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MINDFULNESS, SELF-COMPASSION AND THREAT RELATED ATTENTIONAL BIAS: IMPLICATIONS FOR SOCIAL ANXIETY AND LONELINESS IN LATE ADOLESCENT COLLEGE STUDENTS.

Kimberly Raymond
Syracuse University

ABSTRACT

The present study examined associations among mindfulness, self-compassion, social anxiety, loneliness and attention bias toward threat in a community sample of undergraduate university students (n = 176). Of interest was whether threat bias would mediate the independent effects of mindfulness and self-compassion on social anxiety and loneliness. Threat bias is characterized by the display of exaggerated attention toward threatening cues in the environment and has been repeatedly linked to the origin and continuation of anxious symptoms. Given the focus of contemplative practices on attentional awareness and control, this study examined whether mindfulness and self-compassion may contribute to decreased levels of anxiety and loneliness, in part, by influencing attentional mechanisms that may lower threat bias. The specificity of individual facets of mindfulness and self-compassion were also examined in relation to threat bias, social anxiety and loneliness. Overall, findings confirm previous studies, demonstrating strong predictive associations between mindfulness, self-compassion, social anxiety and loneliness in college students. Results also highlight the indirect effect of attention bias in the relationship between self-compassion, loneliness and social anxiety. The implications of these findings are discussed in relation to contemplative intervention programs to promote healthy social adjustment and relations in late adolescent college students.

Keywords

Attentional biases, Anxiety disorders, Dot probe, Mindfulness, Self-Compassion, Adolescence, College Students

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by

Kimberly P. Raymond, M.S.

B.A. State University of New York at Oswego, Oswego, NY, 1994
M.S. State University of New York at Oswego, Oswego, NY, 2001

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CHAPTER I. INTRODUCTION

Social Adjustment in College Students

The transition to college is marked by complex challenges in social, emotional and academic adjustment. Evidence has shown that the ability to adjust in college has a strong impact on *academic* persistence, achievement and psychological well-being (Wintre & Bowers, 2007) and thus can have a lasting effect on occupational and life prospects, as well as the overall long-term wellness of adolescents and young adults. Some students can adapt constructively to meet the demands of this transition, while others find themselves overwhelmed by the challenges of their roles and new environment. While many studies focus on academic ability and competence as an important factor influencing college success, other literature has shown that a second dimension, social adjustment, is as important as academic factors in predicting persistence and success in a college environment and may have even greater consequences for overall emotional health and well-being. Research examining college success and retention reflects that social factors are indeed as important as academic aspects in predicting successful college adjustment (Gerdes & Mallinckrodt, 1994; Ross, Neibling, & Heckert, 1999; Sharma, 2012).

Being able to integrate into the social environment of an academic institution is a crucial element contributing toward adjustment, academic success and overall emotional well-being in college students. Social adjustment and integration involve the student "fitting in" to the social community of the institution (Tinto, 1975, 1993). Important elements of social adjustment include becoming involved and integrated into the social life of college, as well as forming new

friendships networks and social support systems. To adjust socially and transition to a new residential college environment often a major reorganization of one's social network is required, as moving to college, for most adolescents and young adults, represents their first experience living outside the parental household. College students find themselves immersed amongst thousands of unknown and unfamiliar peers with which they will need to cultivate new bonds, while also being physically removed from family, close friends and other established peer associates (Scanlon, Rowling, & Weber, 2007). Establishing new relationships is a crucial component of successful adjustment during the transition to college (Buote et al. 2007; Cutrona, 1987; Hays & Oxley, 1986; Paul & Brier 2001; Swenson, Nordstrom, & Heister, 2008).

The ability to form these new peer relationships on campus influence students' adaptation to and retention in college, as peer interaction serves as one of the major processes through which students become socially integrated into the college environment (Braxton, Sullivan, & Johnson, 1997; Tinto, 1975, 1993). To do so, college students must be willing to take social risks and spend efforts negotiating their interpersonal relationships. The extent to which new students can manage this transition and socially integrate into the institution is an important factor for college success. Students who report difficulty adjusting socially to college are more likely to suffer from feelings of homesickness, loneliness, anxiety, and depression (Mounts, Valentiner, Anderson, & Boswell, 2006), poor grade point averages (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008; Zins, Bloodworth, Weissberg, & Walberg, 2004) and problems with substance use (Gilles, Turk, Fresco, 2006); negatively impacting college persistence (Astin, 1993; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008) and overall emotional and psychological well-being.

Social Anxiety and College Social Adjustment

While some students may adapt easily to their new social milieu, others struggle with the task of forging new social networks and fitting into their new environment. Evidence supports that social anxiety is one factor that may interfere with successful social adjustment in college students (Nordstrom, 2014). Social anxiety disorder (SAD) is the most common anxiety disorder. Studies show a lifetime prevalence of more than 12% (Stein & Stein, 2008) and research on college students specifically have found that as many as 20% may suffer from symptoms of social anxiety. Characterized by an intense fear of social situations and negative evaluation by others; in its severe form, social anxiety results in significant distress and daily functional impairment (American Psychiatric Association [APA], 2000). Socially anxious individuals tend to experience anticipatory anxiety as well as negative post-event processing, based on the construction of highly negative images and expectations of their performance in social situations (Clark & Wells, 1995; Rapee & Heimberg, 1997; Wells, 1997). Consequently, to avoid experiencing anxiety, such individuals often avoid situations that are social in nature, in which there is potential for negative evaluation by others (American Psychiatric Association, 1994; Clark & Wells, 1995; Rapee & Heimberg, 1997). Thus, social anxiety represents a serious concern for youth and adolescents as evidence has shown that symptoms of anxiety are associated with social impairments that may have both concurrent and long-term consequences (Caspi, Taylor, Moffitt & Plomin, 2000). Anxious symptoms may interfere with the ability to form healthy social relationships, thereby negatively impacting overall wellbeing and mental health (Hawker & Boulton, 2000; McCabe, Antony, Summerfeldt, Liss, & Swinson, 2003; Sourander et al., 2007). Indeed, studies have confirmed that socially anxious youth often have problematic peer relationships, are less well liked by their peers (Erath, Flanagan & Bierman,

2007; Ginsburg, La Greca & Silverman, 1998;), and often engage in socially avoidant or withdrawn behaviors (Cartwright-Hatton, S., Hodges, L., & Porter, J., 2003; Schwartz, Snidman & Kagan, 1999).

The continuation of anxious social patterns into late adolescence and even young adulthood may result in adverse consequences, particularly for college students as they attempt to adjust and integrate into a new social environment. Adolescent social anxiety has been shown to negatively impact several areas of social functioning (Stein, 1995; Zhang, Deng, Yu, Zhao, & Liu, 2016) that are relevant to successful integration to the collegiate setting. For example, socially anxious adolescents often avoid social situations (Stein & Stein, 2008) and meeting new people (Mattick & Clarke, 1998). They have lower perceived social support and close relationships (La Greca & Lopez, 1998), have higher levels of negative affect (Inderbitzen-Nolan & Walters, 2000) and experience higher rates of alcohol abuse (DeWit, MacDonald, & Offord, 1999). For adolescents and young adults starting college, such social difficulties associated with social anxiety can impede a successful transition and interfere with their ability to forge new social connections and networks of friendship and support.

Loneliness in College Students

Loneliness has also long been recognized as a reality for college students (Russell, Peplau, & Cutrona, 1980) and in recent years has been strongly associated with college adjustment (Nicpon et al., 2007). Research on social anxiety shares with the literature on loneliness, an emphasis on the subjective experience of emotional distress in actual or anticipated social situations (Buss, 1980; Schlenker & Leary, 1982). Given that both loneliness and social anxiety concern subjectively defined and experienced problems in social interactions, one might

expect a substantial overlap in the empirical and theoretical literature pertaining to these areas. Indeed, early studies of the statistical relationship have consistently yielded correlations between loneliness and social anxiety of .40 or greater (Anderson & Arnoult, 1985; Inderbitzen, Clark & Solano, 1992; Moore & Schultz, 1983).

Evidence suggests that loneliness is a painful and widespread problem among adolescents and college students. The experience of loneliness results from deficiencies in an individual's social relationships and is conceptualized as an internal and subjective psychological experience that transcends physical isolation or solitude (Peplau & Perlman, 1982). The likelihood of loneliness is typically increased by personal characteristics and struggles that undermine either the initiation, maintenance, or quality of relationships. Thus, loneliness, particularly in a new college environment may, at least in part, develop as a consequence of social anxiety disorder, and the experience of anxious symptoms in novel social situations. Studies show that both socially anxious and lonely individuals are more likely to avoid social interactions and less likely to take social risks (Newcomb & Bagwell, 1996). In the college environment, this may result in an avoidance of extra-curricular collegiate activities, and an unwillingness to build new social networks through the initiation of conversations with peers and faculty, both of which are crucial to social adjustment in college. Thus, a vital area of investigation involves the examination of protective factors which may lower both social anxiety levels and loneliness and foster healthy social interactions among college students.

Cognitive Model of Anxiety

Research on the cognitive process of attention has provided a promising path for understanding social anxiety. Attention is defined as a suite of cognitive functions that allows the brain to focus on and prioritize incoming stimuli (Shechner et al., 2012). The prioritization of threat stimuli in the environment is a normative function of attention, as a rapid response to danger facilitates survival (Peers, Simons & Lawrence, 2013). However, extant research has demonstrated that exaggerated cognitive biases toward threatening information play a critical role in the origin and continuation of anxiety disorders (Beck, 1976; Buckley, Blanchard & Neill, 2000; Eysenck, 1992; Mathews & MacLeod, 2002). Such cognitive, attentional biases toward threat are characterized by greater sensitivity and reactivity to explicit cues of threat and contexts associated with threat. Studies suggest that relations between attention bias to threat and social behaviors emerge during early childhood (Cole, Zapp, Fettig, & Pérez-Edgar, 2016) and further research has confirmed its association to patterns of adolescent social anxiety, withdrawal and other social difficulties (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007; Pine, Helfinstein, Bar-Haim, Nelson & Fox, 2009).

Numerous studies have supported cognitive models of emotional disorders, confirming that attentional bias is related to social anxiety levels in both adolescents (Dudeney, Sharp, & Hunt, 2015; Hankin, Gibb, Abela, & Flory, 2010; Puliafico & Kendall, 2006; Roy et al., 2008) and adults (Morrison & Heimberg, 2013; Roberts, Hart, & Eastwood, 2010; Wong & Rapee, 2015), and is most predominant in individuals with the lowest levels of attentional control (Lonigan, Vasey, Phillips, & Hazen, 2004). Indeed, socially anxious individuals display increased attentional focus on both negative internal cues, such as thoughts and self-imagery, as

well as more external cues (e.g., other's facial expressions) during social situations (Schultz & Heimberg, 2008). Evidence from electrophysiological studies are also beginning to suggest that adults with social anxiety demonstrate hypervigilance toward social threat stimuli (Mueller et al., 2008) and more recently, a combination of cognitive, attentional bias and neurobiological systems (e.g. overactive amygdala) have been implicated as playing a critical role in the development and maintenance of social anxiety disorder (Banyard, 2016). Considering the growing evidence associating cognitive biases in the development and/or maintenance of anxiety disorders, more attention on therapeutic interventions that reduce these cognitive biases are needed. As a result, recent focus has begun to examine methods through which attention may be self-regulated to improve symptoms of anxiety (Bar-haim, Morag & Glickman, 2011; O'Toole & Dennis, 2012).

Mindfulness and Attentional Control in Social Anxiety

The concept of mindfulness, as both a disposition and a learned skill, in relation to anxiety has received growing interest in the past two decades and has attracted attention in the domains of emotion research, as well as social–cognitive–affective neuroscience. Described as sustained, receptive attention to the present moment and events (Bluth & Blanton, 2014), mindfulness has been equated with intentional and effortful, attentional processing (Shiffrin & Schneider, 1977). Focus has been on mindfulness as both a psychological construct and as a form of clinical intervention. The effectiveness of mindfulness for a variety of psychological disorders has been examined in many recent studies (Allen, Chambers, & Knight, 2006; Carmody & Baer, 2009; Grossman, Niemann, Schmidt, & Walach, 2004) with several establishing the positive impact of mindfulness on lowering levels of anxiety, specifically (Baer,

2003; Bergen-Cico & Cheon, 2013; Goldin & Gross, 2010;). Goldin and Gross (2010) and Goldin, Ramel, and Gross (2009) reported on the effects of an MBSR program for social anxiety disorder, specifically. Participants received eight weekly 2.5-hour group sessions of mindfulness training, as well as an additional half-day retreat, and daily practice of mindfulness at home between sessions. Participants who completed the intervention improved on a variety of outcome measures, including decreased social anxiety.

Recent conceptualizations have suggested that mindfulness may improve anxiety by altering attentional mechanisms (see Bishop et al., 2004), along with changes to underlying neurocognitive mechanisms known to contribute to threat bias (e.g. overactive amygdala). Indeed, a recent study found that attentional biases and negative cognitive appraisals did mediate links between mindfulness and symptoms of social anxiety (Schmertz, Mesuda, & Anderson, 2012), suggesting that increased levels of mindfulness may indeed alter cognitive and attentional biases leading to social anxiety. Further, changes in neural networks underlying anxiety and emotion regulation (Holzel et al., 2008), have shown decreased amygdala response after mindfulness training in social anxiety patients exposed to socially threatening stimuli (Goldin & Gross, 2010). Given recent evidence, along with cognitive models of social anxiety which suggest the disorder is maintained through underlying maladaptive cognitive appraisals (Taylor & Allen, 2008) and mindless automatic processing (Fox, 1996), it is conceivable that mindfulness may work to decrease anxiety by lowering biases toward threatening information through the modification of both attentional and neurocognitive mechanisms. However, despite the understanding of mindfulness' capacity to influence attention, few studies to date have explored its potential impact on attentional bias toward threat in relation to social anxiety and social relational outcomes.

In addition to attentional control, another benefit of mindfulness that may be associated with anxiety is self-compassion. While the relationship is not yet clearly understood (Baer, Lykins & Peters, 2012; Bluth & Blanton, 2014; Neff, Kirkpatrick, & Rude, 2007; Van Dam, Sheppard, Forsyth, & Earleywine, 2011), studies suggest that greater self-compassion often accompanies greater mindfulness. Self-compassion, which involves being caring and compassionate towards oneself in the face of hardship or perceived inadequacy, promotes the sensation of feeling cared for, socially connected, and emotionally calm (Neff, Kirkpatrick & Rude, 2007; Samaie & Farahani, 2011). It is suggested that self-compassion may achieve this through its influence on neurobiological elements, such as the deactivation of the "threat system" (limbic system) that is associated with feelings of insecurity and defensiveness (Gilbert, 1989). Self-compassion may instead promote the activation of the oxytocin-opiate system, which generates feelings of secure attachment and safeness. Indeed, studies have begun to confirm that self-compassion is also associated with overall well-being and lowered levels of anxiety (Bergen-Cico & Cheon, 2013; Bluth & Blanton, 2014; Neff, Kirkpatrick, & Rude, 2007; Van Dam, et al., 2011). Little is known, however, about the interplay of self-compassion, attentional-threat bias, anxiety and social-relational outcomes. Yet, it is reasonable to assume that individuals with increased self-compassion might be less likely to exhibit biased attention toward socially threatening stimuli in their environment, resulting in lowered levels of social anxiety and more overall positive social functioning. Thus, the proposed study will investigate the influence of both mindfulness and self-compassion on the mechanism of attentional threat bias in relation to social anxiety and loneliness in a community sample of late adolescent college students.

CHAPTER II. LITERATURE REVIEW

Social development, an essential component of child and adolescent adjustment, is defined as 'the behavior, patterns, feelings, attitudes and concepts manifested in relation to other people and the way that these various aspects change over age' (Schaffer, 1996, p.1). Successful social development is the cornerstone for social functioning and relationship development throughout life. However, studies have shown that individual and environmental factors may impede social development through arresting the formation of healthy social relationships; resulting in adverse outcomes related to overall well-being and mental health.

Anxiety and Social Development

A wealth of evidence has implicated anxiety as one such factor that interferes with the ability to form healthy social relationships (Hawker & Boulton, 2000; McCabe, Antony, Summerfeldt, Liss, & Swinson, 2003; Sourander et al., 2007). Anxiety disorders are the most prevalent category of mental health problems experienced in the United States (Narrow, Rae, Robins, & Regier, 2002) and are frequently associated with a chronic course and diminished quality of life. The hallmark of anxiety is often behavioral avoidance. Research has shown that anxious individuals adapt a "seek to avoid" process (Williams, Watts, MacLeod & Matthews, 1988) that involves a hypervigilant detection of threatening stimuli, that is perceived or real, followed by an attempt to evade or escape those threats. As a result, anxious individuals often severely restrict their behavior with the goal of avoiding situations that elicit fear and anxiety.

For individuals with social anxiety disorder, a common psychiatric condition that is characterized by intense fear of evaluation in social or performance situations (Jefferys, 1997), this may mean evading social situations and interactions in which a threat of social evaluation is

perceived. Such social avoidance can place great restrictions on an individual's life, ultimately impeding important domains of functioning (e.g. socially, academically and occupationally). For adolescents with social anxiety, this may mean avoiding those behaviors that promote and cultivate social relationships at a time when such relationships play a crucial role toward healthy social development.

Importance of Peer Relationships in Adolescence

Due to the increased importance of relationships in adolescence, social anxiety may invoke serious concern for individuals suffering during this developmental stage, as evidence has shown that anxiety symptoms may impair adolescent social development and produce deficits that are both contemporaneous and long-term (Caspi, et al., 2003). Adolescence, in particular is a critical period in social development and therefore is particularly vulnerable to negative outcomes related to social anxiety; as social interactions and peer relationships take on greater meaning and importance in the search for personal identity, social acceptance and a sense of belonging. Peer relationships, for example, contribute in important ways to adolescents' well-being and sense of self (Furman & Buhrmester, 1992). They are instrumental in facilitating self-concept and increasing independence from family influences (Dusek, 1991; Ingersoll, 1989). As close peer friendships begin to surpass parent-child relationships as adolescents' primary source of social support, peer network affiliation and acceptance takes on greater value in the adolescent life (Brennan, 1982).

Symptoms of social anxiety can limit social functioning and interactions with peers, impacting peer network affiliations, friendships, as well as romantic attachments (Strauss, Frame, & Forehand, 1987). Studies have confirmed that socially anxious youth often have problematic peer relationships, are shy, less assertive (Erath, Flanagan & Bierman, 2007;

Ginsburg, La Greca, & Silverman, 1998), and often engage in socially avoidant or withdrawn behaviors (Boivin, Hymel, & Bukowski, 1995; Cartwright-Hatton, Hodges, & Porter, 2003; Schwartz, Snidman & Kagan, 1999). Social avoidance and disengagement from peer interactions often interferes with the development of close supportive ties with peers.

Generally, studies that have examined the quality of peer relationships in anxious youth show they are less well-liked and are more likely to be rejected and neglected by their peers (La Greca, Dandes, Wick, Shaw, & Stone,1988; La Greca & Stone, 1993). Moreover, adolescents' relationships with friends and peers play a critical role in the further development of social skills, as well as toward feelings of personal competence that are essential for eventual adult social functioning (Ingersoll, 1989). Thus, these deficits in social functioning are often far reaching, as anxious, avoidant or withdrawn behavior may interfere with the growth of proficiencies and personal competencies necessary for both current and future social interactions.

Patterns of social self-perception, as well as social interaction and functioning which have developed through youth and adolescence, do not cease, but expectedly continue into late adolescence and adulthood. Indeed, the onset of social anxiety often peaks in mid to late adolescence (Masia, Klein, Storch & Corda, 2001). Research confirms that the quality of social relationships and friendships show continuity and that negative patterns of social interaction, often associated with shyness and social anxiety, have a long-term developmental trajectory from early childhood through adolescence and adulthood (Chronis-Tuscano, Degnan, Pine, Perez-Edgar, Henderson, Diaz, Raggi & Fox, 2009). While research overwhelmingly supports the importance of adolescent social relationships and the often-detrimental impact of social anxiety during this critical juncture of development, the period of late adolescence, (18-25 years of age) specifically is often less explored (Arnett, 2000; Dornbusch, 2000; Sherrod, Haggerty, &

Featherman, 1993). This developmental stage, sometimes referred to as, "emerging adulthood", (Arnett, 2000) when individuals are moving from adolescence toward adulthood, is a particularly trying time for those making the transition from high school to college. Experiencing symptoms of social anxiety during this time may be detrimental to a student's capacity to form social connections in a manner that is necessary to successfully adjust to a collegiate environment.

College Social Adjustment and Social Anxiety

College students must cope with intense psychological and psychosocial changes that accompany the development of an autonomous lifestyle. During this transitional time, students must contend with being away from home, family, and friends for the first time, while adjusting to a new social environment and attempting to build a new social and supportive network. During the transition to college, late adolescents often continue to question their social relationships and self-worth as such momentous life changes may trigger feelings of insecurity (Lopez & Gormley, 2002) and for some individuals, a successful transition is never attained. Indeed, research shows that as many as 20 percent of college students suffer from social anxiety symptoms that may interfere with their social adjustment and functioning (Strahan, 2003). Those who fail to socially bond and connect in their new environment risk severe negative emotional and psychological outcomes (Baumeister & Leary, 1995). Indeed, students who report difficulty adjusting socially to college are more likely to suffer from feelings of homesickness, loneliness, anxiety, and depression (Mounts, Valentiner, Anderson, & Boswell, 2006), poor grade point averages (Tinto, 1993), and problems with substance use (Gilles, Turk & Fresco, 2006).

Social adjustment to a college environment is one facet of student adjustment and is one of the most critical activities late adolescents must face. Long standing research suggests that it is predictive of success in college and beyond (Baker & Siryk, 1989; McEwan, 2011). Social adjustment "reflects the degree to which students have integrated themselves into the social structures of university residencies and the broader university" (Crede´ & Niehorster, 2012, p. 135). Social adjustment includes the process by which students become integrated into the campus community, often through building support networks, and negotiating the new freedoms of college life (Gerdes & Mallinckrodt, 1994). Studies examining college success and retention reflect that social factors are indeed as important as academic aspects in predicting successful college adjustment (Gerdes & Mallinckrodt, 1994; Ross, Neibling, & Heckert, 1991; Sharma, 2012). College students must make a series of adjustments to integrate into their new life, academically, personally, emotionally, and socially (Hiester, Nordstrom, & Swenson, 2009).

This critical transition period is confirmed by research which shows that most students who drop out of college, tend to do so in the first year (Rausch & Hamilton, 2006). Adopting higher levels of autonomy, enterprise, and self-regulation (Bryde & Milburn, 1990), spurred by changes in residence, places of employment, and the formation of new circles of friends (Arnett, 2000) can place novel, sometimes frightening demands on late adolescents and young adults. Students are required to separate from long-term relationships with friends and family and are forced to develop new friendships and navigate new peer networks during a time when those friendships have taken on enhanced meaning and importance. Yet, they must do so all while managing demanding academic tasks and new requirements of independence and autonomy. (Tinto, 1982, 1993). Thus, understanding how students adjust to college has long been of interest to institutions of higher education, and much research has examined this process (Hertel,

2002; Hurtado, Carter, & Spuler, 1996; Kaczmarek, Matlock, Merta, Ames, & Ross, 1994; Owens, Lacey, Rawls, & Holbert-Quince, 2010) to evaluate the use of programs and steps to improve overall student adjustment (Abe, Talbot, & Geelhoed, 1998; Mayhew, Stipeck, & Dorow, 2011). The strong relationship between social adjustment and the successful transition to college has resulted in many studies that have focused on exploring ways of enhancing and implementing these support systems where needed (Lau, 2003; Mayhew et al., 2011).

Predictors of social adjustment and suggest that individual social behaviors (e.g., socializing with peers and faculty) are strongly associated with a student's ability to socially adjust to their new collegiate environment (Chartrand, 1992; Elliott, Alexander, Pierce, & Richmond, 2009; Hays & Oxley, 1986; Hurtado et al., 1996). Specifically, students' ability to develop meaningful connections, as well as develop and maintaining a local social support network are key predictors of student adjustment (Gerdes & Mallinckrodt, 1994). Moreover, learning to manage those new social networks, embracing social life and campus community are essential to social integration at college (Gerdes & Mallinckrodt, 1994; Hays & Oxley, 1986). Despite the need for social assimilation for successful college adjustment, change can be disconcerting for some individuals and studies have confirmed that the continuation of anxious social patterns into late adolescence and young adulthood can have adverse consequences, as college students attempt to adjust and integrate into a new social environment. Thus, given that late adolescence is a sensitive period in an individual's lifespan, evidence has suggested that university students are vulnerable to mental health issues, such as symptoms of social anxiety, that may interfere with their ability to adjust socially (Bayrem & Bilgel, 2008).

Loneliness, specifically, has also long been investigated as both a strong correlate of college adjustment (Nicpon et al., 2007; Ponzetti, 1990; Rotenburg & Morrison, 1993; Rokach, 2003; Russell, Peplau, & Cutrona, 1980) and social anxiety (Jones et al., 1990). Ponzetti and Cate (1988) defined loneliness as a self-perceived problem resulting from an individual's social network either decreasing or becoming less satisfying than what the individual desires. Upon entering college, all students may face a period when the scope of their social network has declined because of leaving friends and family behind. Indeed, an early study by Cutrona (1982) found that 75% of new freshman college students reported feeling lonely during their first 2 weeks at college. However, college students who struggle with loneliness beyond the initial transition, may do so because of symptoms of social anxiety and the resulting difficulty creating new social networks.

Socially anxious individuals tend to withdraw from social interaction. They often have poorer social skills, heightened sensitivity to negative evaluation, and tend to interpret ambiguous social situations as negative (Stopa & Clark, 2000). As a result, socially anxious individuals often fail to seek out or develop new relationships and have a smaller network of friends (Miers, Blote, & Westenberg, 2010; Van Zalk, Van Zalk, Kerr, & Stattin, 2011). Even within their social network, socially anxious individuals report lower intimacy with friends and less social support (Vernberg, Abwender, Ewell, & Beery, 1992). Given that adolescence is marked by an increased emphasis on social relationships, loneliness may be especially problematic for socially anxious teens attempting to adjust to a new college environment. Therefore, late adolescents with higher levels of loneliness are at risk, not only for adjustment problems in college, but for other psychological struggles, such as depression, low self-esteem and suicide (Rokach, Bacanli, & Ramberan, 2000). Thus, considering the high prevalence of

social anxiety in college students and its impact on social functioning. It is crucial to explore the treatment and intervention of such disorders; and to identify protective factors that may lower social anxiety levels, reduce loneliness, and foster healthy social interactions among college students.

Cognitive and Emotion Regulation in Social Anxiety

Developmental scientists have become increasingly aware that anxiety disorders involve deficits in processes which are, at least in part, cognitive in nature. Early work led to cognitive models of psychopathology. Such models posit that belief systems, expectancies, and assumptions, also known as individual schemas, shape the perception, encoding and recollection of information, and ultimately influence both emotion and behavior (Beck, 1993). In this regard, scientists have concluded that anxiety disorders may be initiated and sustained, in part, by a disturbance in information and resulting processing that leads to an overestimation of and overreaction towards danger or perceived threat (Beck, Emery, & Greenberg, 1985).

Recent focus on the cognitive process of attention, specifically, has provided a promising path for both understanding and treating anxiety as studies have shown that anxiety is associated with a maladaptive allocation of attention (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, van Ijzendoorn, 2007). The construct of attention encompasses "a suite of cognitive functions that allows the brain to prioritize particular stimuli for dedicated processing" (Shechner et al., 2012, p. 282). Underlying fear and anxiety, the prioritization of threat and the detection of danger in the environment serves as a normative function of attention as a rapid response to threat facilitates survival and therefore is adaptive (Peers, Simons, Lawrence, 2013). It is not surprising, therefore, that psychologists have long recognized the unique ability of threat to capture attention (Shechner et al., 2012). However, research suggests that a hypervigilant

attentional response toward threat, characterized as increased attention and readiness to respond to specific internal and external noxious stimuli (Van Damme, Crombez, & Eccleston, 2004a; Van Damme, et al., 2004b), may not necessarily be adaptive as it may interfere with ongoing cognitive demands and result in an incessant active sympathetic nervous system. Indeed, a wealth of research has confirmed that a hypervigilant attentional bias towards threatening information is more prevalent among anxious individuals than among non-anxious individuals (Bar-Haim et al., 2007; Mogg & Bradley, 1999; Williams, Mathews & MacLeod, 1996).

Specific focus on social anxiety disorder in both clinical and community samples has also suggested impairments and deficits related to emotion regulation (Hoffman, 2004). Models of social anxiety disorder have highlighted the role of emotional hyper-reactivity, which is thought to arise from distortions in attention and cognitive appraisals of social situations (Clark & McManus, 2002; Rappe, 1997). Individuals with social anxiety disorder tend to over-attend to and transform innocuous social cues into threat. This leads to inaccurate perceptions of self (as socially incompetent or unworthy) and others (as critical judges) resulting in anxious, maladaptive responses. In contrast, healthy social functioning requires the ability to effectively regulate emotion (Gross, 2002). Emotion regulation refers to a variety of strategies that can be implemented at different points during emotionally inducing situations to influence when and which emotions arise, how long they occur, and how these emotions are experienced and expressed (Gross, 2007). Effective regulation of emotion can reduce reactivity to stressful, threatening, and, anxiety provoking situations.

