# STATE-TRAIT INVENTORY FOR COGNITIVE AND SOMATIC ANXIETY: PSYCHOMETRIC PROPERTIES AND EXPERIMENTAL MANIPULATION TO EVALUATE SENSITIVITY TO CHANGE AND PREDICTIVE VALIDITY

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## Abstract

The State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA; Ree, French, MacLeod, & Locke, 2008) is a relatively new measure of state and trait anxiety that contains somatic and cognitive anxiety subscales. The current research investigated the reliability and validity of the STICSA. In the first study, a large sample of undergraduate students completed a battery of self-report questionnaires online, including measures of anxiety, depression, personality features, and quality of life. Results of a confirmatory factor analysis provided support for a four-factor model of the STICSA (i.e., state-somatic, state-cognitive, trait-somatic, and trait-cognitive factors) as well as for a hierarchical model of the STICSA including a global anxiety factor plus four specific factors corresponding to the STICSA subscales. Pearson product-moment correlations provided evidence of the convergent and divergent validity of the STICSA. Comparisons between the validity of the STICSA and the validity of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) revealed advantages of the STICSA over the STAI. In the second study, a sample of undergraduate students filled out the same battery of self-report measures in small groups. Participants were then randomly assigned to either prepare a speech or watch a preview of a television documentary. Subsequently, all participants completed the state versions of the STICSA and STAI for a second time. Results from the second study indicated that the somatic subscale of the STICSA is able to detect changes in somatic anxiety over time and provided evidence that scores on the trait version of the STICSA and its subscales are

predictive of scores on the state version of the STICSA and its subscales after a social challenge. Results from both studies indicated that the somatic subscale of the STICSA measures unique aspects of anxiety which enhances the clinical utility of the STICSA.

# Dedication

I would like to dedicate this dissertation to my family and friends who have supported me throughout my scholarly pursuits. In particular, I would like to dedicate this dissertation to my wonderful parents who encouraged me to pursue my dreams and always had my best interests at heart. I would also like to dedicate this dissertation to my loving husband Justin whose patience and unconditional support were integral to my success in completing this research.

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## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

## 1. Introduction

Anxiety is a multi-faceted construct that can be defined as a sense of apprehension about future danger or threat (American Psychiatric Association [APA], 2000). Anxiety can be triggered by external (e.g., people, places) or internal (e.g., thoughts, physical sensations) experiences (Greenberger & Padesky, 1995). Some people experience anxiety in specific situations (e.g., public speaking) or when certain stimuli are encountered (e.g., needles, spiders). Others experience a more global form of anxiety, experiencing anxiety in many different situations (e.g., social situations) or in response to many different stimuli (e.g., multiple physical sensations, intrusive thoughts; see APA, 2000). A delineation between trait anxiety (anxiety that is experienced in day-to-day life) and state anxiety (anxiety that is experienced in the moment) is also often found in the literature (e.g., Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). These subtypes of anxiety (i.e., specific anxiety, global anxiety, trait anxiety, and state anxiety) help researchers to better conceptualize anxiety and to predict how individuals will react in certain situations.

Anxiety symptoms vary considerably between individuals; however most symptoms can be classified as either cognitive or somatic in nature (Ree, French, MacLeod, & Locke, 2008; Schwartz, Davidson, & Goleman, 1978). Somatic symptoms commonly found in anxiety scales include weakness, dizziness, sweating, shaking/trembling, muscle tension, restlessness, and increased heart rate. Cognitive symptoms commonly found in anxiety scales include difficulty concentrating, intrusive

thoughts, worry, trouble remembering, thinking the worst will happen, indecisiveness, and being noticed by others (Lehrer & Woolfolk, 1982; Ree et al., 2008; Schwartz et al., 1978; Spielberger et al., 1983). Avoidance of anxiety-provoking stimuli (e.g., people, social events, emotions, thoughts) and alcohol and drug use are also strongly associated with increased anxiety (Beesdo-Baum et al., 2012; Brady, Tolliver, & Verduin, 2007; Conway, Compton, Stinson, & Grant, 2006; Kämpfe et al., 2012; Liang, Chikritzhs, & Lenton, 2011; Rinck et al., 2010; Sabourin & Stewart, 2008). Although avoidance and substance use could be considered symptoms of anxiety, individuals often engage in these behaviours in an attempt to reduce anxiety; therefore, in the present research, they will be considered behaviours in response to anxiety.

Increasing rates of trait anxiety and neuroticism have been found in the general population of the United States since the 1950s (Twenge, 2000). It is thought that common values found in the Western culture such as materialism and individualism may partially explain these increases (Eckersley, 2006). It is clear that early detection of anxiety symptoms in children, adolescents, and adults is paramount to preventing the development of anxiety disorders.

When anxiety interferes significantly in an individual's life, it is considered an anxiety disorder. It is estimated that nearly one in six people worldwide (16.6%) meet criteria for an anxiety disorder (Somers, Goldner, Waraich, & Hsu, 2006). In the United States, the estimated 12-month prevalence of anxiety disorders in adults aged 18-64 is 21.3% (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). Despite access to

mental health resources, research also indicates a high prevalence of mood and anxiety disorders among post-secondary students (13%-15.6%; Eisenberg, Golberstein, & Gollust, 2007; Eisenberg, Gollust, Golberstein, & Hefner, 2007).

