action Control Orientation has been found to moderate a person's working memory capabilities and associated intention memory during stressful situations. Intention Memory is a mechanism that allows a person to maintain and store memory of specific actions that they must do a later time and also allows him or her to enact these actions at an appropriate and relevant time in the future (Kazen & Kuhl, 2005). It has been found that Action Oriented individuals demonstrate higher levels of WMC and IM under pressure and State Oriented individuals demonstrate significantly less (Jostman & Koole, 2006). Kuhl & Kazen (1994) have also found evidence to suggest that State Oriented individuals experience more false self-ascriptions when doing activities that have been assigned to them by other people. This means that they are more likely to internalize the intentions of other people as if they were their own when assigned tasks, indicating that people with State Orientation may be susceptible to influence from others. Diefendorff (1998) explored how individuals with a State Orientation on the Decision-Related (AOD) scale perceive themselves as having less self-regulation ability in academic, emotional, social, and general time management scenarios. Additionally, State Orientation in the Failure-Related (AOF) scale was related to lower perception of self-regulation in emotional and general time management scenarios as well (Diefendorff, 1998).

In summary, the experiences and deficits of individuals who have State Orientation in either the Decision-Related (AOD) or Failure-Related (AOF) subscales may be related to the difficulties experienced by children with Attention Deficit Hyperactivity Disorder by either accounting for some of the deficits or moderating the outcomes. Past research provides support for the idea that both populations of individuals with ADHD and State Orientation experience

working memory deficits, problems with goal direction and persistence, as well as a degree of learned helplessness. People with a State Orientation often have negative emotional experiences during tasks that require prolonged attention and focus similar to the way that a child with ADHD would feel frustrated and be more willing to give up on a difficult task. As such, there is the potential for a moderating relationship to exist between Action Control Orientation and Attention Deficit/Hyperactivity Disorder in terms of social, emotional, academic, and behavioral issues as well as attention processes and working memory capabilities. The goal of this current research study is to examine Action Control Orientation as a moderating variable on outcomes for children with ADHD compared to their typical peers.

*Hypothesis 1:* It is postulated that children with Attention Deficit/Hyperactivity Disorder will receive lower scores in parent, teacher, and self-reported comorbid disorder symptoms, academic problems, and social skills deficits. Additionally, it is expected that children with the disorder will perform below average in terms of working memory capabilities and academics such as Reading, Spelling, and Math. If this occurs, there would be significant group differences observed between children with Attention Deficit/Hyperactivity Disorder and children without the disorder.

*Hypothesis 2:* It is expected that Action Oriented individuals in both subscales of Decision Making and Failure Response will perform better than State Oriented individuals in working memory tasks and academics such as Reading, Spelling, and Math. In addition, it is expected that action orientation will be significantly correlated with parent, teacher, and self-reported comorbid disorder symptoms, academic problems, and social skills deficits in children. If this occurs, there would be positive correlations between ACO and beneficial outcomes such as academic performance, full scale IQ, working memory capabilities, and social skills.

Additionally, there would be negative correlations between ACO and detrimental outcomes such as comorbid symptom expression, and school problems.

*Hypothesis 3:* It is expected after running regression analysis that Action Control Orientation of children above and beyond the impact of their Attention Deficit/Hyperactivity Disorder status in terms of behavior problems, higher executive functioning abilities, academic, and social abilities. If this occurs, there would be an interaction where Action Control Orientation acts on the relationship between ADHD status and outcomes in children. When comparing two populations of children with ADHD and control children, it is also expected that having an Action Orientation would improve the performance and experience of children with ADHD, bringing their outcome levels closer to or equal to their non-ADHD counterparts. If this occurs, then there would be a significant moderating effect of Action Control Orientation subscales of Decision Making (AOD) and Failure Response (AOF) on the relationship of ADHD to outcome as indicated by a hierarchical regression

## Methods

### *Data Collection Procedure*

The participants in this study were 209 school-aged children, both with and without Attention Deficit/Hyperactivity Disorder. All children were recruited from local school districts in and around Centre County, Pennsylvania and York County, Pennsylvania. Recruitment methods utilized flyers, print and website advertisements, and a research study volunteer database previously formulated by The Pennsylvania State University. The children with ADHD (n=102), which included subtypes ADHD-C (n=52) and ADHD-I (n=50), as well as children without ADHD in the control group (n=107), were all between the ages of 8-12 years of age. There was an even gender distribution within the sample of male (n=108) and female (n=101) children. In the ADHD group, the gender distribution was 65 male and 37 female; in the Control Group, the distribution was 43 male and 64 female. The ethnic distribution of the sample collected is 85% Caucasian/Non-Hispanic, 2.5% African American, 2% Caucasian Hispanic, 1.5% Asian, and 5% of mixed race/ethnicity.

In order to determine eligibility for this study, participants were cleared at three levels. First, children were evaluated via phone interview with their parents and ruled out if they had previously been diagnosed with a neurological disability, a profound sensorimotor disability, a pervasive developmental disorder such as Autism Spectrum Disorder, psychosis, and/or a full scale IQ less than 80. Only one child per family was allowed to participate in the study. Additionally, children who were reported by a parent to be actively using prescription medications for purposes of improving attention were required to stop taking this medication 24-48 hrs prior to the laboratory visit. This removed any possible confounding effect that the medication may have on the child's results. If any families were unable to discontinue use of

medication or chose not to at the time of recruitment, the child was not included in further stages of the study.

The second stage for admittance into the study involved one parent and one familiar teacher completing a comprehensive packet of questionnaires about the child's thoughts, feelings, and behaviors experienced while not taking medication. Both parents and teachers were both asked to complete the ADHD Rating Scale-IV (ADHD-RS IV; Dupaul et.al., 1998), Behavioral Assessment Scale for Children (BASC-2; Reynolds, & Kamphaus, 2004), Conner's Rating Scales-Revised (CRS-R; Conners, 2001) and Social Skills Rating System (SSRS; Gresham & Elliot, 1990).

