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Keeping It in the Family: How Family Functioning and Childhood Environment Impacts Social Anxiety in College Students

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by

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Abstract

Social Anxiety Disorder (SAD) affects approximately 7% of the United States population yearly. Certain factors such as disturbed family functioning and the occurrence of adverse life events during childhood or adolescence significantly increase the risk of developing social anxiety later in life. This study proposal examines the relationship between childhood experiences with the severity and occurrence of SAD in the college population to see if childhood experiences affect the ability to focus on a single task after exposure to socially salient information. 250 undergraduate students will be randomly placed in either a control condition, without any exposure to a social conversation, or the Anxiety Manipulation condition, in which the experimenter will mention false, task-irrelevant information about the participant's behavior and typical social anxiety symptoms. I predict that more severely anxious participants will perform worse on the working-memory task given to them after they are exposed to socially salient information present in the Anxiety Manipulation condition. I predict this decrease in performance will result from the socially anxious fear of negative evaluation which will cause said participants to divert their attention from the original task to their own behavior and the experimenter's perception of their actions.

Keywords: Social Anxiety Disorder, Family Functioning, Attention

Introduction: What is Social Anxiety Disorder?

Clinical Diagnostic Criteria

Social Anxiety Disorder [SAD], previously known as Social Phobia, is an anxiety disorder that is characterized by the current Diagnostic and Statistical Manual of Mental Disorders (DSM 5) as an intense fear of judgment or failure by peers and in a variety of social and performance situations, especially when the individual is exposed to unfamiliar people and potential judgment by others (American Psychiatric Association, 2013). Social anxiety disorder affects approximately 7% of people in the United States, and approximately 2.3% in Europe with estimates for the rest of the world ranging between 0.5 and 2.0 %. Onset and diagnosis of SAD typically occurs during adolescence, with 75% of diagnosis occurring between the ages of 8 and 15 years of age (APA, 2013). Often times, people with SAD fear that other people are able to tell that they are visibly anxious, causing a self-perpetuating negative cycle of fear and increased anxiety. As a result, people with SAD often avoid situations where they think they might struggle, such as social gatherings with new people (Heeren & McNally, 2018). Although the severity of the condition can vary greatly, social anxiety is fairly common.

Despite having significant overlap with other anxiety disorders, SAD is currently recognized by the DSM 5 as a unique diagnostic entity. Prior to the adoption of ‘social phobia’ in the DSM-III in the 1980s, social anxiety as a concept was not widely understood or recognized within the psychiatric community. The term ‘social phobia’ was replaced by the more specific term, ‘social anxiety disorder’ in 1994 in the DSM-IV. In the DSM-III, the disorder that is currently known as ‘Social Anxiety Disorder’ [SAD], was referred to as ‘Social Phobia’ [SP]. The name social anxiety disorder was added as an alternate name for in the DSM-IV before it later became the singular, current title for the disorder in the DSM 5. One of the primary reasons

SAD is preferred over SP is because there was significant concern that is the disorder was referred to as SP, that people in the mental health and primary care settings would not see the disorder as frequent or impairing (Heimberg et al., 2014), and changing the name would more adequately describe the pervasiveness and impairment of the disorder, since it was found that people were more likely to recommend treatment is the disorder was referred to as SAD, as opposed to SP (Bruce, Heimberg, & Coles, 2012; Heimberg et al., 2014). Further, the name SAD better distinguishes the disorder from other specific phobias.

Recent epidemiological studies propose that SAD is most common among in females and adolescents in Western society, specifically North America, and the United States has one of the highest prevalence rates for SAD in the world (Bandelow & Michaelis, 2015). Differences of prevalence across cultures may be attributable to frequency and type of social situations experienced, as well as environmental and familial risk factors such as parental psychopathology or high rates of comorbid disorders (Nagata, Suzuki, & Teo, 2015). Prevalence rates can also be affected by diagnosis and self-reporting since social anxiety can be measured along a continuum; even though one might appear to have symptoms concurrent with high levels of social anxiety, they may not necessarily reach the threshold that defines clinical significance. Furthermore, since social anxiety hinges on the concern of negative evaluation by others, SAD is linked to social expectations and interactions that are culture-dependent. Previous studies have also found that when social anxiety is acknowledged but continues to remain untreated, symptoms persist. Lifetime prevalence rates differ across culture, with Russian samples showing the highest prevalence rates while Asians generally had the lowest lifetime prevalence rates (Hofmann, Asnaani, & Hinton, 2010). Minority communities with lower reported rates of social anxiety also tended to have lower levels of education. Overall, a clear pattern can be gleaned from previous

epidemiological studies that suggest the presence of protective factors in childhood that can affect the prevalence and the internalizing of the disorder (Hofmann et al., 2010).

In children, social anxiety is diagnosed slightly more frequently in girls than boys, occurring in approximately 1-3% of children. Inderbitzen-Nolan and Walter (2000) theorized that SAD was found more common in girls as females were generally more concerned with both potential judgments of social competence as well as actual competence in social situations than their male peers. In terms of symptomatology, beyond increases in social fearfulness and inhibition, children with social anxiety are more considered both more emotional and lonelier than their peers (Mash & Wolfe, 2007). As a result of their social anxiety, they are not adequately equipped to handle socially distressing events, so whenever such an event is encountered, they cannot cope effectively, thereby causing a cyclical reaction in which these negative social experiences to happen with greater frequency. Similarly, the fear of this potential event is so severe, that they may avoid many social interactions, increasing feelings of sadness and loneliness (La Greca & Silverman, 1998).

Comorbidity and Consequences

Social anxiety disorder can be broken into categories, as the generalized form of social anxiety disorder is defined differently, based on performance alone, which is comorbid with avoidant personality disorder. Frequently, social anxiety goes untreated due to lack of education and understanding about the disorder, lack of recognition, and fear of judgment. As such, SAD is often treated based on its relationship with other common health problems that occur such as other anxiety disorders, depression, and substance abuse (Beesdo-Baum et al., 2012; Burstein et al., 2011). The relationship between SAD and the most common comorbid disorders are complicated, leaving the causal relationship between them unknown (Spence & Rapee, 2016)

although this was examined by Beesdo et al. (2007) who found that there was an increased risk for individuals diagnosed with SAD during adolescence to also be later diagnosed with depression and substance and alcohol use during early adulthood. This study, while interesting and potentially very insightful in examining SAD and the relationship to depression, was not replicated in all later studies (Buckner & Turner, 2009). Approximately 66% of children and adolescents with SAD have another disorder; the most common comorbid disorders for those with SAD are other anxiety disorders, such as panic disorder, and generalized anxiety disorder (GAD) (Beidel et al., 1999; Mash & Wolfe, 2007). Major depression was found to co-morbid in about 20% of adolescents and adults with SAD and is speculated to commonly occur in these individuals as a result of chronic social isolation. Many young adults who are found to have both social anxiety and depression disorders use drugs and alcohol to self-medicate and decrease their anxiety levels with encountering difficult social situations (Mash & Wolfe, 2007). Social anxiety disorder is also comorbid with bipolar disorder and body dysmorphic disorder, possibly because of the common preoccupation with one's appearance and the fear of judgment from other people. Disorders that are comorbid for children diagnosed with SAD differ from those associated with adolescents and adults. For children with social anxiety, comorbidities have been found with high-functioning autism (ASD), and selective-mutism (APA, 2013).

SAD Characteristics

Individuals with SAD often experience symptoms related to sensory input and irregular cognitive processes such as panic attacks, dysmorphia, and racing thoughts as well as physiological symptoms such as increased heartbeat and perspiration (Anthony et al., 1995) which are atypical and considered to be unpleasant and overwhelming. When defining the characteristics for diagnosis and definition of SAD, the DSM posits the person experiencing said

fear must also be preoccupied with the concern that their behaviors and anxiety symptoms will be humiliating (Heimberg et al., 2014). In many social situations, adaptation and social awareness is a positive skill, but excessive concern and preoccupation with minute behaviors can become overwhelming and evolve into social anxiety in excess, developing into SAD. Preoccupation and anxiety about mundane social experiences inhibit children from participating in regular interactions that help them learn alongside their peers and form meaningful social bonds which subsequently leads them to become more withdrawn and lonelier. Further focus on minor incidents can cause people's perceptions of their social abilities to become skewed, leading to an increased belief that they lack practical social skills. This self-focus utilizes valuable cognitive resources and energy stores that would otherwise be spent forming new, positive memories. A large portion of symptoms related to SAD involves sensory perception and processing sensitivities, which are conceptualized as a personality trait that manifests as the avoidance of overstimulation. Sensory sensitivity refers to a person's heightened awareness of specific sensory modalities, such as light, sound, and temperature, although it is not necessarily explicit or conscious. This trait is assumed to be a heritable trait that leads to increased vulnerability to anxiety and shyness (Aron et al., 2005) as it is separate from but highly correlated with social anxiety disorder. Individuals with SAD reported greater levels of sensory-processing sensitivity and avoidance behaviors than those without social anxiety (Hofmann & Bitran, 2007), suggesting that sensory-processing is associated with SAD, although this sensory sensitivity is not central to the diagnostic criteria. The DSM 5 reports that symptoms of SAD can also be physical as anxiety can manifest itself as blushing, sweating and an increased or irregular heartbeat. The central symptoms of social anxiety involve the occurrence of anxiety in response to the fear or anticipation of judgment, often in respect to a specific social situation regardless of

scale (i.e., determining where to sit and eat at lunch, or giving a presentation in an academic setting). The anxiety that individuals experience is often independent of whether or not they will be judged, but is instead reliant on the excessive fear of this possibility. Because of the way social anxiety occurs and manifests, anxious reactions occasionally occur in anticipation of an event as the negative anticipation surrounding an event is so great, anxiety manifests before anything else. Therefore, people with social anxiety have an increased tendency to exhibit avoidant behaviors.

Presentation and Performance in SAD. Self-assessment and presentation are critical elements in the development and maintenance of social anxiety. In the DSM 5, a performance-only specifier was added to account for people diagnosed with SAD whose symptoms only manifested when faced with performing or speaking in public. These individuals were found to have lower levels of depression, less severe symptomatology and later age of onset. Although the percentage of people diagnosed with SAD is about 12%, it is common for many people in the general population to occasionally experience symptoms of social anxiety without meeting the actual diagnostic criteria. The self-presentational model of social anxiety, initially proposed by Schlenker and Leary (1982), proposed that social anxiety arises when people are motivated to make a positive impression on an audience or a peer but are unable to do so which triggers a self-assessment process. These negative self-perceptions are essential in the development of SAD and related processes which underline self-focused attention, self-evaluation, and attentional biases.

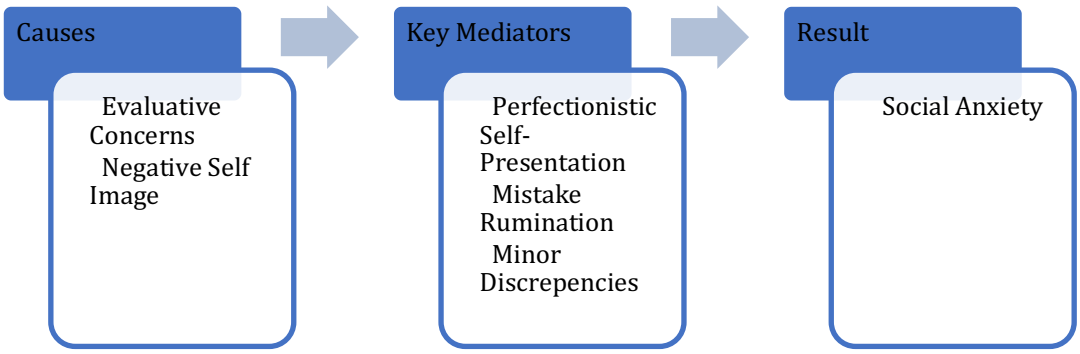

Figure 1. Model of the causes and process of rumination and elements that feed into post-event processing, which feeds social anxiety.

Anxiety states and cognitions regarding danger and risk are linked. Anxious individuals overestimate subjective personal risk, meaning their cognitive processes and judgmental heuristics are greatly impacted by their anxiety (Butler & Mathews, 1983). Current cognitive models postulate that hyper fixation on one's behaviors and emotions in social situations can distort their recollections as more impactful and negative than they originally were, although the mechanisms of this are still debated. Based on this logic, when socially anxious individuals focus on the negative aspects of a social interaction when recalling memories, the post-event processing (PEP) that they experience consolidates and strengthen these negative recollections, connecting high levels of PEP with increased negative self-evaluation and avoidance of social situations (Helbig, Poels, & Lincoln, 2016). Furthermore, recalling previous negative evaluations will exacerbate anxiety. More severe social anxiety will result in the perception that feedback was also increasingly negative and will more negatively affect participants, regardless of the actual content of the feedback, even it remained the same over time (Schlenker & Leary, 1982; Smith & Sarason, 1975). These findings provide further evidence for the impact of the self-perpetuation of social anxiety.

Temperament

Temperament refers to broad characteristics that can be measured in the early stages of development that influence the development and presentation of later personality traits and behavior. These characteristics can be witnesses in the automatic reactions or movements of infants and fetuses and is a description of the way a person constitutionally behaves, meaning that these traits are stable over time (Berk, 2008; Rothbart, 2007). Examining the dimensions that determine what kind of temperament an individual has such as extroversion, negative affectivity, and effortful control can illuminate if a person is predisposed to a disorder such as social anxiety. Furthermore, temperament influences an individual's attention and emotional regulation which significantly impacts personality development (Berk, 2008). Temperament refers to a behavioral style, whereas personality is used as a descriptor for people's actions, as well as an explanation for their behavior. An individual's temperament is determined by examining the nine categories that underlie the construction and categorization of temperaments, such as activity level, threshold, adaptability, and distractibility. These characteristics can be seen in infants, and influence the development of later personality traits (Rothbart, 2007).

Specifically, in SAD, essential elements of an individual's temperament are behavioral inhibition and the fear of negative evaluation (DSM 5, 2013). One personality trait which is crucial to consider when discussing SAD is shyness. Although shyness and social anxiety may appear similar on the surface, there are important distinctions between them. Inhibited temperament is a form of temperament that is strongly associated with social anxiety, and co-morbid disorders such as selective mutism both in childhood and adulthood (Yeganeh, Beidel, & Turner, 2006; White, McDermott, Degnan, Henderson, & Fox, 2011).

Biederman et al., (2001) found that behavioral inhibition and temperament in infancy leads to an increased risk of shyness and developing anxiety during adolescence. In some cases, this increased likelihood can be attributed to the increased likelihood of reacting in a shy or fearful manner to novel situations. Despite this association, BI is not a guarantee of developing social anxiety, as many people with this temperament adapt and do not remain reticent into adulthood or develop SAD. Although associations have been found amongst social anxiety, shyness, and certain infant temperaments, the appearance of one does not necessarily mean that developing SAD is absolute.

