THE EFFECTS OF STEREOTYPE THREAT ON STUDENTS WITH ADD/ADHD

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ABSTRACT

Previous research on Stereotype Threat has shown that the activation of a self-relevant stereotype leads people to portray stereotype consistent behavior, thereby perpetuating the stereotype. Additionally, Stereotype Threat has been shown to impair working memory, motivation, and self esteem. Most prior research on stereotype threat has focused on accounting for academic underperformance among various ethnicities and among genders. However, no prior research has examined the label of having an Attention Deficit Disorder/Attention Deficit Hyperactive Disorder (ADD/ADHD) as a possible negative stigma that may exhibit similar effects.

The present study focuses on the social psychological aspect of ADD/ADHD by examining whether or not students with ADD/ADHD experience stereotype threat in the academic domain. In addition, since research has shown that stereotype threat specifically reduces working memory and attention control, it would be particularly interesting if some amount of the cognitive impairments experienced with ADHD are in fact due to social stigmatization. In our study, we primed students with ADD/ADHD with different thoughts about the malleability of their disorder by framing ADD/ADHD as a “neurologically fixed defect” and a “developmental delay.” Our results showed that students with ADD/ADHD did not experience stereotype threat effects when primed with different thoughts about the malleability of their disorder. These results suggest that primed thoughts on the malleability of ADD/ADHD are not effective inducers of stereotype threat effects, and thus further investigation on different stereotypes about this group and stereotype threat effects would be useful.
The Effects of Stereotype Threat on Students with ADD/ADHD

The world consists of endless differences among individuals: different cultures, different races, different ages, and different abilities. The complexities manifested in the diverse array of individuals can be overwhelming and often difficult to cognitively track. Because of society’s overwhelming differences, individuals utilize generalized categories, assumptions, and expectations (also known as stereotypes) as a way to create and maintain a sense of order among the broad range of people. Ultimately stereotypes of race, gender, and culture help promote and maintain social order by grouping unique individuals and their complexities into simplified groups and general assumptions. Whether these stereotypes are considered complementary or derogatory to individuals, they remain fundamental to social mindsets and interactions.

Stereotypes affect human beings on group and individual levels and for both perceivers and targets. Not only do stereotypes shape group mindsets and intergroup interactions, but they also shape stereotyped individuals’ attitudes, cognition, behavior, and performance. Individuals targeted by stereotypes are usually aware of the labels that pertain to them (Steele & Aronson, 1995). This awareness can stimulate concerns of being judged by others in terms of the stereotype, and can thus disrupt the lives of stereotyped individuals through the phenomenon known as stereotype threat (Steele & Aronson, 1995).

Steele and colleagues argue stereotype threat is “being at risk of confirming, as self-characteristic, a negative stereotype about one’s group” (Steele and Aronson, 1995). It occurs when the “activation of a self-relevant stereotype leads people to portray stereotype consistent behavior, thereby perpetuating the stereotype” (Steele, 1997). Under stereotype threat, capable stigmatized individuals perform significantly worse on specific tasks in situations when self-relevant stereotypes about their identity are made salient. However, stereotype threat can be
eliminated when self-relevant stereotypes are not made salient to group members. The phenomenon was first noted when Steele and Aronson (1995) discovered that African Americans performed significantly worse than whites when a set of verbal problems was framed as a measure of intelligence, but performed equivalent to whites by framing the task as unrelated to intelligence.

Since then, subsequent stereotype threat patterns in numerous studies indicate that stereotype threat can cause psychological interference that hinders performance of a variety of groups including students from disadvantaged economic backgrounds in the academic domain (Croizet & Claire, 1998), Latinos in school (Gonzales, Blanton, & Williams, 2002; Schmader & Johns, 2003), Whites in athletics (Stone, Lynch, Sjomerling, & Darley, 1999), women in negotiation (Kray, Galinsky, & Thompson, 2002), and even White men as compared to Asians in math (Aronson, Lustina, Good, Keogh, Steele, & Brown, 1999). Such patterns have led to the conclusion that stereotype threat partially explains social inequality among various groups, particularly in education outcomes (Schmader, Johns, & Barquissau, 2004).

This past research has shown that negative stereotypes negatively affect a wide range of targeted groups in academic and social settings. The study presented here will explore another group likely to be stigmatized in the academic domain, but who have not previously been examined in the stereotype threat literature. Specifically, we examine whether students with ADD/ADHD also experience similar negative psychological interference when stereotypes about this diagnosis are made salient. Specifically, the current study will investigate whether stereotype threat affects working memory, academic motivation, and academic self-esteem of students with ADD/ADHD. It will further explore whether such effects can be moderated by how ADD/ADHD is described.
We predict that students diagnosed with ADD/ADHD will perform differently based on whether they perceive their attention disorder as fixed or malleable. Specifically, individuals cued to perceive their ADD/ADHD to be a fixed disorder, and thus unchangeable, may exhibit lower performance levels, motivation, and self-esteem than those cued to perceive their disorder to be a developmental delay, thus malleable. In this sense, reminders of the different social perceptions about the nature of ADD/ADHD can prime different ideas about the disorder, and ultimately elicit stereotype threat effects on performance levels within the ADD/ADHD student population. The basis for this hypothesis will be described below.

**ADD and Stereotype Threat**

Although ADD/ADHD may be a stigmatizing label in itself (Barkley et al, 1990), no prior research has examined the label of having ADD/ADHD as a negative stigma that might lead to performance impairments for students with this diagnosis. Rather, prior research on stereotype threat has mostly accounted for academic underperformance among women in math specifically (Spencer, Steele, & Quinn, 1999), or among African Americans (Steele & Aronson, 1995) and Latinos (Gonzales, Blanton, & Williams, 2002) in the academic domain more generally. Previous studies confirm that stereotype threat processes are subsequently manifested in various stereotyped groups. However, academic stereotypes are not confined to gender, race, and social class. They are also applied to students with unusual learning styles and attention difficulties, such as Attention Deficit Disorder/Attention Deficit and Hyperactive Disorder (ADD/ADHD). Because students with ADD/ADHD are often categorized with an academic disorder, they experience a degree of stigmatization.