The ADHD Rating Scale is an 18-item Likert-scaled questionnaire in which a parent and teacher each rate the child's behaviors in terms of "never," "sometimes," "often," and "very often." The items used in the ADHD Rating Scale are the same as those symptoms standardized by the Diagnostic and Statistical Manual IV - Text Revision (DSM-IV-TR; The American Psychiatric Association, 2000) for Attention Deficit/ Hyperactivity Disorder. There are 9 items of hyperactive/impulsive symptoms and 9 items of inattentive symptoms included in the scale.

The Behavioral Assessment System for Children (BASC) is a Likert-scaled questionnaire in which parents and teachers are each asked to endorse characteristics about each child's behaviors in terms of how often they occur: "never," "sometimes," "often," and "always." The Conner's Rating Scale (CRS) is a Likert-scaled questionnaire in which parents and teachers rate children's problem experiences in terms of "not true at all," "just a little true," "pretty much true," and "very much true" of the specific child. The Social Skills Rating Scale (SSRS) is a Likert-scaled questionnaire in which parents and teachers rate children's social experiences in terms of how often the child interacts with others in particular ways: "never," "sometimes," and "very

often.”

During the third data collection stage of the study, children and their primary caregivers were brought into the study for two, three hour on campus visits at The Pennsylvania State University. For the duration of this in-lab session, the participating child was administered an extensive psycho-neurologic battery including several computer generated tasks, segments of the Wechsler Intelligence Scale for Children (WISC-IV; Wechsler, 2003) and Wechsler Individual Achievement Test (WIAT-III; Wechsler, 2009). An Estimated Full Scale IQ was developed using the *Matrix Reasoning* and *Vocabulary* tasks from the WISC-IV and a score of Working Memory Capabilities (Working Memory Index) is determined using the WISC-IV *Digit Span* and *Letter Number Sequencing* tasks. WIAT scores provided information on the child’s abilities in Reading, Spelling, and Mathematics. Children additionally filled out self-report measures of anxiety and depression in the form of the Multidimensional Anxiety Scale for Children (MASC; March, 1997) and the Children’s Depression Inventory (CDI; Kovacs, 2003). Information was gathered from the children about their goal direction and persistence in form of the Action Control Questionnaire (ACS-90).

The Action Control Questionnaire (ACS-90) is a 21-item questionnaire. Each of the items addresses a situation and asks the child to pick one of two possible responses for how he or she would act in that circumstance; the parent version of the ACS-90 asks parents to pick how they believe their child would act in each situation. Action Oriented responses are scored with a 1, and State Oriented responses are scored with a 0. Two sub-scores can be obtained from the ACS-90: Decision Related Action Orientation (AOD) and Failure Related Action Orientation (AOF). The final score of Action Control Orientation is on a total scale of 0 - 21, with 0 representing the state oriented end of the spectrum, and 21 representing the action oriented end.

Additionally during the first visit, parents were administered The National Institute of Mental Health's Diagnostic Interview Schedule for Children (DISC-4; Shaffer, et.al., 2000). The DISC is a highly structured and computer based interview that identifies possible diagnoses in each child based on the information provided by the parents about the child's behavior and emotional experiences throughout the child's life. Next, parents were given a developmental history questionnaire, Behavior Rating Inventory of Executive Function (BRIEF; Gioia et. al., 2000), and parent report version of the Action Control Questionnaire (ACS-90; Personal Communications) to provide a full background on the child's experiences throughout life at home and in school.

During the second in-lab data collection visit, the children completed similar activities to the first session, including additional segments of the WIAT-III.

#### *Experimental and Control Group Screening procedure*

Several levels of collected data were used to determine whether or not each child should be considered in the experimental Attention Deficit/Hyperactivity Disorder group or in the Non-ADHD Control Group. This decision was made based on a combination of parent and teacher report of the child's experiences through the ADHD-RS, BASC, CRS and DISC clinical interview.

For purposes of this study, children were initially considered to be in the ADHD experimental group if the parent and teacher scores combined on the ADHD-RS met one of three clinically significant threshold levels. These children either had three or more *inattentive symptoms* occurring "often" or "very often", three or more *hyperactive symptoms* occurring "often" or "very often", OR four or more *total symptoms* as occurring "often" or "very often." Children included in the experimental group also received BASC or CRS scores from both

parent and teacher above the 85th percentile on each scale's Attention/Cognitive problems and hyperactivity subscales.

Children were initially considered non-ADHD Control if they received fewer than three *inattentive symptoms*, fewer than 4 *hyperactive/impulsive symptoms*, *OR* no more than three total symptoms endorsed as "often" or "very often" by his or her parent and teacher combined on the ADHD-RS IV. Additionally, all BASC and CRS scores for ADHD related subscales were required to be below the 80<sup>th</sup> percentile.

Following this initially screening, results from the DISC clinical interview are utilized to make a final determination on each child's ADHD status. The parent report on the DISC was integrated with teacher report on the ADHD-RS and the number of symptoms endorsed is counted following the same "Either/Or" algorithm described above for the original ADHD-RS. All children who were considered in the ADHD experimental group for this study met the requirements for a diagnosis of ADHD as described by the DSM-IV-TR; all children in the non-ADHD control group had never been diagnosed or treated for ADHD at any time in their lives. Furthermore, children in the non-ADHD control group were screened out prior to the second visit if their FSIQ was > 110; this cut off prevents a high IQ bias in the control sample group.

#### *Consent and Compensation Procedure*

After the initial phone screen of interest, parents are mailed a comprehensive consent form prior to any data collection. Parents are also asked to sign a form giving the child's teacher permission to complete the questionnaires about their child. Parents are additionally asked to provide written consent on witness copies of both forms again during the first visit while the participating child is administered a verbal assent form. All children were confirmed to be off



medication while completing the neurologic tasks and all questionnaires by parents and teachers were answered about the children as they are while not taking medication.