Given the high prevalence rates, anxiety disorders are a great economic burden in North America. They have been linked to impairment in work functioning and increased use of the medical system (Koerner et al., 2004; Tolin, Gilliam, & Dufresne, 2010). Post-secondary students with anxiety disorders often experience impairment in school functioning and many drop out of school due to anxiety and its sequelae (Stein & Kean, 2000; Van Ameringen, Mancini, & Farvolden, 2003). Unfortunately, countless individuals with anxiety disorders end up receiving government disability or social assistance (Gadalla, 2009; Tolman et al., 2009).

A number of different disorders fall under the umbrella term *anxiety disorders*. Some are more somatic in nature, while others are more cognitive in nature. For example, panic disorder can be considered more of a somatic anxiety disorder as individuals experience unexpected somatic symptoms (i.e., panic attacks) and subsequently develop a fear of these panic attacks or the consequences of them (e.g., dying, loss of control; Craske & Barlow, 2001). In contrast, generalized anxiety disorder can be considered more of a cognitive anxiety disorder in that individuals with this disorder tend to worry constantly about a number of different issues and often think that the worst will happen (Spitzer, Kroenke, Williams, & Löwe, 2006). Other anxiety disorders such as social anxiety disorder, obsessive-compulsive disorder, and post-traumatic stress disorder are

less clearly somatic or cognitive in nature, but have symptom clusters that can be classified as somatic (e.g., performance anxiety, hyperarousal) or cognitive (e.g., social interaction anxiety, obsessions) symptoms (APA, 2000).

### 1.1 Anxiety and Depression Comorbidity

Many individuals with symptoms of anxiety also suffer from symptoms of depression. Strong correlations ($rs > .50$) are commonly found between scores on self-report measures of anxiety and scores on self-report measures of depression (e.g., Bados, Gomez-Benito, & Balaguer, 2010; Beck, Steer, Ball, & Ranieri, 1996; McWilliams, Cox, & Enns, 2001). Among individuals with an anxiety disorder (obsessive-compulsive disorder, generalized anxiety disorder, social anxiety disorder or post-traumatic stress disorder) the 12 month prevalence of a comorbid major depressive disorder ranges from 42% to 62% among adults in the United States (Kessler, Chiu, Demler, Merikangas, & Walters, 2005). Anxiety disorders tend to precede depressive disorders in individuals with comorbid anxiety and depression. In a large clinical sample of adults from the Netherlands, 57% of people with comorbid anxiety and depression/dysthymia reported that their anxiety disorder preceded their depression compared to 18% who reported that their depressive disorder preceded their anxiety disorder and 25% who reported that their anxiety and depression occurred at the same time (Lamers et al., 2011).

Clark and Watson's (1991) tripartite model of anxiety and depression suggests that anxiety and depression each load onto one unique factor (anxiety onto social tension/arousal and depression onto anhedonia and low positive affect) as well as onto a

shared factor (general distress). This model has received a generous amount of support in the literature (e.g., Brown, Chorpita, & Barlow, 1998; Watson, Clark et al., 1995; Watson, Weber, et al., 1995). Other researchers have investigated possible etiological and maintaining factors shared by anxiety and depression to inform their conceptualizations of these constructs. For example, McLaughlin and Nolen-Hoeksema (2011) found that rumination fully mediated the relation between anxiety and depression in prospective analyses with a large adult community sample. Sarin, Abela, and Auerbach (2005) also found a relation between ruminative response styles and anxious and depressive symptoms; however, they found that the relation was mediated by increases in hopelessness. This research suggests that anxiety and depression may share variance due to ruminative tendencies and hopelessness.

Given the reviewed research, moderate to high correlations between anxiety and depression measures are expected. Correlations between two constructs that are greater than or equal to .85, however, are indicative of poor discriminant or divergent validity (see Kenny, 2012). Even if correlations between anxiety and depression measures are less than .85, it is important to investigate whether the measures can distinguish between anxiety and depression. If a measure can discriminate between these two constructs, then that is further evidence of the measure's divergent validity. It is essential that anxiety scales show some divergent validity with measures of depression (e.g., anxiety measure correlates more highly with other anxiety measures than depression measures). If not, the anxiety measure could be construed as a measure of general distress.

## 1.2 Relation to Other Constructs

Individuals with an eating disorder or with body image issues often have comorbid anxiety, particularly social anxiety (e.g., Becker, DeViva, & Zayfert, 2004; Phillips, Siniscalchi, & McElroy, 2004; Swinbourne & Touyz, 2007; van der Meer et al., 2012). Becker and colleagues (2004) found that both social anxiety disorder and post-traumatic stress disorder accounted for unique variance in eating pathology in female adults attending an anxiety disorders clinic. In addition, with eating disorder and anxiety disorder comorbidity, anxiety disorders tend to precede eating disorders (Swinbourne et al., 2012).

