ANXIETY SENSITIVITY AND ITS UNIQUE RELATIONSHIP WITH PANIC DISORDER, GENERALIZED ANXIETY DISORDER, SOCIAL ANXIETY DISORDER, AND DEPRESSION

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Anxiety Sensitivity and its Unique Relationship with Panic Disorder, Generalized Anxiety Disorder, Social Anxiety Disorder, and Depression

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Abstract

There has been significant interest in the unique relationship that anxiety sensitivity (AS) holds with the anxiety disorders and depression. Anxiety sensitivity is the fear of arousal-related bodily sensations due to the personal belief that these symptoms will produce harmful consequences such as the loss of cognitive control, negative physical symptoms, and the fear of publicly observable symptoms (Reiss, 1991). Current research has examined the relationship between AS and anxiety disorders and depression and has found that high levels of AS are associated with the development of panic disorders, social anxiety, generalized anxiety disorder, and depression (Maller & Reiss, 1992; Olatunji & Woitzky-Taylor, 2009; Taylor, Koch, Woody, & McLean, 1996); however, limited research has examined the three facets of AS and how they relate to specific anxiety disorders and depression. The present study examined three specific anxiety symptom clusters (panic, generalized anxiety, and social anxiety) and depressive symptoms and their relationship with the three facets of AS (fear of physical symptoms, social concerns, and fear of cognitive dyscontrol). It was found that the fear of physical symptoms component of AS was correlated with panic, as was hypothesized, but also correlated with social anxiety symptoms and generalized anxiety symptoms. Consistent with hypotheses, fear of publicly observable symptoms, or the social concerns component of AS, was correlated with only one cluster of symptoms, social anxiety. Lastly, fear of cognitive dyscontrol was unexpectedly found to correlate with panic and symptoms of social anxiety; however, it did not correlate with generalized anxiety or depressive symptoms as predicted in the hypothesis. These results, although preliminary, suggest a degree of specificity with respect to how the various components of AS correlate with specific anxiety and mood symptoms. Future work in this area might be

useful in preventative efforts to address aspects of AS that serve as specific risk factors for these disorders.

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List of Abbreviations

AS	Anxiety Sensitivity
ASI	Anxiety Sensitivity Index
ASI-Physical	Anxiety Sensitivity Index-Physical Concerns Subscale
ASI-Social	Anxiety Sensitivity Index-Social Concerns Subscale
ASI-Cognitive	Anxiety Sensitivity Index-Cognitive Concerns Subscale
ASP	Anxiety Sensitivity Profile
ASI-3	Anxiety Sensitivity Index-3
ASI-R	Anxiety Sensitivity Index Revised
GAD	Generalized Anxiety Disorder
PSWQ	Penn State Worry Questionnaire
SIAS	Social Interaction Anxiety Scale
DASS-21	Depression Anxiety Stress Scales-21
DASS-21-A	Depression Anxiety Stress Scales-21-Anxiety Subscale
DASS-21-D	Depression Anxiety Stress Scales-21-Depression Subscale

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Anxiety Sensitivity and its Unique Relationship with Panic Disorder, Generalized Anxiety Disorder, Social Anxiety Disorder, and Depression

Anxiety is defined as a generalized mood condition that can result in a state of intense apprehension or worry often accompanied by physical symptoms such as shaking, sweating and intense physiological feelings in the body (Barlow, 2002). Anxiety can be a very distressing experience and can often occur without an identifiable triggering stimulus. When anxiety becomes excessive, and begins to interfere with an individual's day to day functioning, then it is considered an anxiety disorder (National Institute of Mental Health, 2011). In order to determine whether anxiety is a normal or abnormal reaction, the intensity and reasoning behind it has to be evaluated (Barker, 2009). Anxiety disorders are common psychological problems with a prevalence of 25 percent in the general population. According to the National Institute of Mental Health (2011) there are five specific types of anxiety disorders: Generalized Anxiety Disorder , Obsessive-Compulsive Disorder (OCD), Panic Disorder, Post-Traumatic Stress Disorder (PTSD) and Social Phobia (or Social Anxiety Disorder).

Anxiety disorders represent a major concern in regards to public health. The prevalence, persistence, and recurrence of anxiety disorders create a social and economic burden that affects not only the sufferers but society as a whole (Smit et al., 2006). As previously mentioned, physical symptoms can become severe and prevent an individual from functioning. In addition to physical symptoms, anxiety disorders have profound psychological implications for an individual. Someone suffering from an anxiety disorder may experience constant tensions and worry, decreased confidence, increased self consciousness, irritability, insomnia, and the inability to concentrate (American Psychiatric Association, 2000). These individuals may also begin to avoid stress provoking situations, distance themselves from family and friends, and stop

partaking in activities in which they used to enjoy (American Psychiatric Association, 2000). Because of the impact that anxiety disorders have on our society, it is of the upmost importance that we gain further insight into their cause and structure.

In contrast to anxiety, anxiety sensitivity (AS) is the fear of arousal-related bodily sensations due to the personal belief that these symptoms will produce harmful consequences such as the loss of cognitive control, negative physical symptoms, and the fear of publicly observable symptoms (Reiss, 1991). Taylor (1999) describes AS as "a trait like cognitive characteristic that amplifies the intensity of specific anxiety symptoms and thus builds up the perception of anxiety reactions" (Taylor, 1999, p. 264). Considerable research has gathered support for the relationship between anxiety disorders and AS. The relationship between AS and specific anxiety disorders has been shown in numerous studies that have found that high levels of AS are associated with the development of panic disorders, social anxiety, generalized anxiety disorder, and post-traumatic stress disorder (Maller & Reiss, 1992; Olatunji & Woitzky-Taylor, 2009). In addition to the anxiety disorders, elevated levels of AS have also been observed among patients with major depression relative to controls (Taylor, Koch, Woody, & McLean, 1996). This finding led Taylor and colleagues (1996) to question the structure of AS and how it relates to not only the anxiety disorders, but also depression. Taylor and colleagues argued that two facets of AS (fear of publicly observable symptoms and fear of physical symptoms) are specific to anxiety while the third facet (fear of cognitive dyscontrol) is specific to depression. Although more recent research has shown that the fear of cognitive dyscontrol predicted both depressive and anxious symptoms (Schmidt, Lerew & Joiner, 1998) and suggested that depression may also be linked to the fear of publicly observable symptoms (Viana & Rabian, in press), the specific mechanism of these relationships still remains unclear (Olatunji & Woitzky-Taylor, 2009).

This study seeks to determine if the comorbidity between anxiety and depression is accounting for the correlations observed between depressive symptoms and facets of AS or whether a unique relationship exists between depressive symptoms and facets of AS. Specifically, this study will examine three specific anxiety symptom clusters (panic, generalized anxiety, and social anxiety) and depressive symptoms and their relationship with the facets of AS. Although anxiety related bodily sensations occur in a number of contexts and all five of the anxiety disorders may be associated with these symptoms to varying degrees, the present study has decided to concentrate on only three of the anxiety symptom clusters (panic, generalized anxiety, and social anxiety). Post traumatic stress and obsessive compulsive symptoms were not included in the present study because research has not shown a clear casual view of the role of specific dimensions of AS in the development of these symptoms, instead showing that within these symptom constellations, different AS facets may serve different predictive functions, which is outside of the scope of the present study (Ozer, Best, Lipsey, & Weiss, 2003; Taylor et al., 1992; Vujanovic, Zvolensky, & Bernstein, 2008).To study the unique relationship that AS has with these three areas of anxiety and with depressive symptoms, the hierarchical structure of AS that was suggested by Olatunji & Woitzky-Taylor (2009) will be used. This model proposes that the three facets of AS are nested beneath the higher order factors of negative affect and trait anxiety. More specifically, this study will investigate if AS-fear of cognitive dyscontrol is independently associated with both anxiety and depressive symptoms. Consistent with the theory that was proposed by Olatunji & Wolizky-Taylor (2009) it was predicted that after an investigation into the three lower factors of AS (AS Physical Concerns, AS Cognitive Concerns and AS Social Concerns) this study would show a correlation of each factor with a particular anxiety symptom cluster. It was predicted that there would be a correlation between fear of

physical concerns and Panic, fear of publicly observable symptoms and Social Anxiety, and fear of cognitive dyscontrol and both Depressive symptoms and Generalized Anxiety separately. If it is found that distinct AS dimensions correspond to specific anxiety or depressive symptoms, this information might subsequently inform efforts to develop specific interventions to target each of these dimensions to treat and prevent specific anxiety and depressive symptom clusters.

Anxiety Sensitivity

The construct of AS originated from Reiss and McNally's (1985) elaboration of Goldstein and Chambless' (1978) concept of the fear of fear (Reiss, 1991; Reiss & McNally, 1985). In their article, they proposed that the fear of fear can be separated into two component processes called anxiety expectancy and anxiety sensitivity (Reiss & McNally, 1985). AS has been defined as an individual difference variable based on the belief that anxiety related symptoms (increased heart rate, sweating, dizziness) have harmful, if not catastrophic consequences (Reiss & McNally, 1985). Reiss and McNally (1985) reported that they believed that an individual difference variable consisted of the belief that the experience of anxiety and fear causes illness, embarrassment, or additional anxiety (Reiss, Peterson, Gursky, & McNally., 1986). For example, a person with high AS might perceive a racing heart beat as an indication of an impending heart attack, may fear sweating because it will lead to humiliation, or may fear worrying because it will validate the belief that the individual is losing cognitive control (Olatunji & Wolizky-Taylor, 2009).

Following the introduction of AS, a debate began in the literature discussing whether AS and trait anxiety are independent constructs. Reiss, Peterson, Gursky, and McNally (1986) used the newly constructed Anxiety Sensitivity Index (ASI: Reiss, Peterson, Gursky, & McNally, 1986) to argue that because AS only moderately correlates with trait anxiety, AS and trait

anxiety are distinct constructs. To strengthen this argument, researchers demonstrated that AS predicted certain conditions that are completely independent from trait anxiety, such as panic attacks and anxiety reactions to procedures that an individual finds challenging (Brown & Cash, 1990; Reiss et al., 1986). In contrast, Lilienfeld, Turner, and Jacob (1993) argued that AS and trait anxiety may not be distinct constructs. They stated that many of the early findings that relate AS to anxiety disorders could possibly be due to the effects of trait anxiety and similar unmeasured variables. As such, they contended that AS should be viewed as a lower order facet of trait anxiety and not as a completely independent construct (Lilienfeld, Turner, & Jacob, 1998). After many years of discussion, Lilienfield and colleagues (1998) summarized the debate in their review of AS in the adult population in 1998. They stated that there is now a consensus in the literature that although AS and trait anxiety are moderately correlated, AS does contribute to the prediction of certain anxiety and mood disorders above and beyond trait anxiety, thereby making it an independent construct. The debate concerning the construct of AS has lead to extensive research into how the anxiety disorders are associated with AS and has encouraged further research into this unique relationship.

AS is theorized to manifest from the combination of genetic predispositions (Stein, Jang, & Livesley, 1999) and learning experiences that result in the acquisition of beliefs about potential harmful effects of autonomic arousal (Stewart, et al., 2001). To study the relationship between heritability and AS, researchers have used the strong predictive relationship of AS and panic disorder. There is an abundance of empirical support for the role of AS in panic disorder (e.g., Parker & Swanson, 1996; Maller & Reiss, 1992; Eke & McNally, 1996; Schmidt, Lerew, & Jackson, 1997; Schmidt, Zvolensky, & Maner, 2006; Taylor, 1995) and researchers have used twin studies to demonstrate that panic disorder runs in families. Specifically, it has been

proposed that patients with panic disorder inherit a physiological or biological risk factor for panic (Fyer, Mannuzza, Chapman, Martin, & Klein, 1995; Weissman, 1988; Vieland, Goodman, Chapman, & Fyer, 1996). Other studies (e.g., Stein, Jang, & Livesly, 1999) have shown similar results reporting that a heritable component accounted for 45% of the variance in AS levels of twins. Additionally, in their study on the heritability of AS in twins, Stein and colleagues (1999) concluded that AS has a strong heritable component and that it accounted for nearly half of the variance in total AS scores. They cautioned that even though AS seems to manifest from genetic predispositions, unique learning and environmental factors also need to be taken into consideration (Stein, et al., 1999).