Parents received monetary compensation for their participation, the amount of which was determined by the level of the study they completed; there was a \$100.00 maximum amount for full completion of both in-house lab visits and partial amounts for each previous step. Parents also had the option to receive informal feedback on their child's performance following completion of the study. Immediately following each 1.5-hour session, children were allowed to choose from a gift box of prizes; in total, the prizes amounted to being worth less than \$2.00 per child.

## Results

### *H1: One Way ANOVA*

Means and standard deviations for all ANOVA analyses can be found in Tables 1 and 2. Children with ADHD were rated by parents and teachers as having higher levels of anxiety, aggression, and oppositional behaviors (*all*  $p < .001$ , *all*  $\eta^2 > .096$ ), as well as more difficulty engaging in prosocial behavior ( $p < .001$ ,  $n^2 > .459$ ). Children with ADHD also self-reported higher levels of depression ( $p < 0.001$ ,  $n^2 = .168$ ), but did *not* report higher levels of anxiety ( $p = .001$ ,  $n^2 = .736$ ). Academic achievement was lower in children with ADHD as indexed by parent and teacher report ( $p < .000$ , *all*  $n^2 > .647$ ), as well as by performance on the Spelling ( $p < .001$ ,  $n^2 = .182$ ), Reading ( $p < .001$ ,  $n^2 = .112$ ), and Mathematics ( $p < .001$ ,  $n^2 = .107$ ) subtests of the WIAT. There were no group differences in estimated IQ ( $p = .179$ ,  $n^2 = .009$ ), though children with ADHD had lower working memory spans than children without ADHD ( $p < .001$ ,  $n^2 = .409$ ).

For Action Control Orientation, children with ADHD were more state oriented on the Failure Related subscale (AOF) as reported by parents ( $p = .021$ ,  $n^2 = .028$ ) and on the Decision Related subscale (AOD) as reported by both children themselves and their parents (*both*  $p < .004$ , *both*  $n^2 > .063$ ) than non-ADHD control. Overall, significant group differences among children with and without ADHD were found for mental health, academics, social abilities, and in terms of goal direction and persistence.

### *H2: Correlations*

Intercorrelations of parent and child ACO Subscales can be found in Table 3. Parent and child report of the child's Action Orientation were significantly correlated for all indices, except

child reported failure response was not associated with parent reported failure response ( $p = .053$ ,  $r = .180$ ), or parent reported decision making ( $p = .784$ ,  $r = .025$ ).

Intercorrelations of Action Control Orientation in relationship to childhood outcomes can be found in Tables 4 and 5. Child reported AOD (cAOD) was negatively correlated with parent and teacher reported symptoms of anxiety, opposition, inattention, and academic problems (*all*  $p < .007$ , *all*  $r > -.237$ ). cAOD was positively correlated with parent and teacher report of social skills ( $p = .003$ ,  $r = .263$ ). cAOD was also negatively correlated with child-reported depression ( $p < .001$ ,  $r = -.333$ ), anxious coping, and harm avoidance (*both*  $p < .007$ , *both*  $r > .256$ ). Intellectual ability, performance in WIAT tasks of Reading, Spelling, or Math (*all*  $p > .289$ , *all*  $r < .095$ ) and working memory were *not* correlated with child reported AOD (*all*  $p > .116$ , *all*  $r < .139$ ).

Parent reported AOD (pAOD) predicted the same outcomes as cAOD (*all*  $p < .001$ , *all*  $r > -.238$ ) but several additional associations were also found. pAOD predicted parent and teacher reported aggression and hyperactivity (*all*  $p < .001$ , *all*  $r > -.469$ ), WIAT reading, spelling, reading, and math, *as well as* working memory index (*all*  $p < .047$ , *all*  $r > .139$ ).

Child and Parent reported AOF were not as closely aligned when predicting outcomes as were AOD. Child Reported AOF (cAOF) was negatively correlated with child reported depression ( $p = .005$ ,  $r = -.267$ ), parent reported anxiety ( $p = .012$ ,  $r = -.221$ ), and child reported anxiety (e.g. tenseness/restlessness, somatic and physical symptoms, performing in public, social anxiety, and separation/panic; *all*  $p < .048$ , *all*  $r > -.183$ ). No relationship was found between cAOF and any other outcome measures (*all*  $p > .122$ , *all*  $r < .243$ ).

Parent Reported AOF was negatively correlated with Parent/teacher report of anxiety, opposition, aggression, hyperactivity, inattention, and school problems (*all*  $p < .05$ ,  $r > -.169$ ).

Parent Reported AOF (pAOF) was positively correlated with social skills ( $p = .024$ ,  $r = .23$ ).

There were no other significant relationships found between pAOF and other outcome measure ( $\text{all } p > .144$ ,  $\text{all } r < .050$ ).

### *H3: Hierarchical Regression*

Regression analyses results and significance levels for each subscale of Action Control Orientation can be found in Tables 6, 7, 8, and 9. ACO predicted outcomes in children above and beyond their ADHD status in a few areas. Child reported AOD and AOF predicted child-reported depression symptoms over and above ADHD status ( $\text{both } p < .01$ ,  $\text{both } \Delta r^2 > .065$ ). Child reported AOD also predicted social skills ( $p < .05$ ,  $\Delta r^2 = .109$ ) over and above ADHD status. Child reported AOF, but not AOD, predicted parent/teacher and child reported anxiety symptoms ( $\text{both } p < .05$ ,  $\text{both } \Delta r^2 > .043$ ).

Parent reported AOD and AOF predicted unique variance beyond ADHD status in terms of social skills ( $\text{both } p < .006$ ,  $\text{both } \Delta r^2 > .057$ ). Parent reported AOD predicted conduct problems ( $p < .05$ ,  $\Delta r^2 = .011$ ) and Parent reported AOF predicted parent/teacher reported anxiety ( $p < .001$ ,  $\Delta r^2 = .084$ ) over and above ADHD status as well. Child reported AOF and AOD predicted unique variance in depressive symptoms ( $\text{both } p < .05$ ,  $\text{both } \Delta r^2 > .049$ ) beyond ADHD status. Additionally, child reported AOF alone predicted child-reported anxiety ( $p < .001$ ,  $\Delta r^2 = .149$ ), and Child reported AOD predicted social skills ( $p < .05$ ,  $\Delta r^2 = .109$ ) over and above ADHD status.