The ability to regulate and direct attention is a crucial component of emotion regulatory processes. However, individuals with SAD have been shown to possess a strong tendency to overly focus in an attentional manner on both internal cues and external cues during social

situations (Schultz & Heimberg, 2008) leading to enhanced anxious and emotional responses. Indeed, studies have demonstrated that adults with SAD possess abnormal attention processes consisting of hypervigilance in the face of social threat stimuli (Mueller et al., 2008). Neurological studies lend further support confirming that individuals with SAD show diminished recruitment in areas of the brain associated with cognitive and attention regulation, during reappraisal of emotional reactivity to social threat (Goldin, Manber, Hakimi, Canli, & Gross, 2009). This struggle to regulate attention and resulting down-stream emotion regulatory processes serves to maintain social anxiety symptoms.

Attentional deployment is the emotion regulation process of directing attention toward or away from specific stimuli to influence emotional responding and cognitive change strategies (Gross, 2015). Individuals confronted with threatening situation or stimuli may regulate emotion by either directing attention toward or away from situations of stress and fear. Gross' (1998) model of emotion regulation suggests that attentional deployment relates to which aspect of a situation a person focuses on. For example, a common form of attentional deployment used to modulate emotion in threatening situations is distraction, whereby an individual might focus attention away from the situation or stimuli or onto another aspect of situation to modulate their emotional response. Anxiety disorders, however, have been linked to the inappropriate implementation of such attention oriented emotion regulation strategies (Andersen & Teicher, 2008; Jazaieri, Morrison, Goldin, & Gross, 2015) in that individuals with anxiety tend to bias attention toward perceived social threat.

Attention Bias Toward Threat and Anxiety

Developmental studies have revealed that beginning at an early age, anxious individuals seem to possess an attention system that is characteristically sensitive to threats and that such

vigilance may play a significant role in both the origin and continuation of anxiety disorders (Beck, A. T., 1976; Eysenck, 1992; Mathews, May, Mogg, & Eysenck, 1990; Mathews & MacLeod, 2002; Williams, Watts, MacLeod, & Mathews, 1988). The construct of "attentional bias towards threat," as it is commonly referred, has been defined as the expression of intensified monitoring and enhanced attentional fixedness on threatening stimuli relative to neutral stimuli (Bar-Haim et al., 2007; MacLeod, Mathews & Tata, 1986; Mogg & Bradley, 1999). The specific stimuli identified as threatening differs across disorders. For example, individuals with panic disorder tend to selectively attend to physical pain and certain bodily sensations associated with panic (Asmundson, Sandler, Wilson, & Walker, 1992; Schmidt, Lerew, & Trakowski, 1997), and bias toward threat related to trauma is evident in individuals with PTSD (Foa, Feske, Murdock, Koak, & McCarthy, 1991; Kaspi, McNally, & Amir, 1995). However, research is consistent in threat bias' link to anxiety and studies have confirmed that social anxiety specifically is linked to a bias toward attentional allocation to social threat cues and social stimuli (Gamble & Rapee, 2010; Mogg & Bradley, 2002; Mogg, Bradley, Miles, Dixon, 2004; Staugaard, 2010), namely threatening or critical faces (Coles & Heimberg, 2005; Lundh & Ost,1996; Wells et al., 1995). Indeed, heightened attention to social threat cues have been confirmed in studies in both clinical (Asmundson & Stein 1994; Maidenberg, Chen, Craske, Bohn, & Bytritsky, 1996; Mattia, Heimberg, & Hope, 1993) and community samples (Mogg & Bradley 2002; Pishyar, Harris, & Menzies, 2004).

Cognitive theories implicate attentional bias toward threat (AB) in the maintenance, and perhaps the etiology, of SAD (Morrison & Heimberg, 2013). According to Rapee and Heimberg's (1997) model of social phobia, a bias toward allocating attention preferentially to social threat cues may maintain the disorder, and exacerbate anxiety symptoms. Thus, models

suggest that social anxiety may, in part, result from an attentional preoccupation toward threatening stimuli, along with increased emotional reactivity to such stimuli, along with the inability to employ regulation strategies to modulate response.

Studies of the neural correlates of attentional bias to threat indicate that the bias is likely modulated by the amygdala (Carlson, Reinke, & Habib, 2009) and consists of a heightened sensitivity to both the recognition and the detection of stimuli that are perceived as potentially threatening in one's environment, as well as the directing of attentional resources toward such stimuli (e.g., a narrowing of attention or "tunnel vision"). It is further characterized by greater orienting and reactivity to explicit cues of threat and contexts associated with threat and may also generalize to innocuous stimuli, whereby non-threatening stimuli are then perceived as threatening.

Attention Modification and Anxiety Interventions

Considering both the prevalence and continuity of anxiety in youth and adolescents (Albano, Chorpita, & Barlow, 2003; Feehan, McGee, & Williams, 1993; Ferdinand & Verhulst, 1995; Pine, Cohen, Gurley, Brook, & Ma, 1998), clear theoretical and practical impetus exists to study threat-related bias in anxiety among these populations. However, relative to the extensive research with adults, a surprisingly small number of studies examining threat-related bias have been published with a youth or adolescent population. Moreover, fewer yet have focused on the explicit stage of late adolescence. While some studies relevant to threat-bias have utilized college student populations for convenience, none have specifically examined the role of attention bias and social outcomes during this vital phase of development. Despite the scarcity or research during this critical period of transition, those studies which have examined attentional bias toward threat in youth have linked it to patterns of adolescent anxiety, as well as poor socio-

emotional functioning, behavioral avoidance, withdrawal, loneliness and other social difficulties (Bar-Haim et al. 2007; Pérez-Edgar et al., 2010, 2011; Pine, Helfinstein, Bar-Haim, Nelson, & Fox, 2009). This confirms threat bias as an important mechanism for examining anxiety in this population.

Given the extensive adult literature, as well as the burgeoning youth studies that have documented deleterious outcomes associated with attentional bias, focus has begun to shift toward mechanisms and strategies that may alter or buffer this hypervigilant response to threat. Early studies suggest that directly targeting attention control mechanisms may act to attenuate anxiety in disordered individuals (MacLeod, 1996). This idea that dysfunctional patterns of thinking may contribute to anxiety pathology has driven the development of cognitive behavior therapy (CBT) for clinical anxiety disorders (Clark & Beck, 2010). In fact, cognitive behavioral therapy (CBT) methods have been utilized for decades to treat anxious symptoms by addressing behavioral avoidance, negative thoughts, and self-focused attention (Bradley, Mogg, Millar, & White, 1995; Mathews, Mogg, Kentish, & Eysenck, 1995; Mogg & Bradley 1999).

Other Attention Modification Strategies

Given the evidence that individuals with anxiety disorders tend to selectively process threat-related information in their environment, a recent emphasis has expanded to the exploration of attentional traits of resilience, along with methods through which attention, and attention bias specifically, may be modified or self-regulated to improve symptoms of anxiety. For example, Derryberry & Reed (2002) examined the association between attentional control and threat bias in anxious individuals and found that possessing greater attentional control acted as a buffer to attentional bias in anxious individuals. In this study, anxious individuals who possessed greater attentional control seemed to modulate attention away from threat bias easier

than those with less attentional control. Generally, anxious individuals seem to have difficulty self-regulating through attentional control to disengage from the anxious, threatening stimuli. This inability to disengage is thought to lead to escalating reactivity. To effectively cope with threatening and stressful stimuli requires the ability to regulate attention among available sources of both threat and safety, rather than toward threat alone. Thus, it appears that strategies that are aimed at modifying attention and cognitive control are indeed beneficial in alleviating anxious symptoms through reducing attentional biases (Bar-haim, Morag, & Glickman, 2011; Dandeneau, Baldwin, Baccus, Sakellaropoulo, Pruessner, 2007; O'Toole & Dennis, 2012).

Based on evidence implicating the role of attention in anxiety, attention training strategies such as Attention Bias Modification (ABM) and Cognitive Bias Modification (CBM) (Amir, et al., 2009; Bar-haim, 2010; Heeren, Lievens, & Phillippot, 2012; March, 2010; O'Toole & Dennis, 2012; Schmidt, Richey, Buckner, & Timpano, 2009), which attempt to alter attentional bias responses in anxious individuals, have been developed in the last decade and deemed useful in the reduction of threat bias. Such training has demonstrated effectiveness in reducing both behavioral and physiological measures of anxiety.

For example, the CBM-A training is an approach that has been most frequently employed across recent years and represents a unique application of the attentional probe task that is often used to assess anxiety-linked attentional bias (MacLeod et al., 1986). CBM is not designed to alter the way in which individuals respond to anxious thoughts but rather to directly change attention and cognitive processes that give rise to such thinking. In the assessment version of the dot probe task, probes are presented equally often in the screen locations where either the negative or neutral stimulus appeared. However, in the modification version of the task, the probes always appear only on the side of the screen containing negative stimuli. Mathews &

MacLeod (2002) report that extended exposure to threatening stimuli in this manner induces a different way of attentional responding to negative information.

ABM, on the other hand uses dot probe attention training sessions designed to direct attention away from threat cues, rather than toward (reviewed in Mathews & MacLeod, 2002). The goal of ABM is to reduce anxiety by retraining automatic attentional biases toward threat that have been observed in anxious individuals, and studies have indeed shown enduring success with this method in treating social anxiety disorder. Schmidt, Richey, Buckner, Timpano, (2009), for example, randomly assigned patients with SAD to either a training condition designed to reduce bias toward threat (using negative facial expressions) or to a control condition. Following the intervention, which consisted of eight sessions spread across a four-week interval, 72% of the patients in the attentional training condition no longer met diagnostic criteria for social anxiety, compared to 11% of the patients in the control condition. Four months later, 64% of the participants in the attentional training condition remained in remission versus 25% of those in the control condition. Several studies have confirmed that ABM often reduces symptoms in people with SAD (Amir, Weber, Beard, Bomyea, & Taylor, 2008; Amir et al., 2009; Heeren, Reese, McNally, & Philippot, 2012; Li, Tan, Qian, & Liu, 2008; Schmidt, Richey, Buckner, & Timpano, 2009).

Mindfulness as Attention Modification Strategy

Mindfulness, an additional promising approach to both increasing attentional awareness and improving emotion regulation strategies has begun to receive a significant amount of consideration in the field of anxiety research and treatment. Mindfulness was originally inspired by teachings of spiritual Buddhist traditions and derived from Eastern meditation practices. It has since been widely adapted in Western culture, where it is applied in a more secular nature,

often utilized to address issues of psychological well-being and stress (Baer 2003; Dryden & Still 2006; Kabat-Zinn, 1990). While research on mindfulness began in the 1960s and 1970s, its application and study as a form of behavioral intervention for psychological well-being and clinical problems began with the work of Jon Kabat as a means of treating patients with chronic pain (Kabat-Zinn, 1982).

Though mindfulness has been defined in multiple ways by those studying and utilizing the phenomenon, descriptions provided by most researchers are similar. Described in earlier spiritual writings as: "The miracle which can call back in a flash our dispersed mind and restore it to wholeness so that we can live each minute of life" (Hanh,1976, p. 14) mindfulness, in the recent secular sense is most often defined as paying attention in a purposeful, nonjudgmental way, in the present moment, (Kabat-Zinn, 1994, p.4) to the continuing stream of stimuli (both internal and external) as they arise (Baer, 2003). In addition to present moment orienting, some definitions include components of openness to novelty, sensitivity to different contexts, and the awareness of multiple perspectives (Langer, 1989; Sternberg, 2000).

It has also been further described as sustained, receptive attention to the present moment and events (Bluth & Blanton, 2014) and the ability to perceive the most fundamental nature of an object or situation, to experience it just as it is without bias (Gunaratana, 2002). Though some researchers focus exclusively on the attentional aspects of mindfulness (Brown & Ryan, 2003), most follow a model that encompasses two components that include attentional regulation, as well as adopting a specific orientation towards one's experiences (Bishop, et al. 2004). Thus, is primarily considered a dual component phenomenon defined both at an attentional level (awareness of the present moment) and an interpretation level (nonjudgmental and with acceptance) (Shapiro & Izett, 2008; Lang, 2013). Orientation to experience concerns the attitude

(curiosity, openness, acceptance) that one holds toward the experience, while attentional regulation refers to awareness and the non-elaborative observation (rather than negative interpretation) of moment to moment sensations, thoughts and feelings.

The primary tenets of mindfulness, namely awareness and nonjudgmental acceptance of moment to moment experience, are regarded as effective against common forms of psychological stress (rumination, anxiety, worry, fear, anger) that typically trigger maladaptive tendencies to avoid, suppress, or over-engage with one's distressing thoughts and/or emotions (Hayes & Feldman, 2004; Kabat-Zinn, 1990). Indeed, significant negative correlations have been found between mindfulness and depression (Brown & Ryan, 2003; Cash & Whittingham, 2010) rumination, neuroticism (Raes & Williams, 2010), dissociation (Baer, Fischer, & Huss, 2005; Walach, Buchheld, Buttenmuller, Kleinknecht, & Schmidt, 2006), difficulties in emotion regulation (Baer, et al., 2006) and social anxiety (Brown & Ryan, 2003; Dekeyser, Raes, Leijssen, Leysen, & Dewulf, 2008; Rasmussen & Pidgeon, 2010).

Dispositional Mindfulness

While clinical applications focus on mindfulness as a trainable skill, it can also be conceptualized as a dispositional characteristic that can be assessed using self-report questionnaires (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). The term mindfulness, therefore, may be used to describe a practice of cultivation, psychological process, and state of awareness, or a psychological disposition (Germer, Siegel & Fulton, 2005). Over the last decade of mindfulness research, there has been an increasing understanding that mindfulness can be expressed in state form, as well as in disposition form, (often referred to in the literature as trait or dispositional mindfulness) (Brown & Ryan, 2003; Walach, Buchheld, Buttenmuller, Keinknecht, & Schmidt, 2006). Thus, mindfulness can and has been studied as a psychological

disposition in which individuals differ in their everyday level, as well as a clinical intervention that aims to increase mindfulness for therapeutic purposes.

However, scientists in this field are just beginning to understand the nature of mindfulness as a disposition and a state and how they may operate both independently and collectively. While a state is a temporary, momentary feature that can be induced but does not persist over time, a disposition is a feature by which individuals naturally differ based upon genes and environment, which is relatively stable over time. Mindfulness as an inherent, yet modifiable ability, is thought to be expressed within individuals in varying degrees amongst the general population, regardless of intervention or intentional attempts to develop such skills (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Brown & Ryan, 2003; Carmody & Baer, 2008; Kabat-Zinn, 2003). Dispositional mindfulness, therefore, is relatively enduring and considers a person's natural tendency to enter mindful states (Loucks, Britton, Howe, Eaton, Buka, 2014). Although relatively little is known about natural variations in dispositional mindfulness, individual differences are presumed to have arisen through an interaction of inherited predisposition and environmental circumstances (Davidson, 2010). Indeed, twin studies examining genetic underpinnings of dispositional mindfulness have confirmed that it is moderately influenced by both genetic and non-shared environmental factors (Waszczuk et al., 2015).

Research examining clinical and therapeutic frameworks of mindfulness are also showing that dispositional mindfulness can be enhanced through intervention (Baer et al., 2008; Carmody & Baer, 2008) and that self-reports of mindfulness are sensitive to changes following intensive training in mindfulness. Recent studies suggest overlap between these two constructs, whereby short-term mindfulness interventions have increased levels of self-reported dispositional

mindfulness with exposure and training (Anderson, Lau, Segal, & Bishop, 2007; Baer, Smith, Lykins, Button, Krietemeyer, 2008; Brown & Ryan, 2003; Carmody & Baer, 2008; Carmody, Reed, Kristeller & Merriam, 2008; Lau et al., 2006; Grossman, 2011; Moore, Gruber, Derose, & Malinowski, 2012). For example, Carmody and Baer (2008) found that dispositional mindfulness levels increased significantly as a function of time spent in home practice of mindfulness meditation exercises.

Thus, while mindfulness has trait-like qualities, it is also a skill (or set of skills) that can be developed with practice (Bishop et al., 2004; Linehan, 1993b). The intention of intervention strategies then is to "cultivate" such skills into a form of everyday mindfulness assumed to be trait-like in that it is stable, enduring, and semi-consistent across situations (Thompson & Waltz, 2007). From a clinical perspective, traits are often difficult to change. Though, Segal (2007) has suggested that an intentionally created state can indeed become an enduring trait of the individual through long-term changes in brain function and structure and growing neurological evidence has indicated that mindfulness practice induces both state and trait changes. By temporarily changing the condition of the brain and corresponding pattern of activity (state mindfulness), enduring traits, (trait mindfulness) can be altered following longer periods of practice (Shapiro, Brown, Thoresen, & Plante, 2011).

Other studies linking mindfulness interventions with trait or dispositional mindfulness have demonstrated that increases statistically mediated the effects of mindfulness interventions on studies associated with various aspects of well-being. This suggests that mindfulness practice does influence dispositional mindfulness in ways that extend to improved psychological outcomes. For example, Carmody & Baer (2008) demonstrated that dispositional mindfulness partially mediated the relationship between formal mindfulness practice and psychological

symptoms and well-being. Other studies have shown similar mediation properties of dispositional mindfulness on the association of mindfulness interventions and psychological symptoms of stress (Nyklicek & Kuipers, 2008; Shapiro et al., 2008), rumination (Shapiro et al., 2008), depressive symptoms (Shahar, Britton, Ekblad, & Brantley, 2010), and behavioral regulation, specifically (Keng, Smoski, Robins, Ekblad, & Brantley, 2010).

Finally, both dispositional mindfulness as measured by self-report, as well as mindfulness increased by intervention, are linked to lowered levels of stress, fear, anxiety, and depression, as well as higher levels of positive affect and greater well-being (Ciarrochi, Kashdan, Leeson, Heaven, & Jordan, 2010; Grossman, Tiefenthaler-Gilmer, Raysz, & Kesper, 2007; Hofmann, Sawyer, Witt, & Oh, 2010; Teasdale et al., 2000). Studies have linked levels of dispositional mindfulness to less habitual responding (Wenk-Sormaz, 2005), healthy self-regulation, cognitive flexibility and openness to experience, or a tendency to seek and appreciate experience for its own sake, (Brown & Ryan, 2003); all of which are contrary to the presence of anxiety (Reeb-Sullivan et al, 2009). Other studies examining associations between dispositional mindfulness and more specific psychological symptoms have linked dispositional levels to agreeableness (Thompson & Waltz, 2007), and self-esteem (Brown & Ryan, 2003; Rasmussen & Pidgeon, 2010), as well as higher levels of life satisfaction, autonomy, competence, optimism and pleasant affect (Brown & Ryan, 2003).

It is important to note, also, that while the terms trait mindfulness and dispositional mindfulness are often used interchangeably in mindfulness-based and other literature, some researchers would argue that the constructs of a trait and a disposition are not synonymous. These conceptual issues in the empirical study of mindfulness should be noted as there are many ways in which the term “mindfulness” is used in the literature, including reference to states, traits

and dispositions. How the term "mindfulness" is conceptualized and operationalized is crucial to future progress and understanding in the field. While it's expected that the term may be qualified differently depending on the context of the study, it is important for researchers in the field to begin serious contemplation of how mindfulness is exemplified to standardize such constructs. While mindfulness is assumed to be a skill that can be taught or cultivated, enhanced through intervention or mental training, it is also conceptualized as an enduring, dispositional quality in which individuals naturally, and in part, innately differ. These individual differences are presumed the product of a complex interaction of genetic disposition and environmental influences, but are also subject to modification and enhancement through explicit training (Brown & Ryan, 2003). An important question left unresolved in the literature is whether this type of mindfulness should be characterized as a trait or a disposition and there is currently no clear distinction of these constructs in meaning, across the literature.

Dispositions are thought to refer to underlying, relatively stable, that reflect an individual's overall character, prevailing mood or tendencies (Carver & Scheier, 2000, p.54). Dispositions are assumed to be shaped by both genetics as well as a person's environment. In contrast, a trait is conceptualized as a specific feature of an individual that is mostly thought to be genetically predetermined. Given the nature of mindfulness and its ability to permeate all aspects of character, and the mindful person's general ability to act mindfully across a variety of situations has many, in the field, characterizing it as an overall disposition. The word trait is often used interchangeably outside of the field of mindfulness, but considered by trait theorists as more specific dimensions of thinking, behavior and feeling in which individuals vary on a continuum. Teasing out whether mindfulness that is present in natural levels, not acquired through training, is more analogous to the construct of trait or disposition is a challenge

deserving of further consideration and a question that needs to be addressed in future research. However, given the current overlap in empirical literature, for this study, and for the remainder of this document, the term mindfulness refers to dispositional mindfulness.

Individual Facets of Mindfulness and Anxiety

In addition to exploring mindfulness as a disposition or trait, versus learned skill, a small number of studies have also begun to consider the unique facets of mindfulness and their influence on psychological distress. Mindfulness has been theorized to consist of several distinct skills or abilities, that have also been validated empirically in several studies examining the factor structure of commonly used mindfulness scales (Baer, Smith, & Allen, 2004; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Baer et al., 2008; Dimidjian & Linehan, 2003; Christopher, Neuser, Michael, & Baimangalkar, 2012).

Previous studies exploring individual facets of mindfulness in relation to overall psychological distress, have mostly considered depression and anxiety, jointly. Evidence has shown, generally, that all facets of mindfulness, except for *Observing*, have been linked to lower levels of psychological distress. More recent studies have begun to piece apart the relationship by examining the different facets of mindfulness in relation to symptoms of depression and anxiety uniquely. Studies exploring anxiety in relation to the individual facets has not been entirely consistent. One study, for example, confirmed that increases in *Observing* were related to increases in anxiety (Desrosiers, Donalds, Anderson, Itzoe, & Britton, 2010). It is thought that this link between *Observing* and anxiety, as well as general psychological distress, may suggest that higher levels of *Observing* are associated with heightened attention to internal and external anxiety symptoms. Without the benefit of other mindfulness features, for example, nonjudging, to develop a non-judgmental stance towards experience, higher levels of *Observing* may

represent heightened attention to internal experience (Dunn et al., 2010), which may contribute to higher levels of anxiety.

Other studies have confirmed that facets *Non-judging*, the ability to refrain from judging one's own cognitions, emotions and bodily sensations, (Cash & Whittingham, 2010) as well as *Describing* (Desrosiers, Vine, Curtiss, & Klemanski, 2014) have both predicted lower levels of anxiety. Having the capacity to describe or label internal experiences, which is the essence of *Describing,* may relate to lower anxious arousal as labeling physiological sensations allows individuals to concretely define their experience of anxiety, while thinking abstractly and over-generalizing negative thoughts, has been associated with higher levels of depression and anxiety (Beck, 2005). Concrete thinking allows individuals to be more specific when reflecting on problems. Studies outside of mindfulness have shown that increased concreteness is associated with decreases in physiological arousal and somatic symptoms, both of which exacerbate symptoms of anxiety (Stober & Borkoveck, 2002).

Very few studies to date have explored individual facets of mindfulness in relation to social anxiety. One study by Clerkin et al., (2017), explored social anxiety as a mediator between mindfulness and drinking to cope and found that the relationship between specific mindfulness facets (acting with awareness, accepting without judgment, and describe) and drinking problems was mediated by social anxiety symptoms. This closely matches other studies linking specific mindfulness facets to more general forms of anxiety. Further, considering the cognitive nature of threat bias, as well as previous studies which have linked threat bias to affect labeling, (Brotman et al., 2007) a process that has been compared to the facet of *Describing*, (labeling internal experiences) it is reasonable to assume that higher levels of *Describing* might

contribute to lower levels of threat bias. However, no studies to date have examined how threat bias might differentially relate to individual facets of mindfulness.

Mindfulness, Emotion Regulation, Attention and Anxiety

Studies exploring mindfulness' influence on anxiety suggest that mindfulness may work to influence anxiety through an emotion-regulation framework, by altering emotional responding through the modification of cognitive and affective processes. The regulation of emotion has been defined as external and internal processes for monitoring, evaluating and modifying emotional reactions (Thompson, 1994). Early developmental research suggests that there are individual differences in reactivity and arousal of emotion, and resulting regulation, whereby anxious individuals have a generally lower threshold of reactivity related to fear and defense. (Calkins & Fox, 1992; Fox & Calkins, 1993; Kagan, Reznick, & Snidman 1988; Kagan & Snidman, 1991b). Further, as mentioned earlier, studies on anxiety support the notion that anxious individuals possess an attention system that may be more sensitive to threatening stimuli. However, early research in this area has also suggested that these individual differences in response to threat may be modified through experience and socialization efforts that alter the individual's reaction to arousal (Dienstbier, 1989).

Emotion regulation, often used to enhance or inhibit emotional arousal (Masters, 1991), encompasses a range of related, overlapping processes (physiological, neurological, cognitive reappraisal, and attention). A wealth of evidence supports that mindfulness may attenuate anxiety, in part, through its impact on several of these overlapping regulatory processes, which in turn impact emotion-related responses to threatening stimuli. For example, extant research has specifically highlighted the influence of mindfulness on regulatory mechanisms of attention (Baer, 2003; Carmody, 2009) and resulting cognitive change strategies. Indeed, two main

components of mindfulness are in direct contrast to the cognitive biases associated with anxiety, a) the adopting of one's experiences with an attitude of acceptance and openness and b) the regulation of attention maintained on immediate experience (Bishop et al., 2004). Attention processes are thought to support the regulation of emotion through bottom-up processing which manages the intake of threatening and emotionally arousing information that effects one's emotional state and response. Mindfulness, involves purposefully changing the focus of attention by expanding attention to capture a broader, more realistic context that may include both threatening and non-threatening information. For example, studies have demonstrated mindfulness' influence on attentional deployment in relation to social threat, a component of emotion regulation that involves directing attention toward or away from specific stimuli to influence emotional response (Brown, Goodman & Inzlicht, 2013; Teper & Inzlicht, 2013; Vago & Nakamura, 2011).

Studies outside of anxiety research also support the notion that mindfulness significantly improves various components of attention and has been equated with more effortful attentional processing, the opposite of mindlessness or automatic processing (Shiffrin & Schneider, 1977). For example, Jha and colleagues (2007) examined three different subsystems of attention (alerting, orienting and conflict monitoring) in relation to mindfulness enhancement received both as a training (MBSR) and through attendance at a retreat. They found improvements in areas of conflict monitoring in the retreat group and improved orienting in the training group, both of which are more effortful types of attention. Mindful awareness has also been associated with decreased errors on sustained attention tasks (Schmertz, Anderson, & Robins, 2009), improvements in areas of selective attention, inhibitory control, and cognitive flexibility (Moore & Malinowski, 2009) as well as greater self-reported attentional control (Baer, Smith, Hopkins,

Krietemeyer, & Toney, 2006; Herndon, 2008; Walsh, Balint, Smolira, Fredericksen, & Madsen, 2009). Thus, studies show that possessing a more mindful nature or skill set may be more beneficial to the overall well-being of anxious individuals as it seems to enhance top-down emotion regulation by fostering awareness and control of attentional processes and behavior, reducing attentional control deficits and negative cognitive styles that are central to mood disorders (Davidson, 2010; Greeson, Garland & Black, 2014; Teachman, Joormann, Steinman, Gotlib, 2012).

In addition to promoting the recognition and awareness of present events and accompanying emotions, mindfulness also promotes the ability to allow situations and resulting emotions to exist without judgment. Conversely, individuals with social anxiety tend to cognitively elaborate and judge social situations in a negative manner, both by focusing on their own social behavior, as well as perceived interpretations of what they believe others think of their social behavior. Mindfulness has been shown to enhance the ability to maintain non-judging awareness of one's own thoughts, feelings, and experiences in more general terms; thus, allowing individuals with social anxiety to emotionally self-regulate by altering their interpretation of incoming arousing or threatening information. Thus, mindfulness enhanced attention may help foster such bottom-up and top-down information processing skills that support emotional and cognitive flexibility (Dajani & Uddin, 2015). To maintain an attitude of acceptance and openness, without judgment, one must be cognizant of where and how the mind wanders when it drifts from the selected focus of attention to cognitively reappraise the situation. To regulate and shift the attentional (as well as cognitive, behavioral and emotional) aspects of anxiety, one must first have awareness (Harvery, Watkins, Mansell & Shafran, 2004). Thus, attentional regulation is an integral aspect of mindfulness, since bringing awareness to the focus

of attention is crucial to attend fully to the continually changing field of thoughts, feelings, and sensations.