It has been proposed that instrumental learning (direct learning where behaviour is acquired or eliminated by its consequences, e.g., positive or negative reinforcement) and vicarious learning (learning by imitating or watching) may influence the development of AS (Bandura, 1986). Research in this area has suggested that when compared to individuals with low levels of AS, those with higher levels of AS reported more instrumental and vicarious conditioning experiences that involve parental reinforcement and modeling of both anxiety-related and non-anxiety somatic symptoms (Watt, Stewart, & Cox, 1998; Watt & Stewart, 2000). The relationship between AS, early childhood learning experiences, and panic disorder was studied by Stewart et al., (2001) who used structural equation modeling to test if the frequency of panic attacks (which are correlated with AS) was affected by childhood learning experiences. Their results provide additional support for the theory that AS is related to early learning experiences; they found that learning history for arousal and reactive somatic symptoms directly influenced both AS and panic frequency. The research into the manifestation and development of

AS is extremely important to note because it sheds light on the relationships between AS and specific anxiety disorders and has led to extensive research in this area.

The relationship between AS and anxiety has been very well established in adult populations over the past few decades. Recent research has shown that adults with anxiety and certain mood disorders have higher levels of AS when compared to individuals with other mood disorders (Taylor, 1995; Lillenfield, Turner & Jacob, 1998). Furthermore, AS was originally proposed as a specific vulnerability trait for panic disorder because elevated levels of AS have been shown to be associated with panic attacks among non-clinical individuals (Taylor, 1995; Taylor, 1999). There is a large amount of research to support this theory. Specifically, studies have shown that AS is predictive of a fearful response to biological challenge procedures in non-clinical individuals and induces panic attacks among those with panic disorder (Zvolensky, Feldner, Eifert, & Stewart, 2001; Rassovsky, Kushner, Schwarze, & Wangensteen, 2000). In Maller and Reiss's (1992) research they found that students with elevated levels of AS were five times more likely to have an anxiety disorder in 3 years. A more recent study reported that elevated levels of AS in non-clinical patients predicted a clinical anxiety disorder diagnosis 24 months after the initial assessment (Schmidt, Zvolensky, & Maner, 2006). Other research showed that elevated levels of AS have been shown in depression, generalized anxiety disorder, post-traumatic stress disorder, social anxiety disorder, and obsessive compulsive disorder and that AS predicts the onset of certain mood and anxiety disorders (e.g., Amir, Coles, & Foa, 2002; Calamari, Rector, Woodard, Cohen, & Chik, 2008; Hazen, Walker, & Stein, 1995; Maller & Reiss, 1992; Rodriguez, Bruce, Pagano, Spencer, & Keller, 2004; Viana & Rabian, 2008; Wald & Taylor, 2007).

Knowledge of the relationship between AS and the specific anxiety disorders is extremely important because if distinct AS dimensions are found to correlate with specific anxiety disorders or depression, then specific behavioural interventions and treatments can be developed to treat and prevent specific anxiety related disorders (Olatunji & Wolizky-Taylor, 2009). The benefits of treatment and prevention of AS in panic disorder patients has been shown in recent studies. These studies have reported that the use of cognitive behavioural therapy (CBT) has been successful in reducing the symptoms of AS and in turn, lowering the risk and severity of panic attacks (Smits, Powers, Cho, & Telch, 2004; Smits, Berry, Tart, & Powers, 2008). To further the research in this area, Schmidt, and colleagues (2007) conducted a longitudinal study to target AS reduction using participants who had high levels of AS. In their study, they randomly assigned participants into two groups, one which received an intervention designed to reduce AS and the other who received no intervention. Their results indicated a greater reduction of AS in the group who received the intervention when compared with the group who received no intervention after a 24 month period. Although this research shows how behavioural treatments and interventions can help lower AS in patients who suffer from panic disorder, literature on how it can help the other anxiety disorders is limited. The limited amount of literature available examining how CBT could benefit all of the anxiety disorders is troubling because of the high prevalence and persistence of anxiety disorders in our society. The present study aims to address these concerns by learning more about the unique relation of AS to each individual anxiety symptom cluster and depressive symptoms.

AS Structure

In order to understand the relationships between AS and the anxiety disorders and depression, one must first understand the underlying structure of AS. In the past few decades,

there has been an ongoing debate concerning the structure of AS. It was initially argued that AS is one dimensional, consisting of a single factor (McNally, 1996; Reiss, Peterson, Gursky, & McNally, 1986). This argument, however, is no longer the consensus among those who study AS. More recently, the structure of AS has been suggested to be multidimensional, consisting of separate and distinct factors that appear to be hierarchical in nature (Lilienfeld, 1996; Lilienfeld et al., 1993). Olatunji & Wolizky-Taylor (2009) have suggested that AS is composed of a unifactorial structure at the higher order level and a multidimensional structure at the lower level. They go on to suggest that the three most replicable lower order AS dimensions load onto a single higher order factor (i.e., a general AS factor) and consist of the following: (1) fear of physical symptoms, (2) fear of publicly observable symptoms, and (3) fear of cognitive dyscontrol. This model of AS contends that an individual can be fearful of anxiety related sensations in general, specific aspects of the anxiety sensations (i.e., profuse sweating), or both (Deacon & Abramowitz, 2006). Studies have shown that a multi-dimensional and hierarchical model of AS provides a much better fit to the existing data (e.g., Rodriguez, Bruce, Pagano, Spencer, & Keller, 2004). Since the present study is looking at the nature of the relationship between anxiety and depressive symptoms and the lower facets of AS, this is the model that will be used to examine how each symptom cluster is related to each of the three subscales of the Anxiety Sensitivity Index (ASI) (i.e., fear of physical symptoms, fear of publicly observable symptoms, and fear of cognitive dyscontrol).

Anxiety and Depression

When investigating specific anxiety disorders and their unique relationships with AS, the inclusion of depression is necessary. Although depression is categorized as a mood disorder, its comorbidity with anxiety makes it significant when investigating the multi-faceted structure of

AS. The close knit relationship of anxiety and depression has been repeatedly demonstrated over the past few decades. Through studies of patients in primary care and the community, researchers have found that of the individuals who meet the criteria for major depression, 50% in the community and 75% in primary care centers also meet the diagnostic criteria for an anxiety disorder (Hirschfeld, 2001). Numerous other studies have supported these data, showing that comorbidity between anxiety and depression is not the exception, but the rule (Brown & Barlow, 1992; Brown, Campbell, Lehman, Grisham, & Mancill, 2001; Maser & Cloninger, 1990).

Major depression is described as a mood disorder in which feelings of sadness, loss, anger or frustration impede a person's functioning in their day-to-day life for long stretches of time (American Psychiatric Association, 2000). Symptoms of depression include consistent irritable mood, recurring thoughts of suicide or death, feelings of hopelessness, weight loss or gain, slowed or agitated physical movements, self-hate and feelings of worthlessness, lack of energy, difficulty concentrating, and trouble sleeping or excessive sleeping (American Psychiatric association, 2000). Not unlike anxiety, depression is theorized to occur through a combination of genetics and learned behaviour and is most often triggered by a stressful or unhappy life event (Fava, Rafanelli, Tossani, & Grandi, 2008).

The comorbidity of anxiety and depression creates major barriers in the diagnosis and treatment of both disorders. It has been reported that individuals who suffer from both depression and an anxiety disorder have a higher severity of illness, reduced functioning at work, and decreased social functioning (Brown, et al., 2001). Comorbidity of these disorders has been shown to increase the severity of each disorder, slow recovery time, and increase the likelihood of a relapse once an individual has recovered (Kessler, Stein, & Berglund, 1998; Sherbourne, et al., 1992). Because these disorders are frequently found to coexist with other medical conditions

such as diabetes and cardiovascular disease, they are sometimes hard to recognize and increase an individual's risk of hospitalization and suicide (Olfson, et al., 1997). According to a national survey, comorbidity was associated with a 2.5 fold increase in the likelihood of hospitalization with individuals suffering from an anxiety disorder (Kessler, et al., 1998).

There is evidence to support a relationship between AS and depression. Studies have shown elevated levels of AS in patients suffering from depression when compared to controls (Taylor, Koch, Woody, & McLean, 1996). Furthermore, depression has been found to specifically relate to the fear of cognitive dyscontrol facet of AS. Schimidt, Lerew, and Joiner (1998) found that the fear of cognitive dyscontrol predicted not only symptoms of anxiety but also of depression. This finding has been supported by Grant, Beck, and Davila (2007) and raises the question of whether depression is specifically associated with AS and the fear of cognitive dyscontrol or whether the relationship is accounted for by anxiety. Alternatively, the AS facet of fear of cognitive dyscontrol could be instrumental in the development of depression because it could lead to the avoidance of social situations (removing a potential source of positive reinforcement) and inhibit an individual's day-to-day functioning. The present study predicted that AS fear of cognitive dyscontrol would correlate with depressive symptoms whereas the other facets of AS, social concerns and fear of physical symptoms, would be predictive of the other anxiety symptom clusters.

Generalized Anxiety Disorder

Generalized Anxiety Disorder (GAD) is described as constant worry and anxiety over many different activities and events (National Institute of Mental Health, 2010). An individual with GAD is described to be in the presence of constant worry and tension, even when there is no rational cause. GAD causes an individual to worry about many different things, even though

they are aware that their worries or fears are stronger than necessary. According to Kessler, Chiu, Demler, and Walters (2005) the usual age of onset for GAD is variable. They go on to state that although GAD can begin anywhere from early childhood to late adulthood, onset is usually more gradual than with the other anxiety disorders. Some common symptoms of GAD are difficulty concentrating, fatigue, irritability, difficulties sleeping, headaches, shakiness, and the constant feeling of being "on edge" (American Psychiatric Association, 2000; Taylor et al., 2008). It is believed that genes may play a role in the development of GAD and it has also been said that learned behaviour when presented with stressful life situations may also contribute to the development of GAD, which can start at any given time in an individual's life (Taylor et al., 2008).

Recent research has shown the there is a unique relationship between AS and GAD. Studies (e.g., Cox, Borger, & Enns, 1999; Rector, Szacun-Shimizu, & Leybman, 2007) have shown the high correlation between AS and GAD and how this unique relationship interacts with both worry and depression. Patients with GAD have shown elevated levels of AS when compared to individuals who did not suffer from an anxiety disorder (Zinbarg, Barlow & Brown, 1997). Empirical evidence has shown that there is a unique relationship between AS and GAD (Borkovec, Alcaine & Behar, 2004; Carleton, Sharpe, & Asmundson, 2007; Viana & Rabian, 2008). Upon further analysis, it has been proposed that worry and GAD have a distinct relationship with the fear of cognitive dyscontrol facet of the ASI. Rector and colleagues (2007) found elevated levels of fear of cognitive dyscontrol in individuals who were diagnosed with GAD when compared to individuals with other anxiety disorders, and Leen-Feldner, Feldner, Tull, Roemer, & Zvolensky (2006) found a similar pattern in a non clinical sample.

Panic Disorder

Panic disorder is a type of anxiety disorder in which an individual has repeated attacks of intense fear that something bad will occur when not expected. Someone who experiences panic disorder lives in constant fear that another attack will occur (Daitch, 2011). A panic attack is reported to begin suddenly and last anywhere from 10 to 20 minutes and the age of onset is usually early adulthood (Bandelow et al., 2000). During a panic attack the person may think that they are having a heart attack, going crazy, or about to die. They may experience any of the following symptoms: chest pain; dizziness; fear of losing control; feelings of choking; feelings of detachment; nausea; numbness of the hands, face, or feet; heart palpitations; shortness of breath; trembling; sweating; or chills (American Psychiatric Association, 2000; Taylor et al., 2008). Studies have shown that genetics may play a role in the development of panic disorder. It has been shown that if one twin has panic disorder then the other twin has a 40% chance of developing the disorder (Taylor et al., 2008). Nishimura and Colleagues (2008) analyzed this genetic component further and found that the instance of panic disorder in first-degree relatives is significantly higher when compared to unrelated individuals.

Panic disorder is the anxiety disorder that is most commonly linked to AS. According to Schmidt, Lerew, and Jackson (1999) AS is highly correlated with panic disorder symptoms, precedes the development of panic disorder symptoms, and the association between AS and panic disorder is not due to a third variable. In their research on the relationship between panic disorder and AS, Taylor, Koch, and McNally (1992) found that individuals who were diagnosed with panic disorder showed greater AS compared to individuals diagnosed with an anxiety disorder other than PTSD. In addition, Schmidt, Zvolensky, and Maner (2006) reported that heightened AS predicted increased panic symptoms after a carbon dioxide challenge in both clinical and non-clinical samples. It has also been suggested by Lilienfeld, Turner, and Jacob

(1998) that AS may play a role in the formation and severity of panic disorder. After reviewing the literature on AS in the adult population, they concluded that strong empirical evidence existed that demonstrated that AS uniquely predicts panic attacks. Furthering the evidence of the clear association between AS and panic disorder, research has shown that AS is a predictor of spontaneous panic attacks (Maller & Reiss, 1992; Plehn & Peterson, 2002).