Two moderating relationships were found. Parent-reported AOF moderated the relationship of ADHD to child reported depression symptoms ( $p = .030$ ,  $\Delta r^2 = .031$ ) as depicted in Figure 1. Child reported AOF moderated the relationship of ADHD to parent reported Aggressive symptoms ( $p = .027$ ,  $\Delta r^2 = .021$ ); this relationship is depicted in Figure 2. These results

indicate that the relationship between depression and aggressive symptoms are potentially changed by the status of action control orientation. Figures 1 and 2 demonstrate scatter plots of the two interactions found, which both demonstrate that the differences between ADHD and Control groups decrease significantly as a child becomes more action oriented. In terms of parent reported AOF and child reported depression symptoms, children with ADHD seem to experience lower levels of depression as they become more goal-directed and persistent, while children without ADHD actually demonstrate higher levels of depressive symptoms the more action oriented they are. Figure 1 also demonstrates how similar the results of children who are action oriented are between ADHD and control groups in terms of depression symptoms. As for the relationship between child report AOF and parent report aggressive symptoms, a similar pattern is depicted in Figure 2.: children with ADHD show fewer aggressive symptoms as they become more action oriented and control children showed increased levels with the scores of children who are action oriented being similar despite ADHD or control status.

## Discussion

### *Summary*

This study found that children with ADHD experience higher levels of opposition, aggression, anxiety, and depression than non-ADHD controls. Additionally, children with ADHD underperformed their same age peers on tests of working memory and academic achievement. There were no group differences between children with ADHD and controls on IQ or child reported levels of anxiety.

Both parent and child reported AOD were negatively correlated with parent/teacher reported anxiety, opposition, depression, and school problems; both were positively correlated with social skills. pAOD was negatively correlated with aggression and hyperactivity, and positively correlated with working memory and WIAT achievement. Neither parent nor child reported AOD were related to child-reported anxiety, estimated full scale IQ.

Both parent and child reported AOF were negatively correlated with parent reported anxiety. Child reported AOF alone was negative correlated with child reported anxiety and depression. Parent reported AOF alone was negatively correlated with opposition, aggression, both hyperactive and inattentive ADHD symptoms, and school problems. Parent Reported AOF was also positively correlated with social skills. Neither parent nor child reported AOF was related to working memory, full scale IQ, or academic performance in reading, spelling, and numerical operations.

Action Control Orientation was impacting outcomes in children over and above the presence of ADHD in terms of anxiety, depression, and aggression symptoms, as well as social skills. There were two moderating effects of ACO on the relationship of ADHD to outcomes were found in terms of parent reported AOF and child reported depression., and child-reported

AOF and parent reported opposition symptoms. These results suggest that action control orientation is an important factor in determining levels of depression and aggression symptoms in children particularly because it appears that as children become more action oriented, the differences between ADHD and Control groups diminish.

### *Implications*

These research findings contribute to the current body of work surrounding Attention Deficit/Hyperactivity Disorder and help to further explain how the presence of the disorder interacts with and relates to childhood traits and outcomes. Additionally, most research in the past regarding Action Control Orientation has been completed with non-clinical adult populations; this study adds to the previous literature through its focus on Action Control Orientation in children with ADHD.

Furthermore, acknowledging that level of goal-directed persistence and volition makes a difference in the experiences of all children is important for future researchers to consider when examining similar outcomes as this study, including poor academic performance, social skill deficits, problems with working memory, or symptom expression of childhood disorders. The clinical relevance of this research is that it suggests incorporating some level of action control skills training into cognitive-behavioral therapies for children with Attention Deficit/Hyperactivity Disorder could potentially empower them and help them to achieve better outcomes in school and with peers. Overall, these results suggest that skills in goal directed persistence may be beneficial to teach for children who are suffering in terms of academics, and social skills, regardless of whether or not they have a diagnosable disorder.

### *Comparison to Past Research*

These findings were generally consistent with past research on the topic, however, with a few exceptions. Significant group differences were found as expected between children with and without ADHD. Children with the disorder experienced significantly more comorbid symptom expression, academic problems, and social skills deficits, as similarly discussed in the findings of several studies over the last two decades (Cohen et al. 1993; Wilens, et.al. 2002; Biederman et al. 2004; Antshel et al. 2008). Additionally, the current research supports past findings of at least three studies completed by Mariani & Barkley (1997), Wilcutt et al., (2005), and Martinussen et al. (2005), which support the idea that children with ADHD experience less goal directed persistence than their unaffected peers. Contrary to past research (particularly studies conducted by Faraone et al. 1993, Fischer et al., 1990, and Seidman et al., 2005) the current study did not find any group differences in Full Scale IQ or WISC performance in children.

In terms of Action Control Orientation, not much research had previously been done to explore this trait of volition in children. The current findings are, however, consistent with past research completed in older population samples. Consistent with the experience of adults in a study completed by Jostman & Koole (2006), children in this sample whose parents reported higher levels of action orientation in decision making and failure response experienced executive functioning deficits in working memory and inhibition. In addition to what has been discovered about adult populations in the past, this study found that action control orientation does impact the outcomes of children both with and without a diagnosis of ADHD. Child reported AOD was negatively correlated with parent reported anxiety, opposition, inattention, school problems and child reported depression, while being positively correlated with social skills. Parent reported AOD was negatively correlated with parent reported anxiety, opposition, aggression,



hyperactivity, inattention, school problems, and child reported depression, while it was positively correlated with social skills, working memory capabilities, and academic performance in reading, spelling, and mathematics. Child reported AOF was negatively correlated with parent reported anxiety, and child reported anxiety and depression. Parent Reported AOF was negatively correlated with parent reported anxiety, opposition, aggression, hyperactivity, inattention, and school problems, and child reported depression, while being positively correlated with social skills.