ADD/ADHD may be interpreted as a stigma due to the negative assumptions that are generally associated with the disorder. Stereotypes that students with ADD/ADHD “are lazy,”
“are problematic in school,” “are likely to have difficulty succeeding on their own,” and “have neurologically fixed disorders,” may, in fact, implicitly provoke stereotype threat effects, and further hinder academic performance levels of students with ADD/ADHD. We theorize that, in addition to the genetic and neurological component of these disorders, perhaps there are social components (particularly, the student’s internalization of the socially negative stigmatizations/expectations associated with ADD/ADHD) that affect a student’s motivation, cognitive performance, and academic self esteem. Specifically, the current study strives to answer the following: Does the stigmatization of ADD/ADHD elicit stereotype threat? If so, can reframing ADD/ADHD alleviate the inhibiting threat effects?

Investigating ADD/ADHD under stereotype threat is interesting for a few reasons. First, it elaborates on the understanding of the nature of ADD/ADHD. Research on the disorder has identified patterns of low self-esteem and low motivation among students with ADD/ADHD (Valas 2001). Other studies have also shown patterns of poor academic performance trends among students with ADD/ADHD compared to those without (Pintrich et al., 1994). In addition to these correlational studies, current medical research continues to investigate the possible neurological, genetic, and biological explanations for ADD/ADHD (Resnick, 2000). However, research investigating the possible social psychological contributions to the phenomenon can use further exploration. The current study strives to further explore the social psychological aspect of ADD/ADHD by examining whether or not students with ADD/ADHD experience stereotype threat in the academic domain.

Another interesting aspect of the current study is that it investigates working memory capacity as a common theme in both stereotype threat research and the nature of ADD/ADHD. Stereotype threat research reveals that reminders of stereotypes affect the working memory
capacity of stereotyped group member (Schmader & Johns, 2003). Schmader, Johns, and Forbes (2008) argue that reminding an individual of the negative stereotypes about his/her group leads the individual to fear the possibility of verifying the stereotype about one’s group membership with one’s behavior. As a result, the individual implicitly or explicitly self-monitors his or her behavior in order to not confirm the stereotype and experiences increased stress arousal (e.g. Blascovich et al., 2001, Marx & Stapel (2006) that can together or separately reduce cognitive capacity (Schmader & Johns, 2003).

For instance, Osborn (2007) found that stereotype threat manipulations lead to significant physiological reactance in skin conductance, skin temperature, and blood pressure. Furthermore, cognitive psychologist have identified that physiological stress arousal inhibits working memory (Bohen et al. 1990, & Elzinga & Roelofs, 2005). Disruptions of working memory can further interfere with academic performance and may explain why negatively stereotyped groups exhibit lower academic performance patterns. Specifically, Schmader and Johns (2003) examined the effects of stereotype threat on working memory among women stereotyped in the domain of math and among Latinos stereotyped in the domain of intelligence testing. These studies revealed reduced working memory when women and minorities believed that their abilities in these stereotyped domains were being assessed. Moreover, they showed that these reductions in working memory mediated threat effects on test performance.

Given these findings, examining stereotype threat among those with ADD/ADHD is particularly interesting because ADD/ADHD is a disorder defined in terms of attention problems, which also affects working memory. The DSM identifies individuals with ADD/ADHD as often have a hard time concentrating and keeping track of information. Because stereotype threat hinders working memory and students with ADD/ADHD tend to have lower
levels of working memory, perhaps stereotype threat effects may partially account for lower
levels of working memory among students with ADD/ADHD. Therefore, examining stereotype
threat effects within the ADD/ADHD population gives insight to whether or not attention deficits
are partially explained by social factors.

A final interesting component of the current study involves focusing on the hidden nature
of the ADD/ADHD stigma. Unlike the visibility of race and gender, the presence of
ADD/ADHD is less visible. Nonetheless, the hidden nature of the ADD/ADHD stigma may still
be susceptible to stereotype threat. Although most previous stereotype threat research has
primarily focused on stereotype threat effects in populations with visible stigmas, Quinn et al.
(2004) suggested that the stereotype threat can be experienced by those with hidden stigmas as
well. Specifically, Quinn et al. (2004) found that individuals with a history of mental illness who
were asked to reveal their mental illness during an experimental session performed significantly
worse on a standardized test than individuals with mental illness who did not reveal their mental
illness. The findings indicated that when a situation primes negative stereotypes associated with
hidden characteristics, such as mental illness, then stereotype threat effects can occur (Quinn et
al, 2004).

Similar to individuals with a mental illness, individuals diagnosed with ADD/ADHD
could be stigmatized with a visibly discrete label that may also elicit similar effects. Specifically,
we expect to find that students with ADD/ADHD experience threat effects in an intellectual
testing context when reminded of their disorder. However, we also expect to find that stereotype
threat effects will fluctuate depending on how students view what ADD/ADHD is. Specifically,
if students view their ADD/ADHD as a negative stigma that cannot change, we expect to find
patterns of performance decrements that are partially explained by the various negative consequences of stereotype threat.

**Incremental Views of Ability as a Moderator of Performance Decrements due to Threat**

Research has discovered that performance decrements experienced in situations of stereotype threat can, in fact, be moderated, or lessened, by certain factors. One such factor is the person’s lay theory of ability in that domain. Assumptions about the nature of intelligence influence how students respond to academic settings (Dweck, 1999). Those who endorse an entity view of intelligence believe that intelligence is fixed and cannot grow with effort. However, those who endorse an incremental view of intelligence believe that success in intellectual tasks is malleable and can be cultivated through learning and effort. Therefore, individuals who view their intelligence as malleable are more likely to embrace challenging tasks, exhibit more motivation, and have higher performance levels in the face of threat than those who view intelligence as fixed (Dweck, 1999).