Behavioral Inhibition. Behavioral inhibition (BI) and impulsiveness are two critical types of temperament associated with SAD, both of which can be identified during childhood. Identifying early developmental risk factors such as BI is important preventing the development of potential disorders. Hayward et al., (1998) provided evidence for this which found that over 20% of high schoolers who demonstrated social avoidance and fearfulness later developed social phobia, showing that having either of these features of BI puts the individual at risk 4x greater than peers without either feature of BI (Hayward et al., 1998; Svihra & Katzman, 2004). As a temperament, BI is understood to predispose an individual to develop SAD, along with other underlying traits such as fear of negative evaluation. Individuals with high levels of social anxiety often exhibit stronger behavioral inhibition as a result of social fear than those without anxiety (White et al., 2011). Although higher levels of social anxiety do not affect risk perception, it is associated with a reduction in risk-taking behavior. Although having BI is not a guarantee that an individual will develop social anxiety, about 50% of children who demonstrate extreme levels of BI will eventually be diagnosed with SAD as well. This statistic makes this

trait one of the most influential single risk factors for developing SAD that has currently been identified (Clauss & Blackford, 2012).

Shyness vs Social Anxiety. Shyness and social anxiety appear similar on a surface level, although there are a few key elements that differentiate between them. Despite a close association and similar underlying measures, it is important to distinguish between SAD and shyness as they are not the same (Brook & Willoughby, 2019). While shyness is connected to behavioral inhibition and social concern, it is considered a personality trait that is likely to change over time and is influenced by the temperament an individual is born with. Although someone who is extremely shy might demonstrate similar physical symptoms and nervousness in a new or uncomfortable social situation, unlike an individual with SAD, once they become familiar with the situation those feelings begin to subside. With SAD, symptoms often persist regardless of familiarity with the situation or individuals involved. Shyness is merely one aspect of social anxiety, but displaying shy behavior does not inherently mean that that individual also has social anxiety. It is necessary to distinguish between a diagnosable order, (SAD), and a personality characteristic (shyness). Temperament is typically considered an inherited style of behavior, whereas personality characteristics are traits that are influenced by a person's basic temperament. Social anxiety denotes higher levels of distress and avoidance than shyness, resulting in significant impairment. (Furmark, Tillfors, & Everz, 1999). Although it is uncommon, occasionally someone's shyness can increase in severity over time, eventually developing into SAD if behaviors shift, becoming more extreme until they mirror the diagnostic criteria of SAD. However, this trajectory is not typical as shyness does not typically increase over time. Severe social anxiety is easily distinguishable from natural shyness, but only once it has reached or surpassed the diagnostic threshold. The classification difference between shyness

and SAD is essential, but understandable nuanced, similar they seem similar on a surface level which results in the two terms incorrectly being used interchangeably. Despite the classification difference, it is imperative to clarify the difference as neither the distinctions between personality traits and temperament nor the clinical criteria for social anxiety disorder itself.

The original Shyness Scale developed in 1981 (Cheek & Bush, 1981) was designed to measure the affective and behavioral aspects of both shyness and social anxiety. When the distinctions between shyness and social anxiety are not understood, social anxiety can be unrightfully dismissed as extreme shyness even though SAD is actually more complex and impactful on a daily basis than the single trait of shyness. This dismissal of social anxiety is a primary reason why a large percentage of people, an estimated 75 percent, do not seek or receive treatment; those who do seek treatment often wait up to 14 years to do so either because the fear of social stigma and reaction which is an inherent part of the disorder, or because they do not know that SAD is a recognized and widely treatable condition (Bandelow & Michaelis, 2015).

What Influences SAD? Genetic and Physiological Risk Factors

Etiology

Individuals with social anxiety may develop the disorder because of environmental influence, genetics, personal negative social experiences, or some combination thereof. Previous studies such as Rapee and Spence (2004) created a model which was designed to consider what factors could describe how high levels of anxiety emerge during early development, analyzing the interaction between environment and genetics and their influence on the development of the disorder. In a later article, it was noted that the causal and maintaining factors for SAD might be differently influential at different stages of development (Rapee & Spence, 2016). Risk factors

are not always the same for every person. Therefore any single factors could result in a variety of outcomes, and not necessarily even result in the full development of SAD. People are understood to influence their social outcomes to a great extent, beyond what risk factors and genetics might dictate. A complex interaction of genetic factors, biological processes, and social skills, combined with environmental factors together influence the formulation and development of the disorder. The genetic influence of anxiety is subject to gene-environment interaction, meaning that children who display high behavioral inhibition are likely more susceptible to environmental influences such as unnatural or poor modeling of social skills by parents and relatives (Svihra & Katzman, 2004). Social Anxiety Disorder is generally considered heritable; first-degree relatives have a greater chance of being diagnosed with the disorder since the development of the disorder is influenced both by genetics and environmental factors such as family functioning, and adverse childhood experiences. (APA, 2013).

Heritability

Understanding more about what aspects of social anxiety are heritable could lead to greater insight into how environment and genetics overlap and impact the likelihood of certain symptoms and disorders developing over the course of an individual's lifetime. Examining the relatedness of these different risk factors and symptom presentation in individuals with social anxiety or related disorders could lead to novel discoveries about how certain factors interact, since something like sensory sensitivity might be different in different disorders such as SAD, GAD, OCD, or ASD. Furthermore, certain heritable traits such as behavioral inhibition, cause certain people to be predisposed to the disorder which is a genetic influence (Rapee & Spence, 2004). In addition to providing genetic materials that influence someone's likelihood for anxiety,

parents also provide the environment for their children that can be a deciding factor in how they exhibit and react to their anxiety (Elizabeth et al., 2006). Considering all risk factors for SAD, genetic influence is a major influence in regard to how genetic makeup, hormonal balance, psychological stress, and riskiness of first-degree relatives in how SAD manifests.

Biological Influence

Genetic Contribution. While the genetic risk is consistent, lack of stability and immersion in a negative environment is also an important contributor to the development of social anxiety, especially during the critical years in childhood and early adolescents (Erwin, Heimberg, Marx, & Franklin, 2006). To carefully examine this, longitudinal studies have been conducted to examine parental psychopathology and the higher occurrence in genetically related individuals who have been diagnosed with either the same or similar disorders (Lieb et al., 2000). Negative or traumatic experiences in childhood and young adolescence, conditioning (such as bullying) as well as modeling (if parents are socially phobic) each have a major impact on the anxious behavior and development of young people (Aron, Aron, & Davies, 2005). It should be noted in some situations, environment seems to play a more influential role than genetics alone, especially if a traumatic, violent, or other emotionally formative event occurs during childhood (Binelli et al., 2012).

Brain Chemistry. Although many studies are interested in the genetics of anxiety disorders, consensus regarding an ‘anxiety gene’ has not been reached. This is primarily a result of a lack of empirical research on the specific topic. Most of the research conducted thus far has focused on examining what genetic factors can be implicated in generalized anxiety disorders and common comorbid disorders, with less focus on the specific concern of social anxiety.

Although the mechanisms that link negative life events and psychopathology are highly complex, neurobiological factors play a pivotal role in development as a person's environment influences early brain development.

While many avenues have been explored, the amygdala and prefrontal cortex are the most commonly researched brain structures and neural pathways examined, and research on these brain areas has provided evidence for neuroimaging studies that link social anxiety and behavioral inhibition to these brain areas (Detweiler et al., 2014). Adolescents have elevated activation in the neural pathways that are associated with motivated behavior and reward processing such as the basal ganglia, hippocampus, amygdala and anterior cingulate cortex (Caouette and Guyer, 2014). These findings argue that adolescents with SAD may have increased sensitivity to reward, and subsequently also overly concerned with their social performance, and potential consequences (Caouette and Guyer, 2014). An example of how environment can be related to brain function and development can be seen when examining how exposure to violence in infancy is correlated with increased risk of developing anxiety or a comorbid disorder, even if the individual was adopted into another family (Binelli, et al., 2012).

There is notable overlap in brain areas implicated in the research about general anxiety, social anxiety, and comorbid disorder. Specific neuropeptides have been studied to examine general brain function and possible connections between specific neurotransmitters, brain functions, and potential treatments for anxiety. Understanding the chemistry and brain function behind anxiety is essential to understanding how the neurological processes of an individual with SAD fundamentally functions differently than someone one without an anxiety disorder. Oxytocin, a neuropeptide produced in the hypothalamus has been examined as an important neurotransmitter that affects social anxiety. Research has shown that for people with generalized

SAD, when oxytocin dampens amygdala reactivity to threat, anxiety is subsequently reduced. The pathways between the amygdala and other brain areas associated with socio-emotional functioning are impacted by this dampening, attenuating the reactivity of social threat stimuli to a normalized level (Gorka et al., 2015). This hyper-reactivity is a key element of SAD, and examining the mechanisms behind this activity provides insight into why individuals with social anxiety respond differently to potential threats and fears in social settings. In individuals with anxiety, oxytocin enhanced functional connectivity between the amygdala, bilateral insula and middle cingulate/dorsal anterior cingulate gyrus has been found when fearful faces are shown and processed by individuals with anxiety. The finding by Gorka et al., (2015) suggests that oxytocin could be highly impactful in social situations and therefore has the potential to enhance the control of specific social responses.

Neuroendocrinological and neurobiological studies support the hypothesis that reducing avoidance of social stimuli in socially anxious parents can affect oxytocin facilitation and parental caregiving. For mildly and moderately socially anxious individuals, oxytocin administration suppresses behavioral avoidance and increases socially anxious people's approach to threat-relevant visual stimuli, such as an angry face. Understanding the mechanisms that influence the development of SAD, such as parental caregiving and oxytocin levels provides indispensable insight into how biology and environment interact, consequently affecting the development of SAD in children (Lebowitz, Leckman, Silverman, & Feldman, 2016; Radke, Roelofs, & de Bruijn, 2013).

Multiple studies have examined the serotonin transporter gene SLC6A4 and the serotonin 2A receptor, although different conclusions have been reached regarding the likelihood of these specific genes influence over the development of SAD (Gardner, Hale, Lightman, Plotsky &

Lowry, 2009; Stein et al., 1998; Ollendick & Hirshfeld-Becker, 2002). However, notable studies such as Stein, Schork, and Gelernter (2008) and Biederman et al., (2001) have found evidence that implicates the serotonin transporter gene SLC6A4 (variant 5-HTTLPR) as a risk factor in the development of SAD. Preliminary gene studies about SAD in children have found an association between a "repeat polymorphism" in a dopamine transporter gene and SAD symptoms in children. There is a consensus that genetic factors play a role in the development of SAD although it is not clear what the specific link is, nor whether these factors predispose people to develop SAD specifically or just anxiety disorders in general. This can be partially attributed to the fact that genetic vulnerabilities likely manifest differently at different stages of development. Furthermore, it is also likely that many different individual environmental factors interact with each other affecting the way that SAD would develop or outwardly manifest (Ollendick & Hirshfeld-Becker, 2002). Despite the implications of genetics in the development in SAD and the frequency among genetic relations, studies such as Kreifelts, et al (2014) argue that a person's environment has a strongest effect for the short-term development of social anxiety.

Environmental Contributions to SAD

Familial Environmental Influences

Environment and familial influence in the development of SAD is complex since it is greatly influenced by both the environment and by genetics. Beyond genetics however, environment and relationship dynamics play a major role in the development of social anxiety. SAD has been found to cluster in families, primarily due to genetic factors, even though non-biological relatives have an elevated risk of developing SAD than those who have no relatives with SAD, biological or not (Isomura et al., 2014). The DSM 5 describes a lack of a singular

causative role in increased rates of SAD, although instances of maltreatment during childhood and psychosocial adversity noted as substantial risk factors for the development of the disorder. A meta-analysis by Scaini et al. (2014) found that adults showed about half the genetic contribution to SAD compared to children, possibly as result of longer exposure to environmental influences. The results of these studies were congruent with the assertion by Spence & Rapee (2016) that SAD reflects the interaction between social anxiety and life impairment. A person's environment and genetics influence the presentation of SAD symptoms, such as increased internal self-awareness and sensory perception. In this regard, environment refers primarily to the culture and physical environment that surrounds a person as they develop. In this regard, cultural factors can influence both the type of symptoms and the life impact of social anxiety. Raising a child in an overly critical and protective environment also increases the likelihood of developing social anxiety, and internalizing the negativity that they are exposed to. Such environments provide children with negative models, teaching them to become self-critical and maladaptive processes that continue to affect them as they develop through adolescence into adulthood. Children look to people in their environment as models for their behavior, which significantly impacts their development and social skills (Leib et al., 2000). Since young children primarily interact with their family, if their family does not encourage positive development of autonomy and social coping skills, then social competence and confidence will suffer. This can happen if social engagement is significantly limited, or if models are dysfunctional (Lebowitz et al., 2016; Masia & Morris, 1998). A combination of these environmental elements and genetic predisposition to the disorder leads to a greater likelihood of SAD developing in an individual over time.

Familial Links & Parental Influence

In a 10-year longitudinal study, Knappe et al., (2009) examined how the role of parental psychopathology and environment are analyzed as factors for adolescents at risk of developing social anxiety during critical developmental years. Children and adolescents who have a parent with social anxiety or a comorbid disorder are more likely to have social anxiety than children who have no exposure to anxiety (or a comorbid disorder) in their family. This phenomenon may occur partly due to the fact that psychopathology affects parenting style, and because social anxiety affects social capability and types of interactions, including those between a parent and child, or other family members (Knappe et al., 2009). Despite being a rather commonly prevalent mental disorder, there are still many misunderstandings about the reality of how this disorder can affect someone and how prevalent it is in today's society; family functioning plays a major role. As noted in Knappe et al., (2009), families with higher rates of social phobia tended to have a significantly higher record of relatives with similar social disorders.

Since the vast majority of individuals with SAD experience onset in mid-adolescence (Ollendick, Hirshfeld-Becker, 2002), examining the influence of environmental and familial factors is essential to deepening the understanding of why SAD occurs, and why it most commonly is diagnosed in adolescence. Adults with social anxiety and other comorbid disorders (potentially such as ASD, GAD, or Depression) may inhibit certain emotional responses that inadvertently result in stiff interpersonal interactions, such as muted emotional reactions or stilted conversations in an effort to control their anxiety and fear of potential negative outcomes. Children have a predisposition to vicarious learning and will observe the behavior of adults and caregivers, monitoring and potentially acquiring the observed mannerisms or fears themselves which can even be extended to instances of social referencing. This vicarious learning occurs

under the assumption that adults are more experienced and observing and copying their behavior will provide protective benefits (Lebowitz et al., 2016). This facade can, in turn, affect their children's natural social behavior since children's models deviate from the norm of positive regular interpersonal reactions. A study conducted by Ollendick, Benoit, and Grills-Taquechel (2014), theorized that insecure attachment and behaviorally inhibited temperament increased the risk of developing SAD, although this, in turn, was heavily influenced by a parents' behavior towards their child, recognizing that parents can also be influenced by their own anxiety and information processing biases. Many of the notable studies about SAD have been longitudinal, cross-sectional studies that investigate links between parent behavior and SAD; there are concerns of biased or potentially inaccurate responses as these studies primarily consist of parental self-report surveys instead of observations, or reports from all family members involved in the study. More recent studies have found that parents may unconsciously alter their behavior when dealing with more anxious children leading to a reciprocal relationship of withdrawn behavior, controlling parenting, and increased anxiety (Dadds & Roth, 2001).