### *Limitations and Considerations*

First, the fact that this study failed to find some significant group differences that other studies have found, particularly in IQ, is explained by the recruitment procedures utilized for this study. Non-ADHD children who had above average IQ were screened out of the study as a way to prevent IQ from becoming a confounding variable for neuropsychological measures. This method of assuring that both groups of ADHD and Control have the same range of IQs allows us to draw conclusions that the group differences between ADHD and non-ADHD children in outcomes are in fact related to presence or absence of the disorder, rather than intellectual abilities of the children themselves. Although this is a strength of procedure in terms of determining outcomes in comorbid, academic, and social outcomes, it could potentially be a limitation in that it does not allow for a full exploration into the relationship of IQ to ADHD.

Second, the difference in correlation strength between parent and child report on the Decision Making and Failure Response subscales indicates that parents are not always able to predict their child's experiences with accuracy. Theoretically, the failure related subscale of the ACS-90 is related to more internalized experiences in children, while issues related to the decision making subscale are likely more visible. For this reason, parents may not be as accurate

in predicting their child's internalized response to failure unless the child is vocalizing or outwardly displaying his or her experiences in this regard. This information could be considered a limitation for clinical research in general, as relying on parental report exclusively for internalized thoughts, feelings, and symptoms in children aged 8-12 may not be an effective method for fully understanding childhood experiences. Additionally, acknowledging this discrepancy could be helpful for future researchers who may be interested in utilizing both parent and child report measures, or deciding on measures for a particular study.

Third, the discovery in the current study that Action Control Orientation subscales were not closely correlated with each other combined with the fact that each scale was closely aligned to different types of child reported anxiety has the potential to provide support for the Decision Making and Failure Response subscales measuring separate constructs. However, this also raises questions about whether or not Action Control Orientation is measuring goal-directed persistence as opposed to simply measuring types of anxiety. Although anxiety may play a role in determining one's level of goal-directed persistence, Action Control Orientation as a measure offers more insight into the behaviors that people make more so than the feelings that motivate them to make these decisions.

Fourth, the fact that this sample was drawn from central Pennsylvania indicates a potential limit to the generalizability of results to the larger population. This sample ultimately lacked racial and ethnic diversity, with 85% of participants identifying as Caucasian. Additionally, socio economic status amongst participants was slightly above average; this population sample had a median income of \$61,000-\$70,000 while the median income level for the United States was \$51,914 from 2006-2010. (U.S. Census Bureau, 2012). In general, although this study still provides insight into the experiences of children who have ADHD, it is

still important to note that other influencing factors such as race and socioeconomic status were not as strongly accounted for in the research population utilized here.

#### *Directions for Future Research*

This research study lays potential ground work for further exploration into the idea of goal-directed persistence as an important factor in the outcomes of children both with and without attention deficit/hyperactivity disorder. More research would be needed to replicate these findings before changes are made in school curriculum or therapies, but this current study could certainly contribute to future explorations. If other findings suggest that goal-directed tendencies in children increase their abilities in academic and social settings and potentially decrease their mental health symptoms, efficacy research into whether or not implementation of action control skills training would yield efficacious and practice results in childhood outcomes would additionally need to be conducted.

#### *Conclusion*

In conclusion, this study expands on current literature in place on Attention Deficit/Hyperactivity Disorder in children and also on Action Control Orientation as a measure of goal-directed persistence. These results provide more information on the experiences of children both with and without attention problems in terms of goal-directed persistence and potentially lays the groundwork for future studies into the importance of this trait in therapy processes and improving childhood outcomes in school and at home.

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## Appendix

*Table 1. One-way Analysis of Variance on ADHD and Control Groups*

Measure	ADHD (n = 102)		Control (n = 107)		F
	M	SD	M	SD	
BASC Composite Anxiety	53.51	9.46	48.00	7.40	F (1,207) = 22.072, p < .001, $\eta^2$ = .096
CRS Composite Opposition	58.85	10.02	46.11	2.85	F (1, 207) = 159.453, p < .001, $\eta^2$ = .435
BASC Composite Aggression	56.52	9.21	44.56	3.36	F (1, 207) = 158.088, p < .001, $\eta^2$ = .433
MASC Total Anxiety	51.12	11.39	50.53	9.40	F (1, 138) = 0.114, p = .736, $\eta^2$ = .001
CDI Total Depression	48.66	8.40	42.32	5.73	F(1, 137) = 27.724, p < .001, $\eta^2$ = .168
SSRS Composite Social Skills	88.56	12.25	110.90	12.08	F (1, 98) = 83.265, p < .001, $\eta^2$ = .459
WISC Working Memory Index	98.74	12.45	105.97	11.80	F (1, 207) = 18.648, p < .001, $\eta^2$ = .083
WISC Estimated Full Scale IQ	104.75	12.54	106.96	11.10	F (1, 207) = 1.820, p < .001, $\eta^2$ = .009
BASC Composite School Problems	59.84	7.99	42.84	4.21	F (1, 203) = 371.677, p < .001, $\eta^2$ = .647
WIAT Word Reading	100.41	13.413	108.72	10.01	F (1, 205) = 25.737, p < .001, $\eta^2$ = .112
WIAT Spelling	98.80	13.47	111.8	14.12	F (1, 197) = 43.918, p < .001, $\eta^2$ = .182
WIAT Numerical Operations	98.98	14.436	109.15	15.10	F (1, 204) = 24.331, p < .001, $\eta^2$ = .107
ACS-90 CR AOD	5.611	1.63	6.49	1.74	F (1, 125) = 8.406, p < .01, $\eta^2$ = .004
ACS-90 CR AOF	6.78	2.93	7.03	2.78	F (1, 127) = 0.228, p = .634, $\eta^2$ = .634
ACS-90 PR AOD	3.90	1.38	7.72	1.88	F (1, 203) = 101.124, p < .001, $\eta^2$ = .000
ACS-90 PR AOF	6.64	3.21	7.72	3.23	F (1, 191) = 5.459, p < .05, $\eta^2$ = .021

**Note:** BASC = Behavioral Assessment Scale for Children, CRS = Conner's Rating Scale, MASC = Multidimensional Anxiety Scale for Children, CDI = Children's Depression Inventory, SSRS = Social Skills Rating Scale, WISC = Wechsler Intelligence Scale for Children, WIAT = Wechsler Individual Achievement Test.