Burgeoning evidence has also confirmed that both mindfulness and mindfulness meditation practices may influence more bottom-up processes that reduce reactivity to emotional stimuli. For example, a study which examined the ability to categorize tones presented 1 or 4 seconds following the presentation of affective or neutral pictures found that mindfulness meditation experience was significantly associated with reduced interference from unpleasant and pleasant pictures (Ortner, Kilner & Zelazo, 2007). Additionally, a study by Arch and Craske (2006) found that college students who participated in a brief mindfulness introduction to breath awareness reported less negative emotional reactivity in response to affective slides, as compared to controls. A number of studies support the association between mindfulness and reduced emotional reactivity and the attenuation of emotional responses to threatening stimuli (Arch & Craske, 2006, 2010; Broderick, 2005; Campbell-Sills, Barlow, Brown, & Hoffman, 2006; Creswell, Way, Eisenberger, & Lieberman, 2007; Erisman & Roemer, 2010; Goldin & Gross, 2010; Kaviani, Javaheri & Hatami, 2011; Kuehner, Huffziger, & Liebsch, 2009; McKee, Zvolensky, Solomon, Bernstein, & Leen-Feldner, 2007; Ortner, et al., 2007; Proulx, 2008; Vujanovic, Zvolensky, Bernstein, Feldner & McLeish, 2007; Weinstein, Brown, & Ryan, 2009). These findings suggest that mindfulness may attenuate reactivity to emotional stimuli through facilitating disengagement of attention from stimuli. Thus, mindfulness' influence on anxiety overall seems to be induced conjointly, by changes in attention and emotion (Treadway & Lazar, 2009) and may do so through by influencing both bottom-up and top-down functions.
While threat bias has primarily been explored as being driven by bottom-up processes which implicate greater reactivity and prioritization of incoming threatening stimuli, threatening stimuli

are often detected within contexts that initially cue or suggest the indication of an upcoming threat (Sussman, Jin, & Mohanty, 2016). Thus, in relation to anxiety specifically, enhancing top-down attention processes may allow for intentional allocation of cognitive resources and the cognitive re-appraisal or re-interpretation of incoming stimuli. There is still some debate as to whether mindfulness is primarily influencing bottom-up processes by reducing automatic reactivity of incoming stimuli or more top-down processes, which involve active reinterpretation of emotional stimuli and the effortful re-direction of attention. However, studies are suggesting that both bottom-up and top-down mechanisms of regulation are being altered by higher levels of mindfulness (Chiesa, 2013) suggesting that mindfulness may indeed decrease threat bias and resulting anxiety through both modes of regulation.

Neurobiological Basis of Mindfulness in Relation to Anxiety

Evidence is beginning to suggest that interrelated neurobiological, emotional and cognitive mechanisms may alter how an individual perceives, reacts and attends to threatening stimuli. While much of this work to date has been focused on adults rather than late-adolescents, recent work in the neurobiology of mindfulness is indeed beginning to suggest that mindfulness and mindfulness interventions may both foster plasticity changes in the brain and in neural circuits responsible for anxiety, stress and emotion regulation (Brown & Ryan, 2004; Cresswell, et al., 2007; Taren, Creswell, & Gianaros, 2013). As stated earlier, the amygdala has been implicated as responsible for the gating of threat and stress while orchestrating what is known as the brain's rapid fight or flight response (Arnsten, 2009). Thus, the amygdala is known to play a major role in emotional and mental health, with abnormal function tied specifically to attention bias to threat, as well as issues of anxiety, phobia and panic disorders.

Several studies have linked social anxiety disorder specifically with heightened activation of the amygdala in response to social cues conveying threat (e.g., fearful or angry faces) (Evans, Ferrando, Findler, Stowell, Smart, & Haglin, 2008; Goldin, Manber, Hakimi, Canli, & Gross, 2009; Phan, Fitzgerald, Nathan, & Tancer, 2006; Stein, Goldin, Sareen, Zorrilla, & Brown, 2002). Viewing harsh faces has been shown to activate negative emotions and amygdala response in both adults (Stein et al., 2002; Straube et al., 2004; Yoon et al., 2007) and adolescents (Mcluure et al., 2007; Killgore & Yurgelun-Tood; 2005) with SAD. Considering that research is beginning to highlight modifications to the structure and function of such limbic regions in mindful individuals (Cresswell et al., 2007; Holzel et al., 2007; Wang, et al., 2011; Way, Creswell, Eisenberger, & Lieberman, 2010), it is likely this may explain, in part, mindfulness' link to improved well-being and lowered levels of anxiety. Thus, increased levels of mindfulness seem to modify these neurobiological systems by altering neurological structures and associated neurotransmitters, which thereby act to lessen reactivity. Indeed, studies have found mindfulness meditation to be associated to decreased emotional reactivity, better emotion regulation and greater prefrontal inhibition of the amygdala (Brefczynski-Lewis, Lutz, Schaefer, Levinson, & Davidson, 2007; Creswell et al., 2007; Way et al., 2010) as well as decreased sympathetic hyperarousal (Barnes, Treiber, & Davis, 2001; Carlson, Speca, Faris, & Patel, 2007; Ortner et al., 2007; Sudsuang, Chentanez, & Veluvan, 1991). Other studies focused on mindfulness have demonstrated its association with cortical and limbic markers of emotional reactivity, including less amygdala activation during emotional threat (Creswell et al., 2007) and at rest (Way et al., 2010), as measured by functional magnetic resonance imaging.

Scientists at the University of Massachusetts Center for Mindfulness, for example, found that participation in an 8-week mindfulness meditation program appeared to make measurable

changes in brain regions associated with threat by decreasing "grey matter" density in the amygdala (Lazar, 2011). Other studies conducting volumetric analyses of grey matter in relation to mindfulness have yielded similar results. For example, higher levels of mindfulness have been linked to less grey matter volume in the right side of the amygdala, specifically, which is primarily responsible for processing affective visual stimuli (Lanteaume et al., 2007; Taren, Creswell, & Gianaros, 2013). Other studies have linked reduced resting amygdala activity with the use of affect labeling, which, as mentioned earlier, is a component of mindfulness which involves identifying and labeling emotion (Creswell et al., 2007; Hariri et al., 2000; Lieberman et al., 2005; Lieberman et al., 2007).

Mindfulness in Relation to Threat Bias

Research exploring mindfulness in relation to both neural structures and threatening stimuli have confirmed that greater levels of mindfulness are linked to lowered amygdala activation in response to socioemotional threat (Creswell et al., 2007) as well as more adaptive responses in threatening social situations (Barnes, Brown, Krusemark, Campbell, & Rogge, 2007). However, scientists studying neurobiological features of threat bias have also suggested that threat biased anxious responses may be influenced not only by individual differences in the amygdala, but also the prefrontal control mechanisms associated with selective attention.

Thus, it has been suggested that threat bias and anxiety may result from the combination of hypo-responsivity of prefrontal control mechanisms which inhibits attentional shifting from threat stimuli, and the hyper-responsivity of the amygdala in relation to threat-related stimuli (Bishop, 2007; Carlson, Reinke, & Habib, 2009). Indeed, recent neuroimaging studies have confirmed that anxious individuals show weaker recruitment of prefrontal control mechanisms in response to attentional competition from threat-related distractors than those individuals who are

low in anxiety (Bishop et al., 2004, 2006; Peers, Simons & Lawrence, 2013). So, while amygdala hypervigilance may explain attentional shifts towards threat, deficits in neural structures of the prefrontal cortex may interfere with the ability to augment attentional control away from threat, suggesting that anxiety might be linked to a dysfunctional balance of amygdala-prefrontal activity. While a myriad of research has confirmed that mindfulness decreases amygdala volume and reactivity and changes grey matter density; cortical thickness in other areas, such as the hippocampus and prefrontal cortex, have also been reported in relation to regular mindfulness practice (Grant et al., 2010; Holzel et al., 2011; Holzel et al., 2008; Lazar et al., 2000; Luders et al., 2009; Vestergard et al., 2009). Thus, it is conceivable that mindfulness may be influencing levels of social anxiety by modifying these neural structures that are associated with both reactivity and attention to threat (Brown et al., 2012; Holzel et al., 2010).

Neuro-hormones, Mindfulness and Anxiety

In addition to changes in neural structure, some research has shown that mindfulness may also attenuate stress hormones, such as cortisol; a steroid hormone that is produced and released by the adrenal gland, and functions as a component of the hypothalamic-pituitary-adrenal (HPA) axis in response to stress. During high-stress situations, cortisol is critical for the mobilization of energy resources important for immediate escape and/or problem solving—skills critical to survival. This release of cortisol in response to an acute stressor is thought to promote physiological responses which act as survival functions, such as increasing blood pressure and blood sugar levels, promoting analgesia, while conserving energy from non-vital functions by suppressing reproductive, immune and digestive functions (Sapolsky, Romero & Munick, 2000). However, despite their protective effects during true times of demand and threat, chronic levels of cortisol, resulting from long-term, every day, chronic stressors or perceived threat, can have

damaging effects on the body over time (McEwen, 2006, 2007). Thus, a wealth of research has linked chronically elevated cortisol levels with stress and anxiety and with symptoms of social anxiety disorder (SAD) specifically, (Furlan, DeMartinis, Schwizer, Rickels, & Lucki, 2001; Furmark, et al., 2005) and, while considered a physiological response to stress and threat, some research has shown that chronic levels of cortisol may, sustain or exacerbate levels of anxiety through impaired executive function and self-regulation (Shields, Bonner & Moons, 2015).

Several studies have begun to demonstrate that exposure to mindfulness training may play a role in significantly reducing levels of cortisol (Carlson, et al., 2007; Witekj-Janusek, et al., 2008) and is even being used as a bio-marker measure of success in Mindfulness Based Stress Reduction (MBSR) programs. Levels of mindfulness are also showing similar associations to cortisol. For example, Brown and Colleagues (2012) found that physiological and emotional responses to a social evaluative threat task were moderated by mindfulness, such that attenuations of cortisol and anxiety were found in more mindful individuals. Further, Bergen-Cico and colleagues (2014) found that an MBSR program consisting of four 90-minute sessions, significantly reduced CAR (cortisol awakening response) in veterans with PTSD. Thus, higher levels of mindfulness seem to alter overlapping cognitive, neurological, physiological and emotional structures implemented in the reactivity and response to threatening stimuli.

Self-Compassion, Attention Bias and Anxiety

While the relationship is not yet clearly understood (Baer et al., 2012; Van Dam et al., 2011), a separate line of research suggests that greater self-compassion, which often accompanies (and may be induced by) greater mindfulness, is also associated with overall well-being and lower levels of anxiety (Bergen-Cico & Cheon, 2013; Bluth & Blanton, 2014; Neff,

Rude, & Kirkpatrick, 2007; Van Dam, Sheppard, Forsyth, & Earleywine, 2011). Further, self-compassionate individuals have been found to have improved relationship functioning overall (Neff & Beretvas, 2012).

Self-compassion involves being caring and considerate towards oneself in the face of adversity, shortcomings or failures and perceived inadequacy. It consists of both self-kindness, as well as a sense of common humanity in which suffering and inadequacies are viewed as part of the shared human experience (Neff et al., 2007). Self-compassion promotes the sensation of feeling cared for, connected, and emotionally calm (Neff et al., 2007; Samaie & Farahani, 2011). Research suggests that, like mindfulness, self-compassion may also work to influence anxiety levels both cognitively as well as neuro-biologically. Gilbert and Irons (2005), for example, proposed that self-compassion may serve to generate feelings of secure attachment and safeness, by activating the oxytocin-opiate system and deactivating the "threat system" (limbic system) that is associated with feelings of insecurity and defensiveness. Social signals of affiliation and care, which are enhanced through self-compassion, are soothing and tend to lower stress and anxiety levels by activating the natural neuro-hormone oxytocin, a neuropeptide produced in the hypothalamus (Depue & Morrone-Strupinsky; 2005; Field, 2000; Wang, 2005). Research has shown that in addition to enhancing social affiliation, oxytocin increases trust, facilitates social encounters (Bartz & Hollander, 2006), increases memory for positive social information (Rimmele, Hedinger, Heinrichs, & Klaver, 2009) and encourages a willingness to augment social risks that arise through interpersonal interactions (Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005). At a neural level, oxytocin receptors are expressed in areas of the brain associated with both emotion and attention, specifically the amygdala (Huber et al., 2005)

and recent studies have shown that oxytocin is associated with lower levels of social anxiety (Bale et al., 2001; Heinrichs & Domes, 2008; Labuschagne, et al., 2010).

Oxytocin seems to both reduce sensitivity to socially threatening stimuli, as well as reactivity to faces expressing fear and anger (Domes, Heinrichs, Michel, Berger, & Herpertz, 2007; Kirsch et al., 2005; Petrovic, Kalisch, Singer, & Dolan, 2008). It is thought to do so by altering neurobiological systems related to attention bias to threat such as the fear circuits of the amygdala (Kirsch et al., 2005). Studies examining the role of oxytocin in social anxiety disorder specifically, have found that it decreases social threat perception and promotes symptom reduction (Guastella et al., 2009). By normalizing hyperactive amygdala responses to threat related cues in individuals with social anxiety disorder (Dodhia et al., 2014; Labushchagne et al., 2010), research has shown that oxytocin reduces neural activity. For example, one study found that oxytocin reduced attentional bias for emotional faces, specifically, in socially anxious individuals to levels seen in non-socially anxious individuals (Clark-Elford, et al., 2014). Evidence from other studies provides support for oxytocin's influence on the reduction of hyperactive amygdala and prefrontal responses to threat-related and negative social cues in individuals with SAD (Dodhia et al., 2014; Labuschagne et al., 2010). These neurologically focused studies have shown that oxytocin attenuates the amygdala's fear response and disrupts output from the amygdala to the autonomic nervous system, decreasing physiological reactivity that may sustain feelings of anxiety (Huber, et al., 2005). Thus, oxytocin's impact on anxiety seems, in part, to be through amygdala activation and regions which mediate the fear response.

Like mindfulness, in addition to its influence on neurological structures, oxytocin appears to also contribute to the regulation of the threat system by dampening stress hormones such as

cortisol (Carter, 1998; Depue & Morrone-Strupinsky, 2005; Field, 2000), resulting in both decreased anxiety and more overall positive social functioning. For example, Rockliff and colleagues (2008) found that giving individuals a brief self-compassion focused imagery exercise in which participants were asked to imagine compassion coming for them from an external source, lowered their overall levels of cortisol. Further, it increased heart rate variability, a factor known to predict social anxiety disorder (Alvares et al., 2013).

Similarly, in addition to neurobiological factors, cognitive components of self-compassion may also influence threat bias and anxiety levels. Self-compassion is a state of mind in which one exercises the following three components: a) extending kindness and understanding to oneself rather than harsh self-criticism and judgment; b) seeing one's experiences as part of the larger human experience in which all humans are challenged and flawed, rather than as separating and isolating; and c) holding one's painful thoughts and feelings in balance rather than over-identifying with them (Neff, 2003). Part of self-compassion both at the individual level and regarding overall humanity relates to the awareness of human suffering as an inevitable occurrence which is part of the human condition. Included within that definition of suffering are commonalities of self-criticism and feelings of unworthiness that impact all of humanity.

Adolescence, specifically, is a time when the emerging sense of self and identity is linked with the experience of social place and acceptance; often resulting in struggles with self-doubt and self-criticism. As adolescents and emerging adults regularly engage in comparison of themselves to their peers to establish their position in the social hierarchy, they are frequently self-critical and doubting of their self-worth (Brown & Lohr, 1987; Harter, 1990; Simmons, Rosenberg, & Rosenberg, 1973). Moreover, a myriad of research has linked such excessive self-criticism with a range of psychological difficulties, including various forms of depression,

substance misuse, eating disorders, and social anxiety (Gilbert & Irons, 2005; Zuroff, Koestner, Moskowitz, McBride, & Ravitz; 2005).

Conversely, self-compassion deters self-criticism, since that which one experiences in the moment is no longer loaded with emotional meaning and self-judgment, but is accepted as an integral part of the condition of being human, something we all experience and endure. Further, this awareness results in the exercising of a compassionate stance towards others as the self-compassionate individual recognizes that others also experience moments of feeling unworthy and self-critical. Thus, the individual is not suffering in self-criticism as an isolate threatened by a judging social world, but instead recognizes that all individuals experience such occasional self-doubt. It is reasonable to assume, therefore, that individuals with increased self-compassion might be less likely to exhibit biased attention toward socially threatening stimuli in their environment. However, despite the research suggesting that self-compassion may both cognitively dampen socially perceived threat, and neuro-biologically deactivate the threat system, scientists have yet to explore the potential association between self-compassion and attention bias. Moreover, though a wealth of evidence has confirmed that both mindfulness and self-compassion are associated with lower levels of social anxiety, and seem to dampen attentional biases and emotional reactivity to threatening social stimuli, little is known about the interplay of these components.

Theoretical Framework

The relationship between social anxiety and the tendency toward attentional bias concerning threatening environmental stimuli has been established numerous times in the literature and scientists from multi-disciplinary fields of study have, for decades, been exploring the exact mechanisms of this association. Cognitive, self-regulatory and more recently,

neurocognitive, models have jointly offered a solid framework and foundation for understanding this association. Recent scientific endeavors have begun to consider interventional strategies related to attention control and regulation, that can be taught or enhanced to alter this relationship and attenuate anxious symptoms. Numerous studies have begun to support mindfulness and self-compassion, specifically.

Neurocognitive models of attentional bias consider both automatic and strategic or intentional stages of information processing, or what is often referred to as bottom-up and top-down processing. Examination of neural mechanisms suggests that the amygdala, the region of the brain associated with emotion, fear, and threat detection, may underlie the automatic vigilance for threat indicative of bottom up processing (Anderson & Phelps, 2001; 2002; Davis & Whalen, 2001; Monk et al., 2003; Ohman, 1997, 2005; Ohman & Wiens, 2004; Phelps & LeDoux, 2005). Evidence has demonstrated that activation of the amygdala upon exposure to threatening stimuli, may occur outside of reflective awareness, as a more automatic response. Often referred to as a bottom-up process, this response seems to occur outside of conscious control, and is involved in normal and adaptive automatic, rapid detection of threat in the environment (Adolphs & Tranel, 2004; Davis & Whalen, 2001). Once threat is detected, more strategic or voluntary, top down processes relying on cognitive control regions to be recruited, help manage the threat, typically through shifting attention and disengaging from the stimulus.

However, these neurocognitive structures associated with fear detection and response, may work somewhat differently in individuals who report higher levels of anxiety in that anxious individuals seem to possess an exaggerated, hypersensitive threat-appraisal system (amygdala), a decreased threshold for threatening information. Thus, individuals who report higher levels of

anxiety tend to detect threat more readily and direct attention toward threat in very early phases of stimulus presentation (Shechner et al., 2012); and have a lower threshold for determining whether a stimulus indicates threat (Vasey & MacLeod, 2001; Waters, Craske, Bergman & Treanor, 2008). This hyper-focused attention toward threatening stimuli, while ignoring alternative stimuli that is positive or neutral in nature, leads anxious individuals to be biased toward that which is threatening in their environment.

Neurocognitive models highlight not only a variation in amygdala response to perceived threat in anxious individuals, but also a variation in attentional control, or the ability to flexibly control attentional allocation and to intentionally disengage attention (Bridgett et al., 2012; Posner & Rothbart, 2009). Theoretical explanations also suggest that attentional bias includes, in addition to a propensity to more readily detect threat, a poor ability to disengage from the threat. Thus, anxious individuals not only more readily appraise incoming stimuli as threatening but also exhibit a biased responsiveness to threatening stimuli in which attention directed towards threatening stimuli disengages from it in a delayed manner, like the 'freezing' response that is commonly displayed in animal models of fear (Fox et al., 2001). By directing attention toward threatening stimuli at very early stages of attention capture, individuals prioritize threatening cues over neutral and reward cues.

Neurocognitive models propose, therefore, that threat bias may influence anxiety based upon both a bottom up, hyper-sensitive amgydala-based appraisal system that detects and assigns priority to threat, as well as a top-down attention system based upon mechanisms of the prefrontal cortex (Browning, Holmes & Harmer, 2010; LeDoux, 1996; March, 2010). Thus, neurocognitive models which attempt to explain attentional bias and anxiety include both neurological threat-evaluation systems as well as cognitive attentional resource allocation

(Barhaim et al., 2007; Vuilleumier, 2005). Indeed, recent neuroimaging accounts are beginning to confirm this premise, suggesting that poor prefrontal attentional control may be responsible, in part, for difficulties in disengaging attention from threat (Cisler & Koster, 2010; Peers et al., 2013). It is not surprising, therefore, that research examining correlates of attentional bias have found that it is strongest in individuals with the lowest levels of attentional control (Derryberry & Reed, 2002; Lonigan, Vasey, Phillips, & Hazen, 2004; Peers, Simons & Lawrence, 2013). Thus, while models marginally differ on their placement of anxiety, all emphasize the role of attention in both the detection of and shifting from anxious stimuli.

Models that are more cognitively focused not surprisingly emphasize more attentional mechanisms to explain this connection, and have come to similar conclusions. Attentional Control Theory (Eysenck, Derakshan, Santos & Calvo, 2007) for example, posits that anxiety disrupts the inhibitory and shifting components of executive function related to attentional control. Through this model, it is postulated that anxiety a) potentiates attentional shifting, which leads to an expedited detection of threat related stimuli, while b) also interfering with attentional inhibition. In other words, anxious individuals not only detect threat more readily, but are also less able to shift or disengage attention from the detected threat stimuli. The theoretical premise is that a predisposition to attend to threat, combined with the inability to switch attention away from threat (low attentional control), may exacerbate anxious symptomology, potentially leading to long-term disorder. Thus, greater anxiety seems to also emerge from attentional bias (MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002; Mathews & MacLeod, 2002) as a vigilant focus of attention on threatening stimuli may reinforce a physiological anxious response. Models suggest that this may lead, cyclically to greater attentional bias. Indeed, as discussed earlier, interventions designed to train individuals to attend

towards or away from threatening stimuli have found that those individuals trained to attend toward threatening stimuli do report greater anxiety while completing a difficult task (Mathews & MacLeod, 2002), suggesting that anxiety may result from or at least is exacerbated by the expression of attentional biases towards threat. Other developmentally oriented works support this more reciprocal association in which an already existing predisposition for anxiety, by way of a hypervigilant amygdala response, seems to precede the development of stable, long-term anxiety disorders when moderated by threat bias (Pèrez-Edgar et al., 2010, 2011). Anxiety, therefore, may both influence and be influenced by attentional threat bias and thus, these models suggest that greater attentional and self-regulatory mechanisms that influence greater control of both bottom-up and top-down processing may work to disrupt this process.

Despite the understanding of mindfulness' capacity to influence anxiety and self-regulatory mechanisms of attention, the relationship between mindfulness and attentional threat bias, specifically, remains obscure. However, literature on each of these topics respectively suggests three distinct themes that may advocate for an association between mindfulness and lower levels of attention bias to threat. First, threat bias models recognize that narrowed attention to threat-related cues plays a significant role in the development and continuation of anxiety disorders. Such narrowing of attention associated with attentional bias may result in individuals missing non-threatening aspects of their environment (including information which may counter aspects of threat). Mindfulness, in contrast, promotes the development of receptive attention, encouraging individuals to redirect their attention in such a way that allows them to observe information and events that were previously outside of their narrowed attentional awareness. This promotes not only attentional control but also the broadening of awareness by expanding attention to capture a more expansive context. Mindful behavior, therefore, and a

greater mindful nature, may promote the opposite of bias, helping anxious individuals to incorporate all aspects of their environment (threatening and not), increasing the potential for more effective and flexible responding. Principles of mindfulness require a strong attentional focus on what is present, along with the capacity to switch easily to incoming, alternate, stimuli (Bishop et al., 2004). Such skills directly conflict with the partiality toward, and inability to disengage from, threatening stimuli that is thought to be inherent in threat bias.

Second, the tendency of anxious individuals to cognitively elaborate threat-related stimuli also conflict with the very nature of mindfulness, namely, the allotment of attention to immediate stimuli and their non-elaboration (Bishop et al., 2004). Not only are anxious individuals typically biased toward threatening stimuli, they also tend to cognitively elaborate, or re-interpret even ambiguous stimuli or information by catastrophizing or judging such stimuli as negative (Butler & Mathews, 1983; Foa, Franklin, Perry, & Herbert, 1996; Stopa & Clark, 2000). Evidence has shown that anxious individuals are more prone to negative threat-related interpretative biases of emotionally ambiguous stimuli (Hirsch & Mathews, 1997; Mathews & MacLeod, 1994; Richards, et al., 2002). Further, research has linked repetitive worry and ruminative thought processes, or the tendency to repetitively think about oneself and about the possible meaning and implications of events or stimuli associated with depressed or anxious feelings, with the intensification of such symptoms (Raes, 2010).

Mindfulness, however, embraces a form of "here and now" non-reactivity toward situations and stimuli, as well as encouraging metacognitive awareness, or insight into one's own thoughts, emotions, and behaviors (Greeson, Garland & Black, 2014). Thus, thoughts and feelings are not necessarily perceived as intrinsic aspects of the self or accurate manifestations of reality, but rather as external or passing events in the mind (Teasdale et al., 2002) which can be

shifted and altered toward well-being. Concomitantly, mindful individuals are more open to new information and seek to avoid schema congruent processing, or the tendency to respond to a stimulus by evoking a programmed response or behavior script (Brown & Ryan, 2003). Often termed "de-automatization" (Martin, 1997), mindfulness involves the process of stepping out of automatic or habitual modes of responding. Models of threat bias propose that once a threatening cue is detected, automatic and strategic forms of emotion regulation processing typically follow. Automatic forms of processing have the potential to operate below conscious awareness and are typically over-trained, habitual responses to threat. Considering that attentional biases are the result of automatic processing (Fox, 1996), it is conceivable that higher levels of mindfulness would therefore conflict with threat bias at the earliest points of attentional capture, and ultimately anxiety. As the tenets of mindfulness advocate an awareness of one's automatized reactions, they allow for more strategic forms of processing and greater regulation of such responses which are more volitional, and cognitive in nature.

Studies have just begun to explore associations between mindfulness and attention bias to threat; therefore, research to date is somewhat sparse. Findings from recent studies with select populations, however, have confirmed associations between mindfulness and various forms of attentional bias. For example, studies have shown that individuals who score higher on anxiety sensitivity, a form of attentional bias toward symptoms of anxiety (e.g. heart palpitations & worry), have been found to exhibit lower levels of mindfulness (McCracken & Keogh, 2009; McKee, Zvolensky, Solomon, Bernstein, & Leen-Feldner, 2007; Vujanovic, Zvolensky, Bernstein, Feldner, & McLeish, 2006). Further, an 8-week Mindfulness-based Meditation Training (MMT) significantly reduced pain-related threat bias in a sample of participants with Fibromyalgia. In comparison to a control group, individuals exposed to mindfulness training

demonstrated significantly less avoidance of threat (Vago & Nakamura, 2011). A more recent study examined mindfulness in recovering alcohol-dependent individuals and found that those high in mindfulness exhibited less alcohol attentional bias (Garland, Boettiger, Gaylor, Chanon, Howard, 2011). Therefore, while attentional bias to threat, specifically, has not yet been examined as a potential mechanism linking mindfulness to improvements in anxiety, extant research suggests that this may be a viable route to explore.

As previously stated, research has shown that anxious symptoms negatively impact mental health (Hawker & Boulton, 2000; McCabe, Antony, Summerfeldt, Liss, & Swinson, 2003; Sourander et al., 2007). Studies have confirmed that socially anxious individuals have problematic social relationships (Erath, Flanagan & Bierman, 2007; Ginsburg, La Greca & Silverman, 1998), as symptoms often provoke avoidant and withdrawn behaviors (Boivin, Hymel, & Bukowski, 1995; Cartwright-Hatton, Hodges, & Porter, 2003; Schwartz, Snidman & Kagan, 1999). Developmentally speaking, the consequences of such social impairment is often long-term, impacting the acquisition of relational competencies from youth through adulthood, deficits which then further reinforce social anxieties. The reviewed literature supports that the continuation of anxious social patterns into late adolescence have adverse consequences, particularly for college students as they attempt to adjust and integrate into a new social environment.

Research Questions and Hypotheses

While aspects of mindfulness and self-compassion may assuage symptoms of social anxiety, ultimately improving social relationships and social outcomes, the exact mechanisms through which this occurs is not yet clearly understood. Proposed theoretical models and empirical findings suggest that attentional aspects of greater mindfulness, in addition to

biological and cognitive aspects associated with greater self-compassion (a correlate of mindfulness), may both serve to attenuate the phenomenon of attention bias toward threat, which studies have identified as a strong correlate of anxiety. While studies confirm links between mindfulness/self-compassion and social anxiety, as well as attention bias and social anxiety, no study to date has included all variables to explore this projected pathway. Thus, it is conceivable that late adolescent college students with greater mindfulness and/or greater self-compassion will have less lower levels of social anxiety and loneliness and that this influence may transpire through the dampening effect of mindfulness on threat bias. To formally examine predictive and mediational associations, the following research questions and specific study hypotheses will be proposed:

Regression Models

Research Question 1. How do levels of mindfulness relate to attentional bias toward threatening stimuli in college students? Self-reported mindfulness is hypothesized to independently relate to attention bias toward threat, such that greater levels of mindfulness are expected to predict lower levels of threat bias as measured by a dot-probe paradigm.