Family Functioning

The relationship between family functioning and social anxiety in adolescents and children is an interesting relationship to consider when determining risk factors for the occurrence of social anxiety and other comorbid disorders in young people. There has been growing and changing evidence regarding familial risk factors for SAD when considering the graded relationship between familial risk factors and the diagnosis of SAD in children (Knappe, Beesdo, Fehm, Lieb, & Wittchen, 2008). This relationship between SAD risk in parents and children provides evidence in favor of the continuum theory of SAD and the intergenerational

transmission of the disorder. The longitudinal study by Lieb et al., "Parental Psychopathology, Parenting Styles, and the Risk of Social Phobia in Offspring" (2000) also found a strong association between parents and children diagnosed with social phobia (SP). Similar to Knappe et al. (2009), this study also claimed that while parenting style and overprotective tendencies were strongly associated with SP in offspring, family functioning was not. Both Lieb and Knappe used the McMaster Family Assessment Device (FAD) in their research. The FAD is based on the McMaster Model of Family Functioning, determined to be a valid and reliable source to examine family functioning and has been widely used in research as well as clinical settings (Kabacoff, Miller, Bishop, Epstein, & Keitner, 1990). The assessment was a multiple-choice questionnaire of 60 statements pertaining to family and asked respondents to rate how well each given statement pertains to their family. Six aspects of family functioning were measured: communication, problem-solving, roles, affective involvement, affective responsiveness, and behavior control. These six factors were combined to create a 'general functioning' scale which researchers used to assess the overall mental health of the family.

Knappe et al., (2008) followed a sample of 1,395 adolescents and analyzed parental anxiety, depression, and alcohol use as well as parental rearing styles. The results of this study concluded that families with parents diagnosed SAD tended to score lower on the FAD (McMaster Family Assessment Device), indicating that there was a trend of more disturbed family functioning across all measured variables. Family functioning was determined by the results McMaster Family Assessment Device taken by parents, and was defined by combining the results of the six measured dimensions of: problem solving (defined as a family's ability to resolve problems to a level that maintains effective family functioning), communication (how the family exchanges information), role behavior (the repetitive patterns of behavior by which

people fulfill particular family functions), affective responsiveness (the ability to respond to a range of stimuli with appropriate feelings), affective involvement (the degree to which a family shows interest in and values the interests and activities of the members), and behavior control (the pattern adopted to handle behavior in physical dangerous situations, discussions of psychobiological needs, and social situations) (Kabacoff et al., 1990). No general interaction was found between parental SAD and family functioning in regard to increased risk of SAD in offspring, leading to questions over nature versus nature in the development of the disorder.

It seems peculiar that family functioning was not associated with offspring social anxiety while so many other factors pertaining to family history were relevant. Although parents with social anxiety did tend to score lower on the FAD, meaning lower/more disturbed family functioning, which was irrespective of their child's diagnostic status and while there seemed to be some connection between functioning and diagnostic status, they claimed there was no association. Furthermore, parenting style and rearing behavior were found to be related to social anxiety even though family functioning was not, irrespective of the fact that parents who were diagnosed with social anxiety tended to have lesser family functioning scores (Knappe et al., 2008). Overall family functioning scores were dismissed as statistically irrelevant to SAD in this study, although specific interactions were found to be relevant to SAD. Furthermore, it is interesting that children with SAD reported more parental overprotection and higher rates of parental rejection compared to their non-socially anxious peers, as parental interaction and parenting style affects family functioning and household environment (Knappe et al., 2008). Therefore, family functioning would seem to affect all members of a household, especially at-risk offspring since their role models and the environment profoundly impact children during development.

Different types of family dynamics affect how social heuristics and relationships are formed. Since it was found that only specific elements of family functioning were correlated with SAD in at-risk offspring, it is important to delve into this in order to discover what other environmental factors impact development and the occurrence of anxiety disorders in children. Some important factors in the development of social anxiety that have not been widely examined are how families may differ in size or organization, potentially as a result of cultural norms. Examining how these different factors may interact with different symptoms and occurrences of social anxiety in individuals who develop the disorder in childhood or adolescence. These differences might provide insight into the development of certain symptomatology. Cross-analyzing this with previously recognized risk factors of family functioning would allow for interesting comparisons of how the relevant dimensions of role behavior and modeling may change among groups. Beyond typical measures of family functioning, there is a lack of studies conducted that ascertain whether factors such as culture and family size might affect the development of certain social and emotional recognition difficulties in children and young adults, since research has begun to show that parental psychopathology does affect these things. Interestingly, there is a small percentage of families wherein parents report no diagnosis but were still found to have lower family functioning scores and children with SAD.

In addition to the claims of associations found between parental behavior and offspring SAD, it has also been reported that children's perceptions of negative parental rearing might reflect their psychopathology (Knappe et al., 2008). Previous studies have relied heavily on parental information and parents self-reporting about family functioning measures and diagnoses. Self-report measures are a common method used in studies like this that examine social anxiety although relying solely on parental responses about self-behavior, family

functioning, and offspring behavior encounters the concern of bias and fallible memories. Conducting a study while relying on an individual's report of these same factors instead of just the parents could provide a different insight and potentially reveal biases held by parents, or reveal differences in role behavior and impact. Specifically, maternal overprotection and paternal rejection is associated with higher risk of SAD (Knappe, Beesdo-Baum, Fehm, Lieb, & Wittchen, 2012). Based on these findings, having multiple reporters of family functioning can help to eliminate possible biases and make reporters more reliable. Using multiple reports for each family in a study would lead to a greater source of information about the family as a whole. Additional research has found that other adverse life experiences such as violence and instability within one's family, are correlated with higher rates of social anxiety, implicating childhood family violence as an additional risk factor in developing the disorder later in life (Binelli et al., 2012).

There is a positive correlation between increased risk of developing SAD in children whose parents were diagnosed with any mental disorder (Knappe et al., 2008). However, associations have been found between negative parental rearing styles and increased risk of SAD when compared against children without parental psychopathology with corresponding rearing styles. These findings are congruent with the idea that higher rates of rejection, overprotection, and less emotional warmth all positively increased risk of SAD in children, especially if the child's parents reported having social anxiety disorder or another mental disorder. An interaction was found between parents with any disorder and increased risk of SAD in offspring when parents specifically reported lower scores on certain sections of the family assessment. The three most relevant dimensions were 'problem solving', defined as a family's ability to solve problems in an effective manner that maintains family functioning, 'role behavior', how repetitive patterns

of behavior are used to fulfill each family members role, and 'behavior control', which refers to the pattern adopted when handling a physically dangerous situation, general social situations, and discussions related to biological needs such as eating and sleeping. Lower scores on these three dimensions all resulted in increased risk of children in these family settings developing SAD.

Environmental Considerations; Peer & Social Engagement

Peer Relationships

Negative parent-child relationships can affect the way that children and adolescents learn and how they interpret and interact with their peers in social situations. Exceedingly negative parent-child interactions can be detrimental to self-perception and can cause individuals to perseverate on their previous social interactions and focus on their own perceived negative attribute and social deficits, subsequently raising anxiety levels and increasing avoidance behaviors. This commonly happens following social interactions with peers in the form uncontrollable negative post-event processing and worrying. Adolescents and young adults spend vast quantities of time focused on defining themselves in relation to their interests and peers, often becoming more self-focused and self-conscious (Berk, 2008). During puberty, peer pressure, social stress, and fear of embarrassment can escalate, contributing to the development of social anxiety, especially if an individual is already at risk because of previous negative experiences or genetic predisposition. Individuals with SAD are exponentially concerned with self-presentation and creating positive social interactions even though their social anxiety often manifests in a way that negatively impacts their social interactions often causing others to view their social skills as faulty, continuing to perpetuate the fears that manifest in those with social anxiety (Rapee & Spence, 2004; Beesdo-Baum et al., 2012).

Social Cognition. The ability to infer what other people are thinking and feeling refers to as social cognition, a phenomenon which develops during adolescence. Social cognition is an essential component of SAD; cognitive models of SAD has advanced understanding and treatment for the disorder (Clark & Wells, 1995; Rapee & Heimberg, 1997). The models of SAD concentrate on self-knowledge as well as cognitive processes, such as examining belief about the 'social self', social beliefs, worry processes, and self-focused attention, although metacognitive beliefs were not inspected (Wells & Matthews, 1994) they are vital to consider since both metacognitive and social beliefs are stable vulnerability factors in cognitive models for this disorder. Several studies have found a positive relationship between social beliefs and social anxiety in both nonclinical (Heeren, Wong, Ceschi, Moulds, & Philippot, 2014; Wong et al., 2017) and clinical samples (Wong et al., 2017). However, the aforementioned relationships were inconsistent as a predictor for social anxiety generally (Brozovich & Heimberg, 2008; Holzman, Valentiner, & McCraw, 2014).

Social Implications of SAD

Poor performance on socially challenging activities is a common feature of SAD and can reinforce social fears such as the fear of negative evaluation or socially avoidant behaviors such as isolation. A negative cycle often occurs for people with SAD as people who struggle socially tend to have poor social skill performance, leading to adverse social outcomes which in turn, lead to increased anxiety about social situations. There has been evidence to support this theory proposed by Spence et al. (1999), such as studies that examine how people with SAD behave in a laboratory setting, as they tended to have deficits in social interactions and engage in fewer social interactions overall (Spence et al., 1999, Beidel, Turner & Morris, 1999). A recent article

by Rapee & Spence, (2016) proposed the idea that negative social experiences with peers increase the risk of both developing and perpetuating social anxiety by playing on existing negative beliefs, fears, and avoidance behaviors, as they relate to social interaction.

Developmental Considerations; Adolescents and College Students

Anxiety in Adolescents and College Students

A study by Purdon et al. (2001) examined undergraduate students using self-report measures to determine levels of social anxiety as well as self-impressions of social desirability and interpersonal social skills. People who marked themselves as more socially anxious are more likely to judge others who they also deemed socially anxious negatively. Additionally, individuals who demonstrated higher levels of anxiety subsequently judged others as having weaker character, less compassion, and appear less attractive compared to others who did not appear openly anxious. However, the results of the study also showed upon noticing another individual was anxious, the majority of participants reported that it would not affect the perception of another person's traits such as reliability, intelligence or general mental health.

Risk Factors in Childhood and Early Adolescence

Many risk factors during childhood have been shown to greatly influence the risk and outcomes of social anxiety in young adults, such as family functioning and peer interactions. Many of the most negative and concerning situations for children and adolescents take place within the context of school, where there is constant social interaction, social performance, and new challenges encountered with peers (Blote et al., 2015). Instances of adverse life experiences in childhood are especially poignant when they occur in in a family setting as young children

spend a large portion of their time in a family environment, vicariously learning through caregivers. Traumatic early life experiences such as isolation, bullying, or violence all affect the development of SAD (Binelli et al., 2012; Schlenker & Leary, 1982). Further, socially anxious people also tend to recall memories as more traumatic and experience more emotional reactions when recalling these memories than non-anxious individuals (Erwin, Heimberg, Marx, & Franklin, 2005).

Environmental changes and increased social demands can influence the presenting and occurrence of social anxiety; a study by Lesure-Lester and Evelyn (2001) examined dating competence, social assertion, and social anxiety in college students. This was done using two scales: Social Anxiety Thoughts Questionnaire (SAT) and Social Avoidance and Distress Scale (SAD) to show a relationship between levels of dating competence and social anxiety. These results support the theory that many interpersonal interactions are stressful, especially for college-aged individuals, and can be used for practical applications in life to reduce the stress of romantic and social situations. Universities market themselves in respect to their demographics, location, specialization and school type, all of which impact the environment and culture of the school, subsequently affecting social environment and competition. This change in environment and increase of social demands affects base levels of anxiety and behavior in college students and is therefore possible that students at different colleges and universities could differ from each other significantly. This is crucial to consider when running studies on college campuses, as the results obtained cannot always be generalized to the public as a whole depending on the racial, cultural, and socio-economic status of the participants. Previous studies that have examined parental conflict and family cohesion with social anxiety in college studies have had rather homogenous studies which raises the concern of applying the results found to the public even

though they were statistically significant and provided insight into the relationship between these different factors (Johnson & LaVoie, 2001). There is significant overlap between the populations at risk for developing social anxiety and the ages of those who are enrolling in an undergraduate university or college. Peer influence and individual-specific environmental factors are important in how an individual is affected (Lesure-Lester & Evelyn, 2001; Ollendick & Hirshfeld-Becker, 2002). Anxiety can increase when introduced to an unfamiliar environment that is socially challenging, such as the transition to college, as new complex social situations arise such as concerns of romantic involvement and the navigation of new peer relationships.

Current college students have spent much of their lives surrounded by advancing technology. The theory of social compensation posits that individuals who are socially anxious and are low in perceived social competence are more likely to use online resources to reach out socially, as a means to make up for the perceived deficit in their social skills and confidence (Valkenburg & Peter 2007). This perceived social deficit greatly impacts those with social anxiety. Online social networking sites could be beneficial to those with social anxiety as online interactions provide a buffer, which provides more time to think about things that can be difficult about social interactions in person such as word-choice and conversation topics. Another benefit of online social interactions is that they can serve as practice for in-person social interactions, or provide an excuse as to why an interaction was not, so the anxious individual does not blame themselves. However, in some cases, it can also increase the social pressures on young adults to be interacting with even greater frequency, which could result in additional negative stress on social interactions.

Young Adult Development

Emotional, social and physical maturation often occurs during young adulthood while people are typically in college. Societal expectations can occasionally conflict with an individual's behavior if said pattern in unusual as it often can become when adapting to a new environment with different social rules and roles (Block & Robins, 1993). Interpersonal competence is an important aspect of comfortably situating oneself in a new environment such as developing strong relationships with peers and other forms of social interaction that can signify peer acceptance, something which is a challenge to many new college students. Executive functioning and control are also vital to controlling behavior and acting with social expectations which aids in the formation of social networks. People with elevated social anxiety experience deficits in their attentional control and cognitive abilities. This dysregulation affects people's interpersonal relationships as inhibition and sustained attention interfere with their abilities to focus and respond in social situations, especially when there is threat-relevant stimuli present or the environment is unfamiliar, which often occurs in academic and social college settings.

Emotional Development in Adolescents and Young Adults

In order to understand predictors of anxiety and emotional adjustment in college students, early researchers emphasized the importance of developing individuation and autonomy (Arnstein, 1980; Mattanah, Hancock, & Brand, 2004). It was theorized that students who had a stronger, and thereby healthier, self-awareness and self-identity would be both less anxious and better equipped to handle the increased stress and challenges associated with the transition to increased academic and social stress that commonly occurs when living alone and navigating college and life independent for the first time (Arnstein, 1980). 'Separation-individuation' is the

the lack of negative feelings, such as anxiety and guilt, about the process of separating from one's home. Adolescents who were independent but still maintained a close and supportive relationship with their guardians fared better than people who either attempted to isolate themselves from their parents, or did not have a supportive family system. Further, adolescents who did strive to isolate themselves had an increased risk of developing behavioral problems and anxiety (Grotevant, 1989; Ryan & Lynch, 1989).