*Table 2. One-way Analysis of Variance on ADHD and Control Groups (MASC Subscales)*

MASC Subscale	ADHD (n = 102)		Control (n = 107)		F
	M	SD	M	SD	
Anxious/Coping	47.33	12.83	53.78	10.23	F (1, 146) = 11.572, p < .001, $\eta^2 = .073$
Harm Avoidance	45.33	12.10	53.07	9.13	F (1, 143) = 16.776, p < .001, $\eta^2 = .105$
Perfectionism	44.71	10.79	50.71	0.93	F (1, 143) = 14.266, p < .001, $\eta^2 = .091$
Humiliation/Rejection	51.24	10.02	49.51	9.92	F (1, 144) = 1.084, p = .299, $\eta^2 = .007$
Performing in Public	50.77	9.88	49.17	8.28	F (1, 146) = 1.153, p = .285, $\eta^2 = .008$
Social Anxiety	51.24	9.26	49.31	9.48	F (1, 144) = 1.535, p = .217, $\eta^2 = .011$
Separation/Panic	54.46	12.28	53.98	10.86	F (1, 145) = .061, p = .805, $\eta^2 = .000$
Tense/Restless	52.77	9.89	48.74	8.27	F (1, 146) = 7.280, p < .01, $\eta^2 = .047$
Somatic/Automatic	49.53	11.07	46.04	8.92	F (1, 143) = 4.425, p < .037, $\eta^2 = .030$

**Note:** MASC = Multidimensional Anxiety Scale for Children.

*Table 3. Pearson Correlation of Action Control Scale (90) Subscales*

ACS-90 Subscale	1	2	3	4
1. CR Decision Making	---	.233***	.180*	.189*
2. PR Decision Making		---	.025	.236**
3. CR Failure Response			---	.146
4. PR Failure Response				---

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

**Note:** CR = Child Report, PR = Parent Report.

*Table 4. Pearson Correlation of Action Control Orientation Subscales and Outcomes*

Measure	ACO Decision Making		ACO Failure Response	
	Child Report AOD	Parent Report AOD	Child Report AOF	Parent Report AOF
BASC Composite Anxiety	-.214*	-.238***	-.221*	-.356***
CRS Composite Opposition	-.241**	-.451***	-.068	-.216**
BASC Composite Aggression	-.151	-.469***	-.099	-.196**
BASC/CRS Hyperactivity	-.150	-.496***	-.081	-.234**
CRS Inattention	-.243*	-.517***	-.097	-.188**
CRS ADHD Total	-.208*	-.509***	-.076	-.214**
CDI Total Depression	-.331***	-.348***	-.267**	-.102
SSRS Composite Social Skills	.458**	.568***	.243	.233*
WISC Working Memory Index	.005	.139*	-.137	.050
WISC Estimated Full Scale IQ	.057	.007	.139	.021
BASC Composite School Problems	-.200*	-.509***	-.063	-.169*
WIAT Word Reading	.051	.174*	-.028	.071
WIAT Spelling	.095	.303***	-.055	.052
WIAT Numerical Operations	-.039	-.257***	-.075	.064

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

**Note:** ACO = Action Control Orientation, AOD = Action Orientation Decision Subscale, AOF = Action Orientation Failure Subscale, BASC = Behavioral Assessment Scale for Children, CRS = Conner's Rating Scale, CDI = Children's Depression Inventory, SSRS = Social Skills Rating Scale, WISC = Wechsler Intelligence Scale for Children, WIAT = Wechsler Individual Achievement Test.

*Table 5. Pearson Correlation of Action Control Orientation and MASC Subscales*

MASC Subscales	ACO Decision Making		ACO Failure Response	
	Child Report AOD	Parent Report AOD	Child Report AOF	Parent Report AOF
MASC Total Anxiety	.033	-.083	-.381***	-.087
Anxious/Coping	.318***	.208*	-.080	.025
Harm Avoidance	.256**	.240**	-.108	.017
Perfectionism	.101	.235**	-.100	.035
Humiliation/Rejection	-.152	-.129	-.299***	.037
Performing in Public	-.072	-.106	-.351***	-.138
Social Anxiety	-.143	-.146	-.368***	-.050
Separation/Panic	.015	-.090	-.343***	-.166
Tense/Restless	.038	-.195*	-.186*	-.034
Somatic/Automatic	-.045	-.167*	-.233*	-.025

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

**Note:** CR = Child Report, PR = Parent Report, AOD = Action Control Orientation Decision Related Subscale, AOF = Action Control Orientation Failure Related Subscale, MASC = Multidimensional Anxiety Scale for Children.

Table 6. Regression Analysis - Child Reported Decision Related Action Control (cAOD), ADHD, and Outcomes

	Anxiety	ODD	CD	MASC	CDI	Social Skills	WMI	IQ	School Problems	Reading	Spelling	Math
Predictor	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$
Step 1												
ADHD	.086**	.441***	.464***	.005	.163***	.148*	.118***	.017	.688***	.246***	.282***	.174***
Step 2												
cAOD	.021	.006	.000	.000	.047**	.109*	.007	.001	.000	.006	.002	.022
Step 3												
Interaction	.004	.010	.002	.002	.014	.047	.001	.026	.000	.002	.001	.011

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

**Note:** cAOD = Child Reported Action Orientation Decision Subscale, ODD = Oppositional Defiant Disorder Behaviors, CD = Conduct Disorder Behaviors, MASC = Multidimensional Anxiety Scale for Children, WMI = Working Memory Index.