The undisputable evidence that exists to support the correlation between panic disorder and AS may give us an insight into the development and nature of the underlying structure of AS. It has been proposed that panic disorder has a distinct relationship with the fear of physical symptoms facet of the ASI (Zinbarg & Schmidt, 2002). Evidence for this theory has been accumulating, with many researchers finding a direct correlation only between panic disorder and the fear of physical symptoms subscale and not the other two subscales (Zvolensky et al 2001).

Social Anxiety Disorder

Social Phobia or Social Anxiety Disorder is a persistent and irrational fear of situations that may involve scrutiny or judgement by others (Stein, Stein, Pitts, Kumar & Hunter, 2002). Individuals who suffer from social anxiety become overwhelmingly anxious and self-conscious in everyday social situations and have an intense, chronic fear of being watched and judged by others. Because of the constant dread of social situations, this disorder can interfere with the individual's day-to-day life causing them to avoid public places such as work, school, and activities that involve friends and family members. The age of onset for this disorder is early in childhood or adolescence and it rarely begins after the age of 25 (Beidel & Turner, 1998). Social anxiety can be limited to one situation (such as speaking in front of a group) or it may be so broad that the individual experiences anxiety around almost everyone they encounter. Although

people with social anxiety realize that these fears may be unfounded or excessive, they cannot alleviate this anxiety without intervention. Some of the physical symptoms of social anxiety disorder are blushing, sweating, difficulty speaking, trembling, and nausea (American Psychiatric Association, 2000; Stein et al., 2002). These symptoms have also been shown in individuals who have elevated levels on the AS-social concerns subscale of the ASI suggesting a unique relationship between this facet of AS and social anxiety disorder (Belcher & Peters, 2009).

Studies conducted in the past decade have found a relationship between AS and social anxiety disorder (e.g. Mattick & Clark, 1998; Rector et al., 2007; Zinbarg et al., 1997). Unfortunately, literature on the relationship between AS and social anxiety disorder is limited. Drawing from the studies that do exist, an individual with social anxiety may fear that they will be negatively evaluated if they present with publicly observable symptoms of anxiety and these social concerns may be attributable to AS (Asmundson & Stein, 1994; Ball, Otto, Pollack, Uccello, & Rosenbaum, 1995; Norton, Cox, Hewitt, & McLeod, 1997). Furthermore, AS has been shown to be involved in the development and maintenance of social anxiety disorder (Rapee & Heimberg, 1997). The correlation between AS and social anxiety disorder was also found by researchers during hyperventilation challenges that were aimed at looking into the unique relationship between panic disorder and AS- physical concerns (Brown, Smits, Powers, & Telch, 2003; Zinbarg, Barlow & Rapee, 2001). After it was discovered that AS-physical concerns predicted fear in panic disorder patients in panic provoking situations, it was also noted that participants with elevated AS-social concerns were the first to withdraw from the challenges. The authors theorized that withdrawing from the challenges earlier than the other participants showed a unique relationship between AS and social anxiety. They stated that because having

elevated levels of AS-social concerns led to early withdrawal from the challenge these participants were prevented from having the chance to learn that a potentially threatening situation may not be as threatening as they perceived (Brown et al., 2003; Zinbarg et al., 2001). This correlation was further analyzed by Rodriguez and colleagues (2004) in their study about the discriminant validity of the ASI and subjects that have been diagnosed with social anxiety disorder. The results of this study showed that social anxiety disorder predicted elevated levels on the AS-social concerns subscale. Although limited, the research that has been conducted has pointed to a unique relationship between AS-social concerns and social anxiety disorder.

Summary

Researchers have recently come to the consensus that the underlying structure of AS is hierarchical in nature, with all of the facets of AS loading on to a single higher order factor (Blais, Otto & Zucker, 2001; Hayward, Killen, Kraemer, & Taylor, 2000; Zinbarg et al., 2001). This conclusion has lead to the exploration of the relationship between AS and the specific anxiety disorders. It has been proposed that the three facets of AS (physical concerns, social concerns, and fear of cognitive dyscontrol) relate both differentially and uniquely to each specific anxiety disorder (Abramowitz, 2006; McKay et al., 2004; Rachman & Taylor, 1993). More specifically, AS-physical concerns has been linked to panic disorder, AS-social concerns has been linked to social anxiety, and AS-fear of cognitive dyscontrol has been linked to both GAD and depression. The present study aims to expand the understanding of the unique relationships between the facets of AS and the symptom clusters of anxiety by measuring the correlation between each facet and disorder.

Psychometric properties of measures of Anxiety Sensitivity

There have been a number of scales that have been developed to measure AS in the adult population. The first index that was created was the Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986); although there have been modifications and revisions to this scale (reviewed below), it is still the most commonly used inventory and considered to capture the AS construct in its entirety.

The Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986)

The ASI is a 16-item self-report scale that measures anxiety about possible negative consequences of arousal symptoms. It is the most commonly used measure of AS (Reiss, Peterson, Taylor Schmidt & Weems, 2008). The development of the ASI was based on an earlier scale that aimed to measure AS called the Anxiety Sensitivity Scale that was developed by Epstein (1982). The ASI is made up of three subscales: AS Physical Concerns, AS Fear of Cognitive Dyscontrol, and AS Social Concerns. AS physical concerns involve a fear of sensations: e.g. *It scares me when my heart beats rapidly*; AS Cognitive Concerns are fears of negative psychological consequences of anxiety-related cognitive experiences: e.g. *It is important to me to stay in control of my emotions*; and AS Social Concerns are fears of possible negative social ramifications of publicly observable anxiety sensations: e.g. *Other people notice when I feel shaky* (Reiss et al., 1986). Respondents are asked to rate the degree to which they agree with the listed thoughts and feelings on a 5-point Likert scale from 0 (very little) to 4 (very much) yielding total scores ranging from 0 to 64 where higher scores indicate higher levels of AS.

In the article that introduced the ASI, Reiss and colleagues (1986) reported moderate two-week test-retest reliability estimates for all three samples analyzed: men ($r = .70$), women ($r = .74$), and the full sample of college students ($r = .75$). Maller and Reiss (1992) reported a

satisfactory test-retest reliability of $r = .71$ over three years. Internal consistency has been reported as moderate to high by multiple studies, ranging from .76 to .90 for both clinical and non-clinical studies (Ginsburg & Drake, 2002; Maller & Reiss, 1992; Schmidt & Joiner, 2002; Zinbarg, Barlow and Brown, 1997).

The Anxiety Sensitivity Profile (ASP; Taylor & Cox, 1998a)

The ASP is a 60-item measure of AS that was created using the 16-item ASI as a basis (Reiss et al., 1986). Taylor and Cox (1998a) created the ASP in an attempt to theoretically improve the available assessments of the multifaceted nature of the AS construct. Although the ASI has been the most commonly used measure of AS, there were concerns that since it was not created to measure multiple factors it may contain an insufficient number of items to adequately capture each of the lower factors of AS (Taylor & Cox, 1998b).The test battery consists of a 60-item self-report scale on which respondents rate the extent to which they agree with each item on a 7-point Likert scale (1-"Not at all likely" to 7- "Extremely likely"). The inventory is comprised of six subscales: (1) Fear of cardiovascular symptoms (e.g. *Your heart is pounding*); (2) fear of respiratory symptoms (e.g. *You feel like you can't take a deep breath*); (3) fear of gastrointestinal symptoms (e.g. *Your stomach is making loud noises*); (4) fear of publicly observable anxiety reactions (e.g. *Hot flashes sweep over you*); (5) fear of dissociative and neurological symptoms (e.g. *You have tingling sensations in your hands*); (6) fear of cognitive dyscontrol (e.g. *Your thoughts seems slower than usual*) (Taylor & Cox, 1998a).

In the article that introduced the ASP, Taylor and Cox (1998a) reported that their study showed support for the hierarchical structure of AS but yielded support for only four of the six lower factors: (1) fear of respitory symptoms, (2) fear of cognitive dyscontrol, (3) fear of gastrointestinal symptoms, and (4) fear of cardiac symptoms. These factors loaded on a single

higher order factor and they concluded that the results lend support to the theory that AS is the product of a general factor, with independent contributions from four specific factors. Olatunji Sawchuk, Arrindell, & Lohr (2005) conducted two studies to examine the factor structure and psychometric properties of the ASP in non-clinical samples and found that internal consistency to be high for the full inventory with all items correlating moderately to highly with the total score. They reported moderate to high test-retest reliability for four of the six scales (fear of respitory symptoms, fear of cognitive dyscontrol, fear of cognitive dissociation, and fear of gastrointestinal symptom).

The Anxiety Sensitivity Index-Revised (ASI-R; Taylor & Cox, 1998b)

The ASI-R was developed by Taylor & Cox (1998b) as an extension of the ASI, which they felt did not contain enough items to determine the underlying subscales of AS. Taylor and Cox (1998b) believed that because of this, the ASI was not specific enough to reveal the type and order of lower factors in the hierarchic structure of AS. The ASI-R is comprised of 36 items with subscales assessing six major domains of AS that have been suggested in previous studies: (1) fear of respitory symptoms, (2) fear of publicly observable anxiety reactions, (3) fear of cardiovascular symptoms, (4) fear of cognitive dyscontrol, (5) fear of cardiovascular symptoms, and (6) fear of dissociative and neurological symptoms (Taylor & Cox, 1998b). The ASI-R uses the same instructions and format as the ASI and the assessment battery consists of 10 items from the ASI and 26 newly constructed items that were aimed to provide a more comprehensive measure of the first order anxiety sensitivity dimensions. The items are rated on a five-point Likert scale, ranging from 0 (very little) to 4 (very much). Construct validity for the ASI-R has been established based on significant correlations with the original version of the ASI (r=.94; Taylor and Cox, 1998a). The ASI-R has also been shown to display adequate criterion validity,

in that patients with an anxiety disorder diagnosis tend to score higher than individuals with no history of anxiety disorders (Beck & Wolf, 2001). Deacon, Abramowitz, Woods, & Tolin (2003) also reported that the ASI-R has excellent internal consistency (r = .95) with all items showing adequate item-total correlations ranging from.40-.71.

Anxiety Sensitivity Index-3 (ASI-3; Taylor et. al., 2007).

The ASI-3 is an 18-item version of the original ASI (Reiss et al., 1986) that was developed by empirically selecting items from the ASI and ASI-R that measured either physical, social, or cognitive domains of anxiety sensitivity. Respondents are asked to indicate their agreement with each item on a five-point Likert scale from 0 (very little) to 4 (very much); the total scores range from 0 to 72, where higher scores indicate higher levels of AS. Taylor and Colleagues (2007) reported that they created this scale to try to stabilize the factor structure of AS, which was an issue with other AS measures. Of the 18 items on the ASI-3, five overlap with the original ASI, with one or two overlapping items on each of the ASI-3's 6-item subscales (Physical Concerns, Cognitive Concerns, and Social Concerns) (Taylor et al., 2007). The ASI-3 has demonstrated good psychometric properties that include a stable 3 factor structure, strong reliability as well as high factorial, convergent, discriminate and criterion related validity (Taylor et al., 2007).

Summary

For the present study, the original ASI (Reiss et al., 1996) will be employed given that it is the most commonly used measure of AS. The original ASI is made up of the three facets of AS that are included in the present study (AS-physical concerns, AS-social concerns and AS-fear of cognitive dyscontrol), and thus allowing for analysis of the relationships of these facets with panic, social anxiety, generalized anxiety, and depressive symptoms.

Present Study

The aim of the present study is to examine the unique relationship between three anxiety symptom clusters (panic, generalized anxiety, and social anxiety) and depressive symptoms and the facets of AS, which are physical concerns, social concerns, and fear of mental dyscontrol. The present study predicts that fear of physical concerns will predict panic, fear of publicly observable symptoms will predict social anxiety, and fear of cognitive dyscontrol will predict both depressive symptoms and generalized anxiety separately. If it is found that distinct AS dimensions correspond to specific anxiety or depressive symptoms then specific interventions that target each of these dimensions can be created to treat and prevent each specific anxiety disorder.

Method

Participants

The current study utilized undergraduate students who were recruited from Memorial University of Newfoundland which is located in St. John's, Newfoundland and Labrador. Participants were recruited from introductory Psychology classes during the 2008/2009 and 2009/2010academic years. The sample ranged in age from 18-45 years (mean age = 20) and was comprised of 410 undergraduate students (301 women and 109 men) who predominately identified as White (96%). Using G*Power 3.0.10 (Faul, Erdfelder, Lang & Buchner, 2007) as a guideline, an a priori power analysis for multiple regression, with an alpha set at .05 and power set at .80, was conducted to provide a minimum sample size to detect an effect in the analyses in the study. Having used the results from G*Power 3.0.10 (which suggested a minimum $N = 89$ to detect a medium effect and minimum $N = 40$ to detect a large effect] a sample of 410 was

considered sufficient to confidently examine the relationships between the pertinent constructs of this study.