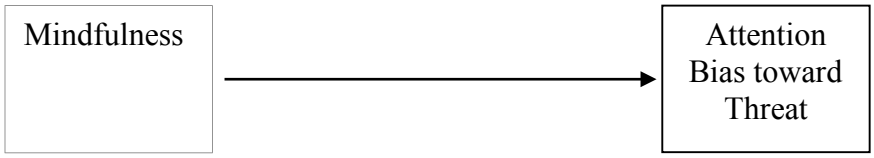


Figure 1. Path Model of the Association between Mindfulness and Attention Bias toward Threat

Research Question 2. How do self-reported levels of self-compassion in college students relate to attentional bias toward threatening stimuli?

Hypothesis 2. Self-reported levels of self-compassion are hypothesized to independently relate to attention bias toward threat, such that greater levels of self-compassion are expected to predict lower levels of threat bias as measured by a dot-probe paradigm.

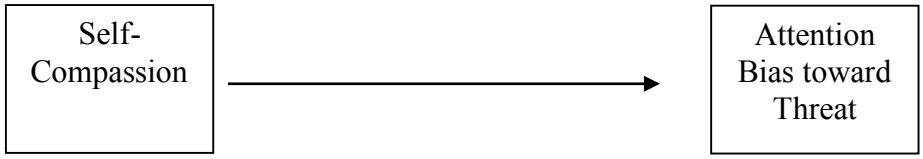


Figure 2. Path Model of the association between Self-Compassion and Attention Bias Toward Threat.

Research Question 3. Do greater levels of mindfulness in college students predict lower levels of social anxiety and loneliness?

Hypothesis 3. Mindfulness is expected to independently relate to the various outcomes associated with social adjustment, such that greater levels of mindfulness are expected to predict lower levels of both social anxiety and loneliness, independently

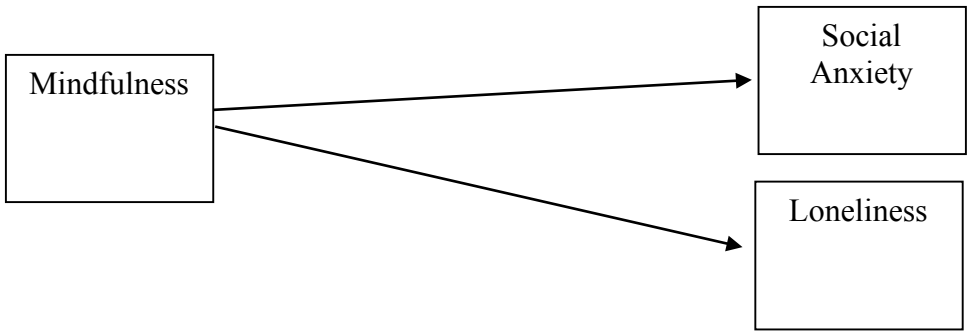


Figure 3. Path Model of the association between Mindfulness and Social Anxiety and Loneliness

Research Question 4. Do higher levels of self-compassion in college students predict lower levels of social anxiety and loneliness?

Hypothesis 4. Self-compassion is expected to independently relate to the various outcomes associated with social adjustment, such that greater levels are expected to relate to lower levels of social anxiety, and loneliness.

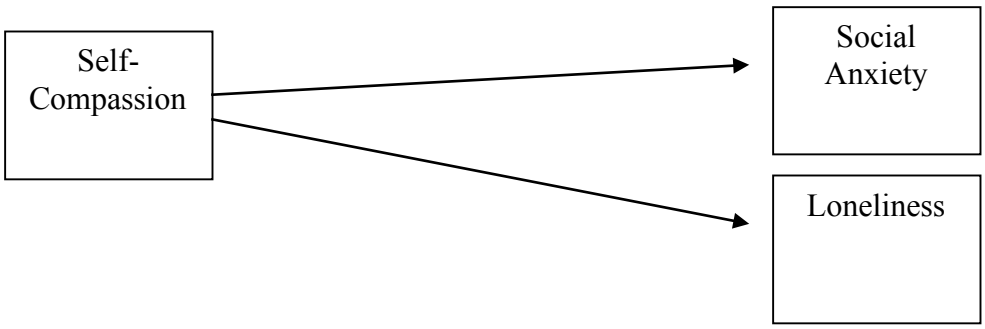
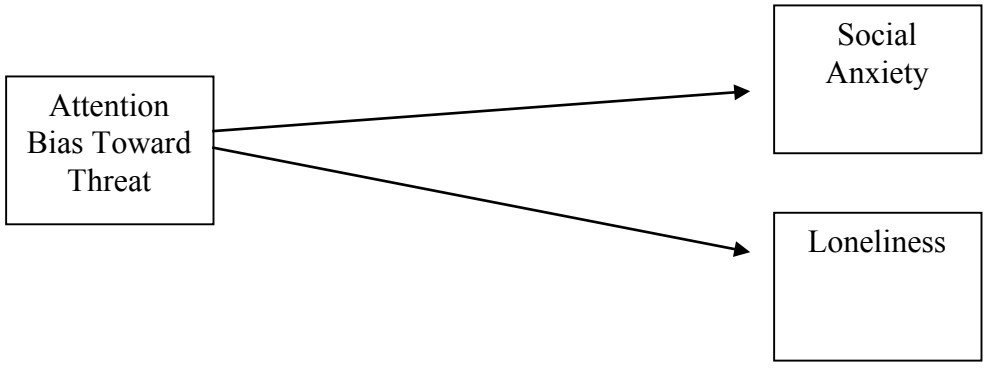


Figure 4. Path Model of the association between Self-Compassion and Social Anxiety and Loneliness.

Research Question 5: Do higher levels of attention bias toward threat predict higher levels of social anxiety and loneliness in college students?

Hypothesis 5. Attention Bias Toward Threat is expected to independently relate to the various outcomes associated with social adjustment, such that greater levels of threat bias are expected to predict higher levels of social anxiety and loneliness.



`Figure 5. Path Model of the association of Attention Bias Toward Threat in Relation to Social Anxiety and Loneliness.

Mediational Models

Research Question 6. Do levels of attentional bias toward threatening stimuli mediate the relationship between mindfulness and social anxiety and loneliness?

Hypothesis 6. It is predicted that attentional bias toward threat will mediate the association between mindfulness and social anxiety in college students such that higher levels of mindfulness are expected to predict lower levels of attentional biases toward threat, that in turn will predict lower levels of social anxiety in college students.

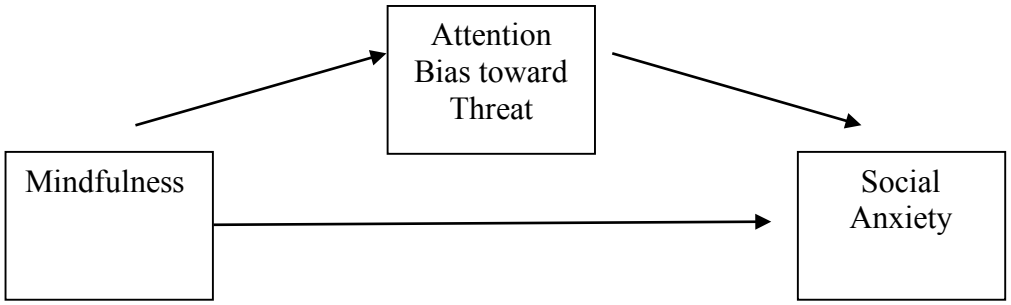


Figure 6. Mediation of Attention Bias Toward Threat in Relation to Mindfulness and Social Anxiety.

It is also predicted that attentional bias toward threat will mediate the association between mindfulness and loneliness in college students such that higher levels of mindfulness are expected to predict lower levels of attentional biases toward threat, that in turn will predict lower levels of loneliness in college students.

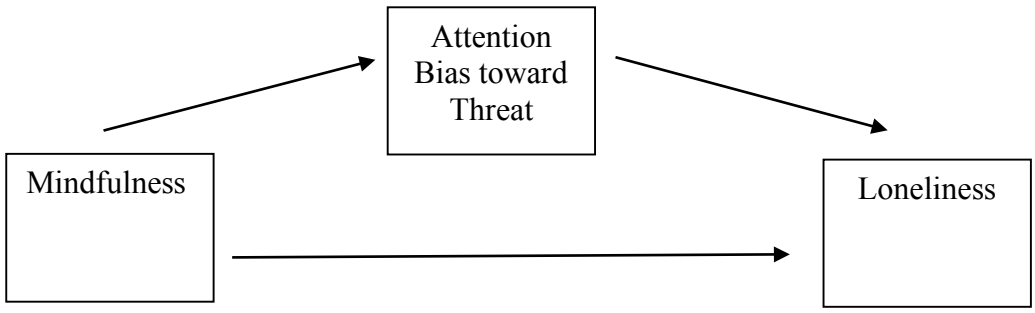


Figure 7. Mediation of Attention Bias Toward Threat in Relation to Mindfulness and Loneliness.

Research Question 7: Do levels of attentional bias toward threatening stimuli mediate the relationship between self-compassion and social anxiety and loneliness?

Hypothesis 7. It is predicted that attentional bias toward threat will mediate the association between self-compassion and social anxiety in college students, such that higher levels of self-compassion are expected to predict lower levels of attentional biases toward threat, that in turn will predict lower levels of social anxiety in college students.

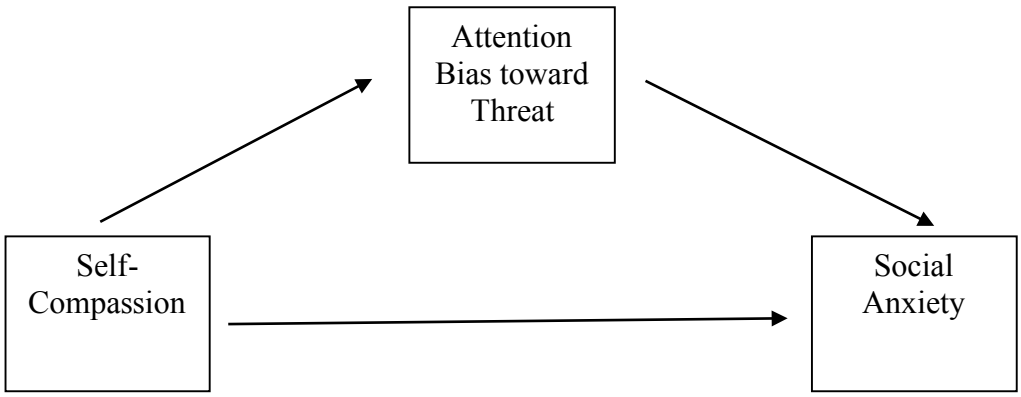


Figure 8. Mediation of Attention Bias Toward Threat in Relation to Self-Compassion and Social Anxiety.

It is also predicted that attentional bias toward threat will mediate the association between self-compassion and loneliness in college students, such that higher levels of self-compassion are expected to predict lower levels of attentional biases toward threat, that in turn will predict lower levels of loneliness in college students.

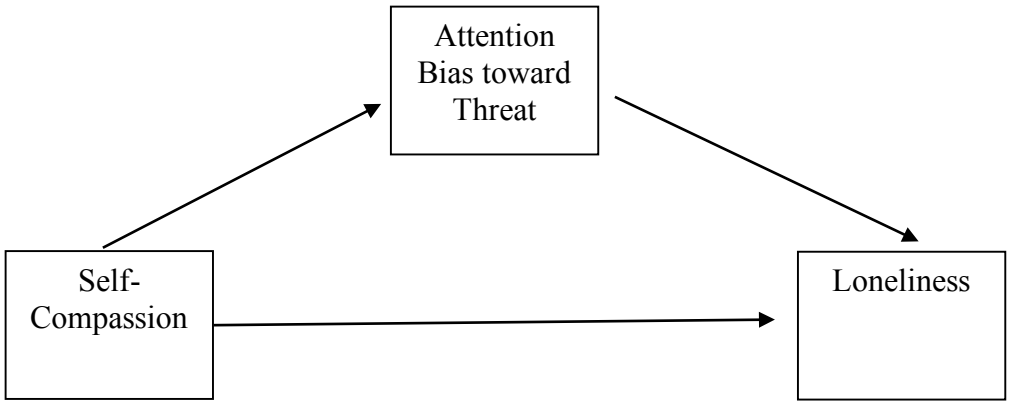


Figure 9. Mediation of Attention Bias Toward Threat in Relation to Self-Compassion and Loneliness.

III. METHODS

Participants

An a priori power analysis was performed using G*Power 3.1 power analysis program (Faul, Erdfelder, & Lang, 2009) to determine the necessary sample size that would be adequate to detect a moderate (.15) effect size (Cohen, 1994). Analyses suggested that a minimum sample size of 55 would be sufficient based upon a linear multiple regression fixed model involving a total of 1 tested predictor and four total predictors using an alpha of .05 and a power of .80. Given that individual multiple regression analyses will need to be implemented to test the five hypotheses and mediation model, Bonferroni's adjustment (Shaffer, 1995) was also applied to account for necessary power, dividing the nominal alpha level, 0.05, by the number of

hypotheses, five, yielding an alpha of .01. Thus, final power calculations were based upon a .99 power level which suggested that a proposed sample size of 125 would provide sufficient power to detect moderate effect size in the most complex linear regression proposed. Further, other more general rules of thumb for determining regression sample sizes were considered. For example, Green (1991) suggests $N > 50 + 8$ m (where m is the number of IVs) for testing multiple regression and $N > 104 + m$ for testing individual predictors, with the larger recommended in studies using both. This study aimed for a final sample size that met suggested sample size recommendations for regression analyses.

In addition, considerations in sample size were also based on expected prevalence of social anxiety symptoms in the general population and in college students specifically. Research has observed sub-clinical social anxiety to be quite prevalent in the general population, with 50% to 61% of individuals reporting social anxiety in at least one situation (Hofmann & Roth, 1996; Stein, Walker, & Forde, 1994). Overall 12-month prevalence in the general population has been reported by the National Institute of Mental Health as 6.8% with 29.9% having severe symptoms. Other studies have reported occurrence as high as 20% in college students specifically. Based on these estimates of social anxiety prevalence in the general population, this study also aimed to gather a sample large enough to comprise an adequate range of social anxiety symptoms amongst college students. Considering a reported prevalence of 20% in college students, it was determined that a sample size of at least 125 would both, be adequate to gather a range of severity and would be sufficient and for all statistical analyses.

Participants were full-time undergraduate students attending a private university in the northeastern United States. Students were given course credit for their participation. Approval

for data collection for this research study was obtained from the University's Institutional Review Board before the commencement of recruitment and data collection. Participants were recruited from seventeen courses among various academic majors within an interdisciplinary college of sports and human dynamics during the Summer and Fall semesters of 2014. All individual department chairs, as well as instructors and professors for the respective courses, were first contacted, either in-person or via email, to request permission to recruit their students and to request a provision of extra credit for those students who participated in the study. The amount of extra credit offered was left to the discretion of the instructor.

Upon receiving permission from the instructors and department chairs, a list of student names and emails for each course was provided by individual department administrative assistants. Students were then recruited through a distributed email (see Appendix A). Recruitment emails for each participating course were uniquely composed to include information regarding instructor, course number, and extra credit offered. A demographic questionnaire (see Appendix C) designed for this study specifically, was used to collect information regarding participants' characteristics. See Table 1 for a summary of participants' demographic characteristics. The substantially larger number of female (n = 144) than male (n = 28) participants was anticipated given the social science focus of the students. While most college majors across campus were represented within the sample, (e.g. biology and life sciences, education, computer and information science, etc.), the distribution was not balanced, as much of the recruitment occurred within social science related majors (e.g. human development and family science, social work, psychology) which are known to contain a greater percentage of females.

Table 1.

Participant Demographics (N = 176)

Demographic Variables	*M*	*SD*	*N (%)*
Age	19.2	2.23	
Sex			
Male			28 (15.9)
Female			144 (81.8)
Ethnicity			
African American			25 (14.2)
Asian			13 (7.40)
Caucasian			111 (63.1)
Latino/Hispanic			9 (5.10)
Native American/American Indian			2 (1.10)
Multi-racial/Other			12 (6.80)
Year in School			
Freshman			34 (19.3)
Sophomore			48 (27.9)
Junior			49 (28.5)
Senior			41 (23.7)
Family Income			
0-$25,000			16 (9.10)
$25,001-$50,000			39 (22.2)
$50,001-$100,000			58 (33.0)
Over $100,000			51 (29.0)

Note. Some demographic categories to not sum to 176 due to missing data

Procedure

Potential participants received an email explaining the study and their participation in detail, contact information for the principal investigator and a link to the study survey (Appendix A). Students were informed that they could participate only once in the study, and if enrolled in multiple participating courses, they would need to decide on a course to apply received extra credit. Emails also contained the deadline date for participation. Non-English speaking undergraduates were excluded from participation for ease of questionnaire administration. Also, participants needed adequate visual, reading, and motor abilities to use the mouse and keypad for the dot-probe computerized attentional bias task.

A custom online survey that included valid and reliable established measures was designed in Qualtrics (Qualtrics, Provo, UT; see Appendix C). All measures were free-access questionnaires and did not require permission for use from instrument developers. The online attentional probe task was configured and delivered via Millisecond's Inquisit software (Inquisit 2.0.60616, 2006) and linked to Qualtrics so that participants could transition from completing questionnaires in Qualtrics directly into the dot-probe task. Participants accessing the link were first directed to a page containing informed consent (Appendix B). Once they agreed to participate, participants were instructed to set their computer resolution to 800 x 600 and to complete the questionnaires and dot probe task alone in a semi-quiet, controlled setting with minimal distractions, allowing 35 minutes without pausing for the completion of all tasks associated with the study. Participants began by first completing questionnaires assessing mindfulness and self-compassion, as well as symptoms of social anxiety and loneliness.

Following completion of these surveys in Qualtrics, participants then encountered a link which directed them to instructions on how to complete the dot probe task. Participants first encountered a screen which instructed them on how to install the Inquisit Web Player, and informed them that they could quit the task at any time by pressing "control Q" on their keyboard. Each trial for the dot probe task started with a display of a white fixation cross in the middle of the screen for 500 milliseconds (ms), followed by one of the three possible face pairs (neutral-neutral, angry-neutral, or happy-neutral) displayed for another 500 ms.

The position of the emotion and neutral pictures was randomly chosen to be either left or right to the location of the fixation cross, with half of the emotion pictures being displayed on the right and the other half on the left. After 500 ms, the two pictures disappeared. Following the offset of the pictures, a probe stimulus (X) appeared in the location previously occupied by one of the cues, (either the neutral or emotional face). The probe remained on the screen until the participant pressed one of two response keys on the keyboard to indicate the position of the dot on the left or right side of the screen. The computer recorded the accuracy and latency of each response. The emotional stimulus faces appeared in the right and left positions with equal probability with the matched neutral face of each pair appearing in the other position. Targets also appeared with equal probability at the location of threat and neutral stimuli.

Participants were instructed to respond as quickly as possible to the probe without compromising accuracy, reporting the location of the probe (left or right); participants were asked to press the one key (E) if the probe appeared on the left side of the screen and another key (I) if the probe appeared on the right side of the screen. Participants were given 10 practice trials to familiarize themselves with the procedure and then one block of 80 test trials, with each stimulus run twice. Concluding the dot-probe participants encountered a screen, thanking them

for their participation and providing them with debriefing information. Upon completion of the study, participating students' names were sent to each individual instructor to distribute extra credit.

Measures

Mindfulness. Mindfulness was assessed via self-report using The Five Facet Mindfulness Questionnaire - Short Form (FFMQ-SF; Baer et al., 2006; Bohlmeijer et al., 2011). The FFMQ-SF consists of 24 items and is designed to assess a core characteristic of mindfulness related to the attentional awareness of what is taking place in the present moment. For each item, students rated how true the statement was for them. Items were answered on a five-point scale (1 = never or very rarely true; 5 = very often or always true), in which higher scores indicated higher mindfulness.

The present study used all five subscales of mindfulness to examine five specific facets of mindfulness: Observing, Describing, Acting with awareness, Non-judging, and Non-reactivity. All negative items were reverse scored so that higher scores indicated higher levels of mindfulness, then specific items were summed to create each individual facet/subscale. The *Observing* facet consisted of 4 items that measure the tendency to notice or attend to internal and external experiences. Sample items include, "I remain present with sensations and feelings even when they are unpleasant or painful" and "I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing." *Describing* used 5 items to measure the tendency to describe and label experiences with words. Items include "I'm good at finding the words to describe my feelings." The *Acting with awareness* facet consisted of 5 items and refers to bringing full awareness to current activity or experiences. Example items are "I rush through activities without being really attentive to them" and "I find it difficult to stay focused on what's

happening in the present." *Non-judging* consisted of 5 items and refers to a non-evaluative stance toward inner experiences. Sample items include "I make judgments about whether my thoughts are good or bad" and "I think some of my emotions are bad or inappropriate and I shouldn't feel them." *Non-reactivity* measured the tendency to allow thoughts and feelings to come and go, without getting caught up in them or carried away by them. This subscale consisted of 5 items, including "I watch my feelings without getting carried away by them."

The FFMQ-S has been shown to have a factor structure that is congruent with the 39-item version of the FFMQ (Bohlmeifer et al., 2011). Previous studies report high internal consistency of the FFMQ among non-meditators (Cronbach's $\alpha = 0.86$) and meditators alike (Cronbach's $\alpha = 0.95$). Alpha coefficients for the specific facets are in the adequate to good range (.72 - .92). Further, the FFMQ shows good construct and predictive validity with both meditators and non-meditators (Baer, et al., 2006; Baer, et al., 2008; de Bruin, Topper, Muskens, Bögels, & Kamphuis, 2012).

Self-Compassion. Self-Compassion was assessed via the 26-item Self-Compassion Scale (SCS; Neff, 2003a), which assesses six different aspects of self-compassion: Self Kindness, Self-Judgment, Common Humanity, Isolation, Mindfulness and Over-Identification. The SCS has shown test-retest reliability of .93 during a 3-week interval; significant positive correlations with social connectedness, emotional intelligence, and life satisfaction; and significant negative correlations with self-criticism, perfectionism, depression, and anxiety. Students responded on a five-point scale to statements reflecting how they typically act toward themselves in difficult times, from "1 = Almost Never" to "5 = Almost Always."

Subscale scores were computed by first reversing negatively worded items and calculating the mean of subscale item responses for the six subscales. An overall composite

score was created by computing the mean of the six subscale scores. *Self-Kindness* consisted of 5 items, including "I try to be loving toward myself when I'm feeling emotional pain." The *Self-Judgment* subscale consisted of 5 items. Examples include "When times are really difficult I tend to be tough on myself" and "When I see aspects of myself that I don't like, I get down on myself." *Common Humanity* measured 4 items, including "When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am." *Isolation* consisted of 4 items, such as "When I'm feeling down, I tend to feel like most other people are probably happier than I am." The subscale *Mindfulness* included 4 items and contained questions such as "When something upsets me I try to keep my emotions in balance." The *Over-identified* subscale consisted of 4 items, such as "When I'm feeling down I tend to obsess and fixate on everything that is wrong."

The SCS has shown good internal consistency with alpha coefficients in previous studies reported as follows: SCS composite (.91), self-kindness (.82), self-judgment (.79), common humanity (.84), isolation (.79), mindfulness (.82), and over-identification (.76) (de Bruin et al., 2012). A large body of research demonstrating that scores on the SCS predict wellbeing constitutes strong predictive validity (Neff, 2003a; Neff & Pommier, 2013). High convergent (Neff, Kirpatrick & Rude, 2007; Neff & Beretvas, 2013) and discriminant validity (Neff, 2003) was shown with overall self-compassion scores correlated negatively with self-criticism, depression, anxiety and rumination and positively with social connectedness and emotional intelligence. The SCS has also tested valid in a variety of distinct populations, including college undergraduates, community adults, clinical samples, and practicing meditators (Neff, Whittaker & Karl, 2017).

Attention Bias to Threat. Attention bias toward threat was assessed using the Dot-Probe Task, a measure of selective attention that has been extensively used to demonstrate attention to threat related stimuli in both clinical and community samples (see Bar-Haim et al., 2007, for a review). Facial stimuli were presented to students using the Inquisit Millisecond web-based software program (Inquisit 2.0.60616, 2006). It has been established that the online probe task is a valid, effective means of assessing attentional threat bias and is as sensitive as laboratory versions of the probe procedure (Macleod et al., 2007). High resolution, black and white emotional faces of males and females between the ages of 18 and 40 years, from the Chicago Face Database (Ma, Correll, & Wittenbrink, 2015) were used for stimuli and programmed into the software (See Appendix C). Photographs used for the dot-probe were digital, high resolution photographs of targets displaying a variety of facial expressions under standardized conditions (e.g. lighting, head positioning, face angle, eye level, etc.). Image size for all photographs measured 13 cm x 18 cm on the screen, presented side-by-side, 3 cm apart. Interrater reliability for the photographs, specifically judgment of emotional expression, has been shown to be high, ranging from .89 to .99. Facial stimulus pairs of 40 different actors were used and included an emotional and neutral photograph of the same actor. Test trials comprised 16 trials in each of two conditions: two emotional expressions (angry, happy), and two probe locations (the location of the emotional face or the neutral face). Additionally, 8 neutral-neutral pairs were included. Of these, 16 were angry/negative (A), 16 were happy/positive (H) and 8 were neutral (N). An equal number of male and female photographs were used. In line with Mogg et al. (2000), three types of stimulus pairs were created: N-N, A-N, and H-N picture pair. An additional ten pairs were selected for the practice trials. All photograph pairs presented side by side on the screen for a total of 500 ms. Half of each condition for the trials was female and the other half male and each

of 8 target items in a category (e.g. angry female) was presented once left and once right and each of the 8 target items in a category (e.g. angry females) was followed by a probe once and not followed by a probe once. Test trials were presented in a new random order for each participant.

Individuals who show an attention bias toward threat were expected to have faster reaction times to the probes that appeared on the same side as the threatening stimuli compared to neutral stimuli. Following previous research (Bradley et al., 1998) attentional bias scores for the current study were calculated by subtracting the mean response (latency) times for dot probes appearing in the location of the emotional face from the mean response (latency) times for dot probes appearing in the location of the neutral face.

Social Anxiety. Student's level of social interaction anxiety was measured with the Social Interaction Anxiety Straightforward Scale (SIAS-S, Rodebaugh, Woods, Heimberg, Liebowitz, & Schneier, 2006; Rodebaugh, Woods, & Heimberg, 2007), based on the original 20-item SIAS (Mattick & Clarke, 1998). The SIAS is a self-report scale that measures levels of social anxiety, specifically distress when meeting and talking with others. Rodebaugh and colleagues (2007) demonstrated that the revised SIAS-S, which excludes three reverse-keyed items, reducing the scale to 17 straightforward items, contains more valid indicators of social anxiety than the reverse-scored items in both undergraduate and clinical samples. Students rated experiences related to social interaction (e.g. "When mixing in a group, I find myself worrying I will be ignored") on a 5-point scale from 0 (not at all characteristic of me) to 4 (extremely characteristic of me). A composite score was created by summing the ratings, with summed scores ranging from 0 to 68.

The SIAS-S has demonstrated excellent internal consistency (α = .93) in undergraduate samples and has been shown to differentiate levels of social anxiety in both normal and clinical populations. Further, it has demonstrated strong construct validity in both undergraduate and clinical samples (Rodebaugh et al., 2006, 2007), as well as good discriminate (Heimberg, 1992; Mattick & Clarke, 1998) and convergent validity (Brown, et al., 1997; Mattick & Clarke, 1998).

Loneliness. Student perceived loneliness was assessed using a short version of the UCLA Loneliness Scale (Version 3; Russell, 1996) which is a measure of global loneliness. This shortened 10-item measure, composed of items selected on the basis of "the corrected-item total correlations from previous studies" (Russell, 1996, p. 26) assesses an individual's dissatisfaction with social relationships, in relation to both intimate relationships and the absence of a social network of friends.

Measured on a 4-point Likert scale ranging from 1 (*never*) to 4 (*often*), examples of items included "I am no longer close to anyone" and "I lack companionship." Scores range from 10-40, with higher scores indicating greater loneliness. A total score was computed by reverse-scoring items suggesting closeness to others and then summing the scores. Coefficient alphas of .89, indicate adequate internal consistency reliability (Russell, 1996; Wei, Russell, Zakalick, 2005). In terms of validity, the UCLA short form was negatively associated with social support as measured by the Social Provisions Scale (Cutrona & Russell, 1987) and has demonstrated good convergent and construct validity (Russell, 2010).

CHAPTER IV. RESULTS

This chapter presents the results of the statistical analyses associated with this study, starting first with preliminary analyses, including the analysis and handling of missing data, participants' demographic information, descriptive statistics and an examination of study variables. Analyses were designed to begin with the assessment of conventional assumptions important to data analysis. A plan to examine descriptive statistics was employed to compute means, standard deviations and frequencies, as well as assess for missing data of all variables, including demographics. Data distributions which were not normal (i.e. with a highly-skewed nature or large kurtosis) may create random effects; therefore, data was first tested for normality, and examined for outliers which may be responsible for non-normality. Further, assumptions of regressions through preliminary analyses were tested to ensure that the data has not violated assumptions of linearity, multicollinearity or homoscedasticity. Findings from primary analyses testing each of the individual hypotheses are then outlined. Results of follow-up mediation analyses are also presented.