Table 7. Regression Analysis - Child Reported Failure Related Action Control (cAOF), ADHD, and Outcomes

	Anxiety	ODD	CD	MASC	CDI	Social Skills	WMI	IQ	School Problems	Reading	Spelling	Math
Predictor	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$
Step 1												
ADHD	.095***	.446***	.455***	.004	.171***	.148*	.114***	.017	.686***	.255***	.288***	.177***
Step 2												
cAOF	.043*	.002	.005	.145***	.065**	.080	.023	.018	.000	.002	.006	.009
Step 3												
Interaction	.001	.013	.021*	.000	.001	.009	.011	.020	.000	.003	.000	.000

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

**Note:** cAOF = Child Reported Action Orientation Failure Subscale, ODD = Oppositional Defiant Disorder Behaviors, CD = Conduct Disorder Behaviors, MASC = Multidimensional Anxiety Scale for Children, WMI = Working Memory Index.

Table 8. Regression Analysis - Parent Reported Decision Related Action Control (pAOD), ADHD, and Outcomes

	Anxiety	ODD	CD	MASC	CDI	Social Skills	WMI	IQ	School Problems	Reading	Spelling	Math
Predictor	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$
Step 1												
ADHD	.095***	.435***	.438***	.000	.175***	.459***	.081***	.011	.645**	.111***	.188***	.116***
Step 2												
pAOD	.005	.104	.011*	.010	.013	.039**	.001	.004	.001	.000	.003	.004
Step 3												
Interaction	.000	.248	.001	.011	.008	.006	.002	.021	.004	.005	.002	.006

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

**Note:** pAOD = Parent Reported Action Orientation Decision Subscale, ODD = Oppositional Defiant Disorder Behaviors, CD = Conduct Disorder Behaviors, MASC = Multidimensional Anxiety Scale for Children, WMI = Working Memory Index.



*Table 9. Regression Analysis - Parent Reported Failure Related Action Control (pAOF), ADHD, and Outcomes*

	Anxiety	ODD	CD	MASC	CDI	Social Skills	WMI	IQ	School Problems	Reading	Spelling	Math
Predictor	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$	$\Delta r^2$
Step 1												
ADHD	.104***	.435***	.431***	.000	.163***	.471***	.080***	.011	.630**	.113***	.181***	.117***
Step 2												
pAOF	.094***	.012	.008	.007	.003	.023*	.000	.000	.002	.000	.000	.000
Step 3												
Interaction	.003	.017	.015	.001	.031*	.016	.002	.016	.001	.000	.001	.001

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

**Note:** pAOF = Parent Reported Action Orientation Failure Subscale, ODD = Oppositional Defiant Disorder Behaviors, CD = Conduct Disorder Behaviors, MASC = Multidimensional Anxiety Scale for Children, WMI = Working Memory Index.

Figure 1. Moderating Relationship: Child Reported Action Control Orientation to Failure on the Relationship of ADHD to Aggressive Symptom Expression.