Accordingly, incremental views on ability may also extend to how people think about a stigmatizing diagnosis like ADD/ADHD. Those who view their disorder as a fixed biological entity may not feel that they can grow with effort, and thus they may refrain from improving their motivation and performance particularly when their diagnosis is made salient. On the other hand, those who view their disorder as malleable, or as something they might grow out of, may be more prone to engaging in challenging tasks and exhibiting higher performance.

Past research has shown that focusing on the malleability as opposed to the fixed aspect of stereotypical traits can actually reduce stereotype threat effects (Dar-Nimrod and Heine, 2006; Aronson, Fried, & Good, 2002). For instance, women primed to associate sex differences in math performance with genetic explanations performed worse than men, whereas women primed
to associate math-related gender differences with environmental explanations did not (Dar-Nimrod and Heine, 2006). Although Dar-Nimrod and Heine (2006) did not explore whether genetic sex differences in math existed, they did examine whether women’s perceptions of sex differences as a genetic trait compared to an environmental effect influenced their math performance. Their findings highlight how our scientific theories about ability can “inadvertently exacerbate the gender gap in science through stereotype threat” (Dar-Nimrod and Heine, 2006). The present study will explore whether these same effects might occur for students with ADD/ADHD.

Students with ADD/ADHD may feel stigmatized by their disorder, and experience stereotype threat effects as a result. Furthermore, given stereotype threat theory, priming individuals diagnosed with ADD/ADHD of their stigmatized identity as having a “neurologically fixed disorder” (ADD/ADHD) may notably impede their motivation, cognitive performance, and academic self-esteem. However, these students may show less stereotype threat effects if they perceive their disorder to be malleable. Thus, we expect that manipulating students’ incremental views of ADD/ADHD in terms of viewing their ADD/ADHD as malleable or fixed will affect their performance relative to non-ADD/ADHD controls.

Manipulating incremental view of ADD/ADHD is appropriate because the malleability of ADD/ADHD remains a debated phenomenon. Some findings claim that ADD/ADHD is a neurological problem that lasts throughout adulthood (Resnick 2000). Other findings claim that ADD/ADHD is only a developmental delay that many children eventually outgrow (Zamethin & Ernest 1999). Our research is not an attempt to resolve this debate about the underlying causes of ADD/ADHD. Instead this study is interested in whether describing ADD/ADHD as a biologically fixed disorder as compared to a developmental delay will exacerbate poor cognitive
performances, low motivation, and low self-esteem among a sample of students with ADD/ADHD. As previous stereotype research on incremental orientations suggested (Aronson, Fried, & Good, 2002; Dar-Nimrod and Heine, 2006; Dweck, 1999), we should expect individuals with ADD/ADHD who view their disorder as fixed to show reduced working memory and lower academic motivation than those who view their disorder as malleable. Information about ADD/ADHD should have no effect on students without this diagnosis.

In addition to examining effects on working memory and motivation, we also examine effects on academic self-esteem. Individuals faced with stereotype threat-induced performance decrements are more prone to attribute their academic shortcomings to their internal characteristics (Koch, Muller, and Sieverding, 2008). For instance, after Koch, Muller, and Sieverding (2008) instructed men and women to engage in an internet task within a stereotype threat environment, they found that women were more likely to associate their failure on the task with their internal attributes. Most women had little awareness of additional external factors that may also lower their performance. As a result, women had lower self-esteem in the domain, and stereotypes of women’s relevant abilities were reinforced, regardless of their actual ability.

Similarly, we predict that being primed with an entity view of ADD/ADHD will lead to lower self-esteem among students with this diagnosis compared to controls, whereas priming ADD/ADHD as a developmental delay will not induce this threat to self-esteem.

**HYPOTHESES**

We hypothesize that the framing of ADD/ADHD will significantly affect working memory and academic motivation of students with ADD/ADHD. Due to the presence of the disorder, which itself should lead to working memory impairments, we expect that students with
ADD/ADHD will perform somewhat worse than students without the disorder on a working memory measure, even when there are no prior reminders of ADD/ADHD. We additionally hypothesize that students in the biologically fixed condition will perform significantly worse than the control group of students in the same condition. In other words, reminders of the stigma of “having a biologically fixed disorder” should further reduce working memory performance and motivation among the ADD/ADHD students. However, we expect to find that students with ADD/ADHD in the developmental condition, where the disorder is framed as a developmental stage, will do significantly better than the students with ADD/ADHD in the other two conditions. In fact, we expect their performance might even be equivalent to the performance of students without learning disabilities. Ultimately, reframing ADD/ADHD from a biologically-fixed condition to a developmental delay (malleable condition) should further reduce stereotype threat, and thus augment working memory, motivation, and self esteem.

**METHOD**

**Participants and Design**

Participants consisted of 120 undergraduates at the University of Arizona (66 students who self identified as being diagnosed with ADD/ADHD and 54 students with no diagnosis). A couple months prior to participation, participants identified their ADD/ADHD status in a “Psychology Mass Survey,” which was distributed in the University of Arizona’s Introduction to Psychology course. In the current experiment, participants received Psychology course credit or were paid $10 for their time. Both ADD/ADHD and non-ADD/ADHD participants were randomly assigned to one of three conditions creating a six cell 2 (ADD/ADHD participants vs. control) x 3 (prime) between-subjects design. The final sample of 120 did not include eight
participants who were excluded from analyses because they failed the manipulation check reported not having ADD once they completed the experiment, or whose vowel counting performance on the working memory measure suggested that they did not understand the task.

**Procedure**

An experimenter ran three participants at a time were run in individual computer cubicles in a testing room. The study was originally presented to be an investigation of online science. Specifically, the study was framed as a measurement of whether information read online is processed differently than information read on hardcopy magazines or newspapers. The experimenter initially informed participants that they were randomly assigned to read a scientific article on the computer, and that other participants in other sessions would read the same article on paper. Participants were further told that they would have to complete a couple of distraction tasks (titled “Distraction tasks 1” and “Word Scramble Task”) that the department was piloting for another study after reading the article. To track what information about the article sticks with the participants after the delay period, the experimenter told participants to answer some questions about the article they read.