Parental Attachment and Emotionality in College Students

A study by Mattanah, Hancock, and Brand (2004) showed provided evidence suggesting that a secure attachment between parents and their children can be a good predictor of academic, personal and social performance and adaptation to college life. Positive social adjustment is indicative of healthy social interactions and therefore increased social interactions, and lower levels of social anxiety. The theory of individuation-within-relatedness in late adolescence occurs within the context of ongoing relationship security and is therefore highly indicative of adjustment and emotional stability (Mattanah, Hancock, & Brand, 2004). While college students are fairly self-reliant and usually live independently of their parental household, parental attachment and family cohesion can also influence children and adolescents' feelings of loneliness and social anxiety. Interparental conflict, family functioning, and family cohesion all affect the manifestation of social anxiety and the internalization of anxiety symptoms across gender. These environmental, family-driven factors are salient throughout childhood and into late adolescence (Johnson & LaVoie, 2001).

Social Deficits in Peer Relationships; the Maintenance of SAD

Peer Relationships and Communication

As with all people who experience Social Anxiety, adolescents with SAD experience distorted beliefs about social rejection and therefore tend to avoid social stimuli such as interpersonal interactions and direct eye contact (White, Nicole, Capriola-Hall, Wieckowski, & Ollendick, 2019). Navigating peer relationships during adolescence and young adulthood requires increased attention and heightened social abilities that affect all resources as more effort is dedicated social interaction including memory, attention, group activities and participation and perspective-taking. Since people with SAD have a deficit in their social skills, these necessary elements of social relationship and friend-making become increasingly strained over time, subsequently perpetuating the increasing cycle of anxiety (White et al., 2019; Heeren & McNally, 2018).

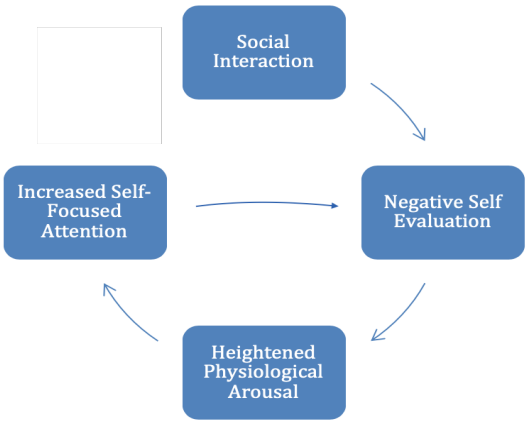

Figure 2. Model of Automatic Negative Self-Evaluations in SAD.

Compared to individuals with SAD, people with Generalized Anxiety Disorder do not experience the same types of social impairments. Despite remaining impairments in overall

social skills, there is no significant difference between children without GAD and those with the diagnosis in terms of social competence ratings (Scharfstein, Alfano, Beidel, & Wong, 2011). In comparison, those diagnosed with SAD were found to have lower social competence scores, have fewer friends and all have greater difficulty making new friends than children with either generalized anxiety or without any anxiety. An important element of building trust and relationships is following the behavior of social norms, such as polite conversation, eye-contact and shared experiences. However, highly anxious individuals (both with and without social anxiety) are likely to have greater difficulty making and maintaining eye-contact with others, thereby negatively affecting their relationships. Comparing people with SAD and GAD provides evidence that SAD is a separate disorder and those with the disorder should not be dismissed as shy people who also have GAD.

Behavioral Avoidance

The role of avoidance behaviors in social anxiety disorder is similar to the concept of conditioning theory which states that fear persists when the conditioned stimulus that the fear is centered on is avoided as avoidance prevents repeated exposures which would otherwise extinguish the fear associated. (Rudaz, Ledermann, Margraf, Becker, & Craske, 2017). Some cognitive models of SAD theorize that to cope with their anxiety in social situations, socially anxious people often engage in avoidance behaviors that help them feel more comfortable, such as eye-contact avoidance and fast-talking to avoid lulls or long pauses in conversation. These safety behaviors, are often avoidance behaviors that disrupt a person's ability to accurately process their social environment, and result in subsequent social failures to be attributed to the aforementioned behaviors (Rudaz et al., 2017). These avoidance behaviors, also described as

safety behaviors, are key in moderating socially phobic behavior, and are a key element of the cognitive model of social anxiety posited by Clark and Wells (1995).

Need for Acceptance

The fear of social failure and judgment is a phobia that dramatically affects the behaviors of people who have SAD. The link between social anxiety and peer acceptance is important to examine as it is a predictor of adjustment, meaning that children with lower adjustment tend to have worse social skills and are more disliked by their peers, increasing the risk for behavioral and emotional deficits and increasing anxiety (Greco & Morris, 2005). Although the goal of social interaction is to strengthen relationships and have positive interactions, the outcome for socially anxious individuals is often not as intended and negative social interactions, in turn, lead to social neglect. Social neglect is also associated with greater internalization of negative opinions and social difficulties, perpetuating the cycle of social anxiety. However, the need for social relationships is independent of social anxiety. A study by Purdon et al., (2001) found that while most people could distinguish between social-anxious and non-anxious individuals, this recognition did not affect the perception of a person's intelligence, reliability, health, or ambition. However, the fear that others will negatively judge those with SAD and therefore not accept them is still a driving concern of those with SAD. The most commonly feared social situations for children center around unstructured interactions with classmates and peers such as lunch periods where they must determine where to sit in the cafeteria, extra-curriculars, as well as everyday conversation (Greco & Morris, 2005). However, despite this report, socially anxious individuals engage in negative post-event processing and fear peer judgment regardless of whether the peer in question is negatively attending to them (Rowa et al., 2016). There is a

positive association between social anxiety and peer rejection. In studies where undergraduates are the participants as well as the experimenters, the need for acceptance and the fear of social rejection could affect their willingness to participate in a study. Additionally, the desire for positive peer social interaction and evaluation could result in atypical performance during an experiment. If a severely anxious individual chooses to participate in a study but is cognizant of a potential pre-existing relationship with the experimenter, the change in peer status during the experiment could affect their task-oriented attention and lead them to be increasingly focused on task-irrelevant social cues.

Atypical Process of External Stimuli

Cognitive Biases

Information-processing models of emotional disorders have speculated there could preferential processing of threat-relevant stimuli in social anxiety such as increased sensitivity and fear towards social ridicule and embarrassment, all of which are central tenets of SAD. The most common aspects of cognitive bias in social anxiety are faster responses to socially threatening cues, increased negative interpretation of social cues such as facial expressions, and vocal patterns (Kreifelts et al., 2014). Information-processing biases are likely causally implicated in social anxiety as individuals with social anxiety tend to attend more closely to both threat-relevant information and ambiguous stimuli, since it is an unknown and could be threatening (Kuckertx & Amir, 2014). Kreifelts et al. (2014) postulated that observable behavioral modifications were found to be related to the dorsal attention system in people with severe social anxiety when given a whole-brain analysis. The primary brain region identified as linking social anxiety and negative attention bias is the left dorsolateral prefrontal cortex. The

left DLPFC is a region of the brain that is typically associated with executive function, working memory, and selective attention (Sturm, Haase, & Levenson, 2016). This region is also a vital connection between the parietal cortex, which integrates sensory input, and dorsal attention networks which process sensory information and response (Sturm et al., 2016). Both people with moderate and high levels of social anxiety have been found to inherently have moderate attention bias, and respond differently to neutral stimuli compared to those without any diagnosed SAD. Since people with SAD have an increased expectation that others will view them negatively, they also tend to perceive neutral feedback as more negative compared to individuals with low anxiety, thereby forming a more emotional response to that stimuli and reinforcing the expectation of negative social interaction (Smith & Sarason, 1975).

Attention Bias. Eysenck and Calvo (1992) discussed the attentional control theory, which assumes that anxiety impairs the goal-directed (stimulus driven) attentional system attention and potentially increase attentional control and increasing attention to threat-related stimuli, impacting the extent to which different stimuli is processed by the stimulus-driven attentional system. This theory was developed from the original processing efficiency theory. However, anxiety does not universally negatively impact performance effectiveness or quality in all situations (Eysenck, Derakshan, Santos, & Calvo, 2007). An important aspect of attentional control theory is the idea that an increase in an individual's self-awareness and fear of negative evaluation will lead to an increase in anxiety behaviors. The underlying causes of these deficits are debated. Attentional control, or a participant's ability to effectively complete a task, might be impaired for those with social anxiety although researchers have looked into how this impairment might be attenuated. Eysenck et al., 2007 discussed the two alternate possibilities

that the causes of these attentional deficits either serve as a contributing factor of anxiety or these impairments in attentional control might be beneficial to socially anxious people as it would allow them to better attend to their environment and notice threat-relevant stimuli. Over-attending to threat-relevant stimuli seems as though it would primarily serve as a negative perpetuating factor of SAD as socially anxious people are already hyper-sensitive and over-attentive to social stimuli and fear of negative evaluation or performance. Further, a close association between attentional control and working memory capacity (Redick & Engle, 2006; Jonides, 1981) has been found, including evidence demonstrating how working memory load impairs goal-directed attention.

Sensory Processing in SAD

Evidence has found that people with low neurological thresholds, meaning those who have a low range of threshold for noticing and responding to sensory events of everyday life, often demonstrate fearful and controlling behaviors such as negative responses and sensation avoidance. Similarly, reports have suggested that a link exists between sensory processing, which is related to primarily low neurological thresholds, and the behavioral and physiological threats of anxiety, thereby acting as a possible risk factor for increased anxiety levels (Engel-Yeger & Dunn, 2011). Sensory processing is important to consider when discussing attention and focus in people with SAD as many individuals with this disorder have enhanced exogenous attentional systems and demonstrate higher than average concern levels in respect to their levels of arousal during social situations (Hofmann & Bitran, 2007). Individuals with SAD reported higher levels of sensory processing sensitivity than individuals with generalized anxiety,

providing evidence for the positive correlation found between harm avoidance, sensory sensitivity, and social anxiety (Hofmann & Bitran, 2007).

Social anxiety has been examined in its relationship to sensory-processing sensitivity as well as endogenous (internal cause or origin, goal-driven, top-down attention) and exogenous (related to/developing from external factors, otherwise referred to as bottom-up, stimulus-driven attention) attentional perceptions (Moriya & Tanno, 2009). Only exogenous factors are significantly impacted by SAD severity, which is demonstrated by the difference in task-accuracy for high SAD individuals. More severely socially anxious individuals show an automatic attraction and awareness of salient stimuli even when the stimuli are non-emotional. These findings suggest that people with severe SAD have an enhanced exogenous attentional system which is why those with SAD rapidly detect and attend to threatening stimuli in social situations (Moriya & Tanno, 2009). The increased attention to socially threatening stimuli is not contested although the potential impairment and meaning of these similar findings. This study by Moriya and Tanno (2009) was built off the previous research conducted by Eysenck et al. (2007). Although their findings were consistent with the determination of an enhanced system of exogenous attention in people with anxiety, it was inconsistent in regards to the endogenous attentional system as this was not found to be affected by SAD.

Once people with high social anxiety notice threatening stimuli, they display great difficulty in controlling their attention and disengaging from that stimuli. In this study, enhanced exogenous attention was found to be specifically linked to social anxiety, and was uninfluenced by similar conditions such as trait anxiety and depression. The findings therefore provide evidence in favor of the theory the attentional systems for processing external stimuli are connected explicitly to social anxiety.

SAD and Sensation Perception

The conclusion that individuals with high levels of social anxiety potentially have enhanced exogenous attention for emotion (Mishra & Srinivasan, 2017) is reminiscent of research done regarding interoceptive sensitivity. Enhanced sensory sensitivity has been found to impact motivated behavior and self-awareness, which is enhanced in those with SAD. This awareness is controlled part a network between the insula, dorsal anterior cingulate gyrus, and amygdala which identifies emotionally salient information by attending to internal and external stimuli, thereby guiding reactivity, perception and behavior. If this 'salience network' is over sensitive or communication is faulty, it is reflected in dysfunctional processing of threatening stimuli (Gorka et al., 2015). Self-awareness is closely linked with social anxiety, many people with SAD constantly check their appearance as well as their presentation such as facial expression, body language and positioning, and social responses. People with SAD tend to be hypersensitive to social feedback, leading to a feedback loop of concern and potentially heightened interoceptive sensations and awareness as well as heightened exogenous attention; individuals with anxiety are keenly aware of internal sensations and emotionally salient stimuli. There is a tendency for these individuals to focus their attention to internal arousal cues when engaged in social interactions in order to adjust their behavior depending on how they believe others may perceive their levels of general arousal and potential anxious behavior (Wild, Clark, Ehlers, & Mcmanus, 2008).

A study by Wild et al. (2008) examined how the perception of amplified arousal in a false-feedback experiment affected participants self-reported increased feelings of performance, anxiety cues, and anxiety visibility based off feedback they experienced. Sensory-processing

sensitivity and social introversion are independent variables that are highly correlated with instances of social anxiety and difficult childhoods (Aron & Aron, 1997).

Performance Anxiety in SAD

As social anxiety is most noticeable when an individual with SAD is in a public and social setting, social performance is a key component of the disorder. Loneliness, poor interpersonal skills, and isolation are all common features of SAD that make the disorder debilitating. Further, social performance deficits are also often found in those diagnosed with SAD. The social-performance issues are relatively apparent to peers can, therefore, impact quality of life and social skill growth. As first described by Jones and Berglas (1978), self-handicapping is an alternative self-presentation strategy used some people who may be faced with social difficulties. Self-handicapping is a strategy used by an individual in order to provide themselves and others with a reason to excuse any failure or difficulty they may encounter. This strategy of self-impediment affects those with higher levels of social anxiety in instances such as: in a situation where anxiety was not a viable explanation as to why a person exhibited lower performance on a task than expected, people either reported reduced effort on the task as an alternative strategy for self-protection (Smith, Snyder, & Handelsman, 1985).

One cognitive approach to understanding SAD suggests that excessive levels of concern and focus on one's own performance in a social situation, known as post-event processing, plays an important role in the maintenance of anxiety (Rowa, Gavric, Stead., LeMoul, & McCabe, 2016). Post-event processing specifically refers to negative rumination of a social interaction, and occurs with much greater frequency in socially anxious individuals than non-anxious individuals. Since this phenomenon is connected to self-perceived social performance, more

severe cases of social anxiety are correlated with increased instances of engaging in negative post-event processing. As such, post-event processing has been found to aid in the maintenance of negative self-evaluation over time (Rowa et al., 2016). Performance is an important aspect in all types of anxiety disorders, including generalized social anxiety disorder. This fear of potential negative evaluation can result in performance impairments in all types of environments, even those that seem minimally evaluative (Maresh, Teachman, & Coan, 2017). This concept is similar to that of attentional control theory: that attentional deficits will occur even in the absence of threat. Fear of negative evaluation has been shown to affect efficiency, but not accuracy, on working memory tasks for individuals with social anxiety. Additionally, fear of negative evaluation is greatly affected by the presence of a peer or authority figure (such as an experimenter) being present in the room with the participant while they are attempting to complete a task. It is primarily the presence, not the identity, of another individual in the room when a task is being attempted that affects the performance of a socially anxious participant. However, knowing that another individual will be present while the participant completes the task given (even though the experimenter will not be able to see the participants results) does elicit higher feelings of anxiety and increased awareness of being monitored (Maresh et al., 2017). This heightened fear level may result in participants diverting their attention from the original task to both their own behavior and the experimenter's perception of their actions. Higher levels of social anxiety result in increased attentional towards other people who you might see or interact with, as they act as task-irrelevant distractors, using attentional resources that would otherwise be focused elsewhere, such as the task given. Therefore, it makes sense to conclude that the presence of the experimenter will cause any impairments the participant may

have to worsen, negatively impacting cognitive performance, regardless of whether there is any overt social evaluation.