Preliminary Analyses

Missing data analysis and testing of assumptions

The original sample of 204 participants was examined carefully for duplicate responses and missing data. Considering the lengthy assessments in this study's protocol and the technical means of web based data collection, some level of missing data (e.g., refusal to answer, incorrect responses, or technical error) was expected. Inappropriate methods for handling missing data can lead to bias in standard errors, test statistics and parameter estimates (Jones, 1996), therefore a plan for addressing such missing responses was anticipated in advance. Twenty-five students were dropped from the original sample due to their failure to complete the dot-probe task. An

initial analysis of the data set revealed that 204 students had complete or nearly complete data for all other measures (SIAS, SCS, FFMQ, UL-10), except the dot-probe task. Therefore, it is likely that the missing dot-probe data was the result of technical issues experienced while students attempted the dot-probe task, perhaps while transitioning from Qualtrics (which contained surveys measuring the predictor and outcome variables) to Inquisit (which assessed the dot-probe task). Some students had expressed difficulty early in the data collection process while attempting to transition to the dot-probe software using their mobile device or IPad, and while an explicit statement was added to the instructions after this, which asked participants to access the survey from a laptop or desktop, it is possible that some participants still attempted to take the survey on another electronic device, resulting in the extensive missing data. Consequently, to conduct full hypothesis testing that included the attention bias variables, the following statistical analyses were only conducted on the remaining subset of individuals, for whom all data, including attention bias data, was present. A series of independent samples t-tests were conducted to compare the scores of those participants who completed the dot probe (the analytic sample) and those who did not. Findings revealed no significant differences on scores of loneliness, $t(193) = -.606$, $p = .545$, social anxiety, $t(193) = -.961$, $p = .582$, total mindfulness $t(194) = -.730$, $p = .946$, or total self-compassion $t(192) = -.751$, $p = .454$ between the two groups.

Two additional participants were fifth year, non-traditional undergraduates and thus, were significantly older than the rest of the sample (ages 54 and 35). Given the focus in our study on undergraduate late adolescent/emerging adults, these two participants were dropped from the sample. This exclusion resulted in a final analytic sample of 176. Utilizing the SPSS program Missing Value Analysis, 7.5, an expectation Maximization (EM) technique (Hill, 1997) was used to assess whether missing data was missing completely at random. The Little's MCAR

test obtained for this study's data resulted in a chi-square = 3468.41 (df = 3391; p < .173), which indicates that the data are missing at random. In other words, no identifiable pattern exists to the missing data. The study variables were then explored to ensure that the assumptions for linear regression analyses were met. First, scatterplots for the variables were examined to determine whether the assumptions of independence, linearity and homoscedasticity were upheld. The visual analysis suggested no violations. Durbin-Watson values were examined in the models and were all found to be between 1.5 and 2.5, confirming independence (Durbin & Watson, 1951). Normality was assessed by plotting residuals for each model. Visual inspection of Q-Q plots indicated that the residuals followed a normal distribution reasonably well. However, further inspection did reveal a few outliers in each model, which could marginally influence normality.

The attention bias variables, specifically, were carefully examined for outliers. Like previous studies using the dot probe, response times shorter than 150 milliseconds or longer than 1000 milliseconds were considered outliers and removed (n = 1) from the data due to their untoward ability to influence average scores of total *Attention Bias*. Overall, error rates were low (less than 5% across all participants) and average time to complete the dot probe assessment was 3.77 minutes. Further inspection of normality on other variables was also conducted using Kolmogorov-Smirnov statistic, which suggested violation of normality by all variables (p <.05). Violations of normality are not uncommon in social science research, particularly in studies addressing anxiety (Osborne & Waters, 2002), however, it is important to consider outliers that can compromise linearity.

Examination of the boxplots revealed that approximately two to three outliers existed for each variable. To further assess whether these outliers had any undue influence on the regression models, Cooks Distance was also examined for each model (Tabachnick & Fidell, 2001). The

maximum values for Cook's Distance were below 1, indicating that the outliers had no undue influence on the results of any model. Additionally, to address issues of non-normality, key variables were standardized before running models and analyses were conducted using standardized variables.

Prior to analysis, a missing values analysis was also conducted using SPSS, on the final sample of participants containing complete, or nearly complete data. An examination revealed less than 5% of data missing in this subsample, scattered across all variables, with no systematic pattern evident in the missing data. A closer inspection of the data was conducted to understand possible patterns that might explain missing data. The number of skipped items per participant on a given measure ranged from one to four. However, upon closer examination, consistent with the missing values analysis, no visible pattern was evident and missingness in items was not consecutive and appeared to be random. Therefore, given the low percentage and random nature of missing data, single mean imputation is considered a sufficient method for addressing missing data (Tabachnick & Fidell, 2007). However, to confirm, two separate datasets were created, one using multiple imputation and one single item imputation. Exploratory and descriptive analyses of both datasets revealed no obvious and substantial differences in findings between the two methods for replacing missing data. Therefore, single mean imputation, which replaces the sample item mean for the missing item, was used to handle missing data for the final data set. After careful examination, and the adjustments describe above, the final data set used in this study included 176 college students. Further, the percentage of college students who reported some degree of social anxiety was explored to ensure an adequate number moderate to high socially anxious participants were included in this sample. Specific threshold categories for anxious severity levels have not been established for the SIAS in the literature. Therefore, to

ensure the sample for the current study included an adequate mix of anxiety severity, SIAS scores from this sample were divided into three categories evenly divided based on the range of scores in this sample. While some have suggested a cutoff score to distinguish between controls and individuals with social anxiety disorder (Brown et al., 1997; Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992), the utility of this score for community samples has not been established. Therefore, the following categories were formed by dividing the total range of SIAS scores into thirds representing low (SIAS = 17-35), moderate (SIAS – 36-55) and high (SIAS = 56-74) levels of reported social anxiety. It's important to note, however, that for analytical purposes the SIAS was only used in this study as a continuous summed score. These categorical scores were not created for clinical utility, or for analyses, but only to ensure an adequate range of severity within the sample. In this sample, 52% of college students (n = 91) scored in lower range (17-35), 37% of college students (n = 65) scored in the middle range (36-55), and 11% of college students (n = 20) scored in the high range (56-74). Therefore, 48% of college students (n = 85) reported at least a moderate degree of symptoms of social anxiety, indicating that the percentage of individuals with anxious symptoms in this study was somewhat higher than the expected level based on the 20% estimate of social anxiety prevalence in college students (Strahan, 2003).

Reliability of the measures was then calculated to ensure that the current sample was comparable to the norm samples. Cronbach's alpha was .95 for the SIAS, .90 for the SCS, .78 for the FFMQ, and .88 for the ULS-10. Alpha's were also calculated for the individual subscales of the SCS and FFMQ and all were found to have acceptable to good alpha levels for this sample. The *describe* and *detach* subscales of mindfulness had the lowest alphas at .72 and .71 respectively. The remainder of subscales were above .78. The reliability values for each measure

used in this study were comparable to the values reported above for validation and community samples.

Descriptive Analyses

Descriptive analyses, including means and standard deviations for all predictor and outcome variables, were performed to ensure that the data showed sufficient variability within this sample (see Table 2). Bivariate correlations were also conducted among all study variables. First, correlations were examined for all demographic variables in relation to the key study variables to determine whether their influence should be controlled for in subsequent models. Class standing (year in school) was positively related to the isolation dimension of self-compassion (r =.161, $p < .05$) such that individuals in earlier years of college were more likely to report feeling isolated in their suffering. Additionally, household income was positively associated with the mindfulness subscale of self-compassion (r = -.152, $p < .05$), suggesting that individuals from households with higher income levels were more likely to report that they keep failures in perspective and their emotions in balance.

Correlations among all key study variables are summarized in Tables 3 through 5. Table 3 shows the correlations among all facets of mindfulness and attention bias, and the social outcome variables (loneliness, social anxiety). Given the high co-morbidity of social anxiety and loneliness, it was anticipated that the two outcome variables would be highly correlated. Table 4 shows the correlations among all facets of self-compassion, attention bias, and the social outcome variables (loneliness and social anxiety). Table 5 shows the correlations between all self-compassion and mindfulness facets, specifically. Self-compassion and mindfulness are not often explored together, therefore, theoretical similarities between these predictor variables lead to anticipated high inter-correlations among them as well.

As expected, significant bivariate correlations were also found between all facets of mindfulness (except *observing*) and the social outcome variables (loneliness, social anxiety) (Table 3). Attention bias to threat was also significantly correlated with both social anxiety and loneliness, as well as the mindfulness facets of *describing, and total mindfulness*. As outlined in Table 4, significant bivariate correlations were also supported between social anxiety, loneliness and all dimensions of self-compassion, except for *mindfulness*. Threat bias was significantly correlated with self-compassion subscales of *common humanity and total self-compassion.* Pearson correlations were also examined to determine whether there was multicollinearity among the predictor variables. As indicated earlier, large significant correlations were found between the predictor variables of mindfulness and self-compassion (see Table 5). Due to this expected multicollinearity, separate regression analyses were conducted to test the predictive associations.

Control Variables.

Demographic variables were examined as potential covariates and included in the models as appropriate. Class standing, sex, income and race/ethnicity were carefully explored and evaluated as covariates for use in the primary analysis via examination of bivariate correlations. Race and ethnicity were collapsed (following the National Institute of Health's guidelines for reporting race and ethnicity) into a single dummy-coded variable (coded as Hispanic and/or non-White [n = 49, 27.8%] versus non-Hispanic White [n = 127, 72.2%]). Income was collapsed into a single dummy-coded variable (coded as up to $50,000. [$n$ = 67 38.1%] versus above $50,000 [$n$ = 109, 61.9%]). Similarly, class standing was also collapsed into a single dummy variable (coded as 1st and 2nd year [n = 82, 46.6%] versus 3rd and 4th year [n = 94, 53.4%]. Among potential covariates, sex (1 = male, 0 = female) was associated with social anxiety (r = .16, p =

.02), indicating that males, compared to females, reported significantly lower levels of social anxiety. Income (r = .24, p =.002) was also significantly associated with loneliness. As such, sex and income were both included as covariates in subsequent models predicting social anxiety and loneliness.

Additionally, due to theoretical assumptions that suggest that college students may struggle more with social anxiety and loneliness in early years, class standing was also controlled for in models predicting social anxiety and loneliness to factor out any potential confounding nature of time in the academic setting. While social anxiety will certainly influence social adjustment at any point during the academic career, studies have revealed that nearly all first-year freshman university students will experience some element of anxiety and adjustment problems as they attempt to assimilate into a new social milieu (Bennett & Okinaka, 1990). As students advance through their academic career, those who struggled early in the transition to college may learn to adjust socially over time. Ethnicity and age were not significantly associated with any of the variables of interest and, as such were not included as covariates in subsequent analyses.

Table 2.

Descriptive Statistics for Key Variables (N = 176)

Variables	*M*	*SD*
Loneliness	18.97	5.40
Social Anxiety	37.18	13.60
Mindfulness Total	76.54	8.85
Mindfulness Observing	13.61	3.10
Mindfulness Describing	17.14	3.17
Mindfulness Acting with Awareness	16.06	3.19
Mindfulness Non-Judging	14.78	3.02
Mindfulness Non-Reacting	14.94	3.55
Response Time: Attention Bias	431.88	87.51
Self-Compassion Total	3.08	.542
Self-Compassion Self-Kindness	2.99	.684
Self-Compassion Self-Judgment	3.04	.834
Self-Compassion Common Humanity	3.08	.757
Self-Compassion Isolation	3.13	.846
Self-Compassion Mindfulness	3.18	.721
Self-Compassion Over-Identified	3.06	.823

Table 3.

Bivariate Correlations between Mindfulness, Attention Bias and Social Outcome Variables (N = 176)

Variables	1	2	3	4	5	6	7	8	9
1. Loneliness	-								
2. Social Anxiety	.540**	-							
3. Mindfulness: Describing	-.384**	-.479**	-						
4. Mindfulness: Observing	-.038	-.017	.142	-					
5. Mindfulness: Acting with Awareness	-.225**	-.365**	.268**	-210*	-				
6. Mindfulness: Non-Judging	-.180*	-.372**	.282**	.043	.054	-			
7. Mindfulness: Non-Reacting	-365**	-.469**	.195**	-.136	.473**	.150*	-		
8. Mindfulness: Total	-440**	-.625**	.680**	.286**	.592**	.537**	.645**	-	
9. Attention Bias	.207**	.204**	-.144*	-.054	-.138	-.065	-.086	-.177*	-

p < .05. * p < .01. ** p < .001. ***

Table 4.

Bivariate Correlations between Self-Compassion, Attention Bias and Social Outcome Variables (N = 176)

Variables	1	2	3	4	5	6	7	8	9	10
1. Loneliness	-									
2. Social Anxiety	.540**	-								
3. Self-Compassion: Self-Kindness	-.258**	-.168*	-							
4. Self-Compassion: Self-Judgement	-.371**	-.542**	.283**	-						
5. Self-Compassion: Common Humanity	-.252**	-.038	.532**	-.059	-					
6. Self-Compassion: Isolation	-.417**	-.591**	.214**	.792**	.063	-				
7. Self-Compassion: Mindfulness	-.181*	-.140	.717**	.193*	.659**	.210**	-			
8. Self-Compassion: Over-identified	-.322**	-.581**	.213**	.821**	-.001	.774**	.261**	-		
9. Self-Compassion: Total	-.439**	-.515**	.676**	.759**	.492**	.766**	.697**	.768**	-	
10. Attention Bias	.207**	.204**	-.145	-.045	-.157*	-.109	-.110	-.078	-.151*	-

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

Table 5.

Bivariate Correlations between Mindfulness and Self-Compassion (N = 176)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Mindfulness: Describing	-												
2. Mindfulness: Observing	.142	-											
3. Mindfulness: Acting with Awareness	.268**	-.210**	-										
4. Mindfulness: Non-Judging	.282**	.043	.054	-									
5. Mindfulness: Non-Reacting	.195**	-.136	.473**	.150*	-								
6. Mindfulness: Total	.680**	.286**	.592**	.537**	.645**	-							
7. Self-Compassion: Self-Kindness	.175*	.125	.160*	.354**	.240**	.382**	-						
8. Self-Compassion: Self-Judgement	.230**	-.092	.368**	.327**	.587**	.530**	.283**	-					
9. Self-Compassion: Common Humanity	.214**	.123	.124	.251**	.016	.257**	.532**	-.059	-				
10. Self-Compassion: Isolation	.351**	-.067	.326**	.377**	.475**	.540**	.214**	.792**	.063	-			
11. Self-Compassion: Mindfulness	.188*	.179*	.178*	.410**	.197**	414**	.717**	.193*	.659**	.210**	-		
12. Self-Compassion: Over-Identified	.262**	-.053	.356**	.454**	.498**	.559**	.213**	.821**	-.001	.774**	.261**	-	
13. Self-Compassion: Total	.345**	.040	.372**	.521**	.499**	.650**	.676**	.759**	.492**	.766**	.697**	.768**	-

p < .05. * p < .01. ** p < .001. ***

Primary Analyses

Statistical Linear Regression Models Addressing Research Hypotheses

Primary analyses include regression models that depict mindfulness and self-compassion as global constructs as well as models that examine their subscales. One additional study which examined self-compassion and mindfulness accounted for the expected inter-correlation of the independent variables (self-compassion and mindfulness) by conducting separate univariate regressions, not only for the measures, but their respective subscales (Van Dam et al., 2011). Thus, to examine unique contributions toward predictive validity as well as to account for expected inter-correlation among the subscales, similarly, separate univariate hierarchical regressions were computed independently for the SCS and FFMQ. Initial simple linear regression analyses were conducted to examine whether mindfulness and self-compassion predicted levels of attention bias. For the regression models predicting social outcomes of social anxiety and loneliness, co-variates (year in school, income and sex) were entered at step 1. The independent subscales for mindfulness (Observe, Describe, Act with Awareness, Non-judge, Non-react) were entered, individually for each regression, at step 2, the final step of the model. Again, the models were tested separately in relation to the mediator variable, threat bias, and each of the two dependent variables of social anxiety and loneliness.

Similarly, a second set of regression analyses were then performed to test individual facets of self-compassion. In models including social outcomes of social anxiety and loneliness, co-variates (year in school, income, and sex) were entered at step 1. The predictor variables for self-compassion, (self-kindness, self-judgment, common humanity, isolation, mindfulness, over-identified) were entered, individually for each regression, at step 2, the final step of the model. Analyses were designed so that the specificity of the subscales related to mindfulness and

attention bias, as well as to self-compassion and attention bias would be explored prior to mediation testing to determine if certain facets of each are more likely to relate to levels of threat bias. As stated earlier, to avoid issues of multicollinearity a plan to compute separate regressions for each of the subscales corresponding to self-compassion and mindfulness, in relation to the proposed mediator variable, threat bias was followed. Significant subscales were incorporated into the full mediation model to test the remaining hypotheses. These regression results for mindfulness and self-compassion, respectively, as related to each individual hypothesis, are described below.

Hypothesis 1: Mindfulness and Attention Bias toward Threat. First, to test the hypothesis that mindfulness (as measured by the FFMQ) would predict lower levels of threat bias (as measured by the dot-probe task) a series of separate regression analyses were conducted with attention bias first regressed onto total levels of mindfulness. Results indicated that the full model including total mindfulness and the control variables was significant (β = -.13, F (4,171) =5.65, p <.05), with the full model explaining 3.1% of the variance (see Table 6). Subsequent regressions then explored each individual facet of mindfulness (*Observing, Describing, Acting with Awareness, Non-judging, Non-reactivity*) as predictors of attention bias. Individual facets of mindfulness were not significant in predicting levels of attention bias. A summary of regression coefficients for the individual facets of mindfulness are presented in Table 6.

Hypothesis 2: Self-Compassion and Attention Bias toward Threat. A second series of regression analyses were then conducted to test the hypothesis that self-reported self-compassion (as measured by the SCS) would account for variation in attention bias as measured by the dot-probe task. Attention bias was regressed first onto *Total Self-Compassion*. Results indicated that the

model including total self-compassion was significant in explaining variance in attention bias (β = -.11, F (4,171) =4.07, p <.05), with the full model explaining 2.3% of the variance (See Table 6). Subsequent analyses then regressed attention bias separately onto each individual subscale of self-compassion (*Self-kindness, Self-judgment, Common Humanity, Mindfulness, Isolation, Over-Identified*). Separate models testing the subscales of both *Common Humanity* (β = -.16, F (4,171) =4.40, p <.05) and *Self-kindness* (β = -.15, F (4,171) =3.71, p <.05) also showed significant associations with the full models explaining 2.5% and 2.1% of the variance, respectively (See Table 10). A summary of regression coefficients for the dimensions of self-compassion are also shown in Table 6.

Table 6.

Summary of Simple Regression Analyses for Mindfulness and Self-Compassion Predicting Total Attentional Bias (N = 176)

Outcome Variables	Predictor Variables	*Regression Coefficients*				
		β	*SE B*	*t*	*F*	R_2
Attentional Bias	Total Mindfulness [b]	-.129*	.054	-2.38	5.65*	.031
	Observing[b]	-.053	.056	-.697	.444	.010
	Describing[b]	-.141	.055	-1.86	1.19	.027
	Acting with Awareness[b]	-.136	.055	-1.78	.431	.026
	Non-Judging[b]	-.078	.056	-1.01	.579	.013
	Non-Reactivity[b, c]	-.068	.057	-.874	.514	.012
	Total Self-Compassion[b]	-.110*	.055	-2.02	4.07*	.023
	Self-Kindness[b,]	-.145*	.055	-1.93	3.71*	.021
	Self-Judgment[b]	-.041	.056	-.538	.394	.096
	Common Humanity [b]	-.157*	.055	-2.10	4.40*	.025
	Mindfulness[b]	-.116	.055	-1.53	.911	.021
	Isolation[b]	-.107	.056	-1.38	.798	.018
	Over-Identified [b]	-.078	.057	-.994	.570	.013

Note: Predictor variables[b] were not combined in the model. Individual linear regressions were conducted for each predictor variable separately.
*p < .05. **p < .01. ***p < .001

Hypothesis 3: Mindfulness and Social Outcomes (social anxiety and loneliness). Regression analyses were also conducted to test the hypothesis that higher levels of mindfulness account for variation in two outcomes associated with social adjustment, social anxiety and loneliness, independently. Social anxiety and loneliness were each regressed separately onto total mindfulness. Greater levels of total mindfulness significantly predicted lower levels of both social anxiety (β = -.61, F (4,171) =29.079, p <.001) with the full model explaining 26% of the variance, and loneliness (β = -.44, F (4,171) =14.95, p <.001) with the full model explaining 40.5% of the variance (See Table 9). All facets of mindfulness were then tested separately. Findings revealed that all subscales, except *Observing*, significantly predicted variation in social anxiety and loneliness. Regression coefficients for social anxiety and loneliness, separately regressed onto the individual facets of mindfulness, are shown in Table 7.

Hypothesis 4: Self-Compassion and Social Outcomes (social anxiety and loneliness). Similarly, regression analyses were then conducted to test the hypothesis that higher levels of total self-compassion account for variation in two outcomes associated with social adjustment, social anxiety and loneliness, independently. Greater levels of total self-compassion significantly predicted lower levels of both social anxiety (β = -.61, F (4,171) =29.07, p <.001) explaining 26% of the variance and loneliness (β = -.45, F (4,171) =14.95, p <.001) with the full model explaining 26% of the variance (See Table 10). All facets of self-compassion were then tested separately. Findings showed that the subscales *Self-Kindness* (β = -.18, F (4,171) =3.47, p <.001), *Self-Judgment* (β = -.52, F (4,171) =19.42, p <.001), *Isolation* (β = -.57, F (4,171) =23.67, p <.001), and *Over-Identified* (β = -.56, F (4,171) =22.21, p <.001), all significantly predicted social anxiety, explaining 7.5% of the variance, 31% of the variance, 36% of the

variance, and 34% of the variance, respectively. Sex was also significant in the self-kindness model, with being female significantly predicting social anxiety (β = -.15, p <.05) in this model.

Higher scores on the Self-Compassion subscales of *Mindfulness*, *Isolation, Self-Kindness, Self-Judgment*, *Common Humanity* and *Over-Identified* all significantly predicted lower levels of loneliness with variance levels ranging from 10% to 25%. Regression coefficients for the individual dimensions of self-compassion, in relation to social anxiety and loneliness, are shown in Table 8. Additionally, income was a significant predictor in all models predicting loneliness (p < .05) and income (p < .001) and class standing (p < .05) were both significant in the model containing the subscale of *isolation*.

Hypothesis 5: Attention Bias and Social Outcomes (social anxiety and loneliness). Lastly, regression analyses were conducted to test the hypothesis that higher levels of attention bias account for variation in two outcomes associated with social adjustment, social anxiety and loneliness, independently. Social anxiety and loneliness were each regressed separately onto attention bias. Greater levels of attention bias significantly predicted both higher levels of social anxiety, (β = .20, F (4,171) =3.81, p <.01), explaining 8.2% of the variance, and loneliness (β = .19, F (4,171) =4.70, p <.001), with the model explaining 10% of the variance in college students. Sex was also significant in the model predicting social anxiety (p < .05) with being female as predictive of higher social anxiety. Additionally, income was significant in the model predicting loneliness (p < .001) with lower levels of income predictive of higher levels of loneliness within the model.

Mediation Analyses

The preceding regression analyses were used to establish initial pathways for mediation testing. Prior to conducting mediation analyses, the specificity of the subscales related to mindfulness and self-compassion were first explored to determine if certain facets of each are more likely to relate to levels of threat bias and/or the tested social outcomes. To test the proposed hypotheses, individual hierarchical regression analyses were conducted with the six facets of mindfulness and seven facets of self-compassion for attention bias, as well as each of the two individual outcome variables (e.g. loneliness and social anxiety), to establish pathways for follow-up mediation analyses.

A second series of post hoc regressions were conducted for mediation testing on significant subscales of mindfulness and self-compassion to explore the potential mediating role of attention bias to threat on the relation between individual facets of mindfulness, self-compassion and the two social adjustment outcomes (i.e. social anxiety and loneliness). The specific variables tested were dependent upon the significance of the subscales of mindfulness and self-compassion in relation to the suggested mediator (attention bias to threat) as well as each of the two social outcomes (social anxiety and loneliness).

Testing of mediation for these models was consistent with Baron & Kenny's (1986) four criteria for mediation: 1) self-compassion and mindfulness should predict social anxiety and loneliness, 2) self-compassion and mindfulness should predict attention bias to threat, 3) attention bias to threat should predict dependent variables associated with social adjustment (e.g. social anxiety and loneliness) while controlling for self-compassion and mindfulness, separately, and 4) the association between self-compassion and mindfulness and the dependent variables

associated with social adjustment (e.g. social anxiety and loneliness) should be reduced or non-significant when the attention bias to threat is entered simultaneously in the models.

Conceptually, the demonstration of mediation involves establishing that a mediating variable partially or fully accounts for the relation between a predictor and an outcome variable. Thus, the magnitude of the relation between the predictor and outcome variable must be reduced (partial mediation) or extinguished (full mediation) when the mediating variable is included in the prediction model (Baron & Kenny, 1986). No model met the requirement for full mediation. Formal tests of the significance of partial mediation in simple mediation models, using bootstrapping methods were conducted on those models which met requirements (Baron & Kenny, 1986) for partial mediation, according to the proposed hypotheses. The Process macro (version 2.16.3, Hayes, 2013;) was used in conjunction with SPSS to conduct a bootstrap estimation approach with 5000 samples to generate percentile bootstrap 95% confidence intervals to estimate the significance of the indirect effect of the hypothesized mediation models (Preacher & Hayes, 2004, 2008; Preacher, Rucker, & Hayes, 2007). In these analyses, mediation is significant if the 95% Bias Corrected and accelerated confidence intervals for the indirect effect do not include 0 (Preacher & Hayes, 2004; Preacher et al., 2007).

Hypothesis 6. Attention Bias as a Mediator of Mindfulness and Social Outcomes of Social Anxiety and Loneliness. Initial regression analyses did not support follow-up mediation testing for threat bias as a mediator of the relationship between mindfulness and social anxiety. While steps 1 and 2 were supported, step three (path b), which examined the association of threat bias predicting social anxiety while controlling for total mindfulness was not significant.

Similarly, initial regression analyses did not support follow-up mediation testing for threat bias as a mediator of the relationship between mindfulness and loneliness. While steps 1

and 2 were supported, step three (path b), which examined the association of threat bias predicting loneliness while controlling for total mindfulness was not significant.

Hypothesis 7. Attention Bias as a Mediator of Total Self-Compassion and Social Outcomes of Social Anxiety and Loneliness.

Initial regression analyses also did not support follow-up mediation testing for threat bias as a mediator of the relationship between total self-compassion and loneliness. While steps 1 and 2 were supported, again step three (path b), which examined the association of threat bias predicting loneliness while controlling for total self-compassion was not significant.

Initial regression analyses did support follow-up mediation testing for threat bias as a mediator of the relationship between total self-compassion and social anxiety. Regression analyses confirmed Step 1 of mediation testing (relationship [c] in Figure 8); the direct effect of total self-compassion in accounting for variance in social anxiety (β = -.50 ($p < .001$)). Follow-up regressions also confirmed Step 2 of mediation testing (relationship [a] in Figure 8); total self-compassion's association with threat bias (β =- .15 ($p < .05$)). Finally, again, Step 3 of mediation testing (relationship [b] in Figure 8), threat bias's association with social anxiety (β = .13 ($p < .05$)), while controlling for total self-compassion was confirmed. To test whether threat bias would act as a mediator in a model predicting social anxiety, a follow-up analysis was calculated by regressing the model's dependent variable (social anxiety) onto the predictor of interest (total self-compassion) while simultaneously entering the potential mediating variable, threat bias into the regression model. Results indicated that the previously significant relationship between total self-compassion and social anxiety remained significant (c' = -.48 ($p < .001$)). A bootstrap estimation approach was used to test the indirect effects of self-compassion and social anxiety.

These results indicated that the indirect coefficient for the model, total self-compassion, attention bias and social anxiety (Figure 8), was not significant.