Measures

To evaluate if the different facets of AS distinguish between the anxiety symptom clusters and depressive symptoms, four self-report instruments were employed. The self-report instruments in this study included: a measure of AS, social anxiety, worry, and depression. A demographic information form was also included in the battery.

Demographic Information Form. The Demographic Information Form (Appendix A) was developed specifically for this study to capture the distribution of demographic characteristics in the study sample. Participants were asked to provide information including their age, sex, ethnicity, marital status, number of children, education, religious affiliation, employment status, and annual income.

Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990). The PSWQ (Appendix B) is a 16-item measure of chronic worry. Participants are required to rate each item on a one to five point Likert scale that ranges from 'not at all typical of me' to 'very typical of me' A sample item includes 'My worries overwhelm me'. As an individual's score on the PSWQ increases, it indicates increasing levels of worry. When a score reaches or is greater than 40, pathological worry is indicated (Meyer et al., 1990). Studies support the good reliability and validity of the PSWQ with a reported high level of both internal consistency (ranging from .80 to .95) and good test-retest reliability (correlations ranging from .74 to .93) (Molina & Bokovec, 1994).

The Depression Anxiety Stress Scales 21-item version (DASS-21; Antony, Bieling, Cox, Enns, & Swinson, 1998). The DASS-21 assesses the core symptoms of depression, anxiety,

and tension/stress, and consists of 21 self-report items that are grouped into three 7-item subscales (i.e., Depression, Anxiety, and Stress). Participants are asked to report the frequency and severity of any negative emotions they had experienced over the previous week on a one to three point Likert scale, ranging from zero (did not apply to me at all) to three (Applied to me very much, or most of the time). Scores range between 0 and 42 on each subscale and higher ratings indicate higher levels of depression, anxiety, and stress. The DASS-21 is widely used and shows good overall validity as well as high internal consistency and reliability. In particular, the Depression scale correlates strongly with the Beck Depression Inventory (Beck, Ward, Mendelson, Mock & Erbaugh, 1961) and the Anxiety subscale correlates strongly with the Beck Anxiety Inventory (Beck & Steer, 1990). Lovibond and Lovibond (1995) state that the authors of the DASS-21 aimed to cover the full range of core anxiety and depression symptoms in the DASS-21 and therefore it can be assumed that once you control for depression, the only variance that remains is that due to physical arousal, which is used to assess panic (Lovibond & Lovibond, 1995). For the purposes of the present study, only data from the Anxiety and Depression subscales were examined.

The Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky & McNally, 1986). The ASI is a 16-item self-report scale that measures beliefs about possible negative consequences of arousal symptoms associated with anxiety. The ASI is made up of three subscales: AS Physical Concerns (fear of sensations); AS Cognitive Concerns (fear of negative psychological consequences of anxiety-related cognitive experiences); and, AS Social Concerns (fear of possible negative social ramifications of publicly observable anxiety sensations) (Reiss et al., 1986). The participants are asked to rate the degree to which they agree with listed thoughts and feelings on a 5-point Likert scale from 0 (very little) to 4 (very much). The ASI has good internal

consistency (range = .82 to .91) and acceptable test-retest reliability of .75 over 2 weeks (Reiss et al., 1986) and .71 over 3 years (Maller & Reiss, 1992).

The Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998). The SIAS is a 19-item measure that is used to assess levels of anxiety experienced before and during situations of social interaction. The participants are asked to rate each item (e.g., 'I am tense mixing in a group') on a 5 point Likert scale from 0 (not at all) to 5 (extremely) (Mattick & Clarke, 1998). The SIAS has been found to have high internal consistency ($\alpha = .93$) and a high 1-month test-retest reliability correlation coefficient above .90 (Hofmann, 2007).

Procedure

The current study received ethical approval from the Interdisciplinary Committee on Ethics in Human Research at Memorial University of Newfoundland. To recruit participants, a researcher visited introductory psychology classes (Psychology 1000 and Psychology 1001) at Memorial University and verbally informed the students of the opportunity to be involved in research that investigates 'how people think about things'. Participants were advised that their participation was completely voluntary and that their names or private information would not appear on any forms or in any reports. Each class was also presented with an incentive to participate in this study. In some classes, these incentives included the chance to enter a draw to win one $50 gift certificate or one of five $10 gift certificates for a local mall, whereas in other classes students were offered a two percent bonus mark towards their final grade for participating in this study. Participants were then informed that they maintained the right to withdraw from the study at any time without penalty and informed that if they had any concerns related to the current study, they could ask a researcher who would be available for clarification prior to the start of the study. Finally, each class was informed of a room and scheduled time to complete the

study. Participants were given two options to complete the questionnaire battery: online through a secured website or by completing paper copies of the questionnaires by hand. Participants who completed paper copies were given an envelope containing two numbered forms. One was for the participant to keep as an information letter and the other was the battery of questionnaires for completion. In order to control for carryover effects, the order of the questionnaires were randomized. However, the demographic information sheet always appeared at the front of the battery and should not have biased participant responses due to the fact that the questions contained on it did not relate to any items in the questionnaire battery. To maintain anonymity, all participants were instructed to complete a consent form before the start of the study and hand it to the researcher. Consent forms were then collected and stored separately from the questionnaires, both in a locked filing cabinet. Before the participants began the test battery they were instructed that they were under no obligation to continue the study if they experienced discomfort or anxiety during the study. After they had completed the battery, they were given the opportunity to ask the researcher any questions. All participants were thanked for their contribution to the study and advised to contact the University Counselling Center in the event they felt any psychological distress after completing the questionnaires. If they felt extreme distress, they were advised to call the Health and Community Services Crises line where a counsellor would be able to speak with them immediately. Also, all participants were provided with a website to view a synopsis of the study's results. Participants who chose to fill out the battery through a secured website went through the same procedure as those who filled out hard copies and were also presented with the above mentioned resources via the website.

Results

Descriptive Statistics and Reliability of Study Instruments

The means, standard deviations, and internal consistencies of the DASS-21 anxiety scale, the DASS-21 depression scale, the PSWQ, the SIAS, and the ASI and its subscales (physical concerns, social concerns, and fear of cognitive dyscontrol) are reported in Table 1. All participants were included in all analyses in this study.

The internal consistencies of all of the measures were good ranging from $\alpha = .88$ to .75, except for the ASI-social concerns scale which was very low ($\alpha = .48$).

Correlation Analysis

Correlation analyses were conducted using the measures of anxiety, depression, and anxiety sensitivity. The correlations between the DASS-21 anxiety scale, the DASS-21 depression scale, the PSWQ, the SIAS, and the ASI and its subscales (physical concerns, social concerns and fear of cognitive dyscontrol) are reported in Table 1. All of the correlations were significant with the majority being medium to high in size (Cohen & Cohen, 1983). Correlations that were small in size were between depression and the ASI and its subscales, between social anxiety and anxiety and worry, and between the ASI_Social subscale and anxiety and worry.

Table 1

Correlations, descriptive statistics, and reliability estimates of the Depression Anxiety Stress Scales-21 (DASS-21), the Penn State Worry Questionnaire (PSWQ), the Social Interaction Anxiety Scale (SIAS), and the Anxiety Sensitivity Index (ASI) (N=410)

Measure	1.	2.	3.	4.	5.	6.	7.	8.
1. DASS-21-A	-							
2. DASS-21-D	.61*	-						
3. PSWQ	.39*	.38*	-					
4. SIAS	.23*	.32*	.25*	-				
5. ASI (Total)	.37*	.29*	.36*	.43*	-			

6. ASI (Social)	.21*	.19*	.22*	.32*	.72*	-		
7. ASI (Physical)	.33*	.24*	.33*	.38*	.93*	.51*	-	
8. ASI (Mental)	.36*	.29*	.32*	.38*	.81*	.48*	.62*	-
Mean	4.46	4.69	52.17	21.64	26.75	7.52	10.69	3.44
SD	3.96	4.42	16.19	11.01	14.36	2.88	6.67	3.40
Coefficient alpha	.77	.88	.75	.93	.88	.48	.79	.85

*Note.*DASS-21-A = Depression Anxiety and Stress Scales – Anxiety Subscale; DASS-21-D = Depression Anxiety and Stress Scales – Depression Subscale (Antony et al., 1998). PSWQ: Penn State Worry Questionnaire (Meyer et al., 1990). SIAS: Social Interaction Anxiety Scale (Mattick et al., 1998). ASI: Anxiety Sensitivity Index; ASI (Social) = Anxiety Sensitivity Index – Social Concerns Subscale; ASI (Mental) = Anxiety Sensitivity Index – Mental Concerns Subscale; ASI (Physical) = Anxiety Sensitivity Index – Physical Concerns Subscale (Reiss et al., 1986).

*$p<.01$

Independent-samples *t*-tests were used to measure whether the means of the DASS-21 anxiety scale, DASS-21 depression scale, SIAS, PSWQ, ASI: fear of physical symptoms, ASI: social concerns and ASI: fear of cognitive dyscontrol differed based on the participants' sex. It was found that women had significantly higher scores on the ASI-fear of physical symptoms scale, the SIAS, and the PSWQ than men (see table 2). There were no significant differences found between men and women on any of the other scales. Given that unexpected gender differences were observed, subsequent analyses involving the ASI-fear of physical symptoms scale, the SIAS, and the PSWQ were conducted separately for men and women, as well as for the sample as a whole.

Table 2

Independent-sample t-tests testing sex differences on the Depression Anxiety Stress Scales-21 (DASS-21 anxiety scale and DASS-21 depression scale) the Penn State Worry Questionnaire

(PSWQ), the Social Interaction Anxiety Scale (SIAS), the Anxiety Sensitivity Index (ASI)-Fear of physical symptoms, the Anxiety Sensitivity Index (ASI)-Social concerns and the Anxiety Sensitivity Index (ASI)- Fear of cognitive dyscontrol.

	Male Mean (SD)	Female mean (SD)	*t*-value	df	*p*-value
ASI Social	7.08 (2.90)	7.68 (2.86)	-1.85	408	.06
ASI Physical	8.08 (5.86)	11.63 (6.70)	-4.89**	408	<.01
ASI Mental	3.01 (3.32)	3.59 (3.42)	-1.50	408	.13
SIAS	23.90 (14.18)	27.78 (14.31)	-2.43*	408	.02
DASS-21 A	4.04 (3.44)	4.62 (4.13)	-1.32	408	.19
DASS-21 -D	4.71 (4.43)	4.68 (4.42)	.06	408	.95
PSWQ	42.87 (15.54)	55.54 (15.09)	-7.45**	408	<.01

*Note.*DASS-21-A = Depression Anxiety and Stress Scales – Anxiety Subscale; DASS-21-D = Depression Anxiety and Stress Scales – Depression Subscale (Antony et al., 1998). PSWQ: Penn State Worry Questionnaire (Meyer et al., 1990). SIAS: Social Interaction Anxiety Scale (Mattick & Clarke, 1998). ASI (Social) = Anxiety Sensitivity Index – Social Concerns Subscale; ASI (Mental) = Anxiety Sensitivity Index – Mental Concerns Subscale; ASI (Physical) = Anxiety Sensitivity Index – Physical Concerns Subscale (Reiss et al., 1986).

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

One-way analyses of variance (ANOVAs) were used to measure whether the means of the DASS-21 anxiety scale, DASS-21 depression scale, SIAS, PSWQ and ASI: fear of physical symptoms, ASI: social concerns and ASI: fear of cognitive dyscontrol differed based on the method of presentation of the questionnaire battery (paper, online round 1, and online round 2). There were no significant differences among those who wrote the first round online, the second

round online, and the paper questionnaires on any of the inventories except for in the SIAS (see Table 3). Using contrast coefficients, it was found that participants in the second round of the online questionnaires had higher scores on the SIAS than those who filled out the paper questionnaire, $t(408) = -2.25$, $p = .03$. Although there is a significant difference between participants in the second round online and participants who filled out their questionnaires by paper, it can be argued that this difference is not a concern for the purpose of this study. This can be argued because when you divide the analysis this way, the results cannot be used to generate conclusions as to whether there is an effect of method of response because there was no difference between paper and online round one responses. It can be assumed that any differences found would be attributed to extraneous factors independent from the method of response. Moreover, the effect size of this difference was small ($\eta^2 = .02$), suggesting that time or method of data collection did not account for a meaningful proportion of variance in SIAS scores. This small effect size also suggests that the significant difference observed between groups with respect to SIAS scores might have been attributable to the large sample size rather than to an actual effect. Accordingly, for all subsequent analyses, participants were examined as a group with respect to method and time of data collection.