SAD and Working Memory

Working memory capacity is an important cognitive function that influences attentional control (maintaining task-relevant information in an active), as well as psychopathological traits such as anxiety (Moriya & Sugirua, 2012). Moriya and Sugiura (2012) suggest that cognitive performance might be enhanced as a result of certain situational factors, which is very different than how others examined and perceived cognitive performance in individuals with social anxiety. Studies have provided conflicting evidence for how social anxiety and visual working memory are related, and whether or not more severe social anxiety negatively affects working memory. The fears associated with social anxiety act as a constant added stressor for performance and cognitive abilities on a daily basis, acting as a regular cognitive impairment as high pressure and fear of negative evaluation negatively influence task performance. Although socially anxious individuals might have high working memory capacity, the traits of SAD impair this, as can be seen in lack of top-down control and performance when exposed to task-irrelevant distractors (Moriya & Sugirua, 2012). Studies based off of Eysenck's theory of attentional control found that when people with anxiety determined themselves to be under threat, it is necessary to allocate visual attention more widely in order to scan for threatening stimuli. High trait anxiety does lead to higher attentional resources as a result of this attentional need (Bishop, 2009; Moriya & Tanno, 2010).

An alternative cognitive theory of social anxiety proposes that biased attention, one example of which is self-focused attention, is key feature that aids in maintaining an individual's

social anxiety. Evidence has been found in support of this claims that persistent biased attention is perceived by anxious individuals as a social threat, significantly impacting the maintenance of social anxiety (Judah, Grant, & Carlisle, 2016). The thought processes of concern and constant contemplation are core features of anxiety that also use working memory, thereby potentially negatively impacting attentional control and working memory capabilities in individuals with SAD (Judah, Grant, Lechner, & Mills, 2013). Although childhood anxiety and working memory are both important to academia and social interactions, there have not been many studies that examine a possible connection between working memory, social anxiety, and academic performance.

It has been found that the ability to understand and accurately process social cues is dependent upon the availability of cognitive resources. When exposed to neutral words, non-anxious people demonstrate better working memory capacity, although socially anxious individuals demonstrated better working memory capacity when engaging with threat-relevant words. This enhanced working-memory capacity for socially relevant information is attributed to how socially anxious individuals are practiced with this as they are constantly scanning for socially threatening stimuli (Amir & Bomya, 2012). Generally, higher levels of anxiety predict poor performance on cognitive tasks because anxious people experience unwanted thoughts that use their limited attentional resources while they attempt to complete a task. These cognitions are not consciously summoned, and occur outside of a person's control. Socially anxious individuals tend to have impaired performances and lower task-accuracy for working-memory tasks if the task is presented following exposure to threat-relevant stimuli. This is because threat-relevant stimuli for people with SAD is considered socially relevant information and exposure to this will affect their attention bias as unwanted cognitions divide their attentional resources, resulting in

greater attention to the socially-relevant information and their own behavior instead of the task presented (Amir & Bomya, 2012; Eysenck et al., 2007). The concern over one's own behavior and the fear of negative evaluation from a peer are more impactful and overwhelming than the working-memory task presented. The question of cognitive resources and attention bias is an interesting and critical aspect of social anxiety, as are the factors that influence their development.

Conclusion

Genetic and environmental factors work together to influence the development of social anxiety and its increased prevalence in certain populations. The greater the number of risk factors a person encounters, the more likely they are to be exposed to an interaction between them the results in the development of social anxiety disorder. It has been established that experiences such as childhood violence, poor social models, and negative social experiences are highly impactful and increase the likelihood of developing social anxiety or a comorbid disorder at some point over the course of an individual's lifetime, although none of these are a guarantee of developing SAD. Exposure at different developmental stages can also affect the likelihood of developing the disorder.

Current Study Proposal

Overview and Rationale.

This proposed study hopes to examine college student's social anxiety levels, and the environmental factors that might influence the development and presentation of social anxiety symptoms. Many studies have been conducted on the correlations between social anxiety and

negative childhood experiences (Binelli et al., 2012; Aron, Aron, & Davies, 2005; Blote et al., 2015), parental relationships (Aron, Aron, & Davies, 2005; Knappe et al., 2009; Mattanah, Hancock, & Brand, 2004), and sensory-perception (Hofmann & Bitran, 2007; Heeren & Mcnally, 2016; Moria & Tanno, 2009). However, to my knowledge, there has yet to be a study that examines the direct comparison of these risk factors in American college students using self-report measures.

In the proposed study, I will be conducting an experiment that will allow me to examine the connections between these aforementioned factors in a small sample population of young adults currently enrolled at a college or university. This study seeks to examine previous findings regarding how genetics, negative family environment, and other important risk factors influence the development and manifestation of SAD in a new way. Previous longitudinal studies that have examined these risk factors only utilized responses from the parents of those with SAD, and not the children or adolescents themselves (Knappe et al., 2009; Lieb et al., 2000). I am interested in seeing if commentary about social anxiety and performance itself will impact individuals with social anxiety differently depending on either their level of social anxiety or their background.

The rationale behind using an online self-report questionnaire is because it will allow for more straightforward data collection, especially since online questionnaires are easy to fill out and college students are frequently exposed to this type of survey format. Self-report questionnaires also allow for the retrieval of information that would otherwise be inaccessible as it is not possible to conduct an observational study in this case and are therefore widely used in studies about family functioning and social anxiety. The post-task questionnaire serves as a tool to confirm some of the potential conclusions of the study. In this study, it is hypothesized that decreased performance on the second trial of the n-back for participants in the anxiety

manipulation condition is indicative of susceptibility to peer social concerns, and has greater attentional issues such as self-focus that detrimentally affect task performance task-relevant information. The comparison of overall score on the n-back (T2 - T1) serves as a means to compare overall working-memory across all participants outside of the anxiety manipulation.

I hope that this study will enable further research to be conducted using college students to examine family background on the development of social anxiety. Ideally, such studies will more closely examine the interaction between these variables of family and anxiety symptoms, and what treatments or activities can be implemented to help mitigate the negative emotions that are fundamental to social anxiety. The experiment is designed to be concise so it can be quickly completed in one 15-minute period, to encourage focus, engagement, and completion of the entire experiment.

I expect that participants with higher levels of anxiety will perform significantly worse than low anxiety individuals when exposed to the same manipulation, and will also be far more likely to report having a less stable and consistently positive childhood. I theorize this would occur because the development of SAD is affected greatly by both genetic and environmental factors, as mentioned earlier and that participants who reported more disturbed childhoods would tend to be in the higher anxiety categories. If this is the case, then those higher anxiety individuals will have more severe cognitive biases, and the peer critique and reference to behavior would be distracting and disruptive compared to low-anxiety individuals in the same condition. If an individual is predisposed to higher levels of anxiety, and then is raised in an environment that is not designed to control for this and mitigate potential social anxiety, then the anxiety is likely to increase or develop more severely compared to another individual with the

same genetic risk factors and family background but who was afforded better tools with which to combat and cope with their social anxiety.

The hypothesis that high anxiety participants will perform worse on the n-back task is based upon previous research that found when an individual's self-awareness and concern is raised there will also be an increase in their anxiety symptoms and fidgeting behavior regardless of whether or not it is intentional or conscious (Berggren & Derakshan, 2013; Eysenck & Derakshan, 2007).

Experimental Hypotheses

Hypothesis 1. High anxiety participants are more likely to have experienced an inconsistent/negative childhood than low anxiety participants, and will achieve a lower overall score on the working-memory task than participants categorized in the low anxiety, consistent childhood category.

Hypothesis 2. Individuals with higher levels of social anxiety will be more susceptible to the social anxiety manipulation and therefore perform worse on the second 2-back task than low-anxiety individuals in the same condition. I further theorize that participants who are exposed to peer critique and commentary about their behavior [manipulation condition] are more likely to show an increase in notable anxiety behaviors such as fidgeting and face touching as a result of increases self-consciousness and heighted social anxiety.

Hypothesis 3. Higher anxiety participants are more likely to report that a parent or guardian either showed symptoms they considered to be related to social anxiety, or discussed having social anxiety, more frequently than those will low levels of anxiety.

Method

Participants

Young adult undergraduates (125 women, 135 men, mean age = 19.5, age range: 18-23) will be recruited from Bard College's campus. Recruitment will occur through informational posters advertising the study posted in the main buildings on campus, as well as through 3 separate posts to the official Bard Students Facebook page using the poster design. Lastly, there will be 2 tabling session that will take place in the Bertelsmann Campus Center, where the experimenter will sit at a table with their poster, in order to encourage people to engage and sign up for the study. Participants will be compensated for their participation by having their name entered into a lottery for a chance to win a 25$ Amazon gift card. Participants will be randomly assigned to either the control condition or the manipulation condition which will differ only in the scripted dialogue spoken to the participant in between the two working memory tasks.

Materials

A dedicated laptop will be used from the Psychology department that will contain all of the data, questionnaires, and computerized tasks that would be part of the experiment. Informed consent [Appendix F] and debriefing forms [Appendix G] will be distributed to all participants.

Recruitment Materials. [Appendix A] Participants will be recruited via posters displayed in major buildings around Bard College's Campus.

Pre-Task Questionnaire. [Appendix B] The pre-task demographic questionnaire will ask the participants to reflect on their family and childhood experiences during different developmental stages in their life, and whether or not any parent or guardian figure discussed or demonstrated any symptoms of social anxiety. In order to streamline the response process and

alleviate the stress and anxiety of recalling childhood memories, all the questions will be multiple-choice. By lowering the demands of the questionnaire, stress will hopefully be lessened as participants will no longer have to recall specific memories and describe them with the additional demands of recreating the potentially negative and impactful childhood memories experienced. This questionnaire will also encompass the following:

Family Background. Family background and functioning will be assessed using responses from three simplified questions that are embedded in the Pre-Task Questionnaire, [Appendix B] that ask about an individual's childhood at 4 different developmental stages. The questions focused on location, parent's marital status, and the general consensus of happiness at that stage of development. The next section of the questionnaire was created with the intent of gathering an overview of family structure and functioning at the different developmental stages in the participants' life, which was broken down into 4 sections to split life stages from the age of 0 until present day.

Social Anxiety Screener (Mini-Spin). [Part of Pre-Task Questionnaire, Appendix B] A three-question, self-report anxiety screener created by Dr. Jonathan Davidson at Duke University, will be used to quickly and accurately assess social anxiety. This social anxiety screener will be the final element of the pre-task questionnaire. The screener was derived from the original 17-item self-rated Social Phobia Inventory [SPIN] and consists of 3 questions from the SPIN that are considered the questions that was best able to detect generalized SAD. Each item is rates on a 5-point scale from 0 (not at all), to 4 (extremely).

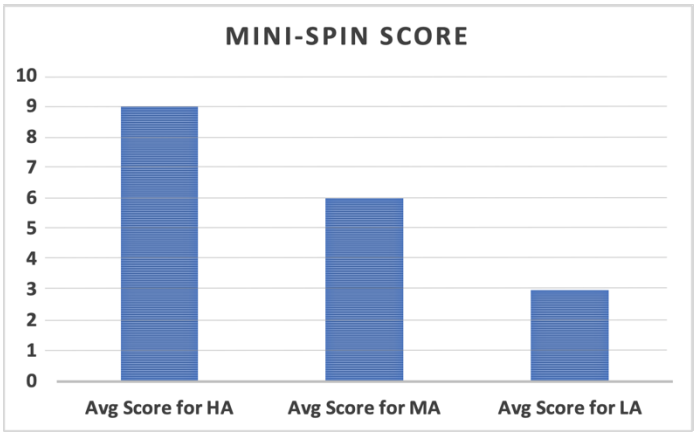

Figure 3. Average score on the Mini-Spin anxiety screener embedded in the pre-test Questionnaire.

According to previous research examining the accuracy and applicability, individuals who scored a 6 or greater demonstrated a sensitivity of approximately 88.7%, and a PPV [positive predictive value] of 52.6% for GSAD [Generalized Social Anxiety Disorder] (Conner, Kobak, Churchill, Katzelnick, & Davidson, 2001).

Working-Memory Task; N-back. [Appendix C] This portion of the experiment will be broken into 2 sections, not including the demo and practice portion of the n-back task. The task will be a silent, color version of the 2-back task. For the silent, visual n-back, participants will be shown a grid on a computer screen, and will be given the goal of identifying if the stimulus repeats. In this case, the visual stimulus is a colored square, and the participants will be monitoring if the of the squares shown on screen repeat either in color or in location. The goal is to identify if the current square matches with a previously shown square at a predetermined lag (e.g., for Lag = 2, the goal is to detect if the current stimuli matches the visual stimuli presented two prior).

Participants will be given verbal instructions on how to complete the task, followed by an opportunity to ask for clarification before the visual list of the same instructions will be displayed on the computer screen. Following this, the experiment will help guide the participant through a practice round of the task, allowing each participant to practice and confirm their understanding of the tasks. This practice session is designed to account for task confusion, so that when the participants are given the actual task the data will be less variable. The practice round will be a full trial of the 1-back before, after which the instructions for the 2-back version of the task will be reiterated. The version of the N-back being used will be a 2-back, silent, version where the location and color of the squares presented is the focus of participants.

Post-Experiment Questionnaire. [Appendix D] The Post-Experiment Questionnaire will collect information about the participants' experience during the task such as whether they experienced any increases in anxiety, their ability of focus during the task, and the difficulty of the task.

Experimenter Script. [Appendix E] The experimenter will follow a clear script that includes written directions for both the control and manipulation conditions. The script will ensure that the only change between the two conditions will be the experimenter's commentary about social anxiety behaviors and the participants performance.

Procedure

Each experimental session will begin with the participant filling out the Pre-Task Questionnaire a laptop provided to them. Upon completion of the questionnaire, each participant will be presented with the next stage of the experiment, the N-back task. This task will be presented to the participant as a 'computer game', and will be completed on the same computer

that was used for the questionnaire. Each trial will begin with instructions appearing on the screen, with a simple visual demonstration of the goal of the task. Participants will be given an opportunity to ask for clarification following the appearance of the demonstration and instructions on screen. Following this, a practice session will begin in order to allow the participants to familiarize themselves with the n-back, to ensure that participants are attentive and fully understand the goal before beginning. Each trial is 1 minute and 30 seconds long.