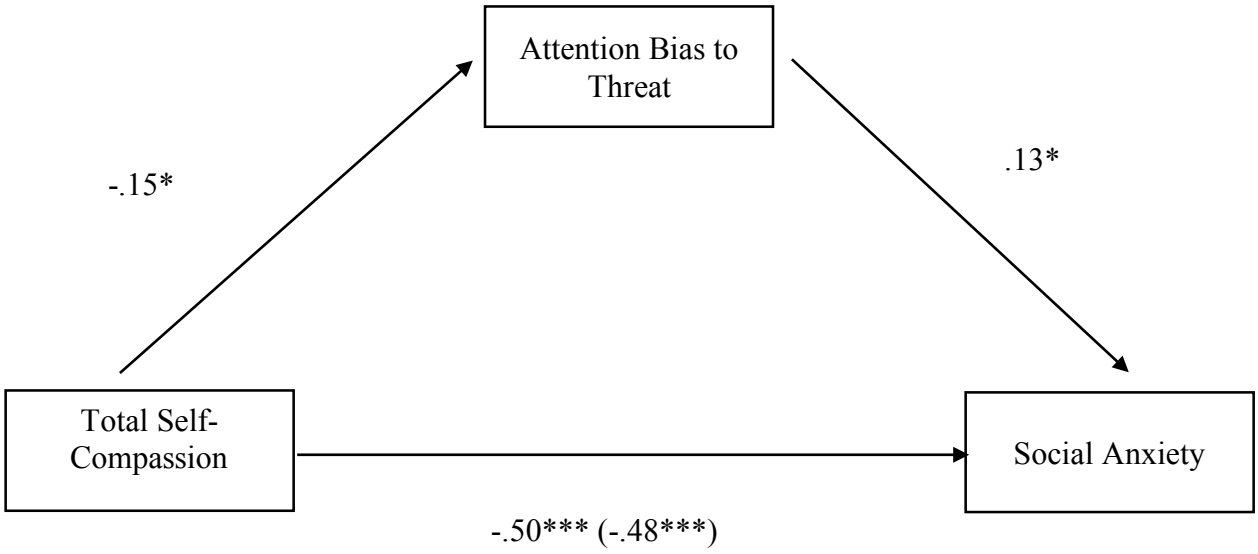


Figure 10. Standardized regression coefficients for the relationship between total self-compassion and social anxiety as mediated by attention bias toward threat. The standardized regression coefficient between total self-compassion and social anxiety, controlling for attention bias, is in parentheses. Indirect coefficient was not significant. *p < .05 **p < .01 ***p < .001

Follow-up mediation testing was also supported for two individual dimensions of self-compassion, *self-kindness (loneliness, social anxiety)* and *common humanity (loneliness)*. Regression analyses confirmed Step 1 of mediation testing (relationship [c] in Figures 9 and 10); the direct effect of self-kindness in accounting for variance in social anxiety (β = -.18 (p < .05)) and loneliness (β = -.26 (p < .001)). Follow-up regressions also confirmed Step 2 of mediation testing (relationship [a] in Figures 9 and 10); self-kindness' association with threat bias (β = - .15 (p < .05)). Finally, again, Step 3 of mediation testing (relationship [b] in Figures 9 and 10), threat bias's association with social anxiety (β = .18 (p < .05)) and loneliness (β = .15 (p < .05)), while controlling for self-kindness was confirmed.

Again, to test whether threat bias would act as a mediator in a model predicting social anxiety, a follow-up analyses were calculated by regressing the model's dependent variable (social anxiety or loneliness) onto the predictor of interest (self-kindness) while simultaneously entering the potential mediating variable, threat bias into the regression model. Results indicated that the previously significant relationship between self-kindness and social anxiety was reduced, but remained significant (c' = -.15 ($p < .05$)). Similarly, the previous significant relationship between self-kindness and loneliness was reduced, but remained significant (c' = -.24 $p < .001$)). Therefore, there is no evidence of a full mediation effect for threat bias in the relationship between self-kindness and social anxiety (Figure 10) or loneliness (Figure 9). A bootstrap estimation approach was again used to test the indirect effect of self-kindness, attention bias and loneliness (b = -.023, SE = .016, 95% CI = -.0717, -.0015), as well as the path of self-kindness, attention bias and social anxiety (b = -.027, SE = .019, 95% CI = -.0800, -.0016). Because zero is not in the 95% confidence interval, the indirect effect is significantly different from zero at $p <$ .05 (two tailed). These results indicated that the both paths showed significant indirect effects.

Similar steps were then taken to examine whether attention bias would act as a mediator of common humanity and levels of loneliness in college students. Preceding regression analyses had supported initial pathways, again, confirming Step 1 of mediation testing, the predictive value of common humanity in accounting for variance in loneliness (relationship [c] in Figure 11) ($\alpha = -.23$ ($p < .05$)). Follow-up regressions also confirmed Steps 2 and 3 of mediation testing; common humanity' association with threat bias (relationship [a] in Figure 11) ($\beta = -.16$, $p < .05$), and threat bias's association with loneliness, while controlling for common humanity (relationship [b] in Figure 11) ($\alpha = .16$ ($p < .05$)). However, results again, indicated that the previously significant relationship between the predictor (common humanity) and the outcome

(loneliness) was reduced, but remained significant (c' = - .21 (p <.01)) after controlling for levels of attention bias. Follow-up analyses examining the significance of the indirect path was conducted using bootstrap estimation and revealed the indirect effect of common humanity, attention bias and loneliness (Figure 11), was significant, b = -.023, SE = .019, 95% CI = -.0752, -.0007. Because zero is not in the 95% confidence interval, the indirect effect is significantly different from zero at $p < .05$ (two tailed).

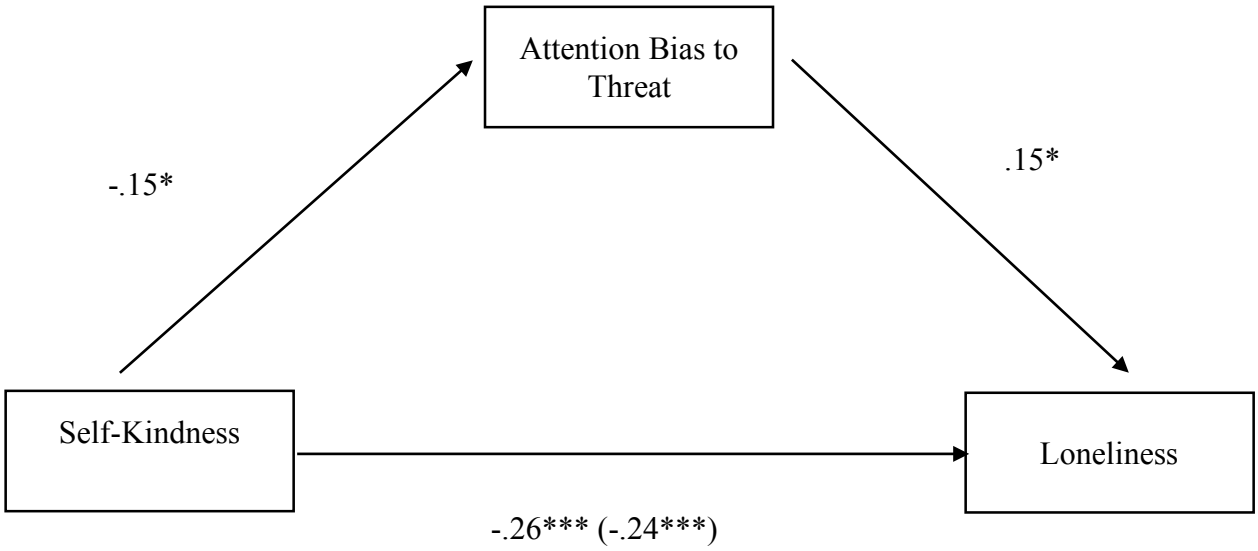


Figure 11. Standardized regression coefficients for the relationship between self-kindness and loneliness as mediated by attention bias toward threat. The standardized regression coefficient between self-kindness and loneliness, controlling for attention bias, is in parentheses. Indirect coefficient was significant.
*p < .05 **p < .01 ***p < .001

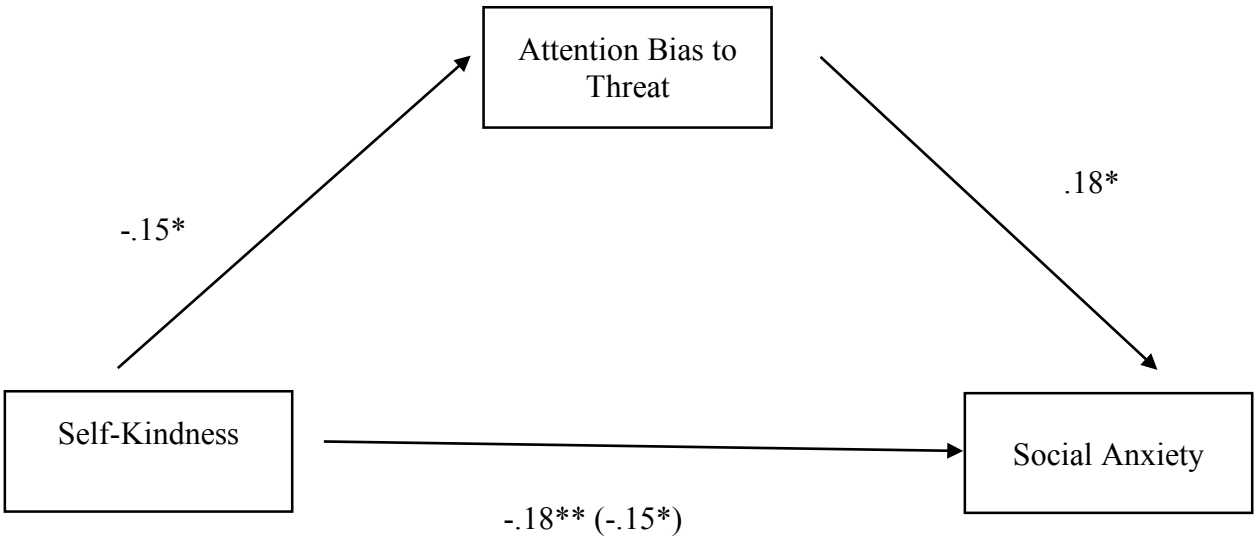


Figure 12. Standardized regression coefficients for the relationship between self-kindness and social anxiety as mediated by attention bias toward threat. The standardized regression coefficient between self-kindness and social anxiety, controlling for attention bias, is in parentheses. Indirect coefficient was significant.

**p < .05 **p < .01 ***p < .001*

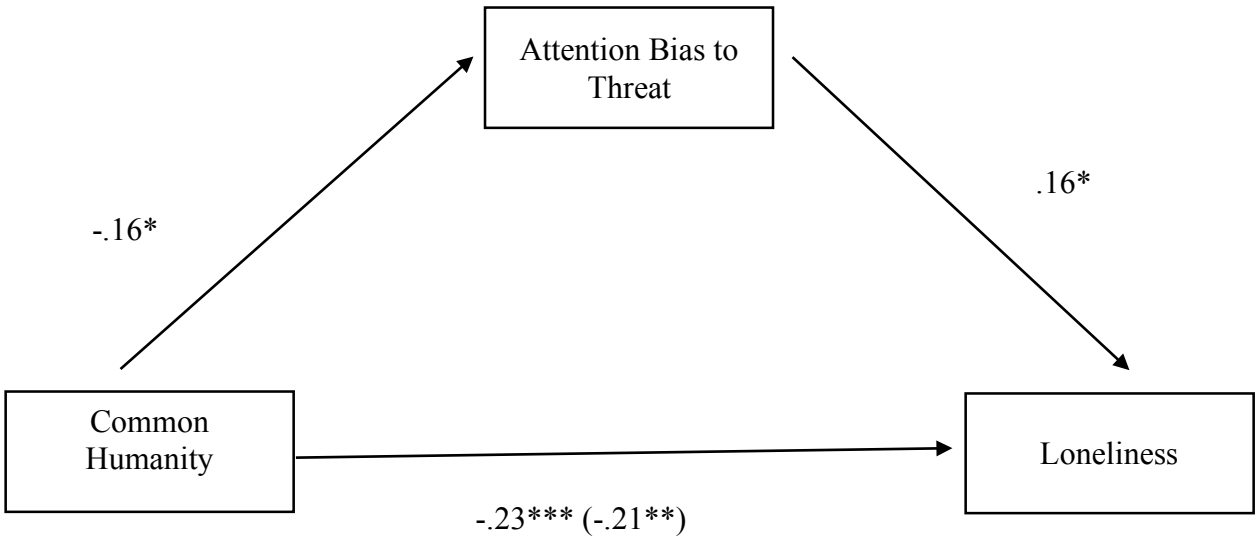


Figure 13. Standardized regression coefficients for the relationship between common humanity and loneliness as mediated by attention bias toward threat. The standardized regression coefficient between common humanity and loneliness, controlling for attention bias, is in parentheses. Indirect coefficient was significant.

**p < .05 **p < .01 ***p < .001*

Table 7.

Summary of Linear Regression Analyses for Individual Facets of Mindfulness Predicting Social Anxiety and Loneliness (N = 176)

Outcome Variables	Predictor Variables	*Regression Coefficients*				
		β	*SE B*	*t*	*F*	R_2
Social Anxiety	Observing[b,c]	-.030	.075	-.404	1.92	.043
	Describing[b,c]	-.467***	.066	-7.05	14.90***	.258
	Acting with Awareness[b,c]	-.365***	.070	-5.20	8.93***	.173
	Non-Judging[b,c]	-.453***	.068	-6.68	13.51***	.240
	Non-Reactivity[b,c]	-.350***	.072	-4.85	8.01***	.158
	Total Mindfulness[b]	-.610***	.060	-10.21	29.08***	.405
Loneliness	Observing[b,e]	-.022	.074	-.299	2.89*	.063
	Describing[b,d]	-.388***	.068	-5.69	11.49***	.212
	Acting with Awareness[b,d]	-.236***	.072	-3.26	5.70***	.118
	Non-Judging[b,d,e]	-.372***	.070	-5.33	10.46***	.197
	Non-Reactivity[b,d]	-.198**	.075	-2.65	4.73***	.100
	Total Mindfulness[b,c,e]	-.449***	.067	-.6.73	14.95***	.259

Note: Predictor variables[b] were not combined in the models. Individual linear regressions were conducted for each predictor variable separately. Income, class standing and sex were included as covariates in all models. Sex[c] was significant in the model. Income[d] was significant in the model. Class Standing[e] was significant in the model.
p < .05. * p < .01. ** p < .001. **

Table 8.

Summary of Linear Regression Analyses for Self-Compassion Subscales Predicting Social Anxiety and Loneliness (N = 176)

Outcome Variables	Predictor Variables	*Regression Coefficients*				
		β	*SE B*	*t*	*F*	R_2
Social Anxiety	Self-Kindness[b,c]	-.182*	.074	-2.47	3.47**	.075
	Self-Judgment[b]	-.525***	.064	-8.20	19.42***	.312
	Mindfulness[b, c]	-.131	.075	-1.75	2.68*	.059
	Common Humanity[b, c]	-.049	.075	-.655	1.98	.044
	Isolation[b]	-.573***	.063	-9.14	23.68***	.357
	Over-identified[b]	-.566***	.064	-8.82	22.20***	.342
	Total Self-Compassion	-.497***	.065	-.497	16.96***	.284
Loneliness	Self-Kindness[b, d]	-.261***	.072	-3.64	6.41***	.130
	Self-Judgment[b, d]	-.374***	.069	-5.42	10.70***	.200
	Mindfulness[b, d]	-.202***	.073	-2.78	4.29***	.103
	Common Humanity[b, d]	-.232**	.073	-3.20	5.59***	.116
	Isolation[b, d, e]	-.440***	.068	-6.49	14.10***	.248
	Over-identified[b, d]	-.350***	.072	-4.86	9.23***	.178
	Total Self-Compassion	-.447***	.066	-6.73	14.95***	.259

Note: Predictor variables[b] were not combined in the model. Individual linear regressions were conducted for each predictor variable separately. Income, class standing and sex were included as covariates in all models. Sex[c] was significant in the model. Income[d] was significant in the model. Class Standing[e] was significant in the model
p < .05. * p < .01. ** p < .001. ***

CHAPTER V. DISCUSSION

This chapter presents a discussion of the results associated with this study, including a summary of findings. Findings will be highlighted in relation to other existing studies. Conclusions and implications for these new findings are discussed, including suggestions for future research and clinical implications regarding contemplative intervention programs to promote healthy social adjustment and relations in late adolescent college students. Limitations and challenges of this study are also discussed.

Summary of Findings

The present study investigated associations between mindfulness and self-compassion in relation to social anxiety and loneliness in a community sample of college students using a cross-sectional design. The role of attention bias toward threat as a mediator of these variables was also examined. To test the proposed hypotheses, a convenience sample of 176 undergraduate students was recruited. Mindfulness, self-compassion, loneliness and social anxiety were all assessed via self-report. Attention bias toward threat was assessed using a dot-probe task which captured response time to a probe relative to exposure toward threatening versus neutral stimuli. A series of regression analyses were conducted to examine relationships between these variables. Overall, results confirmed findings from previous studies revealing strong negative associations between mindfulness, self-compassion and social outcomes related to community levels of social anxiety and loneliness (Goldin, Ramel, Gross; 2009; Hofmann, Sawyer, Witt; 2010; Neff, Kirkpatrick & Rude; Werner et al., 2012; Van Dam; 2011).

While the main results of this study confirmed the benefits of mindfulness and self-compassion in relation to well-being, this study expanded upon existing research in several ways.

First, separate strings of research have confirmed direct effects of mindfulness and self-compassion in relation to social anxiety and loneliness, as well as between attention bias and social anxiety and loneliness. However, no study to date has examined the interplay of these variables in a combined model. The current study found significant associations of attention bias with all key variables further indirect effects through attention bias were found.

Second, while studies are now beginning to examine specific mechanisms of mindfulness and self-compassion in relation to numerous psychosocial outcomes, this is the first examination of attentional bias toward threat in relation to the unique components of mindfulness and self-compassion. Findings revealed that aspects of mindfulness and self-compassion predict both social anxiety and loneliness to varying degrees, and tests of indirect effects revealed that the associations between self-compassion subscales (common humanity and self-kindness) and loneliness were partially mediated through attention bias to threat. Similarly, the relationship between self-kindness and social anxiety was also partially mediated through attention bias to threat. Primary findings are discussed below.

Mindfulness and Social Outcomes

It has been said that mindfulness can "turn our fearful patterns upside down" (Chodron, 2017, para. 10) and as expected, findings from this study confirmed other studies that have focused on the benefits of mindfulness in relation to lower levels of social anxiety. Results from this study showed negative associations between mindfulness and levels of both social anxiety and loneliness, with the strongest direct effects found in the link between mindfulness and social anxiety.

Exploratory analyses were also conducted to examine the association of specific facets of mindfulness in relation to social anxiety and loneliness. Studies are just beginning to explore

these individual facets, to examine granularity in the mechanisms of mindfulness to determine whether certain mindfulness skills are more important for specific psychosocial outcomes. Findings from the current study showed that all individual facets (except *Observe*) significantly predicted levels of social anxiety and loneliness. This aligns with results of Baer et al. (2008) who found all facets but Observe significantly and independently predicted well-being and previous studies have shown similar oddities with the *Observe* facet. The *Observe* facet has shown weak factor loadings in some studies and has often shown non-significant, and sometimes even negative, correlations with one or more of the other four facets (Baer et al., 2006; Bohlmeijer, Klooster, Fledderus, Veehof, & Baer, 2011). Findings were similar in this study, with negative correlations between *Observe* and dimensions of non-reactivity and non-judgment. Other studies have shown *Observing* positively correlating with psychological symptoms, although that was not the case in this study. Baer et al. (2006) has suggested that the *Observing* facet may be more responsive to meditation experience than the other four dimensions. Others have suggested that perhaps individuals who rate high on the observe items may be more sensitive to emotions, bodily sensations and other stimuli. Observing present moment experience is a central component of mindfulness (Bishop et al., 2004), however, it is possible that being high in observing skills and low in overall mindfulness may reflect hypervigilant behavior more reflective of anxious behavior, rather than passive observance of experience. Baer (2016) has suggested that a subset of individuals may be high in *observe* skills, or attentiveness to present moment experience, but in a reactive and non-judgmental way.

While findings from this study show significant impacts of all but one mindfulness facet, the facets of *Describing and Non-judging* have the strongest association with both social anxiety and loneliness. This finding matches other studies that have shown that non-judging, or the

ability to refrain from judging one's own cognitions, emotions, and bodily sensations, predicted lower levels of depression, anxiety, and stress (de Bruin et al., 2012; Bohlmeijer et al., 2011; Cash & Whittingham, 2010). Results support the understanding that social anxiety is often maintained and exacerbated by judging one's own behavior in social situations, therefore this finding is not surprising. Previous research on social anxiety has long confirmed that high-anxious individuals often partake in critical self-evaluation of their own performance in social situations, by underestimating positive aspects and overestimating negative (Clark & Arkowitz, 1975). Individuals with social anxiety disorder tend to possess negative self-views and to be highly self-critical, often grossly underestimating social skills and the quality of their own social functioning. Theories suggest that such critical judgment and self-evaluation ultimately shapes how socially anxious individuals view social situations. The negative self-perceptions lead to expectations of evaluation and judgment by others, as well as frequent avoidance of social encounters (Neff, 2003; Werner et al., 2012). Having the capacity to refrain from judging one's behaviors and experiences enables one to remain an impartial witness, passively observing experience (Bishop et al., 2004; Kabat- Zinn, 2003; Martin, 1997). By maintaining attention in the present moment, with an attitude of non-judgment, individuals can be less reactive and more accepting of their experience (Shapiro, Carlson, Astin, & Freedman, 2006).

Similarly, previous studies have also found *Describing* (Desrosiers et al., 2014) to be predictive of lower levels of anxiety. Describing is a concept that has been defined as being similar to the construct of affect labeling, which is the idea of describing or labeling the emotions you are experiencing in a given moment. Studies, particularly in the areas of psychology and psychotherapy, have asserted that such mindful awareness of feelings can help with regulating such emotions (Brookes et al., 2017). Having the capacity to define or label internal

experiences, which is the essence of *Describing,* allows individuals to concretely state the emotion and limit their experience of anxiety to the moment, rather than overgeneralizing it to all experiences in the future; a behavior which has been linked with higher levels of anxiety (Beck, 2005). A wealth of research has shown that socially anxious individuals tend to perceive social interactions as threatening and other people as critical and overly judgmental. They also tend to perceive themselves as socially unskilled and overgeneralize these negative perceptions of self and others; extrapolating to all social situations. Individuals who have difficulty with emotional labeling, in turn, experience deficits regulating anxious emotions (Vine & Aldao, 2014). Labeling allows one to identify one's anxiety more concretely, and to understand it in non-judgmental ways. By describing or labeling these fears and emotions, individuals are able to be more aware and mindful that anxious symptoms and emotions in the face of social interactions are separate from reality, rather than the experience of a threatening, social environment that cannot be controlled; and therefore are something that can be regulated.

These findings highlighting associations of specific mindfulness facets were interesting and add to the existing body of literature. However, due to the paucity of research regarding individual facets of mindfulness in relation to symptoms of social anxiety and loneliness, these analyses were exploratory and should be interpreted with caution. Future research should also explore additive and interactive models to determine whether specific combinations of individual mindfulness mechanisms might be more important for reducing levels of social anxiety or loneliness.

Self-Compassion and Social Outcomes

Self-compassion's inverse relationship to mental health issues and its positive association with well-being has indeed generated a plethora of attention in the field of research (Barnard &

Curry, 2011). Given that self-compassion is a construct that has been closely related to mindfulness, it was not surprising to find that individuals with higher overall self-compassion also reported lower levels of social anxiety and loneliness. These results are consistent with other research relating self-compassion with social anxiety, specifically. Werner et al. (2012) for example, examined self-compassion in individuals with clinically diagnosed Social Anxiety Disorder (SAD) in comparison to healthy controls and found similar associations, in that individuals with social anxiety reported less self-compassion in relation to all self-compassion subscales. In the current study, individuals with higher levels of social anxiety reported lower levels on the subscales of self-kindness and greater levels of self-judgment and feeling more isolated in their distress. Additionally, those with higher symptoms of social anxiety reported feeling more overwhelmed with negative emotion and identifying with it (over-identification).

Findings from the current study, however, differed slightly from Werner et al.'s (2012) examination of clinical social anxiety versus healthy controls, as common humanity and self-compassion related mindfulness were not significantly associated with social anxiety in the current study. While it is not clear why these differences occurred, some differences might be expected based on the clinical nature of the sample in that study, as diagnosable social anxiety may present differently from symptoms of social anxiety in the general population. While the current sample may underestimate associations of both self-compassion and mindfulness among individuals with clinical levels of anxiety, considering the community sample in the current study, these findings may be more representative of these associations in the general population. Further research that includes both a clinical and community sample would be necessary to explore these differences.

Additionally, Werner's sample had a mean age of 33.9 and 33.8 for men and women respectively, while the current study's mean age was 19.9. For college students faced with an unfamiliar social setting and the loss of their social network, feeling a sense of common humanity with those around them may be extra challenging and may not significantly quell feelings of anxiety in the same way that it might in a familiarized setting. Adolescents are often consumed with self-judgment and doubt about their own self-worth (Harter, 1993; Jacobs et al., 2002) and this developmental stage can be particularly trying, as adolescents frequently feel alone on the emotional rollercoaster and tribulations that they are experiencing. While the component of common humanity may be particularly relevant to this stage of development, it may be especially difficult for late adolescent college students to not feel alone in their suffering, in an unfamiliar college setting without the support of their social network, and to experience common humanity at levels that are able to attenuate their social anxieties. While studies have explored self-compassion in adolescents (Bluth & Blanton, 2013; Neff & McGhee, 2010), further research should explore whether the association between common humanity and social anxiety changes as college students progress through their college career and develop new social networks.

The Role of Attention Bias in Associations with Mindfulness, Self-compassion and Social Outcomes

The results from this study support the already existing wealth of research linking attention bias with social anxiety. The finding of attentional vigilance for angry faces at 500 ms in social anxiety is consistent with results from previous studies showing moderate associations between social anxiety and attentional biases in individuals within both clinical and community samples (Bar-Haim et al., 2007; Bradley et al., 1998; Mogg & Bradley, 1999; Mogg et al., 2004;

Mogg et al., 2007). Thus, studies specific to social anxiety have confirmed that individuals with symptoms of social anxiety are more likely to direct attentional resources towards angry, threatening faces (Rossignol, et al., 2007). This is consistent with cognitive models that suggest individuals with SAD view the world through a lens that expects and emphasizes negative evaluation (Clark & Wells, 1995; Heimberg, Brozovich, & Rapee, 2010; Rapee & Heimberg, 1997). Perceiving the world as a threatening place, and others in their environment as critical and judgmental, may result in significant emotional distress and functional impairment in work, school, and social domains for socially anxious individuals (Acarturk, de Graaf van Straten, ten Have, Cuijpers, 2008; Tolman et al., 2009). For college students specifically, such symptoms may compound their sense of loneliness and isolation. Symptoms often become self-sustaining as perceiving the world as a threatening place interferes with the social encounters necessary for creating a new social network. Further, this study also confirmed earlier studies suggesting that loneliness is also associated with hypervigilance to social threat (Cacioppo and Hawkley (2009) along with earlier work (Jones & Carver, 1991) linking this bias specifically to threats of social rejection or social exclusion.

Results from the current study also revealed that higher levels of both mindfulness and self-compassion predicted lower levels of attention bias to threat. This finding also corresponds with previous research linking mindfulness with attentional bias toward stimuli specific to alcohol and pain (Garland et al., 2012; Garland & Howard, 2013; Vago, 2011) and studies which have linked mindfulness with reduced perceptions of social threat (Barnes, Brown, Krusemark, Campbell & Rogge, 2007; Brown et al., 2010; Creswell et al., 2014; Weinstein et al., 2009). Higher levels of mindfulness have been associated in previous studies with greater self-reported attentional control (Baer et al., 2006; Herndon, 2008), as well as improved selective attention,

inhibitory control, and cognitive flexibility (Moore & Malinowski, 2009) and is thought to promote adaptive regulation of attention and emotion. Given that mindfulness has been shown to foster attentional re-orienting (Jha et al., 2007), it is not surprising that having higher levels of mindfulness may help facilitate disengagement of attention from threatening stimuli. Similarly, greater levels of self-compassion were also found to be associated with lower levels of attention bias toward threat. Other studies have suggested that self-compassion promotes resilience to social threats by facilitating more adaptive responding to social stressors without devaluing the self or the threat source (Neff & Vonk, 2009). Interventions designed to enhance self-compassion have shown that increased levels lead to greater attentiveness and better emotion regulation and response in relation to social threat (Thayer & Lane, 2000). It is also thought that self-compassion may reduce defensiveness associated with threat bias, by activating a biological system related to oxytocin, which is linked to both bonding and stress regulation (Preston, 2013;). Individuals with greater capabilities for self-compassion may also have increased levels of Oxytocin, which has been shown to enhance trust and facilitate social encounters, and ultimately decrease proneness for biases toward social threat (Bartz & Hollander, 2006).

This study also expanded upon previous research by examining individual facets of both mindfulness and self-compassion in relation to attention bias toward threat. As these analyses were exploratory, no a priori hypotheses were made regarding which individual mechanisms would be most associated with attentional bias. Findings revealed that while both total mindfulness and total self-compassion predicted lower levels of attention bias toward threat, no distinct facet of mindfulness was significantly associated with attentional bias, suggesting that the combination of all mindfulness skills may be more relevant to threat bias than any individual mechanism. However, attentional bias was significantly related to two individual features of

self-compassion, common humanity and self-kindness. While, again, no prior predictions were made, these findings were not entirely surprising. Common humanity reflects a general tendency to perceive that all humans suffer equally and those sufferings and inadequacies are viewed as part of the shared human experience (Neff et al., 2007). Those with higher levels of common humanity interpret feelings of inadequacy and disappointment as something universally experienced by all humans, given that we are all vulnerable and imperfect. Being biased toward social threat, in contrast, means that others are perceived as judgmental, critical, harsh and unkind, which distorts perceptions of the self in relation to other's evaluations, often resulting in negative self-perceptions. Social interactions with others are thereby seen as threatening and something to be both feared and avoided. Having higher levels of common humanity means that flaws and failures are simply normal and part of the essence of being human (Neff, 2003). If we are part of a greater, collective human experience, in which we are all flawed and all share suffering and feelings of inadequacy then others can be perceived as less threatening. It is not surprising, therefore, that lower levels of common humanity were found to be associated to higher levels of attention bias toward threat.