Once the experimenter explained the cover story for the study, participants were left alone in their cubicle to read their assigned article, follow the instructions on the computer, and complete their various tasks. Participants were randomly assigned to read one of three articles, which were secretly fabricated to mimic New York Times articles (Appendix A-1). The articles were used to stimulate participants’ ideas about the nature of ADD/ADHD. In the first condition, students read the following article: “Studies Claim Human Activities are the Cause of Global Warming.” This control article, unrelated to ADD/ADHD, intended to give no reminders of the disorder to participants in the condition.
In the neurological condition, students read: “Studies Claim ADD/ADHD to be a fixed Neurological Defect.” The article in this neurologically-fixed condition was aimed to prime participants with the idea that the disorder is a permanent condition due to neurological and genetic explanations. Emphasizing the lifelong perspective of the disorder was intended to frame the disorder as an unchangeable condition beyond individual control. Participants with ADD/ADHD were expected to experience stereotype threat effects when reading this article because of their personal association with the disorder. Specifically, we assumed that participants with ADD/ADHD would be less likely to feel that their ADD/ADHD symptoms could eliminate in time.

The developmental condition primed participants with a less threatening idea about ADD/ADHD. Students in this condition were asked to read the following: “Studies claim ADD/ADHD to be a Developmental Delay.” The article emphasized the developmental aspect of the disorder by describing evidence that most people grow out of ADD/ADHD by their early twenties.

Aside from the various articles described above, the procedures for the first distraction task and the word scramble task were identical for all participants across conditions. On average, the completion of the distraction tasks took a total of 40 minutes. Once participants completed the two distraction tasks, the computer then asked a few questions about the articles they read (Appendix A-2). The questions focused on main findings and theories of the article, rather than specific details. Such questions not only completed the cover story, but they also suggested whether the students actually read the article, thus internalized their assigned condition.

Participants answered additional questions on the reliability of the article, whether they found the
article interesting, and the clarity of the article, which indicated whether the article had an effect (Appendix A-3).

The computer then told participants that there may be various additional influences on their interpretation of articles. Accordingly, participants answered questions regarding their thoughts on their abilities and performance (Appendix A-4) and whether they had a learning disability or attention challenge. Participants who identified as having ADD/ADHD were asked additional questions on their thoughts on the disorder (Appendix A-5). Participants who did not have ADD/ADHD bypassed these questions to the end portion of the experiment. Whether or not participants answered questions on ADD/ADHD, all participants answered questions on their age, race, and gender, which marked the end portion of the experiment. The computer then informed participants that the experiment was over, and the experimenter gave each participant a debriefing worksheet, which asked them to write down their final thoughts and questions on the actual experiment. The debriefing questionnaire aimed to elicit honest thoughts and questions regarding the experiment, while maintaining privacy for participants who identified as having ADD/ADHD. Once all participants turned in their worksheet, they were debriefed and thanked.

**Measures**

*Working Memory.* After reading their assigned article on the computer, participants were instructed to complete a working memory task (Schmader & Johns, 2003), which was initially described as the first distraction task. This computer task, aimed at measuring working memory, instructed participants to switch back and forth between counting the number of vowels in a sentence and mentally storing a series words for later recall. Specifically, a word was flashed to participants for two seconds. A non-related sentence followed the word, and participants were asked to read the sentence and record the total number of vowels presented in the sentence. We
gave participants a total of 12 sets of word/sentence combinations (Appendix A-6; Appendix A-7). Each set contained 4, 5, or 6 words, which summed up to a total of 60 words. At the end of each trial, participants were asked to write down as many words that they recalled from the previous trial. In order to check that participants were reading the sentences, we also asked participants to pick which of the two sentences was the one they just read (although we did not actually code these data). Working memory was recorded to be the total number of words correctly recalled across 72 trials grouped into 12 sets.

Motivation. The second task, framed as the second distraction task, was actually a measurement of motivation. Participants had to complete a computer interactive task containing word scrambles. They were presented with six sets of five random letters in a sequence of difficult to easy and were able to choose which word scramble they wanted to try (Appendix A-8). They also had the option to skip over word scrambles that they did not want to complete. For each word scramble they chose, they were asked to create as many words as they could by using the letters given. Participants were not allowed to repeat letters nor words. We granted points to participants by measuring the level of difficulty they choose, the amount of words they made correctly, and the amount of time they spends on the scramble. The total number of points indicates each participant’s motivation level.

Self Esteem. Self esteem was measured through a state-performance self-esteem questionnaire (Heatherton & Polivy, 1991). Participants were asked 8 questions about their personal thoughts on their abilities and performance. Specifically, participants answered questions indicating their confidence in their general abilities, performance, reading comprehension, smartness, comprehension of material, scholastic abilities, sense of achievement, and academic importance. Participants rated their responses on a 1 to 5 scale. 1 indicated
“strongly disagree,” 3 indicated “neutral,” and 5 indicated “strongly agree.” We measured self esteem scores by averaging their responses to these items. High scores indicated high levels of self esteem.

Results

Manipulation Checks

Article Content. As anticipated, we found that the articles successfully revealed different arguments about the nature of ADD/ADHD. A 2 (ADD status) x 2 (ADD condition) analysis of variance (ANOVA) on participants’ rating of what children with ADD/ADHD will experience as an adult revealed only the predicted main effect of the condition, $F(1,78) = 508.63, p < .001$. Participants in the developmental condition said that ADD was much more likely to change throughout adulthood ($M = 4.63$) than those in the neurologically fixed condition ($M = 1.31$).