Table 3

One-way analysis of variance testing differences between methods of presentation of the questionnaire battery (paper, online round 1, and online round 2) on the Depression Anxiety Stress Scales-21 (DASS-21 anxiety scale and DASS-21 depression scale) the Penn State Worry Questionnaire (PSWQ), the Social Interaction Anxiety Scale (SIAS), and the Anxiety Sensitivity Index (ASI)-Fear of physical symptoms, the Anxiety Sensitivity Index (ASI)-Social concerns and the Anxiety Sensitivity Index (ASI)- Fear of cognitive dyscontrol.

Source	df	F	η^2	p-value
ASI-Social Between	2	.51	<.01	.60
Error	407			
ASI-Physical Between	2	.36	<.01	.70
Error	407			
ASI-Mental Between	2	.73	<.01	.48
Error	407			
SIAS Between	2	3.18*	.02	.04
Error	407			
DASS-21 Anxiety Between	2	.520	<.01	.60
Error	407			
DASS-21 Depression Between	2	2.179	.01	.11
Error	407			
PSWQ Between	2	.734	<.01	.48
Error	407			

Note. DASS-21-A = Depression Anxiety and Stress Scales – Anxiety Subscale; DASS-21-D = Depression Anxiety and Stress Scales – Depression Subscale (Antony et al., 1998). PSWQ: Penn State Worry Questionnaire (Meyer et al., 1990). SIAS: Social Interaction Anxiety Scale (Mattick et al., 1998). ASI (Social) = Anxiety Sensitivity Index – Social Concerns Subscale; ASI (Mental) = Anxiety Sensitivity Index – Mental Concerns Subscale; ASI (Physical) = Anxiety Sensitivity Index – Physical Concerns Subscale (Reiss et al., 1986).

*p<.05

Regression Analysis using the ASI subscales to predict depression, panic, social anxiety, and GAD.

Regression analyses were used to determine which ASI subscales, that is social concerns, fear of physical symptoms, and fear of mental dyscontrol, were specifically predictive of depressive symptoms, panic, social anxiety, and generalized anxiety. In predicting depressive symptoms, after controlling for anxiety (panic, social, and worry) all three of the ASI subscales (social concerns, fear of physical symptoms, and fear of mental dyscontrol) were entered as predictors together. The three predictors accounted for 0.2% of the variance in depressive

symptoms [$F(3, 403) = .56$, $p = .65$]. Inconsistent with hypotheses, mental dyscontrol was not found to be a significant predictor of the DASS-21 depression scale (see Table 4). When this regression analysis was conducted separately for men and women, parallel results were observed for both sexes (see Appendix G).

Table 4

Regression Analysis predicting DASS-21 depression

Measure	*B*	SE	*β*	*t*-value	*P*
DASS-21 Anxiety	.58	.05	.52	12.11	<.01*
SIAS	.05	.01	.17	4.10	<.01*
PSWQ	.04	.01	.14	3.34	<.01*
ASI_Social	.02	.07	.01	.24	.81
ASI_Physical	-.04	.03	-.07	-1.28	.20
ASI_Mental	.04	.07	.03	.52	.60

Note. ASI_Social= Anxiety Sensitivity Index – Social Concerns Subscale; ASI_Mental = Anxiety Sensitivity Index – Mental Concerns Subscale; ASI_Physical = Anxiety Sensitivity Index – Physical Concerns Subscale (Reiss et al., 1986); DASS-21-A = Depression Anxiety and Stress Scales – Anxiety Subscale (Antony et al., 1998).

*$p<.01$

The second analysis examined which ASI subscale was predictive of generalized anxiety/worry when controlling for depressive symptoms. After controlling for depression, all three of the ASI subscales, social concerns, fear of physical symptoms, and fear of mental dyscontrol, were entered as predictors together. The three predictors accounted for 4.7% of the variance in generalized anxiety/worry symptoms [$F(3, 405) = 10.84$, $p < .01$]. Inconsistent with hypotheses, the fear of mental dyscontrol was not found to be a significant predictor of generalized anxiety/worry. Unexpectedly, fear of physical symptoms was the only facet that was

found to be a significant predictor of generalized anxiety/worry (see Table 5). When these analyses were conducted separately by gender, it was observed that only the AS-mental subscale significantly predicted worry in males; amongst females, none of the AS facets significantly predicted worry after controlling for depression (see Appendix G).

Table 5

Regression Analysis predicting Penn-State Worry Questionnaire

Measure	*B*	SE	*B*	*t*-value	*P*
Dass-21 Depression	1.01	.17	.30	6.4	<.01*
ASI_Social	.14	.30	.03	.47	.64
ASI_Physical	.45	.14	.18	3.12	<.01*
ASI_Mental	.50	.28	.10	1.78	.08

Note. ASI_Social= Anxiety Sensitivity Index – Social Concerns Subscale; ASI_Mental = Anxiety Sensitivity Index – Mental Concerns Subscale; ASI_Physical = Anxiety Sensitivity Index – Physical Concerns Subscale (Reiss et al., 1986); Penn State Worry Questionnaire (Meyer et al., 1990).

*p<.01

The third analysis examined which ASI subscale was predictive of social anxiety after controlling for depressive symptoms. All three of the ASI subscales, social concerns, fear of physical symptoms, and fear of mental dyscontrol were entered as predictors together. The three predictors accounted for 12.6% of the variance in social anxiety [$F(3, 405) = 22.00.90$, $p < .01$]. Consistent with hypotheses, social concerns were found to be a significant predictor of social anxiety (see Table 6). Unexpectedly, fear of physical symptoms and fear of cognitive dyscontrol were also found to be significant predictors of social anxiety. When this regression analysis was conducted for men and women separately, it was found that only AS-physical concerns predicted

social anxiety in men and only AS-fear of cognitive dyscontrol predicted social anxiety in women (see Appendix G); among neither sex did AS-social concerns significantly predict social anxiety.

Table 6

Regression Analysis predicting the Social Interaction Anxiety Scale

Measure	*B*	SE	*β*	*t*-value	*P*
DASS-21 Depression	.69	.15	.21	4.61	<.01
ASI_Social	.56	.26	.11	2.13	.03
ASI_Physical	.36	.13	.17	2.86	<.01*
ASI_Mental	.69	.25	.16	2.82	<.01*

Note. ASI_Social= Anxiety Sensitivity Index – Social Concerns Subscale; ASI_Mental = Anxiety Sensitivity Index – Mental Concerns Subscale; ASI_Physical = Anxiety Sensitivity Index – Physical Concerns Subscale (Reiss et al., 1986); Penn State Worry Questionnaire (Meyer et al., 1990).

*$p<.01$

The final analysis examined which ASI subscale was predictive of panic after controlling for depressive symptoms. All three of the ASI subscales, social concerns, fear of physical symptoms and fear of mental dyscontrol, were entered as predictors together. The three predictors accounted for 7% of the variance in panic symptoms [$F(3, 405) = 11.95, p < .01$]. Consistent with hypotheses, fear of physical symptoms was found to be a significant predictor of panic (see Table 7). Unexpectedly, mental dyscontrol was also found to be a significant predictor of panic. When this analysis was conducted separately for men and women it was observed that the AS-fear of cognitive dyscontrol facet predicted panic in males, whereas the AS-fear of

physical symptoms facet predicted panic in females (see Appendix G), suggesting that the initial hypothesis with respect to panic was supported for women but not for men.

Table 7

Regression Analysis predicting DASS-21 Anxiety Scale controlling for the DASS-21 Depression Scale

Measure	*B*	SE	*B*	*t*-value	*P*
DASS-21 Depression	.48	.04	.54	13.55	<.01
ASI_Social	-.03	.06	-.02	-.51	.62
ASI_Physical	.08	.03	.13	2.48	.01*
ASI_Mental	.16	.06	.14	2.77	<.01*

Note. ASI_Social= Anxiety Sensitivity Index – Social Concerns Subscale; ASI_Mental = Anxiety Sensitivity Index – Mental Concerns Subscale; ASI_Physical = Anxiety Sensitivity Index – Physical Concerns Subscale (Reiss et al., 1986); SIAS: Social Interaction Anxiety Scale (Mattick et al., 1998).

*$p<.01$

Discussion

The purpose of this study was to examine three specific anxiety symptom clusters (panic, generalized anxiety, and social anxiety) and depressive symptoms and their relationship with the three facets of AS (physical concerns, social concerns, and fear of cognitive dyscontrol). It was predicted that AS- fear of physical concerns would predict panic, AS- social concerns would predict social anxiety, and AS-fear of cognitive dyscontrol would predict both depressive symptoms and generalized anxiety independently. It was found that the fear of physical symptoms predicted panic symptoms, as was hypothesized, but also predicted social anxiety symptoms and generalized anxiety symptoms, thus suggesting that, in this sample, the fear of physical symptoms component of AS had little specificity. Consistent with hypotheses, fear of

publicly observable symptoms or social concerns predicted only one type of anxious symptomatology, social anxiety. Lastly, fear of cognitive dyscontrol was found to predict panic and social anxiety, but not generalized anxiety and depressive symptoms as hypothesized.

The present study used the hierarchical model that was proposed by Olatunji and Wolitzky-Taylor (2009) to predict the relationship between the three facets of AS, which are fear of physical symptoms, social concerns, and the fear of cognitive dyscontrol and three specific anxiety symptom clusters (panic, social anxiety, and generalized anxiety) and depressive symptoms. Their model proposed that the three facets of AS are nested beneath the higher order factors of negative affect and trait anxiety and that AS-fear of physical symptoms would predict panic disorder, AS-social concerns would predict social anxiety disorder, and AS-fear of cognitive dyscontrol would predict GAD and depression separately (see Figure 1). Results from the present study suggest that Olatunji and Wolitzky-Taylor's (2009) model may be over-simplified. Although the present study's results support two of the four hypotheses suggested by Olatunji and Wolitzky-Taylor's (2009) model, (AS-fear of physical symptoms predicted panic and AS-social concerns predicted social anxiety) it also found additional relationships between AS-fear of physical symptoms and social anxiety, AS-fear of physical symptoms and generalized anxiety, AS-fear of cognitive dyscontrol and panic symptoms and AS-fear of cognitive dyscontrol and social anxiety symptoms (see Figure 2). Although these additional relationships did not appear in Olatunji and Wolitzky-Taylor's (2009) model, it would be beneficial for future research to examine each relationship thoroughly. Since the present study has provided a preliminary look at how AS and its lower-order facets interact with the anxiety symptom clusters and depressive symptoms, it may be helpful to replicate this study using the new model proposed based upon the present findings (see figure 2).

As previously mentioned, the current study also found unexpected and unhypothesized significant differences between the sexes when examining the relationship between AS and panic, social anxiety, generalized anxiety, and depressive symptoms. Specifically, it was found that in males, AS-fear of cognitive dyscontrol was a significant predictor of generalized anxiety (consistent with hypotheses). However, inconsistent with hypotheses, for males, panic was significantly predicted by AS-fear of cognitive dyscontrol and AS-fear of physical symptoms was a significant predictor of social anxiety. Conversely, in females, AS-fear of physical symptoms was a significant predictor of panic, as hypothesized. However, inconsistent with hypotheses, amongst females AS-fear of cognitive dyscontrol was a significant predictor of social anxiety and none of the AS facets significantly predicted generalized anxiety. Interestingly, and consistent with finings observed in the full sample, for neither sex was depression significantly predicted by any of the individual facets of AS after controlling for anxiety (see Appendix G). However, since the current study did not hypothesize sex differences and such differences were not suggested by Olatunji and Wolitzky-Taylor's (2009) model, the findings reported here for men and women should be treated with caution. Nonetheless, the differences with respect to relationships between the facets of AS and anxiety and depression that were observed here do suggest that sex differences in this area warrant further investigation. Specifically, investigation into sex differences will allow us to get a better understanding of how the relationship between AS, anxiety and depression affects the sexes differently.

Past research has found a close relationship between anxiety and depression (Hirchfeld, 2001). It has been shown that of the individuals who meet the criteria for major depression, 50% of the individuals in the community and 75% in primary care centers also meet the diagnostic criteria for an anxiety disorder (Brown & Barlow, 1992). It is because of the high comorbidity

between depression and anxiety that depression was included in the present study. Previous research has shown elevated levels of AS in patients suffering from depression (Grant et al., 2007). In addition, depression has been found to specifically relate to the fear of cognitive dyscontrol facet of AS (Schimidt et al., 1998; Taylor, et al., 1996). Due to the lack of studies that controlled for anxiety when evaluating the relationship between AS-fear of cognitive dyscontrol and depression, the current study did control for anxiety symptoms. The results of the present study did not find that AS-fear of cognitive dyscontrol predicted depressive symptoms after controlling for anxiety, and therefore, it can hypothesized that depressive symptoms do not have a separate, unique relationship with AS-fear of cognitive dyscontrol. Furthermore, depressive symptoms were not found to be predicted by any of the three lower facets of AS (fear of physical symptoms, social concerns, fear of cognitive dyscontrol) after controlling for anxiety, so it can be proposed that depressive symptoms do not have a unique, separate relationship with any facet of AS. Moreover, although none of the lower-order facets of AS predicted depressive symptoms after controlling for anxiety, additional research is needed to clarify the exact mechanisms of this relationship and how the comorbid relationship between anxiety and depression is uniquely related to AS.