Results from this study also showed that lower levels of self-kindness significantly predicted higher levels of attention bias. Self-kindness reflects the tendency to be warm and understanding toward oneself, particularly regarding failings or flaws (Neff, 2007). Individuals who are high in self-kindness tend to be gentle with themselves when experiencing painful experiences and like common humanity, recognize these struggles as part of being human. Thus, it is feasible that individuals higher in self-kindness might feel more accepting of both themselves and others and therefore are less likely to be hypervigilant toward threat in their environment.

Mediational Effects of Attention Bias

Expanding upon previous research in this realm, attention bias was examined as a mediator of both mindfulness' and self-compassion's impact on reduced social anxiety and loneliness. Despite a growing body of research which has suggested associations, no prior study had tested a model examining mindfulness' or self-compassion's impact on social anxiety and/or loneliness through the potential mitigation of threat bias. While post hoc analyses did not support attention bias as a significant mediator in the models, select indirect effects were clearly supported in the findings and further research is suggested to more carefully explore these links. Ultimately, four indirect paths were tested, that included attention bias as a partial mediator (determined based on findings of initial regression analyses) of the following associations 1) total self-compassion and social anxiety 2) self-kindness and social anxiety 3) common humanity and loneliness, and 4) self-kindness and loneliness.

Indirect associations of total self-compassion, attention bias and social anxiety were found. While these indirect effects were not significant, the results do help to understand the model for hypothesized structure given that negative, significant direct effects were found between self-compassion and attention bias, and attention bias and social anxiety. Further, the significant direct effect of self-compassion on social anxiety did decrease, though not significantly, due to the indirect effect of self-compassion through attention bias. While this study confirms that individuals with greater self-compassion have lower levels of social anxiety, it is possible that this association may occur through several combined mechanisms. While attention bias may be an important mechanism linking self-compassion and social anxiety, other processes may be more influential or may combine with threat bias to better explain or mediate

this association. For example, one study exploring self-compassion's relationship to more general forms of anxiety suggests that brooding and worrying behaviors play a role in mediating this association (Raes, 2009). So, while having a bias toward social threat may be an important mechanism linking self-compassion and anxiety, further cognitive elaboration of threatening information in the form of worry or rumination may strengthen the association. Future studies testing more comprehensive models might provide a clearer picture of this relationship.

Findings from this study also revealed that the individual subscale of self-compassion, specifically having greater self-kindness, also decreased levels of social anxiety, in part, through influencing levels of attention bias. Individuals with social anxiety are often the antithesis of self-kind and instead display a high degree of self-criticism and have strong negative self-views (Neff, 2003; Werner, 2012). Indeed, previous studies have suggested that individuals with lower levels of self-compassion tend to be more focused on self-related inadequacies and shortcomings and thus, may also be more prone to perceiving social threat in their environment. Previous studies have linked this bias toward social threat to socially anxious symptoms (Gamble &Rapee, 2010; Mogg & Bradley, 2002; Mogg et al., 2004; Staugaard, 2010).

Further, having a greater sense of common humanity and greater levels of self-kindness also seem to attenuate threat bias in a way that decreases feelings of loneliness in college students. Having a hypervigilant focus on self-insecurities and insufficiencies, as is common in individuals low in self-compassion (Neff, 2003), may lead individuals to perceive the world and those around them as more threatening, critical and as something to be avoided. Such social avoidance has been linked to greater loneliness (Johnson et al., 2001). It is important to note that while loneliness has been closely linked to social anxiety, it has also been identified as both an antecedent and a predictor to other mental health conditions. Thus, general feelings of loneliness

may be tied to many conditions that are seemingly also influenced by levels of social threat. For example, researchers at the University of Chicago found that loneliness both affected and is affected by depressive symptoms (Caciappo & Caciappo, 2014). Similarly, depression has also been shown to have positive associations to threat bias (Mogg & Bradley, 2005) and self-compassion (Krieger et al., 2013). Thus, further studies, examining predictive impacts of self-compassion in longer pathways that include social anxiety and depression as potential mediational links between attention bias and loneliness would help to better understand this association.

While findings showed direct associations between mindfulness, attentional bias and social anxiety, the direct effect of mindfulness' association to social anxiety did not decrease significantly when adding attention bias to the model, suggesting no indirect effect. This suggests that mindfulness' influence on social anxiety may be occurring primarily through other mechanisms besides attention bias. Theoretically, mindfulness and self-compassion are closely linked constructs that have both shown strong influences on psychopathology and well-being (MacBeth & Gumley, 2012). Evidence from previous studies has confirmed that both contribute unique predictive value, other studies have suggested that self-compassion may even be an overall stronger predictor of well-being than mindfulness (Van Dam, 2011) and that mindfulness may be cultivating self-compassion. While mindfulness may work to improve attentional skills in such a way that increases attentional awareness in such a way that improves one's ability to focus on the self and present moment without judgment and overgeneralizations, self-compassion may be necessary to alter one's perception and interpretation of the present moment, and one's relationship to oneself (Neff, 2003). Mindfulness, therefore, may allow one to obtain

the emotional and cognitive distance from negative experiences so that self-compassion, self-kindness and common humanity can thrive (Neff, 2003).

Thus, it may be that mindfulness and self-compassion combined would be more effective for attenuating social anxiety and loneliness through altering attention bias. Future research should examine these paths in combined models to determine the joint effect of both. Additionally, given that this study supports mindfulness' association with threat bias, it is also possible that mindfulness may be more likely to influence other psychological symptoms and disorders through attention bias (e.g. depression) and further studies would be warranted to examine these alternative associations.

Limitations and Recommendations for Future Research

This study has several notable strengths, including the collection of rich data from a large sample of undergraduates on mindfulness and self-compassion via self-report, alongside a dot probe paradigm to measure attention bias toward threat. Further, for parsimonious reasons, most studies on mindfulness and self-compassion explore only the composite or aggregate scores associated with each respective measure. However, this study included an exploratory component to examine individual facets of mindfulness and self-compassion in relation to the key study variables. Although the present study advances our knowledge by examining the links among mindfulness, self-compassion, social anxiety and loneliness in a single design, it is not without limitations.

While the demands of the study were not overwhelming, the web-based nature of data collection introduced both pros and cons that must be acknowledged. While some level of missing data had been anticipated due to challenges with online data collection and the inability to monitor data collection as it occurs in real time, larger than expected amounts of missing data

and zero data occurred. The two different survey programs (Qualtrics and Inquisit) were joined by a hyperlink to dispense the entire survey in one easy administration. It was decided to do this (rather than sending two separate links), to eliminate students from completing part 1 of the study (self-report measures), and not completing part two (dot probe task). Additionally, by combining both, a unique hyperlink could be administered to each student. This was important to assign a unique identifier to keep data collection anonymous and prevent students from completing the survey more than once. Additionally, by collecting data via a web-based platform, students could complete the surveys at their own convenience within their own private space or dorm. It was thought that this method would allow for a larger sample to be recruited, as students and researchers would not have to coordinate in-person sessions or reserve lab time for the dot probe paradigm. However, unexpected technological issues occurred that resulted in a large batch of incomplete dot probe tasks. Unfortunately, the missing dot probe data limited the number of participants that could be used in the analyses. While it is not known exactly what led to the missing dot probe tasks it is likely that some students attempted to complete the surveys via mobile phone or tablet which interfered with their ability to download the plug-in for the dot probe task.

Additionally, while other studies have supported the use of a web-based dot probe task (Macleod et al., 2007), most examining attention bias have administered the task in person in a more controlled, laboratory environment. While, students were instructed to set their computer resolution to 800 x 600 and to complete the questionnaires and dot probe task alone in a semi-quiet, controlled setting with minimal distractions, allowing 35 minutes without pausing, it is unknown whether students completed the measures in this manner, or if findings would be different in a more controlled setting. Therefore, it is recommended that this study be repeated

using a more traditional administration in a controlled in-person laboratory setting, as this would likely minimize both distraction bias and missing data. Additionally, while the images used for the dot probe, taken from the Chicago faces database, have been carefully tested for sensitivity in previous studies, with expert ratings showing that expressions matched those intended, it is assumed, but not known, whether students in this particular sample and age range, interpreted the images as intended.

Several other methodological limitations should be considered. All data were analyzed using a series of regression analyses. While regression provides more information than mere correlation, and tells you not only the strength of the association, but the level one variable changes in relation to the other, the degree of association is still measured based on a correlation coefficient. While the intent of regression analysis is prediction (Tabachnick & Fidell, 2001) correlation does not indicate causation or direction. Though evidence suggests that attention bias to threat may have a negative relationship with both self-compassion and mindfulness, explicit empirical support for causal direction remains unknown. Theoretically, evidence from highlighted studies, including neuroscientific designs, implicate neurophysiological changes resulting from enhanced levels of mindfulness and self-compassion (Bishop, 2007; Eldar, Yankelevitch, Lamy, & Bar-Haim, 2010; Frewen, Evans, Maraj, Dozois, & Partridge, 2007; Mogg, Bradley, De Bono, & Painter, 1997). This supports a directional model suggesting that attention bias and anxiety are being influenced through mindfulness and self-compassion's impact on neurological structures such as the amygdala. Future studies would benefit from the inclusion of neurophysiological measures such as imaging and cortisol levels to address these gaps.

Additionally, given that this study is the first to include these key variables in one design, future analyses should consider testing these associations using other, more sophisticated models. Self-compassion and mindfulness are less often explored together, therefore, theoretical similarities between these predictor variables lead to anticipated high inter-correlations among them. The association between total mindfulness and total self-compassion specifically, revealed a strong positive correlation of .65, suggesting that participants who scored high on mindfulness also tended to score high on self-compassion. This was not surprising as previous studies using the FFMQ and the SCS have confirmed strong positive associations between these two constructs as high as .74 (Hope et al., 2013; Walker & Colosimo, 2010). Mindfulness and self-compassion appear to be overlapping, yet distinct constructs that characterize how people relate to emotional distress. While mindfulness, generally refers to how individuals relate to the experience of the present moment and supports this awareness of experience without judgment, self-compassion represents a way of relating to oneself, within that experience, particularly during moments of suffering. Mindfulness and self-compassion while overlapping, are also conceptualized as arising from distinct physiological systems. Self-compassion is linked to caregiving systems involving oxytocin and other hormones related to attachment and social affiliation (Goetz, Keltner, & Simon-Thomas, 2010) while mindfulness is a form of attention regulation associated with increased activity in the prefrontal cortex (Siegel, 2007).

However, despite these distinctions, it has been suggested that mindfulness may be important and perhaps necessary to gain the cognitive space that allows one to cultivate a compassionate attitude toward oneself in the face of adversity and failure. While attention regulatory processes associated with mindfulness allow for gained insight into thoughts and emotions in the present moment (Teasdale et al., 2002), self-compassion refers to how one

perceives oneself when the present moment is painful (Neff, 2003b). Thus, as assumptions for multiple regression were not met in this study, due to this expected high correlation among predictor variables, separate univariate linear regressions were conducted. However, to guard against the risk of repeated testing effects and to avoid the risk of spurious associations, it is recommended that future studies testing similar associations should consider using Structural equation modeling (SEM) or other more sophisticated analytical approaches that are designed to address the measurement error. Second generation multivariate methods such as SEM (Chin, 1998; Fornell, 1984) allow for simultaneous analysis of all the variables in the model instead of separately. Additionally, these methods do not aggregate measurement error in a residual error term, increasing the efficiency of parameter estimates (Bollen, 1996).

Similarly, other models providing alternate explanations of these associations should be tested in future studies. For example, a reverse mediation model should be examined to determine whether higher levels of attention bias to threat may also result in lowered levels of self-compassion and/or mindfulness. It is feasible that higher levels of attention bias via a hypervigilant focus on threatening stimuli in the environment might interfere with an individual's ability to be mindful and might also interfere with some aspects of self-compassion (e.g. common humanity). Similarly, it could be reasoned that having lower levels of social anxiety might result in individuals less biased toward threatening information in their environment. With lower levels of anxiety individuals might have greater attentional resources to dedicate to such emotion regulation skills, making it easier to employ more mindful, self-compassionate responses. One study, for example, investigated the indirect effects of pretreatment mindfulness on social anxiety and found that individuals who started therapy with higher levels of mindfulness experienced more symptom reduction following treatment

(Desrosiers et al., 2013). Therefore, the association between mindfulness, attention bias and anxiety may be more complex than what this study suggests. In the interest of time and to keep analyses as parsimonious as possible, reverse mediation hypotheses and analyses were not tested in the current study. Thus, future studies would be necessary to determine the exact causal direction amongst these variables.

This study used a community sample of college students to examine symptoms of social anxiety in relation to study variables of mindfulness, self-compassion and attention bias. While numerous studies have confirmed parallel symptoms in clinical and community samples, it is not known whether similar associations among key study variables would exist for individuals suffering from more severe and clinical levels of social anxiety. This would be an important distinction to explore. However, findings from the current sample may be more representative of the general population than a sample of clinically diagnosed individuals. Future studies with a more purposive sampling design that include comparisons with both clinical and community samples are warranted.

It is also possible that other mechanisms may mediate or moderate the associations among these constructs. For example, studies examining sex differences in relation to mindfulness and self-compassion are mixed, depending on the nature of the study. Some studies have failed to find gender differences in reports of self-compassion or mindfulness in undergraduates (Soysa & Wilcomb, 2013). However, Marlatt & Marques, (1977), suggested that mindfulness can potentially be viewed as a type of coping strategy to deal with stimuli that may be negatively provoking. Considering such gender differences in the use of coping strategies, females, in comparison to their male counterparts, may be higher in the use of mindfulness as a coping strategy toward negative stimuli which may more readily alter levels of threat bias and

anxiety. Further, females, overall are more self-critical and studies have shown they report lower levels of self-compassion than males in both college (Neff & McGehee, 2010), as well as later adolescence (Bluth & Blanton, 2014). Thus, it is no surprise that there are also clear gender differences regarding anxiety with females reporting higher levels of social anxiety than males and having a higher lifetime prevalence (La Greca & Lopez, 1998). Studies that have examined gender differences in college social adjustment, specifically, report that adjustment may be more difficult for females rather than males, due to the female tendency to rely more readily upon social support networks in times of stress (Cook, 1995; Kenny & Rice, 1995). La Greca & Lopez (1998) also confirmed this finding, as social anxiety in adolescents more readily interfered with social functioning in females, than in males.

Sex differences in threat processing have also been reported in terms of sex specific differences in amygdala reactivity to threat related scenes (Domes, et al., 2009; Mackiewicz Sarinopoulos, Cleven, & Nitschke, 2006). While sex differences have not been reported for attention bias to threat specifically, several studies have reported a larger amygdala response in females (Domes et al., 2010; Hofer et al., 2006; Klein, Smolka, & Wrase, 2003). However, it is important to note that findings are conflicting in this regard as well, considering other examinations have reported no sex differences in relation to amygdala activity (Aleman & Swart, 2008; Wrase, Klein, & Gruesser, 2003). Further, while studies have failed to find sex differences in studies of threat bias, differences in males and females have been reported regarding the association between threat bias and social anxiety specifically, with male threat bias being significantly more related to social anxiety than female threat bias (Zhao, Zhang, Chen, Zhou, 2014). Considering the mix of findings regarding in gender relation to the explored variables in this study, it is certainly probable that marked sex differences may exist that may influence not

only levels of social anxiety and attention bias toward threat, but also the use of mindfulness. However, sampling constraints resulted in the sample being comprised of primarily female undergraduates. Future studies would benefit from a more balanced sample of males and females, and subsequent testing of moderated mediation models in relation to sex to determine if there are differences between males and females in the proposed mediational pathways (Muller, Judd & Yzerbyt, 2005; Preacher, Rucker, & Hayes, 2007). Despite the low sample of males in this study, sex significantly co-varied in most models predicting social anxiety, with males reporting lower levels of social anxiety, confirming results from previous studies.

Future studies could also extend this research by considering the role of depression. Though depression and anxiety are often seen as co-morbid disorders, it is not clear how anxiety and depression might interact to influence attentional bias. Some studies have reported that when anxiety and depression coexist, the attentional bias is no longer found (e.g., Mogg, Bradley, Williams, & Mathews, 1993). Scientists suggest that this may be the result of differences in how negative or threatening material is processed in anxiety versus depression. While anxiety is associated with cognitive biases toward threatening material, depression is linked with complex elaboration of that negative material (Williams et al., 1998) which may occur at longer processing times than what is typically measured with the dot probe (Eizenman et al.,2003; Mogg & Bradley, 2005). Further, it has been suggested that anxiety is more motivational, in that it directs attention toward negative threats to deal with such stimuli. On the other hand, depression is considered amotivational (Mogg, Bradley, & Williams, 1995). Thus, considering the unidentified influence of depression on threat bias, subsequent studies should consider co-varying depression when examining anxiety and threat bias (Barhaim et al., 2007).

Further, differences in mindfulness' impact on depression versus anxiety have also been

highlighted in previous studies. For example, Desrosiers, Klemanski and Nolen-Hoeksema (2013) found that facets of non-reactivity and describing were associated with anxiety, while non-judging and non-reactivity were associated with depression, implicating potential differences in unique facets of mindfulness in relation to anxiety and depression separately. Lastly, the current study measured self-reported mindfulness and while studies have confirmed that mindfulness interventions do increase levels of self-reported mindfulness (Baer et al., 2008; Carmody & Baer, 2008) due to the limited existing research on attention bias in relation to mindfulness, it is not clear whether increasing or enhancing levels of mindfulness through intervention, would have similar associations with threat bias and social anxiety. Future interventional studies would be needed to explore this association. Additive or interaction effects of mindfulness and self-compassion in relation to attention bias and social anxiety are also unclear. Due to the nature of the analyses, these constructs were not explored together, and future research, with more sophisticated analyses would be necessary to explore potential combined effects. Regardless of these limitations, the results of this study help to clarify one mechanism through which self-compassion, specifically, may be impacting levels of social anxiety and loneliness: through decreased levels of attention bias toward threat. By identifying the specific skills of self-compassion and mindfulness that may be more likely to influence this pathway, future clinical interventions can work to target these specific skills.

Conclusions and Clinical Implications

Collectively, the findings of this study, taken together within the context of the extant literature, confirm strong associations between self-compassion, mindfulness and social outcomes related to social anxiety and loneliness. Further, this study is the first to explore the

role of attention bias in these links. Results from this study support, and are aligned with existing neurocognitive models, as the cognitive process of attention has provided a promising path for understanding social anxiety. Such models have linked abnormal attentional processes (Mueller et al., 2008), specifically diminished recruitment in areas of the brain associated with attentional regulation (Goldin, Manber, Hakimi, Canli, & Gross, 2009), with increased bias and reactivity to social threat. Previous studies have suggested that enhanced levels of mindfulness may improve social anxiety by altering attentional mechanisms known to contribute to threat bias (e.g., overactive amygdala) (Bishop et al., 2004). However, despite the understanding of mindfulness' capacity to influence attention, few studies to date have explored its potential impact on attentional bias toward threat in relation to social anxiety and social relational outcomes. Likewise, previous research has proposed that the related construct of self-compassion, (Neff, Kirkpatrick, & Rude, 2007; Samaie & Farahani, 2011), may work to similarly influence neurocognitive and neurobiological elements which deactivate the "threat system" (limbic system) (Gilbert, 1989). Indeed, the current study confirmed that both mindfulness and self-compassion, at least in part, may work to attenuate social anxiety through mitigating attentional biases toward social threat. Findings provide evidence for understanding the nature of these associations and suggest important implications for clinical applications and contemplative programs aimed at alleviating social anxiety and loneliness in college students.

It has been characterized that late adolescence in particular may be one of the loneliest developmental periods of the lifespan (Steinberg, 1999, p. 321). The importance of peer group acceptance increases and peaks in mid to late adolescence (Brennan, 1982) at a time when self-criticism, evaluation and unfavorable social comparisons run high (Neff & McGhee, 2010). Loneliness and anxieties are often further exacerbated by moving to a new environment, (i.e.

college) and the restructuring of social groups and peer relationships that have been lost by the completion of secondary school. Those late adolescents who continue to post-secondary education face a formidable move to a new, unfamiliar environment as they transition to college and find themselves disconnected and isolated from former peer relationships and existing family support systems. Despite the tribulations faced by this developmental period, late adolescence has received considerably less attention in the literature. This study examined loneliness and socially anxious symptoms in a late adolescent community sample in relation to predictors of mindfulness, self-compassion and attention bias.

Promising findings from previous studies exposing mindfulness and self-compassion as a facilitator of psychological well-being and mental health have prompted development and empirical evaluation of programs designed to enhance these skills in both clinical and community populations (Shapira & Mongrain; 2010). Findings from the current study align with a wealth of research that has suggested that self-compassion and mindfulness may buffer college students against the challenges associated with student life (Neff, Hsieh, and Dejitterat, 2005) and self-compassion specifically, has been found to moderate students' responses to social and academic difficulties as they transition from high-school to college (Terry, Leary, & Mehta, 2012). Students with higher levels of self-compassion seem to handle these social and academic challenges more effectively (Smeets, Neff, Alberts, & Peters, 2014).

Similarly, the benefits of applying mindfulness based programs in a university setting are compiling in the literature and showing great promise for alleviating mental health issues and stressors in undergraduate students (Greeson, 2008; Richards & Martin, 2012; Terry, Leary & Mehta, 2013). Research has shown that college based mindfulness and contemplative programs

are effective for improving psychological health, interrupt psychological reactivity to stress (Rosenzweig et al., 2007), alter perceptions of negative experience (Kabat-Zinn, 2003; Sephton et al. 2007;) promote sleep and enhance students' sense of control, increasing tolerance, acceptance, patience, and courage to deal with unpredictable events (Caldwell, Harrison, Adam, Qin, & Greeson, 2010).

The current study suggests also that enhancing mindfulness and self-compassion may decrease overall levels of attention bias toward social threat which has been linked not only to loneliness and social anxiety specifically, but also to depression, stress and other more general forms of anxious pathology (Hakamata, 2010). While other effective forms of training are emerging that are designed to modify attentional biases, such as Cognitive Bias Training (CBT) and Attention Bias Modification Training (ABMT) (Dennis & O'Toole, 2014), interventions focused on mindfulness and self-compassion arguably provide benefits beyond attentional training and have already shown feasibility for implementing in a college setting. The results of this study provide additional evidence supporting the notion that both mindfulness and self-compassion offer a promising tool for managing symptoms of psychological distress in college students and further support the continued implementation of mindfulness based programs in university setting.

Appendix A

Recruitment Email

Hello,

My name is Kimberly Raymond and I am a graduate student here at Syracuse University. I am seeking students at Syracuse University to participate in an online research study designed to help in understanding how mindfulness may influence aspects of social adjustment in college students.

You are receiving this email because you are enrolled in a course that is offering extra credit for your participation. You may be eligible to participate if you are a student at Syracuse University and you are proficient at reading/writing in English. This research study has been approved by the Syracuse University Institutional Review Board. Participation is anonymous and completely voluntary. The study is completed online, at your leisure, and takes approximately 45 minutes.

If you are interested in participating in the study, please click on the link below. This link will take you to a screen which describes the study and your participation in greater detail and asks for your consent to participate. At that point, you will be able to decide whether to continue participating or not. If you answer no to the consent form, the survey will end.

The provided link is a separate and anonymous survey link. You can only use the link one time. Therefore, if you are enrolled in multiple participating courses, you will receive an e-mail from me to determine which course you would like to receive extra credit for. For example, if you are enrolled in both CFS XXX and CFS XXX, you must choose between the courses. The amount of extra credit you will receive is dependent upon the specific professor and course.

If you have any questions, concerns or would like further information before deciding whether to participate please contact Kimberly Raymond at kraymond@syr.edu.

The survey will be **closed for participation on November 30th at 5 pm**. You will be unable to participate after that time.

STOP: PLEASE READ BEFORE CLICKING ON STUDY LINK:

If you decide to participate in this survey, please make sure you **complete it from a laptop or desktop computer (not a phone or tablet)** and be sure to set aside approximately 45 minutes so you are able to **complete the survey in one sitting.**

The survey will **not** allow you to start and then finish later. It must be completed in one sitting.

Thank you for your time and help.

Follow this link to the Survey: <Take the Survey>

Appendix B

Informed Consent

Department of Child and Family Studies
Project Title: The Mindfulness and Social Adjustment Project

My name is Kimberly Raymond and I am a graduate student here at Syracuse University. I am inviting you to participate in a research study. Involvement in the study is voluntary, so you may choose to participate or not. This sheet will explain the study to you and please feel free to ask questions about the research if you have any. I will be happy to explain anything in detail if you wish.

I am interested in learning more about social adjustment and levels of mindfulness in college students. You will be asked to fill out an online survey of 87 questions. This survey will take approximately 20 minutes of your time. The survey will include basic demographic questions, followed by questions related to your social behavior and relationships. Following the survey questions, you will be asked to complete a visual task, where you will be shown a series of pictures and asked to locate the placement of a dot by pressing the arrows on your keyboard. This task will take approximately 15 minutes of your time. All information will be kept anonymous. This means that your name will not appear anywhere and your specific answers will not be linked to your name in any way.

You will receive extra credit as compensation for your participation. This extra credit may be used in courses for which professors have agreed to offer extra credit for your participation. The class instructor will assign credit according to class policy. While there are no direct benefits to you, the overall benefit of this research is that you will be helping us to understand how levels of mindfulness might influence social adjustment in college students. This information should help us to better understand how we might improve or enhance social adjustment for college students.

The risks to participants from the research protocol are minimal but not absent. The risks to you for participating in this study are that answering consecutive questions about social relationships may cause distress to some individuals who have struggles in these areas. These risks will be minimized by allowing you to ask questions either before or after your participation in the study. Also, you do not need to answer any survey question that makes you feel uncomfortable. If you do not want to take part, you have the right to refuse to take part, without penalty. If you

decide to take part and later no longer wish to continue, you have the right to withdraw from the study at any time, without penalty. That is, if you choose to withdraw you will still receive your extra credit points for participation.

Whenever one works with the internet; there is always a risk of compromising privacy, confidentiality, and/or anonymity. Your confidentiality will be maintained to the degree permitted by the technology being used. It is important for you to understand that no guarantees can be made regarding the interception of data sent via the internet by third parties.

Contact Information: If you have any questions, concerns, or complaints about the research, contact the primary investigator, Kimberly Raymond at kraymond@syr.edu or faculty advisor Dr. Rachel Razza at rrazza@syr.edu. If you have any questions about your rights as a research participant, or if you have questions, concerns, or complaints that you wish to address to someone other than the investigator, or if you cannot reach the investigator, contact the Syracuse University Institutional Review Board at 315-443-3013.

Once you have fully read and understood the risks outlined in the consent form, please click the "print" button below to print a copy of the consent text for your records.

All of my questions have been answered and I am 18 years of age or older. By continuing, I agree to participate in this research study.

- By continuing, I agree to participate in this research study.
- I do not wish to participate in this research study

Appendix C

Measures

1. Demographic Questionnaire
2. The Five Facet Mindfulness Questionnaire. (FFMQ)
3. Self-Compassion Scale (SCS)
4. The Revised UCLA Loneliness Scale - short version
5. Social Interaction Anxiety Scale (SIAS)
6. Center for Epidemiological Studies Short Depression Scale (CES-D-10)
7. Dot Probe Task Sample Trial
8. Dot Probe Task (Neutral versus Angry Congruent)

Demographic Information

Instructions: Please respond to the following questions.

Date of Birth: _____

1. Gender: M / F (circle one)

2. Indicate your ethnicity:
____ African/African American
____ Asian/Asian American/Pacific Islander
____ Caucasian/European American
____ Latino(a)/Hispanic
____ Native American/American Indian
____ Multiracial/Other; Specify: _____

3. Indicate your year in school:
____ Freshman
____ Sophomore
____ Junior
____ Senior
____ Fifth Year
____ Other; Specify: _____

4. Indicate your age: _____

7. Yearly family income: (1) Your income if you are the sole source of financial support, (2) your and your partner or spouse, or (3) your family's income if supported by your family of origin.

____ 0 - $10,000
____ $10,001 - $25,000
____ $25,001 - $50,000
____ $50,001 - $100,000
____ over $100,000

8. Parents' marital status:
____ Married, living together
____ Married, living apart (due to work, etc.)

____ Married, separated
____ Divorced
____ One parent is widowed
____ Unmarried

9. Mother's education. (answer question with mother, foster mother, or step-mother in mind, depending on who you have spent more time with in your lifetime).
Indicate the highest level completed:
____ No schooling completed
____ Some elementary school
____ 8th grade
____ High school graduate or GED
____ Some college, no degree
____ Associate's or technical degree
____ Bachelor's degree (BA, BS, etc.)
____ Master's degree (MA, MS, MBA, etc.)
____ Professional degree (MD, DDS, JD, etc.)
____ Doctorate degree (PhD, EdD, etc.)