Article Qualities. A 2 (ADD Status) x 3 (article condition) analysis of variance (MANOVA) was conducted on subject ratings on reliability, interest, and clarity of their assigned articles. We found a main effect of ADD on interest, $F (1, 114) = 6.34, p < .05$. Subjects with ADD found the ADD articles more interesting ($M = 3.71$) than those with no ADD ($M = 3.26$). We also found a main effect of Condition on interest, $F (2, 114) = 4.06, p < .05$. Subjects in the neurologically fixed condition ($M = 3.82$) and subjects in the developmental condition ($M = 3.51$) were more interested in the articles that those in the control condition ($M = 3.18$). However, we found no differences on reliability and clarity across conditions suggesting that we were successful in creating articles that were seen as equivalently reliable and clear.

Test of Primary Hypotheses

Working Memory. To analyze effects on working memory, we used a 2 (ADD status) x 3 (article condition) analysis of variance (ANOVA) on the total number of words correctly
remembered. Somewhat surprisingly, there was no main effect across ADD status, $F(1, 114) = 1.93, p > .10$. Subjects with ADD ($M = 45$) had similar working memory scores as those without ADD ($M = 47$). This suggested that there was no significant effect of ADD on working memory. We also found no main effect of condition and no interaction, $F’s < 1$.

**Motivation.** Motivation was analyzed using a 2 (ADD status) x 3 (condition) analysis of variance (ANOVA) on the total score of correct words derived from the scrambles (regardless of difficulty). There were no main effects or interaction involving status and condition, all $F’s < 1$. We also analyzed the number of times students chose to skip an anagram across ADD status and conditions. This 2 (ADD status) x 3 (condition) analysis of variance (ANOVA) also yielded no significant effects, all $F’s < 1$.

**Self-Esteem.** Self-esteem was also analyzed using a 2 (ADD status) x 3 (condition) analysis of variance (ANOVA). We found a trend of a main effect for ADD, $F(1, 114) = 2.48, p < .12$, which supported prior research. Subjects with ADD revealed somewhat lower self esteem ($M = 3.63$) than subjects with no ADD ($M = 3.85$). However, we found no significant effects or interaction on self esteem across conditions, all $F’s < 1$.

**Supplementary Correlational Analyses**

The above analyses revealed no support for our primary predictions. One reason for these null effects might have been that our sample of students who vary quite dramatically in the severity of their ADD/ADHD symptoms. Thus, we might expect that the severity of ADD symptoms could predict different psychological consequences within each of our experimental conditions. To investigate this possibility, we conducted within correlations examining ADD students whether ADD severity predicting outcomes among ADD students in the sample. The following table summarizes these results. Interestingly, the severity of ADD predicted somewhat
lower working memory and lower self-esteem in the control and neurological conditions, whereas these relationships were not present when we primed a more developmental view of ADD. In contrast, only among participants in the developmental condition, ADD severity predicted skipping few problems. (# $p < .10$) and (*$p < .05$).

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<th>Control</th>
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<td>-.15</td>
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**Discussion**

Investigating stereotype threat effects on performance decrements remains important to finding ways to eliminate the negative consequences that these social forces can induce. The goal of the present study was to examine whether the effects of stereotype threat extend to the stigmatizing label of ADD/ADHD. Contrary to our prediction, however, our results did not provide evidence that students with ADD/ADHD experience stereotype threat effects when primed with different thoughts on the malleability of their disorder. Specifically, framing the nature of ADD/ADHD as a “neurologically fix defect” or a “developmental delay” did not influence the cognitive performance, motivation, and psychological well-being of students diagnosed with ADD/ADHD. In fact, these primes did not have any effect on the performance and motivation of students with ADD/ADHD in general. Our findings ultimately led us to
conclude that priming different thoughts on the malleability of disorder are not effective inducers of stereotype threat effects in this sample of students. However, stereotype threat effects within this population may still exist if other stereotypes about ADD/ADHD are primed.

It was particularly interesting to find that students with ADD/ADHD had similar working memory and cognitive patterns as students without ADD/ADHD, regardless of article condition. Since the disorder refers to deficits in attention, we initially expected to find performance decrements in the working memory of students with ADD/ADHD compared to students with no ADD/ADHD. We also expected to find that students with ADD/ADHD who viewed their disorder as “a neurologically fixed defect” would have lower working memory than those who viewed their disorder as “a developmental delay”  However, our findings failed to support both expectations. Working memory was not affected by either prime between and across conditions. Additionally, students with ADD/ADHD who viewed their disorder as “a neurologically fixed defect” revealed similar working memory patterns as those who viewed their disorder as “a developmental delay. This suggests that manipulating thoughts on the malleability of the disorder did not determine performance.

Additionally, stereotype threat had no main effects on motivation, regardless of ADD/ADHD status and condition. Possible shortcomings in the motivation measure may partly explain this pattern. Since we designed the word scramble task on our own (with the assumption that motivated students would have higher working memory scores) and never tested its validity prior to use, its actual measure of motivation may or may not have been entirely accurate. Another possible barrier to the measure could refer to framing the measure as “a distraction task.” Subjects could have interpreted the task as unimportant, and therefore they may have not
had any motivation in the first place. Thus the task may not accurately reflect actual motivation levels in the academic domain.

However, when we used a validated measure of self-esteem (Heatherton & Polivy, 1991), we found a trend of differences in self esteem across ADD/ADHD status. Students with ADD/ADHD generally reported lower levels of academic self esteem than students without ADD/ADHD. This confirms the expectation that students with ADD/ADHD feel less confident about their academic abilities than students without. However, there were no deficits in the cognitive ability among students with ADD/ADHD. In essence, students with ADD/ADHD felt less confident about their academic performance even though they had similar cognitive performance levels as students without ADD/ADHD. This interesting pattern indicates that students with ADD/ADHD may have an inaccurate perception of their actual cognitive ability and that other social factors may explain these patterns. For example, stereotypes, such as expecting the ADD/ADHD population to perform worse than the non-ADD/ADHD population, may partially elicit lower self esteem. Clearly, additional research investigating the effects of other stereotypes about ADD/ADHD on self esteem would be useful to better understanding this pattern.