Previous studies have found a unique relationship between AS and GAD (Cox et al., 1999; Rector et al., 2007) with AS-fear of cognitive dyscontrol predicting GAD (Zinbarg et al., 1997). Other studies have come to similar conclusions, finding elevated levels of fear of cognitive dyscontrol in individuals with GAD when compared to individuals with other anxiety disorders (Borkovec et al., 2004; Carlton et al., 2007). However, inconsistent with previous literature, the present study did not find that generalized anxiety was predicted by AS-fear of cognitive dyscontrol. Olatunji and Wolitzky-Taylor's (2009) model theorized that after

controlling for depression, worry would have a separate and unique relationship with AS-fear of cognitive dyscontrol but after testing this theory, the current study found that AS-fear of cognitive dyscontrol did not predict generalized anxiety after controlling for depressive symptoms. The finding that AS-cognitive dyscontrol did not predict worry after controlling for depressive symptoms suggests that Olatunji and Wolitzky-Taylor's (2009) model better represents the comorbidity that exists between anxiety and depression. As previously mentioned, further research should examine the comorbid relationship between anxiety and depression and how it relates to AS. Unexpectedly, AS-fear of physical symptoms did predict worry. The relationship between AS-fear of physical symptoms and worry, although not predicted, could partially be explained in that fears of the physical symptoms of anxiety may elicit worry about those symptoms occurring, where this worry could further maintain and possibly perpetuate the intensity of the fear. Although the predicted results were not observed in the present study, these findings do add evidence to the existing theory that AS has a unique relationship with generalized anxiety (Leen-Felder et al., 2006; Viana & Rabian, 2008), with AS-physical symptoms being a significant predictor of generalized anxiety.

As previously mentioned, the relationship between panic disorder and AS has received a significant amount of attention in the literature. This relationship has been extensively researched and has shown that AS is highly predictive of panic disorder symptoms and precedes the development of these symptoms. Moreover, this strong correlation does not appear to be due to a third variable (Maller & Reiss, 1992; Plehn & Peterson, 2002; Schmidt et al., 2006; Taylor et al., 1992). More specifically, previous research has found a distinct, unique relationship between AS-fear of physical symptoms and panic disorder (Zvolensky et al., 2001). The present study found evidence to support a significant relationship between AS-fear of physical symptoms and

panic but also found that AS-fear of cognitive dyscontrol predicted panic. It can be proposed that AS-fear of cognitive dyscontrol predicted panic because the fear that once you have lost physical control, you would also lose cognitive control. For example, if an individual starts breathing heavily, they may begin to think that they are going to die. The individual may then be unable to concentrate on anything other than the panic attack that they are experiencing and this can make them fear that they are also losing control of their thoughts.

Social anxiety disorder has been proposed to have a distinct relationship with AS-social concerns (Asmundson & Stein, 1994; Brown et al., 2003; Norton et al., 1997; Rapee & Heimberg, 1997). It has been shown that social anxiety predicted elevated levels on the AS-social concerns subscale (Rodriguez et al., 2004) and the present study also found that elevated levels on the AS-social concerns scale predicted social anxiety. Although AS-social concerns was not found to predict any other anxiety symptom cluster that the present study explored, social anxiety was also found to be predicted by AS-fear of physical symptoms and AS-fear of cognitive dyscontrol. With respect to AS-fear of physical symptoms and social anxiety, it could be suggested that one could fear that if they did have physical symptoms that people would notice. For example, if someone is scared of being embarrassed by their stomach growling, then the individual has to also have fear of this physical symptom occurring. In addition, it could be proposed that fear of cognitive dyscontrol predicted social anxiety in the same way: a sufferer could fear that if they lost control of their mind, then people would think they were crazy. In spite of the additional predictors that were found, the present study adds much needed evidence to the limited literature on AS as a predictor of social anxiety disorder.

Limitations

Despite strengths in the current study (e.g., large sample size, methodologically controlling for anxiety or depression when examining the other as an outcome variable), the present study is not without limitations. The first limitation that appears in the present study is the generalizability of the findings. Because first and second year undergraduate students comprised the sample for the present study, these results may not be generalizable to other specific age groups. The current sample of undergraduate students was selected due to its proximity to both adulthood and adolescence but generalizing to these populations should be cautioned. To allow for a more accurate view of the relationship between AS and anxiety disorders and depression in adulthood or adolescence, samples specific to these age groups should be utilized. This generalizability is an important implication for counsellors in the community who would benefit from learning about the underlying structure of AS and how it may predict and aid in the development of depression and certain anxiety disorders.

It is also important to note that although the current study added to the literature on how the three facets of AS (fear of physical symptoms, social concerns and fear of cognitive dyscontrol) relate to specific symptom clusters of anxiety, it did not use diagnostic tools and thus cannot predict the relationship between AS and the actual anxiety disorders. However, the results of the present study add to the current knowledge base on the relationship between AS and anxiety and will aid in future research in this area.

Another limitation of the current study is that there was only one inventory used to measure each construct (i.e., depressive symptoms, worry, panic symptoms, AS symptoms and symptoms of social anxiety). Because of the limited number of inventories, it could be argued that any construct which is measured by one inventory may not be captured in its full capacity. Additionally, the poor reliability of the social concerns subscale of the ASI has proven to be

another limitation of the present study. However, despite its lack of reliability, the AS-social concerns subscale performed as predicted.

The present study utilized the ASI (Reiss et al., 1996) to measure AS and to examine its three proposed facets, which are fear of physical symptoms, social concerns, and fear of cognitive dyscontrol. Using the ASI can be considered a limitation because it was not initially designed to measure these three facets of AS. It was not until after the ASI was developed measuring the full construct of AS that factor analyses were conducted to determine whether subfactors existed in the construct. Although the ASI was not initially created to measure particular facets of AS, the ASI, which is now the most commonly used measure of AS, has been shown to fit the existing data that contends that AS is a multi-dimensional and hierarchical model with three lower order AS dimensions (i.e., fear of physical symptoms, social concerns, and fear of cognitive dyscontrol) loading onto a single higher order factor (i.e., AS) (Deacon & Abramowitz, 2006; Olatunji & Wolizky-Taylor, 2008; Rodriguez et al., 2004).

Future Directions

The findings of the present study add evidence to the theory that AS has a specific and unique relationship with symptoms of panic, social anxiety and generalized anxiety but refute the hypothesis that it has a separate relationship with depressive symptoms. Future research is needed to replicate and extend the findings from the present study. For instance, although the facets of AS predicted some symptom clusters as hypothesized (e.g., social anxiety was predicted by social concerns and panic was predicted by physical symptoms) the present study also found relationships that were not predicted. Specifically, panic was predicted by fear of cognitive dyscontrol, social anxiety was predicted by both fear of physical symptoms and fear of cognitive dyscontrol, and generalized anxiety was predicted by fear of physical symptoms. Surprisingly, in

contrast to previous studies, the present study did not find that fear of cognitive dyscontrol predicted depressive symptoms. It would be beneficial for future research to study this area more thoroughly and explore the theory that although depression is associated with AS, it may only be associated through its comorbid relationship with anxiety

Understanding of the relationship between AS and the anxiety disorders and depression would also benefit from a study that slightly modified the present study's aforementioned limitations. Modification of these limitations could be achieved in a number of ways. Firstly, the sample could be comprised of an older or younger sample and not undergraduate students to allow for an accurate view of the relationship between AS and anxiety and depressive symptoms in other specific age groups. Knowledge of the relationship between AS and anxiety and depression in a specific age group would be beneficial for counsellors who deal with specific age populations and seek to better understand AS, anxiety disorders, and depression. Next, it would be beneficial for future research to examine the relationship between AS and anxiety and depression in a clinical sample of participants. Since the present study and a large percentage of the previous research on this topic has concentrated on non-clinical samples, more studies using a clinical sample will substantially enhance the literature that is currently available on the relationship between AS and the anxiety disorders, and depression in clinical populations. It would also allow researchers to generalize their results to each of the actual disorders. Another modification that would be beneficial for future research is to use multiple inventories to measure each of the constructs. Using more than one measure for each construct would allow for greater reliability of the study and strengthen any conclusions of the study. In addition, future studies should use a different measure of AS-social concerns such as the ASI-3 (Taylor et. al., 2007) due to the poor reliability of the ASI-social concerns subscale. Lastly, it would be

interesting to replicate the present study using a measure of AS that has been specifically designed to measure the three lower constructs of AS (fear of physical symptoms, social concerns, and fear of cognitive dyscontrol), namely the ASI-3 (Taylor et. al., 2007). As previously mentioned, although the ASI (Reiss et al., 1986) is the most widely used measure of AS, it was not designed to measure specific lower order subscales, therefore it would be beneficial to replicate the study using the ASI-3.

The current study was conducted due to the limited research that has examined the three facets of AS and how they relate to specific anxiety disorders and depression. Specifically, the present study examined three specific anxiety symptom clusters (panic, generalized anxiety, and social anxiety) and depressive symptoms and their relationship with the three facets of AS (fear of physical symptoms, social concerns, and fear of cognitive dyscontrol). It is believed that learning more about these relationships may make it possible to identify potential therapeutic mechanisms to treat and predict AS. It was found that the fear of physical symptoms predicted panic, as was hypothesized, but also predicted social anxiety and generalized anxiety. Consistent with hypotheses, fear of publicly observable symptoms or social concerns predicted only one symptom cluster, social anxiety. Lastly, fear of cognitive dyscontrol was not found to predict generalized anxiety and depressive symptoms separately, but did predict panic and social anxiety. The findings of the present study underscore the importance of AS in predicting anxiety symptomology and highlight interesting and unique relationships that are proposed to exist between the specific facets of AS and the anxiety disorders.

There are many positive and practical implications for studying the relationship between the facets of AS and the anxiety disorders and depression. As previously mentioned, anxiety disorders and depression represent a major concern in regards to public health with sufferers

presenting both physical and psychological symptoms that sometimes prevent them from functioning in their day to day lives (Smits, et al., 2004). AS has been proposed to be involved in the development of anxiety disorders and depression, and therefore, understanding these relationships is very important in both prevention and treatment of both anxiety and depression. As the literature examining the relationship between AS and anxiety and depression continues to grow, so too does the literature that looks at how the reduction of AS can help treat and prevent these disorders (Smits et al., 2004; Smits et al., 2008). It is encouraging to see researchers employing AS intervention strategies, such as cognitive behaviour therapy, to study how the reduction in AS affects individuals who are currently suffering from anxiety or depression (Amir et al., 2002; Smits et al., 2007) but this type of research depends on the continued study of exactly how AS and its lower facets are related to the anxiety disorders and depression. It is possible that the progress of research in the area of AS and its relationship with anxiety and depression may eventually lead to the development of strategies that can be put in place to prevent a disorder from actually manifesting, which will be beneficial for community care providers, those who suffer from AS or anxiety or depression and society as a whole.

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Figure Captions

Figure 1. Olatunji and Wolitzky-Taylor's (2009) conceptual hierarchical model of the unique relationship between anxiety sensitivity and specific anxiety and mood disorders.

Figure 2. The present study's conceptual hierarchical model of the unique relationship between anxiety sensitivity and specific anxiety and mood symptoms.

Figure 1.