In between the two session, participants will be given a one-minute break so they can rest their eyes and look away from the screen. This break will also give the experimenter time to engage the participant in conversation. Depending on the condition, the experimenter will either engage in small-talk that is not relevant to the task. After this, the second trial of the n-back will be run. Afterwards, participants will be given the Post-Experiment Questionnaire. This will be done to gather information about the participant's experience participating as whole in regard to difficulty, and potential increased levels of anxiety during different points during the task. This enables the understanding of how each element of the experiment affected the anxiety and emotions of the participant, as well as gathered feedback form participants about how complex they believed the task to be, their ability to focus, and what elements, if any, raised feelings of anxiety during the experiment.

Manipulation Condition. The control condition of the experiment will remain as previously described without any commentary by the experimenter that reflects on performance, social abilities, or behaviors. However, in the manipulation condition, in between the first and second round of the silent n-back task, the experiment is prompted to talk to the participant, using scripted dialogue that will bring up information regarding behaviors that an individual with social anxiety display, and the participants performance. This script can be found in Appendix E.

Although the dialogue will be scripted, the experimenter will not be reading pre-written lines in front of the participant, in order to make the conversation seem more natural and casual. More specifically, the experimenter will reflect on the participants performance, casually mentioning a few facts about how symptoms of social anxiety typically manifest in one's behavior. The experimenter will comment on how socially anxious people tend to act more distracted and fidget more frequently. This comment will be followed by a false observation that the current participant also touched their face multiple times during the first n-back trial, even if they weren't aware of it. This will be done before the second round of the n-back to allow for a performance comparison between the first and second n-back trials, as well as whether their anxiety increased, or their behavior is subsequently altered. This could happen if they are socially anxious and subsequently unfairly divide their attention between monitoring their worrying about their behavior and the task at hand.

Anxiety Level Scoring. Anxiety level will be determined by sorting participants responses, and placing them in either the High, Medium, or Low Anxiety group upon the completion of the experiment in order to create different categories to compare against 'childhood categorization' and performance on the n-back. The grouping will be based off of participants responses to the self-report anxiety screener, the Mini-Spin®, which will be imbedded in the Pre-Task Questionnaire. Anxiety level categorization will be determined by sorting the scores of the anxiety screener. Traditionally, a score of 6 on the Mini-Spin is taken as a likelihood of that individual actually having SAD. For the purposes of this study, participants who scored 8 or above will be sorted into 'High Anxiety', participants who scored between a 4 and 7 will be labeled as 'Medium Anxiety', and participants who scored a 4 or below will be labeled as 'Low Anxiety'.

Anxiety Behavior Scoring. Anxiety behaviors of participants will be measured by having the experimenter watch the behavior of the participant throughout each trial, and record when a participant seems to engage in a typical 'anxiety behavior'. Each time a participant visibly engages in a given behavior or physically reacts, a single point will be added to their overall 'anxiety behavior score'. Examples of potential behaviors include: flushed cheeks, face touching (such as rubbing one's nose or cheek), hair pulling or touching, tapping of fingers, or fidgeting with hands.

Childhood Scoring and Categorization. The responses on the pre-experiment questionnaire will be condensed, categorizing participants into three distinct groups: positive (consistent) childhood, neutral childhood, and negative (inconsistent) childhood. The questionnaire is broken down into four sections, distinguishing the four time periods from one another. Participants will be sorted into the negative/inconsistent childhood category if they reported more than one change in parents' marital status, two or more changes in location, or two or more selections of marking their own childhood as mixed or negative. Since this category is labeled as inconsistent/negative childhood (as both lead to increased risk of developing anxiety), there will likely be a large number of participants placed into this category. Only participants who reported selected 'neutral' when reflecting on 3 or more of the developmental reflection periods will be placed in the neutral childhood category. The 'positive' [consistent] childhood will consist of participants who mark their childhood as positive in at least three of the four sections, regardless of their responses to the other questions.

Performance Scoring. Working memory will be tested by examining performance on the n-back task. Overall performance will be measured by comparing the results of the first and second trials of the n-back task to see if there is a significant difference in score between the two

trials (T1 – T2). In the manipulation condition, the second trial will take place after the experimenter's conversation with the participant. Therefore, any decrease in performance can be attributed to an increase in anxiety as a result of the experimenter's speech, and potentially attributed to an increased in divided and weakened attention on the task presented.

Parental Anxiety Scoring. On the pre-task questionnaire, participants will be asked whether they believed if a parent or guardian exhibited socially anxious behavior, or ever discussed having social anxiety. Parental anxiety will be scored from 0-2, with each positive response to the two questions equaling a single point.

Predicted Results

The analysis of the data will involve the comparison of participants score on the anxiety screener imbedded in the Pre-Task Questionnaire (the Mini-Spin), the overall task performance the n-back, and finally, the responses on both the pre-task & post-task questionnaires. The data from the Pre-Task Questionnaires will be used to sort participants post-experiment into 3 levels of anxiety (Mini-Spin), and type of childhood experienced (pre-task questionnaire). Task performance will be measured by subtracting the score of the second trial (post experimenter engagement) by the score of the first task in order to get a single number score that will show if there was a significant difference found between the first and second trials. I expect to find results that are generally consistent with my main three hypotheses. I do not anticipate many of the participants to respond that another family member or caregiver has social anxiety, even if they may actually fit the criteria of SAD or a comorbid disorder. As an undergraduate, I am very concerned that it would be unethical for me to ask about a clinical diagnosis and the specifics of a student's background and family. This concern is why I chose to keep the phrasing of the

question vague. The analyses focus on comparing the results of the demographics questionnaire to the results of the working-memory task.

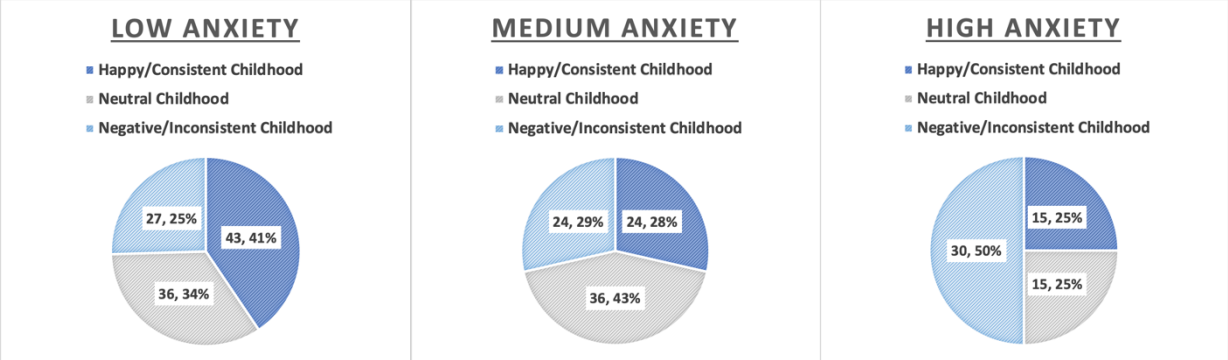

Figure 4. Total participants, sorted by theorized responses on the Pre-Task Questionnaire. Categorized by Anxiety Level (Mini-Spin Responses), and Childhood Scoring and categorization.

To test my first hypothesis, that high anxiety participants are more likely to have an inconsistent/negative childhood than low anxiety participants and will therefore achieve a lower overall score on the working-memory task than participants categorized in the low anxiety, consistent childhood category, a t-test will first be run between to compare the continuous variables of 'Childhood Score' and the categorical variable 'Anxiety Level Score' (as measured by the Mini-Spin). Consequently, I will run an ANOVA statistical test to analyze the different categorical variables of 'Childhood Score' against the continuous variable of 'Overall N-Back Performance'. I will therefore run an ANOVA, as each category of 'childhood experience' will be compared against the score overall n-back performance.

My second hypothesis postulates that exposing participants to mild critique or commenting on typical anxiety behaviors will increase their self-awareness and concern that they will be judged by those around them. Testing this hypothesis will necessitate comparing the second n-back trial score of all participants from each anxiety category group in both the manipulation condition and the control condition. Separately, comparing the average overall

score of both trials of the n-back task will show if there was a significant difference in overall accuracy and performance among High, Medium, and Low Anxiety. Performance on the working memory task will be measured by finding the difference between in performance between the first and second trial for the participants placed in each anxiety group, which will become the continuous variable 'n-back difference'.

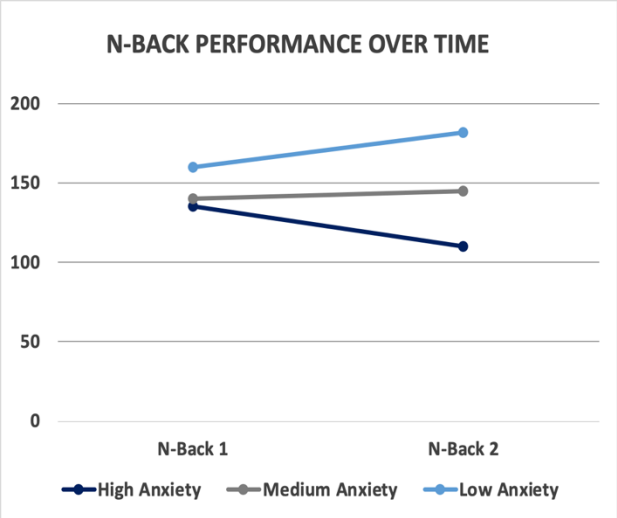

Figure 5. The average performance score on each of the two n-back trials conducted in the experiment. Participants in the medium and high anxiety condition are expected to show a minor, non-significant improvement in their performance and accuracy score. High anxiety individuals are expected to show a decrease from trial 1 to trial 2.

Figure 5 shows the predicted average results for each trial of the n-back given, which if correct, will provide evidence that more severely anxious participants will become distracted by task-irrelevant, socially-relevant information. A correlation will be run to determine the relationship between anxiety and n-back performance.

Finally, to test my third hypothesis, participant's responses from the Mini-Spin anxiety screener in the pre-task questionnaire will be analyzed, and each will be assigned the label of "High Anxiety', 'Medium Anxiety', or 'Low Anxiety'. To test the theory that participants who report that their parents also exhibited behaviors typically associated social anxiety will score

higher on the anxiety screener, I will use the average score of the categorical variable 'Parental Anxiety' and the categorical variable of 'Anxiety Score' all three anxiety groupings using an ANOVA, as there are more than 3 groups.

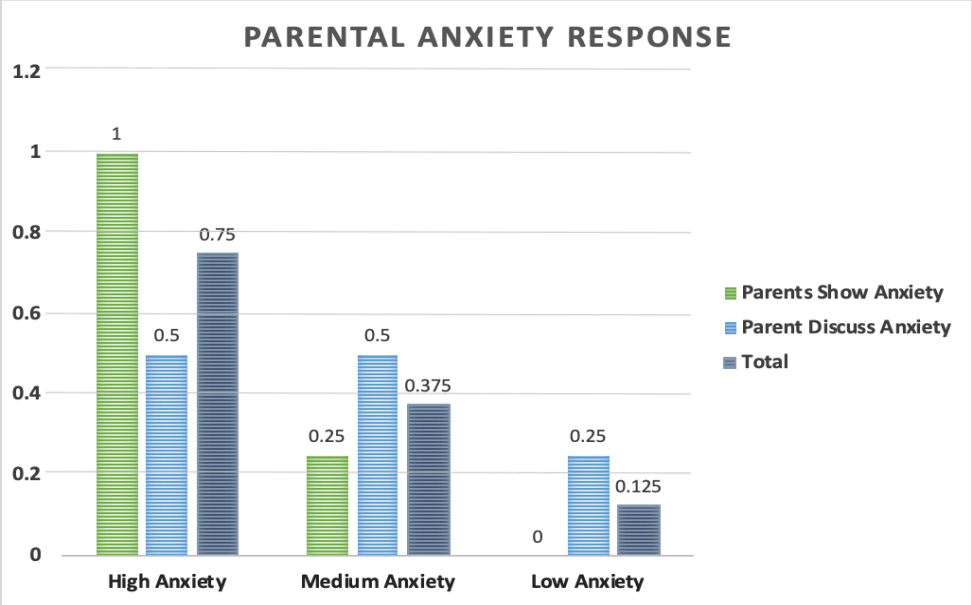

Figure 6. Comparison of participants who responded that their parents showed symptoms of social anxiety or discussed social anxiety with the participant, grouped by the anxiety levels of participants. Each response was scored between 0 - 1. For each question, a response of 'no' = 0, and a response of 'yes' = 1, with a maximum score of 2.

Discussion

The design of this experiment allows for a different view of family functioning and social anxiety than many previous studies. New insights can be derived by using college-aged participants instead of focusing on the parents of younger children, potentially demonstrating a new way to examine how family functioning and cohesion affects the development of social anxiety in youths, and what risk factors may play a role that were previously not as thoroughly considered. I think that I will generally find my hypothesis to be correct as the previous literature tends to be in line with the hypothesis put forth in this proposal.

As college-aged individuals are typically young adults between the ages of 18-22, they are independent young adults who are newly exposed to navigating social experiences on their own. College students function as newly independent entities but are still connected to the household and environment in which they were raised, often travelling multiple times a year. This status can potentially make the insight from college students about their childhood and family cohesion especially poignant. Furthermore, testing younger children on working memory would present a different set of challenges, as would asking them to articulate their experiences with social anxiety and earlier life experiences within their family. Young adults also possess better communication skills to discuss their thoughts and previous experiences than children.

This study aims to synthesize the findings of previous research done examining social anxiety and symptomology in adolescents and young adults in order to create a simplified preliminary study that will verify certain hypothesizes by conducting a study from a new angle, by asking young adults to reflect on their childhood and family functioning instead of only asking the parents to report this data. The current study also aims to examine how social input and commentary from a peer effects participant's current levels of self-awareness, focus, and social anxiety, as the peer is placed in a position of authority both as an experimenter and the commentator in this environment.

Having the experimenter mention anxiety in the manipulation condition will be done to allow a comparison between those who were exposed to socially-relevant conversation and those who were not in order to answer the main research question. Conducting this experiment in a neutral setting using a simple working-memory task (the n-back) was done to examine performance deficits and attention-biases, as well as to promote external validity as the events of the task do not fully replicate the demands of an academic setting. Having a manipulation

condition as well as a control condition is essential for this portion of the study. Sorting participants into three groups based on their responses to the short anxiety screener given at the beginning of the study, participants performance on the n-back task and reaction to the anxiety manipulation can be easily compared. Theoretically, this can lead to insights about how people may respond to distractions in other settings. One such possibility would be extrapolating these results to theorize how people of different anxiety levels might react to socially relevant stimuli in an academic setting where they are similarly engaging working and short-term memory. External validity and application to real-world scenarios are limited as this is only a preliminary step in analyzing how childhood experiences and family environment interact and affect attention and task performance.