Additionally, students with ADD/ADHD had similar levels of self esteem to one another, regardless of condition. Such findings were unexpected because we thought framing ADD/ADHD as a “neurologically fixed defect” would be a greater threat to academic self esteem than framing it as a malleable “developmental delay.” However, both stereotypes may have equivalent levels of threat, which could be a possible explanation for our contradicting results. For instance, students who thought that “most people grow out of ADD/ADHD by early adulthood” (developmental condition) may in fact have felt threatened by the idea that they are
young adults who have still not grown out of their disorder. Therefore, they may have felt similar to students who viewed ADD/ADHD as “a neurologically fixed defect.” This could explain why students with ADD/ADHD reported a trend of lower levels of self esteem and did not display variations of self esteem between conditions. Nonetheless, both primes were not effective in eliciting stereotype threat patterns.

Despite these patterns, we should not entirely discount the possibility that stereotype threat effects on ADD/ADHD exist. In fact, the supplementary correlations we conducted suggest that effects might be more pronounced among those students who ADD/ADHD symptoms are most severe. Furthermore, we cannot conclude that students ADD/ADHD do not feel threatened at all by stereotypes regarding their disorder. Stereotypes of ADD extend beyond the two ADD/ADHD primes used in this study (“ADD/ADHD is a neurologically fixed defect” and “ADD/ADHD is a developmental delay”). For example, other stereotypes of ADD/ADHD include thoughts that “students with ADD/ADHD are lazy” and thoughts that “students with ADD/ADHD have more difficulty in school.” If students with ADD/ADHD find these stereotypes more threatening than stereotypes on the malleability of the disorder, then priming these stereotypes in an academic setting may in fact elicit stereotype threat effects.

Although this research indicated that different thoughts on the malleability of ADD/ADHD do not provoke stereotype threat effects, it remains important to continue investigating whether social factors, such as other stereotypes, may influence cognition, motivation, and self-perceptions of students with ADD/ADHD. Since ADD/ADHD research primarily focuses on the biological and genetic components, exploring other possible social components can provide a more complete understanding of the entire nature of the disorder. Therefore, further research should maintain the exploration of stereotype threat effects on
students with ADD/ADHD. To do so, further research should prime alternative thoughts of the disorder (excluding thoughts that “ADD/ADHD is a neurologically fixed defect” and “ADD/ADHD is a developmental delay”).

Overall, continuing this research may be useful for policy-makers, teachers, parents, and schools because it strives to uncover whether or not the framing of ADD/ADHD may factor into poor performance. By examining this relationship, we can gain a general understanding of whether the social framing of ADD/ADHD can either inhibit or promote success in the ADD/ADHD population, and therefore, develop strategies to augment success without medical intervention. Furthermore, continuous exploration on this topic would also enhance stereotype threat research by revealing possible additional groups affected by stereotype threat and by further investigating whether the visibility of stigmas affect the induction stereotype threat. Ultimately, additional research investigating different stereotypes on ADD/ADHD remains important because it may still encounter stereotype threat effects, and thus bring insight to alternative ways of working with children with ADD/ADHD outside of the traditional medical domain.
REFERENCES


Pintrich, P. R., Anderman, E. M., & Klobucar, C. (1994). Intraindividual Differences in


**APPENDIX A**

**A-1: Articles**

**Neurological Condition**

<table>
<thead>
<tr>
<th>Studies claim ADD and ADHD stem from a Fixed Neurological Defect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention Deficit Disorder/Attention Deficit Hyperactive Disorder, also known as ADD/ADHD, is by far the most common psychiatric diagnosis given to disruptive young children. Scientists have long debated whether it was due to a fixed brain deficit or to a delay in development. Recent scientific evidence suggests that the disorder is, in fact, due to neurological defects and genetic trends.</td>
</tr>
<tr>
<td>In a study published late last year and since expanded on by others, Dr. Alan J. Jones, a psychiatrist at the Clinical Brain Imaging Section at the National Institutes of Health in Bethesda, reported that attention-deficit patients had an abnormally low rate of activity in parts of the brain governing attentiveness and motor control. “The inactivity of these brain regions will undoubtedly hinder concentration and performance,” explained Dr. Jones. “Alternative learning strategies may help improve performance, but our lab studies have confirmed that the neurological defects in the brain are in fact a fixed phenomenon in both children and adults.”</td>
</tr>
<tr>
<td>Adults sometimes have the same neurological defects that are present in children with ADD/ADHD. In the first successful effort to quantify these impairments, Dr. Jones compared brain activity in 50 adults who had been diagnosed as hyperactive in childhood with that of 50 normal adults. Brain scans showed that in hyperactive adults, the brain's prefrontal lobe, which governs auditory attention, could not metabolize glucose, the brain's energy source, as efficiently as did the brains of normal subjects. That inefficiency, he said, indicates that in hyperactivity the prefrontal lobe is slightly abnormal in the same way as children with ADD/ADHD.</td>
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<tr>
<td>Dr. Jared M. Werner, the chairman of the department of psychiatry at the George Washington School of Medicine in Washington, further elaborated on his findings suggesting the fixed biological aspects of ADD/ADHD. &quot;The disorder appears to run in families. We have explored this trend and have successfully identified shared genetic attention traits within families,&quot; Dr. Werner said.</td>
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<tr>
<td>Scientists hope to move beyond a mere accounting of the abnormality to an identification of what caused the defect. Several research groups are exploring the exact locations of defects that may need intervention. These new results suggest, however, that there is only so much within the individual’s control. People with ADD/ADHD may not be able to change their inattentive behavior. Prescriptions, such as Ritalin, may temporarily eliminate the symptoms, but may never completely cure the core of the problem.</td>
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<tr>
<td>A substantial number of children with ADD/ADHD will continue to struggle with the disorder in adulthood.</td>
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</tbody>
</table>

**Developmental Condition**
Studies Claim ADD and ADHD stem from a Developmental Delay

Attention Deficit Disorder/Attention Deficit Hyperactive Disorder, also known as ADD/ADHD, is by far the most common psychiatric diagnosis given to disruptive young children. Scientists have long debated whether it was due to a brain deficit or to a delay in development. Recent scientific evidence suggests that ADD/ADHD is, in fact, a developmental delay that many eventually grow out of.