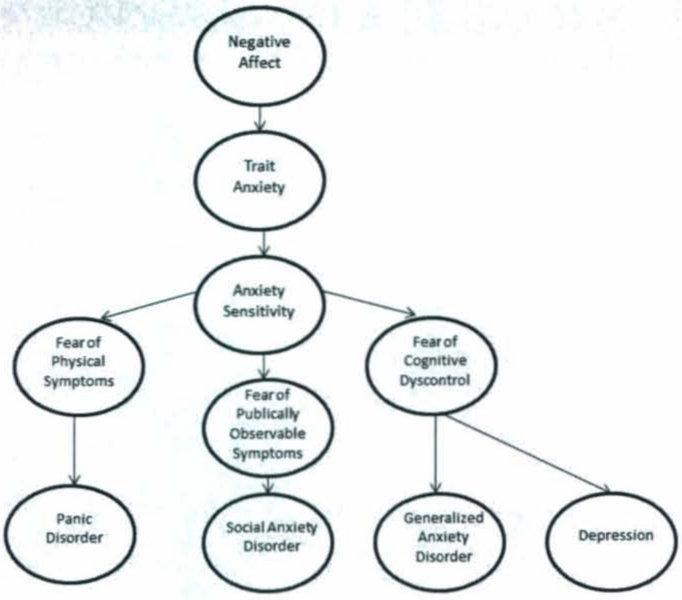
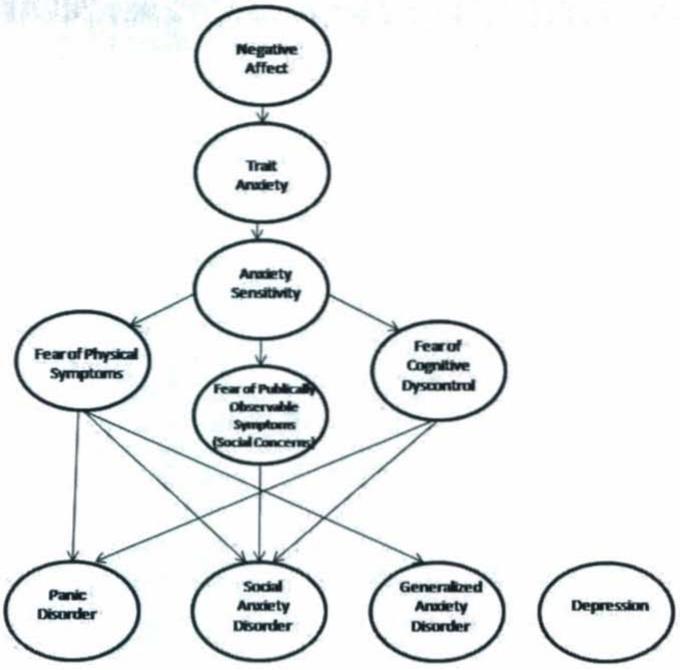

Negative Affect
Trait Anxiety
Anxiety Sensitivity
Fear of Physical Symptoms
Fear of Publically Observable Symptoms
Fear of Cognitive Dyscontrol
Panic Disorder
Social Anxiety Disorder
Generalized Anxiety Disorder
Depression

Figure 2.


Negative Affect
Trait Anxiety
Anxiety Sensitivity
Fear of Physical Symptoms
Fear of Publically Observable Symptoms (Social Concerns)
Fear of Cognitive Dyscontrol
Panic Disorder
Social Anxiety Disorder
Generalized Anxiety Disorder
Depression

Appendix A

Demographic Information Form

Participant:

Demographic Information

1. **Age:** _____

2. **Sex:** ____ Male ____ Female

3. **Ethnic Identity.**
Rank number all that apply (**1** for primary ethnicity, **2** secondary, etc.):

_____Aboriginal (Inuit, Metis, North American Indian) *please specify all that apply in order of ethnic identity (most to least)* _____

_____Arab/West Asian (e.g., Armenian, Egyptian, Iranian, Lebanese, Moroccan)

_____Black (e.g., African, Haitian, Jamaican, Somali) *please specify all that apply in order of ethnic identity (most to least)* _____

_____Chinese

_____Filipino

_____Japanese

_____Korean

_____Latin American

_____South Asian

_____South East Asian

_____White (Caucasian) *please specify all that apply in order of ethnic identity (most to least)* _____

_____Other *please specify all that apply in order of ethnic identity (most to least)*

_____

4. **Marital status:**

_____ Married _____ Divorced _____ Cohabiting _____ Single

_____ Other *please specify* _____

5. **Number of children:** _____ **Number of children in household:** _____

6. **Highest education level attained:**

_____ Grade 8 or less

_____ Completed a business, trade, or vocational school instead of High School

_____ High School Graduate

_____ Completed a business, trade, or vocational school after High School

_____ Graduated university with a bachelor's degree (B.A., B.Sc., B.Ed., etc.)

_____ Post-baccalaureate graduate education or professional programme (M.A, M.Sc., Ph.D., M.B.A, M.D., LL.B., etc.)

7. **Religious affiliation:**

_____ Agnostic/Atheist _____ Buddhist _____ Hindu _____ Jewish

_____ Muslim _____ Protestant _____ Roman Catholic

_____ Other *please specify* _____

8. **Employment Status:**

_____ Work at home

_____ Employed outside of home

_____ Unemployed

If employed outside of home, current job title: _____

9. **Estimated annual family income:**

_____ $0 - $36,378

_____ $36, 379 - $72, 756

_____ $72,757 - $118,285

_____ over $118,286

Appendix B

Undergraduate Informed Consent Form

The purpose of an informed consent form is to ensure that you, as the participant, understand the purpose of the study as well as the nature of your involvement.

Research Title: Understanding Thoughts and Feelings

Research personnel: For questions about this study please contact the principle researcher, Dr. Peter Mezo (Department of Psychology, Memorial University of Newfoundland, 709-737-4345).

The proposal for this research has been approved by the Interdisciplinary Committee on Ethics in Human Research at Memorial University of Newfoundland (ICEHR). If you have any ethical concerns about the research (such as the way you have been treated or your rights as a participant), you may contact the Chairperson of the ICEHR at icehr@mun.ca or by telephone at 737-8368.

Purpose: The purpose of this study is to provide insight into how people think and feel.

Task requirements: This study will involve you filling out a demographic form and then a series of short questionnaires.

Duration: This study should take approximately 40 minutes to complete.

Potential risks: You are under no obligation to continue the study if you experience discomfort or anxiety during any part of it, or if you feel uncomfortable to do so. We understand that completing questionnaires on mood disorders may cause personal distress. In the event that this does occur, we ask that you please contact the University Counselling Centre at UC5000, telephone 737-8874. In the event of extreme distress, please call the Health and Community Services Crisis line at 1-888-737-4668 where a counsellor will be available to speak with you immediately.

Benefits: Your participation in this study will be contributing toward research on thinking and behavior.

Anonymity and confidentiality: The data collected in this study are coded with a number that is not associated with your name and therefore all data are anonymous. The data will be used only by researchers associated with this project for the purpose of research publications, conference presentations, or teaching material. To ensure anonymity, please do not write your name anywhere on the questionnaires. As well, the informed consent forms will be kept separate from

your questionnaires once returned. All informed consent forms will be stored confidentially in a locked filing cabinet.

Right to withdraw: Your participation in this study is entirely voluntary. At any point during the study you have the right to not answer any question or to withdraw with no penalty whatsoever.

Signatures: I have read the above description and I understand that the data in this study will be used in research publications or for teaching purposes. My signature indicates that I agree to participate in this study. I also confirm that I have reached the age of 18 years.

Participant's name: _____ Participant's signature:

_____

Date: _____Student #:_____Email: _____

Visit www.mun.ca/psychology/miriam/home/ to view a synopsis of the results of this study.

Please remove the completed Informed Consent Form from the experimental package and return to the researcher before beginning the study. Thank you.

Appendix C

Penn State Worry Questionnaire

Participant:

PSWQ

Circle the number that best describes how typical or characteristic each item is of you.

1 = Not at all typical of me
2
3 = Somewhat typical of me
4
5 = Very typical of me

		Not at all typical of me		Somewhat typical of me		Very typical of me
1.	If I do not have enough time to do everything, I do not worry about it.	1	2	3	4	5
2.	My worries overwhelm me.	1	2	3	4	5
3.	I do not tend to worry about things.	1	2	3	4	5
4.	Many situations make me worry.	1	2	3	4	5
5.	I know I should not worry about things, but I just cannot help it.	1	2	3	4	5
6.	When I am under pressure I worry a lot.	1	2	3	4	5
7.	I am always worrying about something.	1	2	3	4	5
8.	I find it easy to dismiss worrisome thoughts.	1	2	3	4	5
9.	As soon as I finish one task, I start to worry about everything else I have to do.	1	2	3	4	5
10.	I never worry about anything.	1	2	3	4	5
11.	When there is nothing more I can do about a concern, I do not worry about it any more.	1	2	3	4	5
12.	I have been a worrier all my life.	1	2	3	4	5
13.	I notice that I have been worrying about things.	1	2	3	4	5
14.	Once I start worrying, I cannot stop.	1	2	3	4	5
15.	I worry all the time.	1	2	3	4	5
16.	I worry about projects until they are all done.	1	2	3	4	5

Appendix D

Depression Anxiety and Stress Scales-21

Participant:

DASS - 21

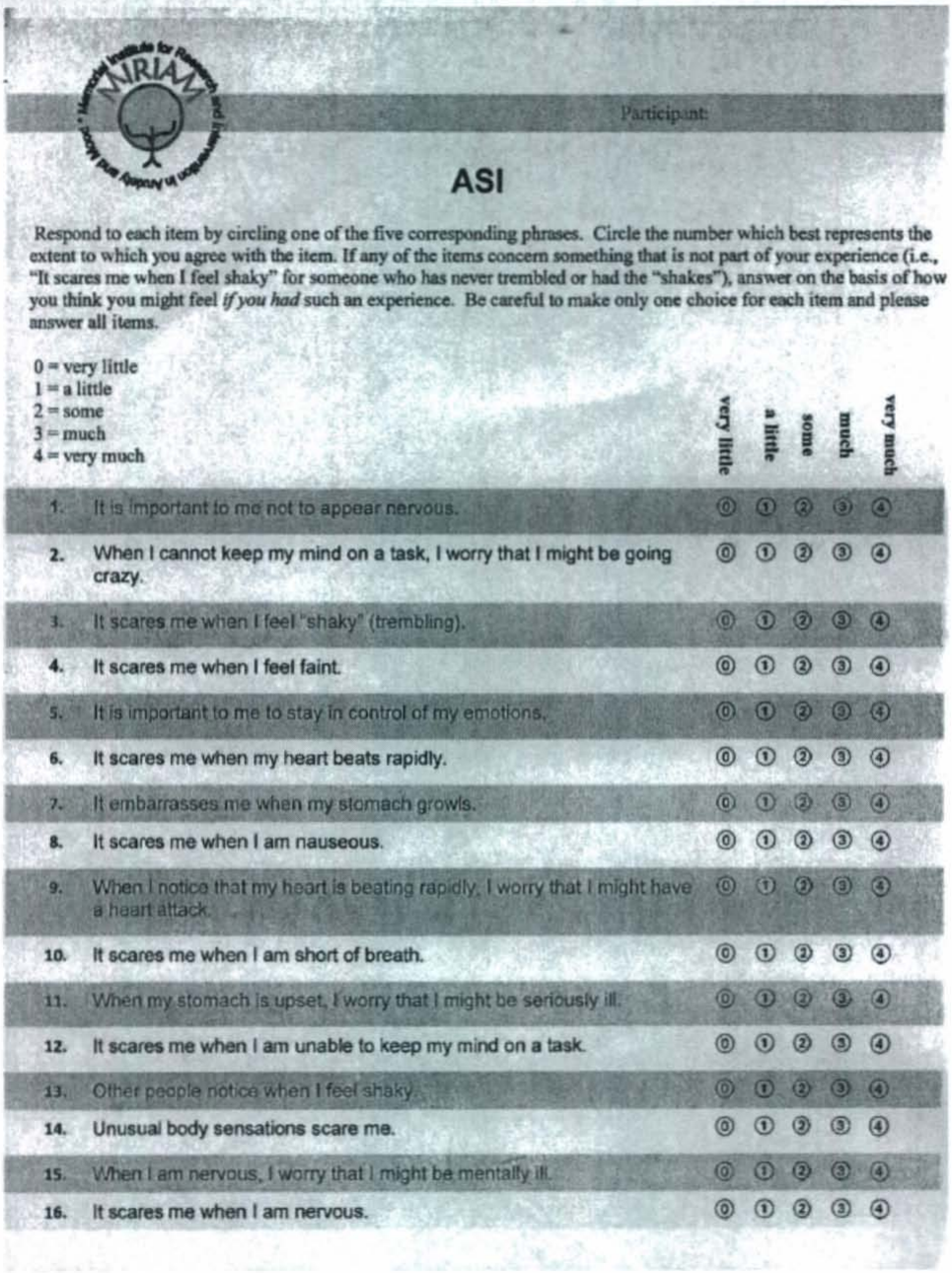
Please read each statement and circle a number 0, 1, 2 or 3 that indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

0 = Did not apply to me at all
1 = Applied to me to some degree, or some of the time
2 = Applied to me to a considerable degree, or a good part of time
3 = Applied to me very much, or most of the time

		Not at all	To some degree	To a considerable degree	Very much
1.	I found it hard to wind down.	0	1	2	3
2.	I was aware of dryness of my mouth.	0	1	2	3
3.	I couldn't seem to experience any positive feeling at all.	0	1	2	3
4.	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion).	0	1	2	3
5.	I found it difficult to work up the initiative to do things.	0	1	2	3
6.	I tended to over-react to situations.	0	1	2	3
7.	I experienced trembling (e.g., in the hands).	0	1	2	3
8.	I felt that I was using a lot of nervous energy.	0	1	2	3
9.	I was worried about situations in which I might panic and make a fool of myself.	0	1	2	3
10.	I felt that I had nothing to look forward to.	0	1	2	3
11.	I found myself getting agitated.	0	1	2	3
12.	I found it difficult to relax.	0	1	2	3
13.	I felt down-hearted and blue.	0	1	2	3
14.	I was intolerant of anything that kept me from getting on with what I was doing.	0	1	2	3
15.	I felt I was close to panic.	0	1	2	3
16.	I was unable to become enthusiastic about anything.	0	1	2	3
17.	I felt I wasn't worth much as a person.	0	1	2	3
18.	I felt that I was rather touchy.	0	1	2	3
19.	I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat).	0	1	2	3
20.	I felt scared without any good reason.	0	1	2	3
21.	I felt that life was meaningless.	0	1	2	3

Appendix E

Anxiety Sensitivity Index



Participant:

ASI

Respond to each item by circling one of the five corresponding phrases. Circle the number which best represents the extent to which you agree with the item. If any of the items concern something that is not part of your experience (i.e., "It scares me when I feel shaky" for someone who has never trembled or had the "shakes"), answer on the basis of how you think you might feel *if you had* such an experience. Be careful to make only one choice for each item and please answer all items.