10. Mother's occupation. (answer question with mother, foster mother, or step-mother in mind, depending on who you have spent more time with in your lifetime).
Indicate most recent job title: _____

11. Father's education. (answer question with father, foster father, or step- father in mind, depending on who you have spent more time with in your lifetime).
Indicate the highest level completed:
____ No schooling completed
____ Some elementary school
____ 8th grade
____ High school graduate or GED
____ Some college, no degree
____ Associate's or technical degree
____ Bachelor's degree (BA, BS, etc.)
____ Master's degree (MA, MS, MBA, etc.)
____ Professional degree (MD, DDS, JD, etc.)
____ Doctorate degree (PhD, EdD, etc.)

12. Father's occupation. (answer question with father, foster father, or step- father in mind, depending on who you have spent more time with in your lifetime).
Indicate most recent job title: _____

Mindfulness Scale

Day-to-Day Experiences

Instructions: Below is a collection of statements about your everyday experience. Using the scale of 1 to 5 below, please indicate how frequently or infrequently you've had each experience in the last month. Please answer according to what really reflects your experience rather than what you think your experience should be.

Never	Not Often True	Sometimes True, Sometimes Not True	Often True	Very Often or Always True
1	2	3	4	5

I'm good at finding the words to describe my feelings.	1	2	3	4	5
I can easily put my beliefs, opinions and expectations into words.	1	2	3	4	5
I watch my feelings without getting carried away by them.	1	2	3	4	5
I tell myself that I shouldn't be feeling the way I'm feeling.	1	2	3	4	5
It's hard for me to find the words to describe what I'm thinking.	1	2	3	4	5
I pay attention to physical experiences, such as the wind in my hair or the sun on my face.	1	2	3	4	5
I make judgments about whether my thoughts are good or bad.	1	2	3	4	5
I find it difficult to stay focused on what's happening in the present moment.	1	2	3	4	5
When I have distressing thoughts or images, I don't let myself be carried away by them.	1	2	3	4	5
Generally, I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.	1	2	3	4	5
When I feel something in my body, it's hard for me to find the right words to describe it.	1	2	3	4	5
It seems I am running on automatic without much awareness of what I'm doing.	1	2	3	4	5
When I have distressing thoughts or images, I feel calm soon after.	1	2	3	4	5
I tell myself I shouldn't be thinking the way I'm thinking.	1	2	3	4	5

I notice the smells and aromas of things.	1	2	3	4	5
Even when I'm feeling terribly upset, I can find a way to put it into words.	1	2	3	4	5
I rush through activities without being really attentive to them.	1	2	3	4	5
When I have distressing thoughts or images, I can just notice them without reacting.	1	2	3	4	5
I think some of my emotions are bad or inappropriate and I shouldn't feel them.	1	2	3	4	5
I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.	1	2	3	4	5
When I have distressing thoughts or images, I just notice them and let them go.	1	2	3	4	5
I do jobs or tasks automatically without being aware of what I'm doing.	1	2	3	4	5
I find myself doing things without paying attention.	1	2	3	4	5
I disapprove of myself when I have illogical ideas.	1	2	3	4	5

Self-Compassion Scale (SCS)

HOW I TYPICALLY ACT TOWARDS MYSELF IN DIFFICULT TIMES

Please read each statement carefully before answering. To the left of each item, indicate how often you behave in the stated manner, using the following scale:

Almost Never				Almost Always
1	2	3	4	5

_____ 1. I'm disapproving and judgmental about my own flaws and inadequacies.

_____ 2. When I'm feeling down I tend to obsess and fixate on everything that's wrong.

_____ 3. When things are going badly for me, I see the difficulties as part of life that everyone goes through.

_____ 4. When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world.

_____ 5. I try to be loving towards myself when I'm feeling emotional pain.

_____ 6. When I fail at something important to me I become consumed by feelings of inadequacy.

_____ 7. When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.

_____ 8. When times are really difficult, I tend to be tough on myself.

_____ 9. When something upsets me I try to keep my emotions in balance.

_____ 10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.

_____ 11. I'm intolerant and impatient towards those aspects of my personality I don't like.

_____ 12. When I'm going through a very hard time, I give myself the caring and tenderness I need.

_____ 13. When I'm feeling down, I tend to feel like most other people are probably happier than I am.

_____ 14. When something painful happens, I try to take a balanced view of the situation.

_____ 15. I try to see my failings as part of the human condition.

_____ 16. When I see aspects of myself that I don't like, I get down on myself.

_____ 17. When I fail at something important to me I try to keep things in perspective.

_____ 18. When I'm really struggling, I tend to feel like other people must be having an easier time of it.

_____ 19. I'm kind to myself when I'm experiencing suffering.

_____ 20. When something upsets me I get carried away with my feelings.

_____ 21. I can be a bit cold-hearted towards myself when I'm experiencing suffering.

_____ 22. When I'm feeling down I try to approach my feelings with curiosity and openness.

_____ 23. I'm tolerant of my own flaws and inadequacies.

_____ 24. When something painful happens, I tend to blow the incident out of proportion.

_____ 25. When I fail at something that's important to me, I tend to feel alone in my failure.

_____ 26. I try to be understanding and patient towards those aspects of my personality I don't like.

Revised UCLA Loneliness Scale, Short Form

INSTRUCTIONS: Indicate how often each of the statements below is descriptive of you.

Statement	Never	Rarely	Sometimes	Often
1. I lack companionship	1	2	3	4
2. I have a lot in common with the people around me	1	2	3	4
3. There are people I feel close to	1	2	3	4
4. I feel left out	1	2	3	4
5. No one really knows me well	1	2	3	4
6. I feel isolated from others	1	2	3	4
7. There are people who really understand me	1	2	3	4
8. People are around me but not with me	1	2	3	4
9. There are people I can talk to	1	2	3	4
10. There are people I can turn to	1	2	3	4

Social Interaction Anxiety Scale (SIAS-S)

Instructions: For each item, please circle the number to indicate the degree to which you feel the statement is characteristic or true for you. The rating scale is as follows:

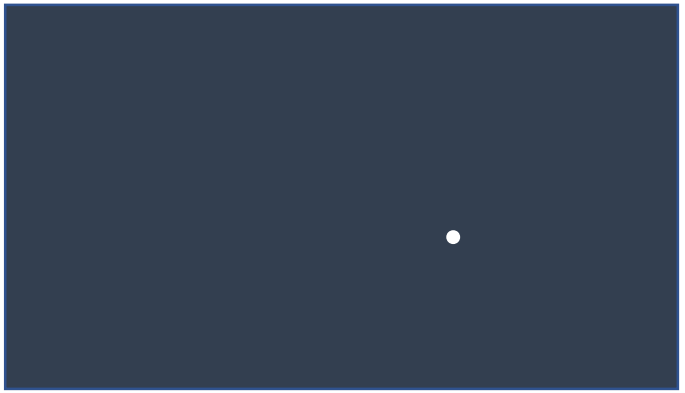
0 = **Not at all** characteristic or true of me.
1 = **Slightly** characteristic or true of me.
2 = **Moderately** characteristic or true of me.
3 = **Very** characteristic or true of me.
4 = **Extremely** characteristic or true of me.

CHARACTERISTIC	NOT AT ALL	SLIGHTLY	MODERATELY	VERY	EXTREMELY
1. I get nervous if I have to speak with someone in authority (teacher, boss, etc.)	0	1	2	3	4
2. I have difficulty making eye contact with others.	0	1	2	3	4
3. I become tense if I have to talk about myself or my feelings.	0	1	2	3	4
4. I find it difficult to mix comfortably with the people I work with.	0	1	2	3	4
5. I tense up if I meet an acquaintance on the street.	0	1	2	3	4
6. When mixing socially, I am uncomfortable.	0	1	2	3	4
7. I feel tense if I am alone with just one other person.	0	1	2	3	4
8. I have difficulty talking with other people.	0	1	2	3	4
9. I worry about expressing myself in case I appear awkward.	0	1	2	3	4
10. I find it difficult to disagree with another's point of view.	0	1	2	3	4
11. I have difficulty talking to attractive persons of the opposite sex.	0	1	2	3	4
12. I find myself worrying that I won't know what to say in social situations.	0	1	2	3	4
13. I am nervous mixing with people I don't know well.	0	1	2	3	4
14. I feel I'll say something embarrassing when talking.	0	1	2	3	4
15. When mixing in a group, I find myself worrying I will be ignored.	0	1	2	3	4
16. I am tense mixing in a group.	0	1	2	3	4
17. I am unsure whether to greet someone I know only slightly.	0	1	2	3	4

Dot Probe Task

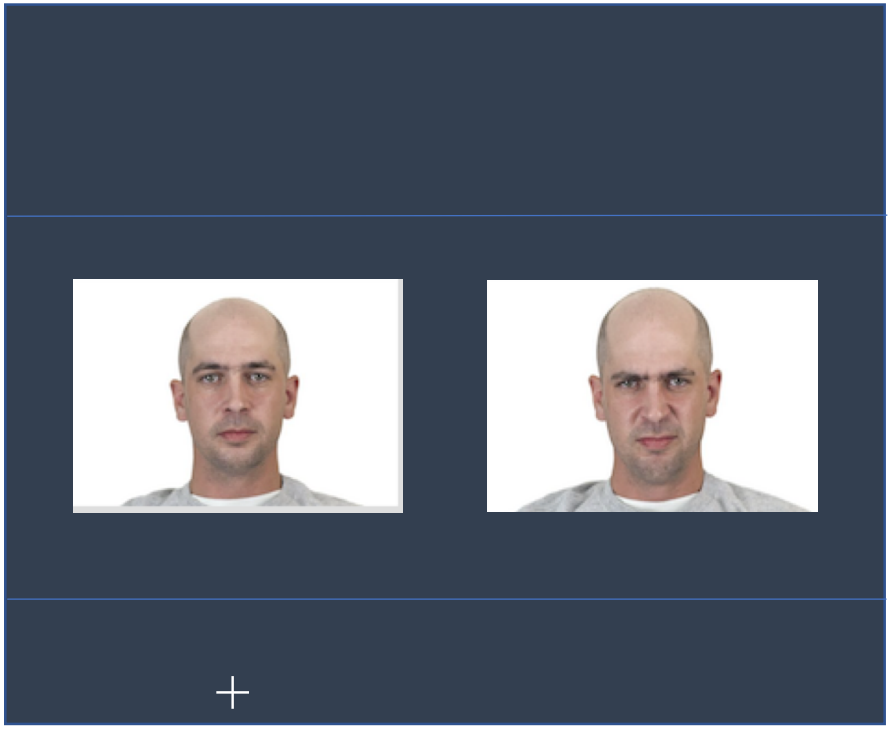
500 ms

500 ms



Until Response

Angry Congruent Trial



Neutral Congruent Trial

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copying in women newly diagnosed with early stage breast cancer. *Brain, Behaviour, and Immunity 22*, 969–981.

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Curriculum Vitae

EDUCATION

2018 **Ph.D., Human Development and Family Science**
Syracuse University
Syracuse, New York, USA.

2001 **M.S., Counseling/Human Services**
State University of New York at Oswego
Oswego, New York, USA

1994 **B.A., Psychology**
State University of New York at Oswego
Oswego, New York, USA

RESEARCH/TEACHING EXPERIENCE

Oct 2015 to Present **Qualitative Research Scientist**
Optum (QualityMetric)
Lincoln, Rhode Island, USA

- Designs qualitative research studies, conducts interviews/moderates focus groups, analyzes and interprets data.
- Prepare literature reviews, qualitative reports, conference abstracts and poster presentations, technical reports, and manuscripts for publication.
- Maintain substantial knowledge of state-of-the-art theory and application of qualitative research methods and of clinical outcome assessments
- Interacts with clients, clinical experts, and research support staff to ensure that projects are completed in a timely fashion and in accordance with quality standards
- Participates in client calls and proposals for business development
- Delegates and provides supervision and training/mentoring to junior-level staff.

Dec 2014 to Apr 2015 **Graduate Research Assistant**
Development and Evaluation of a Mind-Body Awareness Intervention to Enhance Self-Regulation as a Mechanism to Promote Healthy Weight among Young Children.
Syracuse University
Syracuse, New York, USA

- Conducted self-regulation and dietary child assessments in pre-school and elementary school environment (child ages 3-5).

Aug 2009 to May 2014 **Adjunct Instructor, Child and Family Studies**
Syracuse University
Syracuse, New York, USA

- Taught core courses in Child Development and Family Studies, designed courses, taught weekly and bi-weekly sessions, delivered lectures in traditional and online format, provided support and mentoring to undergraduate students in Child and Family Studies.

July 2013 to April 2014 **Data Specialist/Program Evaluation Consultant**
OnCare (Onondaga County System of Care)
Onondaga County & Syracuse University
Syracuse, New York, USA

- Evaluation of County databases and system of care operations for Mental Health, Child Welfare and Juvenile Justice to examine potential for merging systems to utilize in a Crossover Youth Model.

Dec 2014 to Apr 2015 **Graduate Research Assistant**
Enhancing At-Risk Children's Self-Regulation via Mindfulness and Yoga: A Pilot Study**.**
Syracuse University
Syracuse, New York, USA

- Conducted self-regulation child assessments in pre-school and elementary school environment (child ages 3-5).

Jan 2011 to May 2011 **Graduate Research Assistant**
Indian Dual Career Couples Study
Syracuse University
Syracuse, New York, USA

- Data entry and cleaning

Jan 2010 to May 2010 **Graduate Research Assistant**
Parent-Child Interaction Study
Syracuse University
Syracuse, New York, USA

- Data entry and cleaning

Jan 2003 to Mar 2009 **Research Project Director**
Family Life and Asthma Project II (NIH Funded)
Syracuse University
Syracuse, New York, USA

- Managed a longitudinal, multi-method study investigating the experience of families raising children with asthma.
- Conducted parent, child and family assessments
- Conducted semi-structured qualitative interviews in laboratory and home environments
- Conducted qualitative content analyses on family interviews.
- Developed measures and protocol procedures, as well as coding schemes and trained others to reliability.

Dec 2001 to Mar 2003 **Research Assistant**
Family Life and Asthma Project I (NIH Funded)
Syracuse University
Syracuse, New York, USA

- Coordinated a pilot study that examined the asthma coping strategies of 61 children
- (5-12 years of age) and their families.
- Conducted parent, child and family assessments using quantitative measures and semi-structured qualitative interviews.
- Recruited participants from multiple pediatric sites
- Conducted qualitative content analyses on family interviews.

Aug 2000 to May 2001 **Research Assistant**
State University of New York at Oswego
Oswego, New York, USA

- Conducted extensive literature for a studying examining the association between psychological type and ADHD.

CLINICAL EXPERIENCE

Addiction Counselor

Harbor Lights Chemical Dependency, Mexico, NY (January 2001- August 2001) Supervisor: Katie Chawgo Responsibilities: Provided individual counseling to clients and facilitated and co-facilitated daily Intensive Outpatient Program (IOP) and Mentally Ill Chemically Addicted Program (MICA).

Supervisor, Psychology Student Advisement Program/ Graduate Assistant

State University of New York at Oswego, Oswego, New York (August 2000 - May 2001) Responsibilities: Developed program material and manuals. Served as a peer advisor to undergraduates. Supervised undergraduate peer advisors and advisement office managers.

Administrator, Rosewood Adult Home

Fulton, New York (April 1995 - April 1996) Responsibilities: Accountable for physical and emotional welfare of 24 residents. Managed personal income accounts, conducted regular case management interviews with each resident. Supervised and trained staff. Assured that maintenance and overall functioning of home remained in accordance with New York Social Service Regulations.

COMPUTER SKILLS

- Alpha 5.0 & 6.0 (Database)
- JMP 5.0 (Data Analysis)
- MedTrac RxLog 1.0 (Utilized to Track data collected for medical adherence)
- Microsoft Office (Word, Excel, Powerpoint, Publisher, Access),
- Office Tracker (Scheduling software)
- Pinnacle Studio 8, Ulead, Capwiz (video capture software)
- Endnote 9 (Citation tracking software)
- SPSS, 23.0 (Data Analysis)
- NVivo, 11.0 (Qualitative Data Analysis)

PROFESSIONAL DEVELOPMENT

QRSI Qualitative Research Summer Intensive (July, 2017)
UNC Odum Institute, Chapel Hill, NC

- *Coding and Analyzing Qualitative Data,*
- *Synthesizing Qualitative Data*

NVivo Qualitative Software Training (April, 2017)
QSR International; Optum, Lincoln, Rhode Island.

Introduction to SAS (Fall, 2015)
Penn State University, State College, PA.

Future Professoriate Program (FPP)
Syracuse University, (Fall 2010 – Spring, 2015)

Mindfulness Fundamentals Online Training, July 2015
Mindful Schools, Oakland CA

Mind and Life Summer Research Institute, MLSRI (June, 2015)
Selected Research Fellow
Mind and Life Institute, Garrison, New York

SRCD Developmental Science Teaching Institute, (March, 2015)
SRCD Biennial Meeting, Philadelphia, Pennsylvania**.**

Introduction to Structural Equation Modeling Workshop (Spring, 2013)
Syracuse University, Syracuse New York.

SRCD Developmental Science Teaching Institute, (April, 2013)
SRCD Biennial Meeting, Seattle, Washington.

The Fragile Families and Child Wellbeing Data Workshop, (July, 2012)
The Columbia Population Research Center, Columbia University

Study of Early Child Care and Youth Development (SECCYD), Inter-University Consortium for Political and Social Research (ICPSR) Data-User Training Workshop, (August, 2010) University of Michigan, Ann Arbor, Michigan.

Human Subjects Research Education Program CITI, (January 2003 – March 2009)
Upstate Medical University, Syracuse, New York.

Human Subject Research Education for Research Training, (December, 2002)
National Institute of Health – online training

Diagnostic Interview Schedule for Children, (October, 2002)
Columbia University, New York, New York.

Narrative Consortium Training, (February, 2002)
Syracuse University, Syracuse, New York.

Five Minute Speech Sample Narrative Training, (June, 2002)
National Jewish Medical and Research Center, Denver, Colorado

PROFESSIONAL SERVICE

Invited Speaker

Syracuse University, Department of Child & Family Studies and Pennsylvania State University, Early Childhood Education, Mini-Conference on Play and Early Education (April,2011). Pennsylvania State University, Pennsylvania. "Associations among Family Environment, Delay of Gratification, and School Success across the Early Childhood Years*"*

Syracuse University, Department of Child & Family Studies New Graduate Student Orientation (August,2010). Syracuse, New York. *"The Association between Father-Child Relationship Quality, Paternal Depression and Child Social Functioning"*

Syracuse Family Leadership Conference (May 2010). Syracuse, New York. *Who is this child? An Overview of Developmental Stages and Communication Styles: Understanding the 14-18-Year-Old and Effective Communication.*

Professional Service

Reviewer, Submissions for the 2013 Society for Research in Child Development (SRCD) Biennial Meeting; Review Panels: Context of Child Development: Family, Neighborhood, Child Care, Media, & Religious Institutions/ At-Risk: Social and Emotional Processes & Personality.

Reviewer, Submissions for the 2011 Society for Research in Child Development (SRCD) Biennial Meeting; Panel 4: Childhood Social Processes

Reviewer, *Journal of Applied Developmental Psychology, Infant and Child Development, Development, Family Science Review Journal, Early Education and Development, Social Development*

Reviewer, National Council on Family Relations (NCFR) Submissions for 2012 Conference; Sections: Research and Theory; Family Science

Board and Committee Service

Syracuse University Contemplative Collaborative, *student member, a successful cross-university initiative that unites students, faculty and staff in using contemplative practices to enhance student experience and promote academic excellence in tandem with personal wellbeing***,** ***(Spring, 2015 – Fall, 2015).***

Graduate Student Representative, February, 2012, David B. Falk College of Sport and Human Dynamics Graduate Information Session

The Falk College Promotion and Tenure Committee, Elected Student Representative, (Fall and Spring 2012)

NCFR Student Affiliate Council, President (and pioneer) of the Syracuse University Graduate Student NCFR affiliate Council, under faculty advisor Dr. Matthew Mulvaney (Fall 2012 - Fall 2013)

Technical Reports and Manuals

Fiese, B.H., **Raymond, K.P**., Josephs, Kimberly, Wamboldt, Frederick. *Family Narrative Codebook Manual, Unpublished, Version 5.1,* For Use with the Asthma Impact Interview.

Covas, M., Botti, J., **Raymond, K.P.,** Fiese, B.H. *Child Routines Interview Coding System, Unpublished Manual,* Adapted from the Family Routines and Ritual Questionnaire, used for children ages 5-7.

SELECTED HONORS

- Phi Kappa Phi National Honor Society (2001- present)
- Golden Key International Honor Society (2010 – present)
- Graduate Fellowship, Syracuse University (August 2009 – August 2010)
- Inter-University Consortium for Political and Social Research (ICPSR) Summer Program Travel award (University of Michigan, August 2010)
- Alice Sterling Honig Award - *Award honoring scholarship in Family Studies and Child Development*, (May, 2011).
- The Fragile Families Data Workshop Travel Award (Columbia University, July 2012)
- Child and Family Studies Outstanding Graduate Teaching Award – *award honoring a graduate student with a strong commitment to teaching and learning,* (May, 2013).
- Child and Family Studies Doctorate Award for Research Excellence (April, 2014) – *award honoring a doctoral student who has excelled in academic achievement, research practice, and leadership qualities.*
- Department Nominee for Syracuse University's Outstanding Teaching Assistant Award (February, 2015).

PUBLICATIONS/PRESENTATIONS

Publications

White MK, Bayliss M, Guthrie SD, **Raymond KP**, Rizio AA, McCausland KL. Content validation of the SF-36v2® Health Survey with AL amyloidosis patients. *Journal of Patient Reported Outcomes. Dec 2017 [Epub ahead of print]*.

Razza, R., Bergen-Cico, D., & **Raymond, K.P**. Enhancing Preschoolers' Self-Regulation via Mindful Yoga. Journal of Child and Family Studies. 2013. doi: 10.1007/s10826-013-9847-6.

Raymond, K. P., Fiese, B. H., Winter, M. A., Knestel, A., Everhart, R. Helpful Hints: Caregiver generated asthma management strategies and their relation to pediatric asthma symptoms and quality of life. *Journal of Pediatric Psychology,* 37:(4), 414-423. 2012. doi: 10.1093/jpepsy/jss001.

Razza, R., **Raymond, K.P**. Associations among Family Environment, Delay of Gratification, and School Success across the Early Childhood Years. *Social Development*, 22:(2), 180-196. 2012 doi:10.1111/j.1467-507.2012.00665.x.

Book Chapters

Razza, R. A., & **Raymond, K. P**. (October, 2014). Executive functions and school readiness: Identifying multiple pathways for school success. In Routledge International Handbook of Young Children's Thinking and Understanding. 2014.

Presentations

Raymond K., Spaulding, W., Yee, K., Kando, J., Bayliss, M. (2018) Binge Eating Disorder: Clinician Thoughts on Diagnosis, Remission, and Treatment Success. Poster to be presented at the International Conference on Eating Disorders (ICED); April 19-21, 2018; Chicago, Illinois.

Spaulding, W., **Raymond K**., Yee, K., Kando, J., Bayliss, M. (2018) Binge Eating Disorder: Clinician Views on Comorbidities, Patient Burden, and Treatment-Related Decisions. Poster to be presented at the International Conference on Eating Disorders (ICED); April 19-21, 2018; Chicago, Illinois.

Bayliss M, White MK, **Raymond K**. Best Practice Approaches to Patient Cognitive Debriefing of the SF-36v2 Health Survey. Poster presented at the International Society for Quality of Life Research (ISOQOL) 23rd Annual Conference; October 19-22, 2016; Copenhagen, Denmark.

White MK, **Raymond KP**, Bayliss M, Guthrie S, Sanchorawala V. Cognitive debriefing of the SF-36v2 with amyloid light chain (AL) amyloidosis patients. Poster presented at the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) 21st Annual International Meeting; May 21-25, 2016; Washington, DC.

Raymond, K.P., Razza, R. Roundtable Discussion: Barriers and Bridges to Online Teaching: Lessons Learned and New Directions. SRCD Developmental Science Teaching Institute, SRCD Biennial Meeting, Philadephia, Pennsylvania. March, 2015.

Raymond, K.P., Razza, R., Mulvaney, M., Alford, K., Mudrick, N., Smith, C., Lopez, L. Implementation of the Crossover Youth Practice Model in Onondaga County**.** *Poster presented at the Society for Research in Child Development Special Topic Meeting: Strengthening Connections among Child and Family Research, Policy and Practice, Alexandria, Virginia*. April, 2014.

Razza, R., Bergen-Cico, D., **Raymond, K.P**., Enhancing Children's Self-Regulation via Mindful Yoga: A Pilot Study of Feasibility and Effectiveness. *Poster presented at the Society for Research in Child Development Special Topic Meeting: Strengthening Connections among Child and Family Research, Policy and Practice, Alexandria, Virginia*. April, 2014.

Razza, R., **Raymond, K.P**. The Moderating Effects of Parental Warmth on the Association Between Parental Depression and Child Social Functioning. *Poster presented at the Society for Research in Child Development Biennial Conference, Seattle, Washington*. April, 2013.

Razza, R., **Raymond, K.P**. Associations among Family Environment, Delay of Gratification and School Success across the Early Childhood Years**.** *Poster presented at the Society for Research in Child Development Biennial Conference, Montreal Canada*. April, 2011.

Knestel, A., **Raymond, K. P**., & Fiese, B. H. *Perceived Caregiver Barriers in the Management of Children's Asthma: A Qualitative Study*. Poster presented at the 29th International Congress of Psychology, Berlin, Germany. July, 2008.

Raymond, K.P., Fiese, B.H. & Winter, Marcia. *Child Pulmonary Function: A Product of Caregiver Mental Health and Perceived Burden of Care?* Poster presented at the National Conference on Child Health Psychology, Miami Beach, Florida. April, 2008.

Raymond, K.P., Knestel, Andrea & Fiese, B.H. *Helpful Hints: A Qualitative Study of Caregivers' Perceptions of "What Works" When Managing Children's Asthma.* Poster presented at the National Conference on Child Health Psychology, Miami Beach, Florida. April, 2008.

Raymond, K.P. & Fiese, B.H. *The Relationship between Family Functioning and Social Anxiety in Children with Asthma.* Poster presented at the Society for Research in Child Development Biennial Conference, Boston Massachusetts. March, 2007.

Raymond, K.P., Nazarian, Deborah & Fiese, B.H. *Narrative Representations of Relationship Expectations: The Connection to Child Psychopathology.* Poster presented at the National Conference on Child Health Psychology, Gainesville, Florida. April, 2006.

Raymond, K.P., Kelley, Kristen & Fiese, B.H. *Family Impact and Illness Severity: A function of family structure and healthcare utilization in a chronically ill pediatric*

population. Poster presented at the National Conference on Child Health Psychology, Gainesville, Florida. April, 2006.

DelSavio, Katherine; **Raymond, K.P**. & Fiese, B.H. *The Relation between Rituals, Routines and Overall Functioning in Families with Asthma.* Poster presented at the National Conference on Child Health Psychology, Gainesville, Florida. April, 2006.

Foley, K.P., **Raymond, K.P**., Spagnola, Mary & Fiese, B.H. *The Relationship Between Maternal Psychopathology and Quality of Life in a Chronically Ill Pediatric Population.* Poster Symposia presented at the Society for Research in Child Development Biennial Conference, Atlanta, Georgia. April, 2005.

Fiese, B.H., Howell, K.J., **Raymond, K.P**., Spagnola, M., Poltrock, S.L. *Burden of Care and Family Negativity Affects Child and Parent Quality of Life.* Poster Symposia presented at the Society for Research in Child Development Biennial Conference, Atlanta, Georgia. April, 2005.

Foley, K.P., **Raymond, K.P.**, & Fiese, B.H. (April, 2004). *The Relationship between Caregiver Depression and Pediatric Adherence to Daily-Prescribed Asthma Medications*. Poster presented at the National Health Conference on Child Health Psychology, Charleston, South Carolina. April, 2004.

Fiese, B.H., Winter, M.A.., Everhart, R., **Raymond, K.P.** (March, 2010). Chaotic Home Environments: A breeding ground for relational stress and poor lung functioning in children with asthma. Presented at the *American Psychosomatic Society 68th Annual Meeting.* Presenter: Dr. Barbara Fiese. March, 2010.

Fiese, B.H., Winter, M.A.., Everhart, R., **Raymond, K.P.** (April, 2009). *Chaos can take your breath away: Disrupted family routines and children's lung functioning. Part of a paper symposium titled: The Impact of a Chaotic Family Environment on Children's Cognitive, Social-Emotional, and Health Outcomes.* Presented at the Society for Research in Child Development Biennial Conference, Denver, Colorado. Presenter: Dr. Barbara Fiese.

Raymond, K.P., Nazarian, Deborah & Fiese, B.H. (March, 2007). *I worry and worry: Narratives of coping with pediatric illness and relation to child and parent mental health.* Part of a paper symposium titled *Stories of the Parent-Child Relationship: Enriching Traditional Research on Dyadic Process with Families' Narrative Accounts*. Presented at the Society for Research in Child Development Biennial Conference, Boston Massachusetts. Presenter: Kimberly Raymond.