One recent study from the Crossroads Institute ADD/ADHD Lab found neurological evidence suggesting ADD/ADHD to be a developmental delay disorder, not a stable personality or behavioral issue. Scientists explain that they have detected brain wave activity that suggests delays in attention development, which often coexist with delays in other areas, such memory and laterality development.

“I think this may become a landmark finding,” said Sharon Ellen Dellar, director of the Georgetown University Center on Health and Education.

Experts further state that the finding of the study could change the way scientists, teachers and parents understand and manage children who are disruptive or emotionally withdrawn in the early years of school. The study may even prompt a reassessment of the possible causes of disruptive behavior in some children.

In an additional study, researchers from the National Institute of Mental Health and McGill University, using imaging techniques, found that the brains of children with ADD/ADHD developed normally but just somewhat more slowly in some areas than the brains of children without the disorder.

Government psychiatric researchers compared brain scans and found that in a normally developing brain, the cerebral cortex thickens during early childhood. It then reverses course and thins out, losing neurons as the brain matures through adolescence. “However, children with ADD/ADHD experience evident delays in brain maturation in precise areas of the cortex that are most involved in attention and motor control,” said the lead author of the study, Dr. Eric Shone, a psychiatrist at the National Institute of Mental Health. “Those are exactly the areas where we would expect to find differences,” Dr. Shone said.

Dr. Shone further explained, “The basic sequence of development in the brains of these kids with ADD/ADHD was intact and absolutely normal. I think this is pretty strong evidence we’re talking about a delay, and not an abnormal brain.”

Ultimately, these findings indicate that certain areas of the brain are likely to eventually mature in the majority of children diagnosed with ADD/ADHD. In other words, children with ADD/ADHD are not doomed to forever struggle with ADD/ADHD. About three in four children grow out of the problem by early adulthood.

Control Condition

Studies Claim Human Activities are the Major Cause of Global Warming

Global warming is known to significantly increase the average temperature of the Earth’s air and oceans, which further influences agriculture, trade routes, glacier retreats, species extinction, extreme weather patterns, and proliferation of disease. The earth has warmed up by about one degree over the past century, and the increase in temperature is projected to continue. Scientists have long debated whether global warming was the result of human activities or reflects a natural cycle of weather variation. However, recent scientific evidence suggests that global warming is, in fact, mostly due to human behavior.
Scientists claim that the behaviors of human beings are changing the composition of Earth's atmosphere. Since the dawn of the industrial era, carbon dioxide and other key heat-trapping gases have increased at a rate that is unprecedented in more than 10,000 years. Dr. Roland Prime, a Professor of Atmospheric Sciences at MIT, explained, “there is a greater than 90 percent chance that greenhouse gases from human activity are responsible for most of the steadily rising average global temperatures observed in the past 50 years. To some degree, every person on the planet is responsible, but some are much more responsible than others.”

The National Research Council, the Federal Climate Change Science Program, the International Council on Science, and many other scientific research organizations have all found strong evidence indicating that natural influences and cycles of climate change cannot explain the rapid increase in global near-surface temperatures observed during the second half of the 20th century. “A particular concern is that atmospheric levels of carbon dioxide may be rising faster than at any time in Earth's history,” explains Dr. Joe Stern from the National Research Council. Dr. Stern further declared, “We find that the evidence for human induced climate change is now persuasive, and the need for direct action compelling.”

Due to these irrefutable findings, the UN Climate Change Conference held in December 2007 emphasized a great urgency to combat the increase in atmospheric abundance of greenhouse gases with changes in environmental policy. They outlined a series of international policy changes that could significantly scale back the progression of global warming within the next decade. The UN Climate Change Conference Consensus 2007 further concluded that important climate decisions confront current and future national and world leaders. Because atmospheric buildup of carbon dioxide and other greenhouse gases is largely the result of human activities, human decisions on governmental policies enacted in the next few years can have a significant effect on the future of global warming.

A-2: Manipulation Check

Article Recall Questionnaire

Given to the neurological and developmental conditions:

1. What was the main finding of this article?
   a) ADD/ADHD is a developmental delay
   b) ADD/ADHD is a fixed neurological defect
   c) The article does not discuss ADD/ADHD

Items rated on a 1 (will continue to show ADD/ADHD throughout adulthood) to 5 (will eventually outgrow ADD/ADHD) scale.

2. The results presented in the article suggest that a child who has ADD/ADHD will have what experience as an adult?

Given to the control condition:

1. What was the main finding of this article?
   a) Global warming is mostly caused by human activity
   b) Global warming is mostly caused by normal weather variations, which do not include human activity
   c) The article did not discuss global warming
Items rated on a 1 (humans cannot change global warming) to 5 (humans can change global warming) scale.
2. The results presented in the article suggest that humans have how much influence on the future of global warming?

A-3: Article Qualities

Items rated on a 1 (Not at all) to 5 (Very) scale.
1. How reliable do you consider the article’s findings?
2. How interesting was the article?
3. How clear was the article?

A-4: State Performance Self Esteem

Performance Self-Esteem

1. I feel confident about my abilities.
2. I feel frustrated or rattled about my performance.
3. I feel that I am having trouble understanding things that I read.
4. I feel I am at least as smart as others.
5. I feel like I am not doing well.
6. I feel like I have less scholastic ability right now than others.
7. I feel like I am not doing well.
8. Being academically successful is important to me.

A-5: ADD/ADHD Questionnaire

Learning Disability Check

1. Have you been diagnosed with a learning disability? If so, check all that apply.
   - Math Disability
   - Writing Disability
   - Reading Disability
   - Speech and Language Processing Disability
   - ADD/ADHD
   - Other __________
   - I am not diagnosed with a Learning Disability.