0 = very little
1 = a little
2 = some
3 = much
4 = very much

		very little	a little	some	much	very much
1.	It is important to me not to appear nervous.	0	1	2	3	4
2.	When I cannot keep my mind on a task, I worry that I might be going crazy.	0	1	2	3	4
3.	It scares me when I feel "shaky" (trembling).	0	1	2	3	4
4.	It scares me when I feel faint.	0	1	2	3	4
5.	It is important to me to stay in control of my emotions.	0	1	2	3	4
6.	It scares me when my heart beats rapidly.	0	1	2	3	4
7.	It embarrasses me when my stomach growls.	0	1	2	3	4
8.	It scares me when I am nauseous.	0	1	2	3	4
9.	When I notice that my heart is beating rapidly, I worry that I might have a heart attack.	0	1	2	3	4
10.	It scares me when I am short of breath.	0	1	2	3	4
11.	When my stomach is upset, I worry that I might be seriously ill.	0	1	2	3	4
12.	It scares me when I am unable to keep my mind on a task.	0	1	2	3	4
13.	Other people notice when I feel shaky.	0	1	2	3	4
14.	Unusual body sensations scare me.	0	1	2	3	4
15.	When I am nervous, I worry that I might be mentally ill.	0	1	2	3	4
16.	It scares me when I am nervous.	0	1	2	3	4

Appendix F

Social Interaction Anxiety Scale

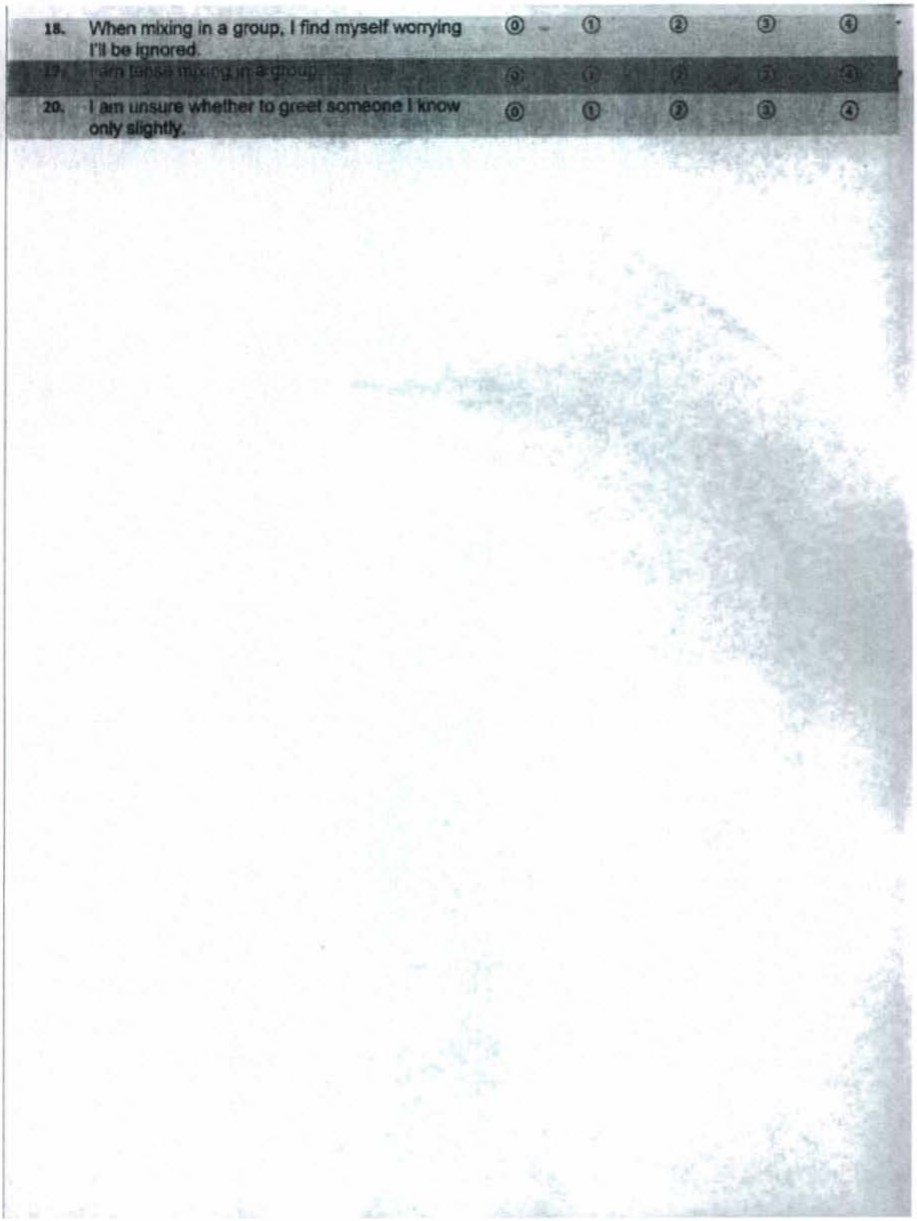
Participant:

SIAS

For each question, please circle a number to indicate the degree to which you feel the statement is characteristic or true of 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

		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 difficulty mixing comfortably with the people I work with.	0	1	2	3	4
5.	I find it easy to make friends of my own age.	0	1	2	3	4
6.	I tense-up if I meet an acquaintance on the street.	0	1	2	3	4
7.	When mixing socially, I am uncomfortable.	0	1	2	3	4
8.	I feel tense if I am alone with just one person.	0	1	2	3	4
9.	I am at ease meeting people at parties, etc.	0	1	2	3	4
10.	I have difficulty talking with other people.	0	1	2	3	4
11.	I find it easy to think of things to talk about.	0	1	2	3	4
12.	I worry about expressing myself in case I appear awkward.	0	1	2	3	4
13.	I find it difficult to disagree with another's point of view.	0	1	2	3	4
14.	I have difficulty talking to an attractive person of the opposite sex.	0	1	2	3	4
15.	I find myself worrying that I won't know what to say in social situations.	0	1	2	3	4
16.	I am nervous mixing with people I don't know well.	0	1	2	3	4
17.	I feel I'll say something embarrassing when talking.	0	1	2	3	4



18.	When mixing in a group, I find myself worrying I'll be ignored.	0	1	2	3	4
19.	I am tense mixing in a group.	0	1	2	3	4
20.	I am unsure whether to greet someone I know only slightly.	0	1	2	3	4

Appendix G

Summary of Regression Analysis for males on the Depression Anxiety Stress Scales-21 (DASS-21 anxiety scale and DASS-21 depression scale) the Penn State Worry Questionnaire (PSWQ), the Social Interaction Anxiety Scale (SIAS), and the Anxiety Sensitivity Index (ASI)-Fear of physical symptoms, the Anxiety Sensitivity Index (ASI)-Social concerns and the Anxiety Sensitivity Index (ASI)- Fear of cognitive dyscontrol.

	B	**SE**	***β***	***T***	**Step 2 R^2_{Change}**
Depressive Symptoms (Dass-21-D)					R^2=.009, $F(3,102)$ = .47
Step 1					
Dass-21-A	.33	.12	.26	2.67**	
PSWQ	.07	.03	.26	2.62*	
SIAS	.06	.03	.20	2.33*	
Step 2					
ASI_Social	.07	.16	.05	.44	
ASI_ Physical	-.09	.08	-.12	-1.05	
ASI_Mental	-.03	.15	-.021	-.19	
Worry (PSWQ)					R^2=.12, $F(3,104)$ = 6.45**
Step 1					
Dass-21-D	1.65	.30	.47	5.51**	
Step 2					
ASI_Social	.50	.53	.09	.94	
ASI_ Physical	.35	.28	.13	1.3	
ASI_Mental	.98	.47	.21	2.06*	
Social Anxiety (SIAS)					R^2=.18, $F(3,104)$ = 9.32**
Step 1					
Dass-21-D	1.23	.29	.38	4.20**	
Step 2					
ASI_Social	.44	.49	.09	.88	
ASI_ Physical	.64	.26	.27	2.49**	
ASI_Mental	.70	.44	.17	1.61	
Panic (Dass-21-A)					R^2=.16, $F(3,104)$ = 8.51**
Step 1					

Dass-21-D	.36	.07	.46	5.34**
Step 2				
ASI_Social	.05	.12	.04	.45
ASI_ Physical	-.02	.06	-.03	-.30
ASI_Mental	.42	.10	.41	4.11**

*Note.*DASS-21-A = Depression Anxiety and Stress Scales – Anxiety Subscale; DASS-21-D = Depression Anxiety and Stress Scales – Depression Subscale (Antony et al., 1998). PSWQ: Penn State Worry Questionnaire (Meyer et al., 1990). SIAS: Social Interaction Anxiety Scale (Mattick et al., 1998). ASI (Social) = Anxiety Sensitivity Index – Social Concerns Subscale; ASI (Mental) = Anxiety Sensitivity Index – Mental Concerns Subscale; ASI (Physical) = Anxiety Sensitivity Index – Physical Concerns Subscale (Reiss et al., 1986).

*p<.05, **p<.01

Summary of Regression Analysis for females on the Depression Anxiety Stress Scales-21 (DASS-21 anxiety scale and DASS-21 depression scale) the Penn State Worry Questionnaire (PSWQ), the Social Interaction Anxiety Scale (SIAS), and the Anxiety Sensitivity Index (ASI)-Fear of physical symptoms, the Anxiety Sensitivity Index (ASI)-Social concerns and the Anxiety Sensitivity Index (ASI)- Fear of cognitive dyscontrol.

	B	**SE**	***β***	***t***	**Step 2 R^2_{Change}**
Depressive Symptoms (Dass-21-D)					R^2=.001, F(3,294) = .18
Step 1					
Dass-21-A	.61	.05	.57	12.65**	
PSWQ	.05	.01	.16	3.34**	
SIAS	.05	.01	.16	3.70**	
Step 2					
ASI_Social	6.71	.08	.00	.00	
ASI_ Physical	-.02	.04	-.04	-.62	

ASI_Mental	.05	.08	.04	.64	
Worry (PSWQ)					R^2=.03, $F(3,296)$ = 3.65**
Step 1					
Dass-21-D	1.28	.18	.38	7.01**	
Step 2					
ASI_Social	-.1	.33	-.002	-.04	
ASI_ Physical	.19	.16	.09	1.19	
ASI_Mental	.53	.32	.12	1.68	
Social Anxiety (SIAS)					R^2=.10, $F(3,296)$ = 12.23**
Step 1					
Dass-21-D	.98	.18	.30	5.50**	
Step 2					
ASI_Social	.55	.31	.11	1.77	
ASI_ Physical	.24	.15	.11	1.59	
ASI_Mental	.73	.30	.18	2.47*	
Panic (Dass-21-A)					R^2=.03, $F(3,296)$ = 5.33**
Step 1					
Dass-21-D	.61	.04	.66	6.71**	
Step 2					
ASI_Social	-.04	.07	-.03	-.53	
ASI_ Physical	.09	.04	.15	2.54*	
ASI_Mental	.07	.07	.06	1.07	

*Note.*DASS-21-A = Depression Anxiety and Stress Scales – Anxiety Subscale; DASS-21-D = Depression Anxiety and Stress Scales – Depression Subscale (Antony et al., 1998). PSWQ: Penn State Worry Questionnaire (Meyer et al., 1990). SIAS: Social Interaction Anxiety Scale (Mattick et al., 1998). ASI (Social) = Anxiety Sensitivity Index – Social Concerns Subscale; ASI (Mental) = Anxiety Sensitivity Index – Mental Concerns Subscale; ASI (Physical) = Anxiety Sensitivity Index – Physical Concerns Subscale (Reiss et al., 1986).

*p<.05, **p<.01