If my third hypothesis is found to be true, it will provide evidence in favor of the theory that if a parent was generally perceived as an anxious individual by their own children that their children are more likely to also be socially anxious individuals. This is based more off of the first question, which asks more about the child's own perception of their parent or guardians' behavior and potential anxiety levels. This is why there is a second question on the pre-task questionnaire that specifically asks whether the same adult figure ever discussed their own social anxiety with the child. Based on previous research, I theorize that whether or not there was an actual diagnosis of SAD in the parent or the child, if there was still socially anxious behavior, it will influence the likelihood of the child developing social anxiety. This can be attributed to social anxiety that has developed but never been diagnosed either because it remained right beneath the diagnostic threshold, or because treatment and diagnosis was never sought out. The idea that environment and families can influence the development of social anxiety is because both heritability and shared environments can impact the development of the disorder. Biological

and shared-environment factors are important in the curation of experiences that shape the individual and the potential development of social anxiety and other comorbid disorders as do formative, individual experiences with peers and family members.

Because of the nature of responses and the categorization of childhood experiences, I imagine that inconsistent/negative childhood will have the greatest number of participants by a small margin, followed by the positive childhood category. Participants will be recruited from the general population, so I predict that this category will be so large because of the qualifiers for each category. Even though having a mixed childhood of positive and negative experiences or lots of change does not inherently make one's childhood negative, it does mean that it was inconsistent. If one's childhood is reflected on as emotionally positive and negative, then it aligns more with the label of mixed, or inconsistent, than the non-emotional neutral or the majority positive. An example of common change which can result in an inconsistent childhood is moving. Another would be the change in a parent's marital status, which is fairly commonplace in the United States. Although neither of these experiences automatically mean that an individual's childhood was negative because of these experiences, it is likely to make their childhood and adolescence more inconsistent or complicated which will place them in the mixed/negative childhood category. The neutral childhood will consist of participants who marked their childhood as neutral or mixed in at least three of the four sections asking about the general overview of their reflection on that development stage of their lives. A fairly small response is expected in this category as most people will likely respond with a more emotional reflection for developmental period such as "mixed" on the questionnaire as opposed to the non-emotional 'neutral' option. When considering childhood memories and intimate relationships, people tend to attach more emotional labels. I theorize that people will be more likely to recall

specific, poignant, emotional memories and will therefore be more likely to select a more emotion-based option for each of the four periods asked about. Long-term memories, such as those from early childhood, are influenced by an individual's emotion, later experiences, potentially influencing the emotions associated with memories when they are recalled (Buchanan, 2007). Emotionally based memories tend to be recalled with greater ease than non-emotional memories which will influence this selection.

Limitations

The current study has not yet been fully run on a college campus, as it had to be redesigned on the basis that asking questions that require an individual to recall previous potentially upsetting childhood memories could be too anxiety provoking. In order to account for this, the questionnaire has been greatly simplified by removing all short answer questions and replacing them with multiple choice options, as well as by shorting the questions themselves. When actually running this study, it will likely be difficult to recruit a large population, especially if using a small liberal arts college with a population as limited at Bard College. As a single undergraduate individual, it would be difficult to run a study that asks participants to reflect on potentially upsetting or negative childhood experiences, and to collect enough participants to have a sizable enough sample to test.

Beyond the concern that asking questions that require an individual to reflect on potentially emotional or upsetting childhood memory, there could be additional issues with recalling childhood memories. One such issue could be if there was an emotional response triggered by a question, it could be overwhelming. Further, there is a real possibility that memories could be suppressed if too emotionally taxing to live with, or even just regularly

forgotten over time. Socially anxious people frequently engage in post-event processing and negative rumination which negatively affects memory and increases anxiety and negative emotions. This possibility limits the types of questions that can be asked and raises concern over negatively impacting participants (Rowa et al., 2016). Furthermore, both the lack of knowledge about SAD as well as the stigma surrounding the disorder might discourage accurate responses even though the identity of the participants is confidentially and the survey is anonymous. Similarly, significant changes have been made to the questionnaires used in this study. While participants are asked to respond with a general reflection for the four separate developmental period in the pre-task questionnaire, the questions are intentionally minimal as this is all that is needed to subsequently categorize their overall childhood as neutral, positive/consistent, or mixed/inconsistent.

Another limitation to note in the design of the study is the format and questions on the pre-task questionnaire. The pre-task questionnaire also has some weaknesses such as the questions asked are very simplistic and are not able to adequately examine childhood cultural exposure or family dynamics in a detailed manner. The questionnaire fails to ascertain information regarding family size, organization, or culture. These factors may have a substantial influence on the development of social anxiety and the type of symptoms that manifest.

Furthermore, the n-back task explained in this experiment also has some weaknesses and limitations. One such weakness is that the n-back was taken from a website instead of being created and living on the computer used for the experiment. If either internet connectivity issues occurred or the website experienced functionality issues, it would prohibit the experiment from being conducted. A limitation of creating a program for the n-back is coding experience and complexity. Ideally, a unique, malleable, offline version of this task would be used and installed

permanently on the computer for this experiment. The possibility of confusion and practice effects on the n-back task remains a potential weakness of this study even though a detailed explanation of the task and a pre-task practice trial will occur.

The weakness of the anxiety manipulation limits the study's external validity and applicability to real-world social situations. This can be attributed to the concise nature of the commentary given by the experimenter during the short break between n-back trials, which may be compounded by the language and phrasing used. If the participant is not convinced that the experimenter's comments about their behavior and performance naturally arose, the results of the n-back task and the participants' behaviors could be significantly altered. Further, a clear and concise list outlining, qualifying, and categorizing the specific symptoms of social anxiety that are pertinent to the study would greatly benefit the anxiety scoring as well as the anxiety manipulation.

Although I theorize that regardless of how individuals initially behave, those who are exposed to a mild peer critique will alter their behavior following this interaction and false-social input regarding the participants own behavior, there are limitations on how this would actually be examined. Although the most common symptoms of anxiety are well documented, the proposed study relies primarily on measuring task accuracy and performance as an indicator of attention bias and increased social anxiety, instead of solely relying on the monitoring all of the participants movements. There would be many limitations in the monitoring and scoring of anxiety behaviors. One such limitation would be finding an accurate way of categorizing which behaviors should be counted, and how exaggerated each behavior should be in order to qualify. Since anxiety symptoms are so diverse and many are subtle physical traits such as an increased heartbeat, sweating, and flushed cheeks, as well as the behavioral symptoms such as fidgeting

and face-touching, it will be challenging to decide ahead of time which symptoms qualify and are measurable. Beyond this issue, it might be difficult to ensure that participants would be willing to grant permission to record the experiment as the added pressure of video recording could increase their anxiety and possibly detrimental impact task performance. Nevertheless, having video and coding procedures would help assure that behavior is properly coded, so the data are as accurate as possible. Although this would be very interesting to examine if appropriately done, it would also be challenging to do this in a discrete manner that would not increase pressure on the participants. This is why performance score on the n-back task is of elevated importance in the proposed study as it would provide more clear data to compare performance as a proxy for increased anxiety. However, it is possible that even though the experimenter is not facing the participant and monitoring them throughout the computer task, even the presence of another person can increase anxiety and affect performance from the beginning. This is a significant limitation of the proposed study. In hopes to moderate this effect, the primary emphasis will be placed on decreased performance on the second trial of the task as this will show if the participant was susceptible to the anxiety manipulation of the experiment when engaging in conversation.

It will be challenging to extrapolate the results of this study to claim how socially anxious people might behave in a real-world scenario. One reason for this is the concern of using the results of the anxiety screener. While the SPIN & Mini-Spin screeners are reputable instruments, they were not designed to sort people into levels of social anxiety. This anxiety screener was chosen because it is a relatively accurate social anxiety screener, and has been adapted from a larger 17-item screener used in many previous studies. Though having minimal questions is generally positive, this screener cannot be considered a tool to definitively measure social

anxiety. Moreover, since the anxiety screener was designed as a preliminary diagnostic tool, it was not designed to categorize individuals into more than 'highly likelihood of SAD,' or not, even though it was used in this unexpected way in the study proposed. Although previous studies have examined the risk factors of specific environmental influences such as parenting style and exposure to violence, there has not been much discussion concerning the potential differences in SAD severity and symptoms present as a result of these environmental influences.

Further, although previous studies have examined the risk factors of specific environmental influences such as parenting style and exposure to violence, there has not been much discussion concerning the differences in SAD severity and specific symptoms present. Although the experimenter monitored the number of times a participant demonstrated an anxious behavior (as defined by the pre-established limitations), a significant limitation of this was the lack of categorization of anxiety symptoms or comparison between family background and the type of anxious behaviors most frequently engaged in for each participant. Categorizing what symptoms anxious individuals, I believe that it is important to consider this, as well as how an inconsistent childhood could impact the development of SAD more deeply. This proposed study aims to discover if there is an initial association between these variables, although further work is needed to address the gaps and limitations of this study.

Future Directions

Work beyond the proposed study to further examine the details of social anxiety and how different environments can affect symptomatology and development is very interesting. Ideally, this study would enable more studies to be conducted that build off of the findings and methodologies proposed. Further work would benefit from having a longer pre-task

questionnaire that asks more specific questions regarding family environment and childhood experiences. However, although this might pose some challenges that the design of this study initially faced such as participant sensitivity to an anxiety manipulation or possible triggers of childhood trauma if asked to recount specific memories of adverse childhood events.

I would like to explore methodologies used to assuage anxiety. I believe that the next step in that process is to invest my time further researching treatments for social anxiety. Based upon what I have already researched, I believe expressive-arts based therapy, specifically art therapy, to be the best treatment option. Expressive arts-therapy has been found to relieve anxiety and stress in a wide variety of people, as well as to help with attention, memory formation, distraction, and recall. Art therapy can be adapted for a wide range of people and branches onto individuals with social anxiety well since SAD is associated with adverse life events such as negative family functioning, bullying, isolation, and childhood violence (Maher, 2013; Lampe, 2005). Art therapy uses art as a safe and creative way to process emotions and express feelings or problems. The methods of art therapy can be especially helpful for people with severe social anxiety as it is a non-verbal, effective, and non-threatening form of expressive communication. As a result, it is easier and more likely for certain people to seek and accept treatment. One of the conventional approaches to art therapy is by focusing on the relaxing and joyful qualities of art-making. This approach can help develop social skills relationship building by redirecting the participants' attention on their creative project and encouraging focus and engagement (Lampe, 2005). Future work integrating an expressive-art therapy activity into a modified version of the current proposed study could provide interesting data on how effective different art-based activities might at mitigated anxiety for individuals of different backgrounds if feelings of anxiety were heightened. This theory is based on the idea behind art therapy, that expressive art

tasks are often helpful in relieving symptoms of anxiety and distress that may have occurred through the course of the experiment.

Furthermore, engaging in creative activities is understood to activate many brain regions including the visuospatial and motor cortices, and also the areas related to emotion and memory processing (Solso, 2000). Monitoring brain function would be interesting to examine post-working memory task, after potentially raising anxiety levels. Having a few alternative versions of calm, creative arts task for participants to engage with following a more cognitively involved task could provide data about which types of artistic and creative activities are the most helpful in immediately reducing stress. In such a study, it would be beneficial to monitor participants brain waves throughout the experiment as this will provide much more accurate and nuanced data than only using self-report measures. Brain waves can be easily tracked using simple and non-invasive technology such as the headbands from a company called "Dreem", which are now commercially available and have been used in previous psychological research Since beta waves are most active when coping with anxiety, this could be carefully monitored, tracking potential severe increases in anxiety, which are associated with decreased alpha waves, increased high beta waves, or other notable or unexpected changes in brain activity over the course of the experiment that the participant may not be aware of or might fail to report on a questionnaire. In this sort of study, an EEG would likely need to be implemented in order to measure a participant's brain wave frequencies accurately. Based on frequency, brain waves can be categorized into four types: delta, theta, alpha, and beta. The two lowest frequencies, delta, and theta are associated with sleep. However, theta frequencies have also been found to be associated with creativity according to previous research about anxiety and art therapy (Belkofer & Konopka, 2011). Subsequently, the two faster frequencies, alpha, and beta are associated with

states while an individual is awake. Beta waves, which are the fastest frequency, are highly active when anxiety manifests (Thatcher, 1998). This would allow for the comparison between high and low anxiety individuals both overall, and how the tasks differentially affected them. Further work should also investigate how the results of this study would change if the stimuli participants were exposed were more obvious threat-relevant or threat-neutral. This portion was not integrated into the current proposed study as Bard College's resources are currently limited and would pose major challenges to run a study of this complexity as a Senior Project. Further, although research about Art Therapy is rapidly growing, the number of published studies on the specifics are more limited which makes research more difficult, as it is a vast field of study, and not all paths have been explored in depth thus far. These challenges are difficult obstacles for an undergraduate to adequately overcome in order to create a well-designed experiment on the subject.

It would also be interesting to investigate family functioning and cultural environment during childhood further, to see what behavioral anxiety symptoms occur more frequently across cultures. Further, developing deeper into this analysis would enable studies to examine what factors during childhood influence the likelihood of developing certain behaviors, as opposed to just examining the frequency of SAD in different locations and cultures across the globe as has previously been done. With the limited population at Bard College, this study would not be feasible, but I would hope in the future to create a fuller picture of anxiety within the realm of family.

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Appendix A [Recruitment Materials]

Appendix B [Pre-Test Questionnaire]

Demographic Questionnaire

1. **Participant ID Number**

2. **Age**

3. **College Year**
Mark only one oval.
- First Year (1st semester)
- First Year (2nd semester)
- Sophomore (1st semester)
- Sophomore (2nd semester)
- Junior (1st semester)
- Junior (2nd semester)
- Senior (1st semester)
- Senior (2nd semester)
- Other

4. **Did any parental figure or guardian ever exhibit signs of social anxiety?**
Mark only one oval.
- Yes
- No

5. **Did any parental figure or guardian ever discuss their social anxiety?**
Mark only one oval.
- Yes
- No

Between the ages of 0-5:

6. **Did you move during these years? (0-5)**
Mark only one oval.
- Yes
- No

7. **Did the marital status of either of your parents change? (0-5)**
   Mark only one oval.
   - ◯ Yes
   - ◯ No

8. **How would you generally categorize your childhood? (0-5)**
   Mark only one oval.
   - ◯ positive
   - ◯ negative
   - ◯ mixed
   - ◯ neutral

Between the ages of 6-10:

9. **Did you move during these years? (6-10)**
   Mark only one oval.
   - ◯ Yes
   - ◯ No

10. **Did the marital status of either of your parents change? (6-10)**
    Mark only one oval.
    - ◯ Yes
    - ◯ No

11. **How would you generally categorize your childhood (6-10)?**
    Mark only one oval.
    - ◯ positive
    - ◯ negative
    - ◯ mixed
    - ◯ neutral

Between the ages of 11-15:

12. **Did you move during these years? (11-15)**
    Mark only one oval.
    - ◯ Yes
    - ◯ No

13. **Did the marital status of either of your parents change? (11-15)**
    Mark only one oval.
    - ◯ Yes
    - ◯ No

14. **How would you generally categorize your childhood (11-15)?**
Mark only one oval.

- positive
- negative
- mixed
- neutral

Between the ages of 16-now:

15. **Did you move during these years? (16-now)**
Mark only one oval.

- Yes
- No

16. **Did the marital status of either of your parents change? (16-now)**
Mark only one oval.