2. Are you diagnosed with ADD/ADHD?
3. At what age were you diagnosed?
4. How severe are your symptoms? Items rated on a 1 (not at all) to 5 (very) scale.
5. Are you currently taking medication for ADD/ADHD?
Thoughts about ADD/ADHD

Items rated on a 1 (strongly disagree) to 7 (strongly agree) scale.

1. I thought about my ADD during the distraction task.
2. I thought about my ADD/ADHD during the word scramble task.
3. ADD/ADHD interferes with my academic success
4. No matter how hard I try, I can’t really change the symptoms of my ADD/ADHD
5. ADD/ADHD is over-diagnosed
6. Sometimes I wonder if I was falsely diagnosed with ADD/ADHD.

A-6: Recall Words for Working Memory Task

<table>
<thead>
<tr>
<th>Set 1</th>
<th>Set 2</th>
<th>Set 3</th>
<th>Set 4</th>
<th>Set 5</th>
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<td>KNIFE</td>
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<td>BEAT</td>
<td>NOSE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPOT</td>
<td>ROCK</td>
<td>MISS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A-7: Sentences Presented During Working Memory Task

Confidence Statements

I am very confident that our team will win the big game tonight.
I really felt secure when I was living in that neighborhood years ago.
I felt a little bit assured after asking many questions in the end.
It is skillful to fly under such weather conditions and I did it.
The superior movie I watched last night was not what I was expecting.
The opening statement was hopeful to me in the effort of accelerating the legitimizing process.
I become certain when it comes to what I want to eat for dinner.
I succeeded in fulfilling my promise that I am going to be there this year.
I was capable of changing the light bulb from the ceiling in the dining room.
Unlike others in the audience I was totally competent in understanding the content of the play.
Overall I hold a very positive attitude toward how the government deals with issues like this.
The show that my friends and I put up last night was a total accomplishment.

**Doubt Statements**

I am very doubtful that our team will win the big game tonight.
I really felt insecure when I was living in that neighborhood years ago.
I felt a little bit stupid after asking many questions in the end.
It is foolish to fly under such weather conditions and I did it.
The inferior movie I watched last night was not what I was expecting.
The opening statement was hesitant to me in the effort of accelerating the legitimizing process.
I become uncertain when it comes to what I want to eat for dinner.
I failed in fulfilling my promise that I am going to be there this year.
I was unsure of changing the light bulb from the ceiling in the dining room.
Unlike others in the audience I was totally confused in understanding the content of the play.
Overall I hold a very negative attitude toward how the government deals with issues like this.
The show that my friends and I put up last night was a total frustration.

**Neutral Statements**

Some dietary supplements have been shown to have many harmful side effects.
The burglars enter houses only when they think the occupants are away or asleep.
Being an only child has little to do with a child’s social development.
He always arrives too late for the meeting and finds all kinds of excuses.
The paper was cut into small squares and scattered around the place.
You can trace the languages English and German down to the same roots.
He went home yesterday for the big family reunion his parents planned.
There are at least three explanations that might account for what has happened.
The boy was hitchhiking and wanted to go to the city to find a decent job.
These animals have more than one method of obtaining food during winter.
Congress is still in the process of developing a consensus on energy policy.
Although each theory is based on different assumptions they all reach the same conclusion.
The experts try to determine who really painted several of those masterpieces.
Most people with chronic hypertension have intentionally restricted their salt intake in meals.
My dog likes to sleep on the couch after we watch TV together.
Coin flipping has been used as a prime example of a random process for decades.
We drove down the road looking for a place to eat lunch.
The situation is one commonly encountered by many famous movie companies and producers.
Many animals exhibit patterns of group behavior similar to those of human societies.
He was more regarded as a writer in his own time than he is in ours.
Eating lots of fish can decrease the risk of developing heart disease.
Do not make exaggerated claims about the products you are trying to promote.
High fuel efficiency is the most important criterion in choosing a car for many buyers.
Floating on the surface of the water was a spread-wing moth the shape of an arrow.
Most myths express a culture’s most serious beliefs about eternity and God.
The office had been turned into a village store that sold ice creams.
Animals as different as termites and elephants follow certain similar and predictable patterns.
of behavior.
It is true that increasing demand for a limited number of products drives up the price.
The Odyssey includes more features of mythology that are accessible to readers.
Only a small proportion of children ever participate in team sports at school.
He prepared a meal for his friends during their visit the day before yesterday.
The company’s pay scale is intended to compensate more trivial work with higher wages.
Accidents on highways occurred at about the same frequency last year as in the year before.
Many people know that excess salt intake is inherently dangerous to health.
The occurrence rate of liver transplants is lower in children than in adults.
The bottle was cracked on the side when it fell down on the floor.
Each cable must contain at least three wires of at least two different colors.
Sometimes people who get allergies do not know exactly what it was that led to the symptoms.
Her most timely works are more similar to architecture than to traditional sculpture.
Throughout human history there have been many taboos concerning watching other people eat.
It is unlikely that a general explanation can be found to explain the phenomenon.
She travels a lot during the summer to places she has never seen before.
Sitting with his face to the door was a young man with broad shoulders and brown eyes.
People often recall having felt chilled before the onset of a cold.
The old box left by him on the floor was filled with magazines.
The various items are grouped according to place of origin at this vegetable market.
She did not want to sit near the front because she had normal eye sight.
We left the sprinklers running all night so the flowers in the garden could get enough water.

A-8: Word Scrambles Presented During Motivation Task

<table>
<thead>
<tr>
<th>Set 1- Easy</th>
<th>Set 2- Hard</th>
<th>Set 3- Easy</th>
<th>Set 4- Hard</th>
<th>Set 5- Easy</th>
<th>Set 6- Hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>EOBADN</td>
<td>YAZDPT</td>
<td>ACOEMD</td>
<td>WENQUS</td>
<td>ANSEOU</td>
<td>YZDEPT</td>
</tr>
</tbody>
</table>