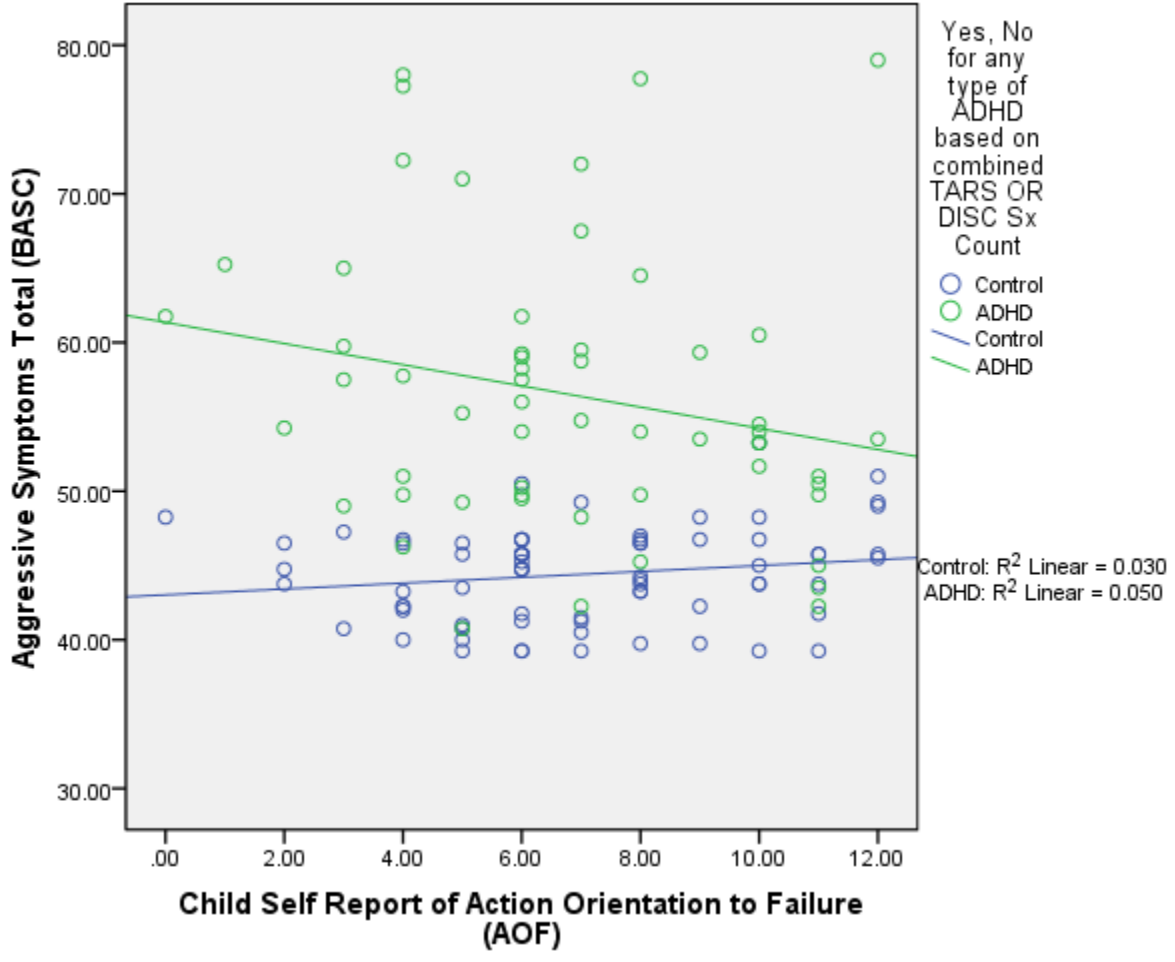
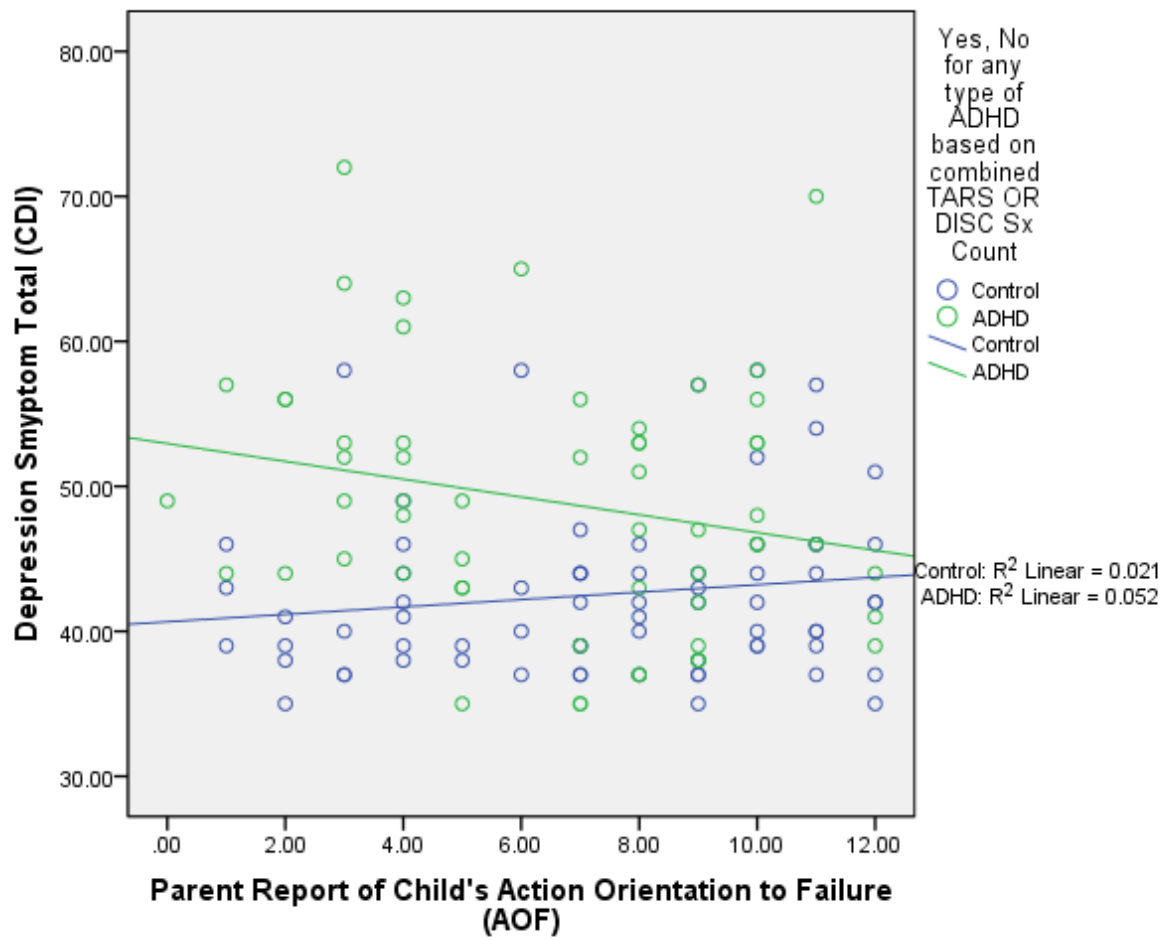


Figure 2. Moderating Relationship: Parent Report of Child's Action Orientation to Failure on the Relationship of ADHD to Depressive Symptom Expression.



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**Research Assistant**, Behavioral Health in Urban Schools Project, The Children's Hospital of Philadelphia  
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Summer 2011

**Research Assistant**, The Psychopathology Research Unit, The University of Pennsylvania  
Supervisor: Dr. Amy Cunningham, & Dr. Aaron T. Beck

**Honors and Awards:**

Student Marshal, Psychology Department Commencement (*May 2012*)  
Phi Beta Kappa (*March 2012*)  
Charles N. Cofer Memorial Award in Psychology (*February 2012*)  
The Costello Family Scholarship in Psychology (*January 2012*)  
Psi Chi, The International Honor Society of Psychology (*April 2010*)  
Penn State Liberal Arts College Paterno Fellow (*April 2010*)  
*Dean's List (Fall 2008 - Fall 2011)*

**Presentations**

Association for Psychological Science Annual Conference, Honors Thesis Poster Presentation (*May 2012*)

Penn State University Undergraduate Exhibition, Honors Thesis Poster Presentation (*April 2012*)

Psi Chi Research Conference, Honors Thesis Poster Presentation (*April 2012*)

Alumni Society Board of Directors Meeting, Honor Thesis Presentation (*March 2012*)

**Activities**

President of Psi Chi, The International Honor Society of Psychology (*May 2011-May 2012*)

THON Chair of Psi Chi (*Fall 2010 - Spring 2011*)

THON OPPerations Committee Member (*Fall 2009 - Spring 2010*)

Penn State Indoor Drumline Ensemble Member (*Spring 2009*)