- Yes
- No

17. **How would you generally categorize your childhood? (16-now)**
Mark only one oval.

- positive
- negative
- mixed
- neutral

MINI-SPIN

Please respond as honestly and as accurately as possible.

Not at all (0) , A little bit (1) , Somewhat (2) , Very much (3) , Extremely (4)

18. **Fear of embarrassment causes me to avoid doing things or speaking to people**
Mark only one oval.

0	1	2	3	4
◯	◯	◯	◯	◯

19. **I avoid activities in which I am the centre of attention**
Mark only one oval.

0	1	2	3	4
◯	◯	◯	◯	◯

Demographic Questionnaire

20. **Being embarrassed or looking stupid are among my worst fears**
Mark only one oval.

0	1	2	3	4
◯	◯	◯	◯	◯

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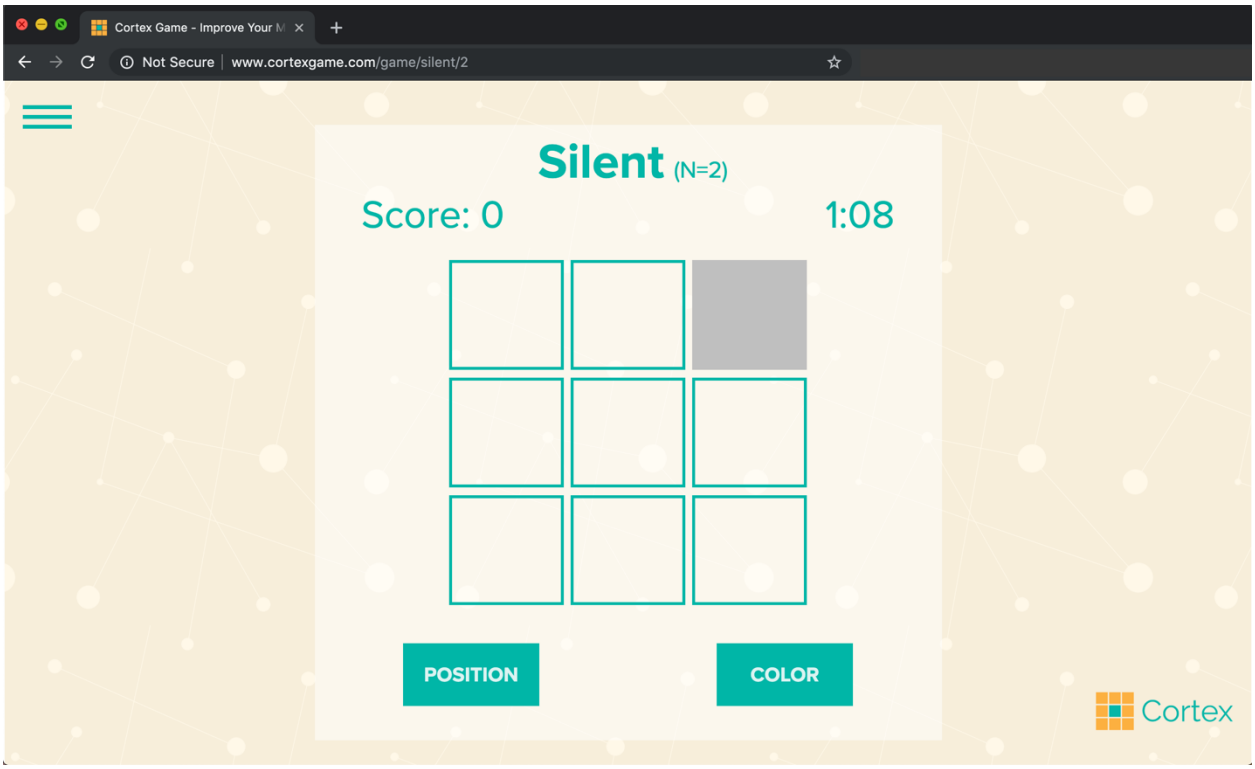
MINI - SOCIAL PHOBIA INVENTORY (MINI-SPIN) ©

Please indicate how much the following problems have bothered you during the past week. Mark only one box for each problem and be sure to answer all items.

		Not at all (0)	A little bit (1)	Somewhat (2)	Very much (3)	Extremely (4)
1.	Fear of embarrassment causes me to avoid doing things or speaking to people	☐	☐	☐	☐	☐
2.	I avoid activities in which I am the centre of attention	☐	☐	☐	☐	☐
3.	Being embarrassed or looking stupid are among my worst fears	☐	☐	☐	☐	☐

Appendix C [Working-Memory Task; N-back]

http://www.cortexgame.com/levels/silent



Appendix D [Post-Experiment Questionnaire]

Post-Test Questionnaire

Post-Test Questionnaire

Please answer the following questions honestly on a scale of 1 - 7.
[[1 = not at all, 3 = somewhat, 5 = fairly, 7 = incredibly]]

1. **Participant ID**

2. **1) Did you find the computer game difficult?**
   Mark only one oval.

1	2	3	4	5	6	7
◯	◯	◯	◯	◯	◯	◯

3. **2) Were you able to focus on the computer game?**
   Mark only one oval.

1	2	3	4	5	6	7
◯	◯	◯	◯	◯	◯	◯

4. **3) Did you find yourself focused on the task, or distracted by external noise and visual information?**
   Mark only one oval.

1	2	3	4	5	6	7
◯	◯	◯	◯	◯	◯	◯

5. **4) Were any feelings of anxiety raised during the questionnaire?**
   Mark only one oval.

1	2	3	4	5	6	7
◯	◯	◯	◯	◯	◯	◯

6. **5) Were any feelings of anxiety raised during the computer game?**
   Mark only one oval.

1	2	3	4	5	6	7
◯	◯	◯	◯	◯	◯	◯

Appendix E [Experimenter Script]

Control Condition Script:

Set-up:

Log into SPROJ account on MacBook Pro Laptop. Open Web browser CHROME, and open up demographic questionnaire, n-back website, and post-task questionnaire (in that order).

Experimenter: Hello! Thank you for participating in this study. Today I am going to be reading the directing and following along with a script. This may seem strange, but please bear with me as it is to help keep consistency across participants.
Today you will be taking a short preliminary demographic questionnaire, followed by a short computer game. After the computer game, there is a mini follow-up survey.

Do you understand?

Allow participant to take demographic questionnaire on the computer. When completed, approach the participant and adjust the computer to display the website for the n-back task. (The task should be set-up and ready to play). Turn the computer around to face the participant and walk over next to them.

In order to get you more acquainted with the game you will be playing, there is going to be a demo round that I will show you now while I explain the game.

(*explain what experimenter is doing as they walk through the task for a 30-second version)*

The goal of the game is to watch the color and location of the blocks on the screen, and to select with the trackpad what changes, the color or the position of the block as designated by the two labeled boxes on the screen. Watch the boxes as they appear on the screen. If position of the block matches the position of the previous block, you should click 'position'. If the color of the block matches with the color of the previous block, press 'color'. You will be completing this short computer game twice, and I will give you a short 30 second break in between each round.

Do you understand?

(wait for response from participant)

Great. Do you have any questions?

(If they have any questions, reiterate the directions and make sure they understand the goal)

Okay. I will be sitting right over here to monitor everything going on.

Experimenter gives control of the computer to the participant, and can move aside and sit down in a chair a few feet away so the participant has space to complete the task, but the experimenter can still observe their behavior.
Once the participant has completed the first round, go back over.
—

Did you finish round one? Okay. Great Job.

(Inform the participant that they can take a minute break and can use this time to look away from the computer screen and rest their eyes if they would like)

Were you able to complete the task alright? Okay, I'll let you know when we will start round two.

—

Turn around computer screen to face experimenter, and facing away from the participant. Mark down the score of the participant on the n-back. After, refresh the page and open the webpage back open to the same version of the n-back that was taken before (silent, 1-back). Set-up should take about 15-30 seconds. When completed, turn the computer screen back around to face participant.

——

Okay. Try the game one more time.

—-

Once the participant has completed the second round of the computer task, make sure to screenshot their results to categorize in a folder later. Change the display on the computer to bring up the post-task survey.

——

Okay. Thank you so much.

Please fill out this post-task survey and select if you'd like to be entered in the lottery to win the amazon gift card.

Please let me know if you have any questions or concerns!

Appendix E [Experimenter Script] (cont.)

Manipulation Condition Script:

Set-up:

Log into SPROJ account on MacBook Pro Laptop. Open Web browser CHROME, and open up demographic questionnaire, n-back website, and post-task questionnaire (in that order).

Experimenter: Hello! Thank you for participating in this study. Today I am going to be reading the directing and following along with a script. This may seem strange, but please bear with me as it is to help keep consistency across participants.
Today you will be taking a short preliminary demographic questionnaire, followed by a short computer game. After the computer game, there is a mini follow-up survey.

Do you understand?

Allow participant to take demographic questionnaire on the computer. When completed, approach the participant and adjust the computer to display the website for the n-back task. (The task should be set-up and ready to play). Turn the computer around to face the participant and walk over next to them.

In order to get you more acquainted with the game you will be playing, there is going to be a demo round that I will show you now while I explain the game.

(*explain what experimenter is doing as they walk through the task for a 30-second version)*

The goal of the game is to watch the color and location of the blocks on the screen, and to select with the trackpad what changes, the color or the position of the block as designated by the two labeled boxes on the screen. Watch the boxes as they appear on the screen. If position of the block matches the position of the previous block, you should click 'position'. If the color of the block matches with the color of the previous block, press 'color'. You will be completing this short computer game twice, and I will give you a short 30 second break in between each round.

Do you understand?

(wait for response from participant)

Great. Do you have any questions?

(If they have any questions, reiterate the directions and make sure they understand the goal)

Okay. I will be sitting right over here to monitor everything going on.

Experimenter gives control of the computer to the participant, and can move aside and sit down in a chair a few feet away so the participant has space to complete the task, but the experimenter can still observe their behavior.
Once the participant has completed the first round, go back over.
—

Did you finish round one? Okay. Great Job.

(Inform the participant that they can take a minute break and can use this time to look away from the computer screen and rest their eyes if they would like)

(Interject-)

I noticed you were fidgeting a bit during the task, you touched your face a few times. Did you know that when people are more anxious they tend to touch their faces more?

—

Turn around computer screen to face experimenter, and facing away from the participant. Mark down the score of the participant on the n-back. After, refresh the page and open the webpage back open to the same version of the n-back that was taken before (silent, 1-back). Set-up should take about 15-30 seconds. When completed, turn the computer screen back around to face participant.

——

Okay. Try the game one more time.

—-

Once the participant has completed the second round of the computer task, make sure to screenshot their results to categorize in a folder later. Change the display on the computer to bring up the post-task survey.

—

Okay. Thank you so much.

Please fill out this post-task survey and select if you'd like to be entered in the lottery to win the amazon gift card.

Please let me know if you have any questions or concerns!

Appendix F [Informed Consent]

Consent Form

Researcher: Shira Ma'ayan Prusky
Faculty Advisor: Sarah Dunphy-Lelii

Thank you for agreeing to participate in this experiment. This experiment hopes to examine the effects of how a simple working memory task preoccupies the brain and affects multi-tasking abilities such as task completion and awareness of your surroundings. As a participant, you are free to withdraw from the experiment at any point or rescind your data upon the conclusion of the experiment.

In this first portion of the experiment, you will fill out questionnaire online about your background and general childhood experiences. You will then be asked to schedule a follow-up date within the following two days from the meeting, in which you will participate in the main experiment. In the main portion of the study, you will be asked to participate in a simple memory task where you attempt to track the object that appears on screen and are asked to recall the last position and color of the block shown. After this, you will be asked how you felt during the experiment. The experiment will last approximately 20 minutes.

You are not required to disclose any personal or specific information. However, recalling and grading your emotions towards different stages of one's life may bring up feelings of anxiety. If this is the case, please feel free to rescind your data and withdraw from the experiment. There are many on-campus resources available such as Bard's Health Services and Counseling at counselingservice@bard.edu, (845) 758-7433 or Bard's 24/7 peer counseling service BRAVE by calling Security (845) 758-7777 and requesting a BRAVE counselor.

If at any point you do not feel comfortable participating in this experiment, please inform the experimenter and the study will end immediately. All information you provide will remain confidential. If for any reason during this study you do not feel comfortable, you may inform the experimenter and leave at any time without repercussion and will still be entered in the raffle.

When the study is complete, you can ask any questions you may have about the experiment. If you have any further questions concerning this study after you leave, please feel free to contact us through email at sp7142@bard.edu for the experimenter Shira Ma'ayan Prusky, or her advisor Sarah Dunphy-Lelii, reachable at sdl@bard.edu. Furthermore, you can contact Bard College's Institutional Review Board at irb@bard.edu with any concerns you may have about this study. Please note that the findings of this study will be available in Stevenson Library and will be discoverable through DigitalCommons. Finally, by signing these forms, you

Consent Form

are also verifying that you are at least 18 years of age. Finally, if you so choose, you can contact the experimenter and rescind your data at any time.

_____
Signature of Participant

_____
Print Name (Participant)

_____
Experimenter Name

_____
Date

Appendix G [Debriefing Form]

Debriefing Form

Researcher: Shira Ma'ayan Prusky
Faculty Advisor: Sarah Dunphy-Lelii

Thank you for your participation in my study! The general purpose of this research is to examine if certain emotional childhood experiences are related to attention and social anxiety in young adults. This study is being conducted to examine the potential effects of childhood experiences on symptoms and behaviors of individuals with social anxiety, as well if this affects attention and memory.

We invited people to participate who completed a preliminary online survey and were available for testing on Bard's college campus. In this study, you were asked to reflect on childhood emotional experiences and self-report state of anxiety. The results from this study will assist me in potentially determining the impact of emotional childhood experiences of attentional bias, multi-tasking capabilities and presentation of symptoms in young adults with varying levels of social anxiety.

This experiment utilized incomplete disclosure at the beginning of the study, meaning that full intentions of the study was withheld. As a participant, you reserve the right to withdraw your consent and retract your data at this point after completing the experiment.

Confidentiality is guaranteed via randomized ID numbers. All data will be kept anonymous and all data is stored separately from any personal information.

The study will provide insight into how familial background can impact levels of social anxiety and the prevalence of different symptoms. Many previous studies that look at family as a factor in social anxiety only use reports from the parents, and fail to include any responses from children who are affected by anxiety or their personal experiences of their family functioning.

Any information in this project at the time of publishing will be permanently available in the Bard College Library and online through DigitalCommons. If you have any additional questions or concerns, please feel free to ask the experimenter Shira Prusky at this time or email sp7142@bard.edu. You may also contact the experimenter's advisor Sarah Dunphy-Lelii at sdl@bard.edu. If you experience any feelings of anxiety and wish to speak with a counselor, you can always contact Bard's Health Services and Counseling at counselingservice@bard.edu, (845-758-7433) or Bard's 24/7 peer counseling service BRAVE by calling Security (845) 758-7777) and requesting a BRAVE counselor. Further, if you have any concerns you can always contact Bard College's Institutional Review Board at irb@bard.edu.