Behavioral inhibition is another construct that has been shown to be strongly linked to anxiety. Gray (1982; Gray & McNaughton, 2000) proposed that three separate neuropsychological systems operate to determine our behaviour: a behavioural inhibition system (BIS), a behavioural activation system (BAS), and a fight-flight-freeze response. He described BIS in terms of sensitivity to punishment resulting in inhibition or avoidance of stimuli that are potentially threatening, BAS in terms of sensitivity to reward resulting in goal-motivated behaviour, and the fight-flight-freeze response in terms of reactions to actual threat (i.e., primary punishing or frustrating stimuli). Gray posited that higher sensitivities of the BIS and BAS occur naturally in the population and that higher BIS sensitivity would lead to anxiety, whereas higher BAS sensitivity would lead to impulsivity and would not necessarily be related to anxiety. In contrast, the activation of the fight-flight-freeze response would lead to the experience of fear rather

than anxiety. Research has supported Gray's neuropsychological theory of anxiety (e.g., Johnson, Turner, & Iwata, 2003), although there is some indication that BAS may be inversely related to social interaction anxiety (Kimbrel, Mitchell, & Nelson-Gray, 2010).

In regard to personality structure, individuals with high levels of anxiety tend to have high scores on measures of neuroticism and low scores on measures of extraversion (Jylhä & Isometsä, 2006; Naragon-Gainey, Watson, & Markon, 2009). Individuals with social anxiety also tend to have low scores on measures of agreeableness (Glinski & Page, 2010). Impairment in multiple life domains is also common in individuals with clinical levels of anxiety, particularly impairment in occupational functioning and social activities/relationships (Quilty, Van Ameringen, Mancini, Oakman, & Farvolden, 2003). Norberg, Diefenbach, and Tolin (2008) found a link between anxiety disorders and a lower quality of life (e.g., low self-worth, impaired social life, less learning/play). Further, they found that having a comorbid depressive disorder resulted in an even lower quality of life.

### 1.3 Measuring Anxiety

As anxiety is a latent construct that can only be inferred from observable or reported symptoms, there is no consensus on how to measure it. There are several methods through which anxiety can be estimated. These include, but are not limited to, physiological measures such as heart rate and galvanic skin response, clinician-administered measures such as the Anxiety Disorders Interview Schedule for DSM-IV (ADIS; Grisham, Brown, & Campbell, 2004) or the Structured Clinical Interview for

DSM-IV-TR Axis I Disorders (SCID; First, Spitzer, Gibbon, & Williams, 2002), clinical judgments based on interviews or treatment, as well as a myriad of self-report measures. The most common method of measurement is through self-report scales, as these are easily administered, readily available, and are often less costly and time-consuming than other types of measures.

Studies investigating the reliability and validity of self-report measures of anxiety are essential in helping researchers and health practitioners to determine the most appropriate scales to use to measure anxiety. When choosing a self-report measure, researchers and practitioners should review the psychometrics of the measure thoroughly to determine whether it is internally consistent (e.g., high alpha coefficients) and reliable over time (e.g., high test-retest reliabilities) in a number of different samples. In addition, they should investigate whether the measure is correlated with other measures of the same or similar constructs (convergent validity), less correlated with measures of different constructs (divergent validity), and predictive of future outcomes related to the construct (predictive validity). The clinical utility of the measure (e.g., Does the measure determine the severity and type of anxiety symptoms a person is experiencing? Are there clinical cut-off scores?) should also be considered if the measure is to be used in a clinical context. If a measure has poor psychometrics or if the psychometrics of a measure are unknown, then any conclusions derived from scores on that measure might not be valid.

**State-Trait Anxiety Inventory.** A common measure of state and trait anxiety, the State-Trait Anxiety Inventory (STAI, Spielberger et al., 1983), is used extensively in psychological research. The STAI consists of two identical 20-item subscales: one measuring state anxiety and the other measuring trait anxiety. For the state scale, individuals are asked to rate their anxiety "in the moment" and for the trait scale, individuals are asked to rate their anxiety "in general". Participants rate items (e.g., "I feel nervous and restless") on the state version on a 4-point scale ranging from 1 (*not at all*) to 4 (*very much so*) and rate items on the trait version on a 4-point scale ranging from 1 (*almost never*) to 4 (*almost always*). Samples of undergraduate students and community volunteers scored an average of 43.05 ($SD$ = 10.02) and 33.39 ($SD$ = 6.32) on the trait version of the STAI, respectively. On average, samples of individuals with anxiety disorders (e.g., panic disorders, obsessive-compulsive disorder, and social anxiety disorder) scored between 52.04 and 55.93 ($SD$s = 8.88-11.79) on the trait version of the STAI (Bieling, Antony, & Swinson, 1998; Vigneau & Cormier, 2008).

Previous research has indicated that the state and trait versions of the STAI have good internal consistencies and adequate test-retest reliabilities in various samples. Based on over 50 estimates of internal consistency, internal consistencies range from $\alpha$ = .65-.96 with a mean of $\alpha$ = .91 for the state scale of the STAI and range from $\alpha$ = .72-.96 with a mean of $\alpha$ = .89 for the trait scale of the STAI (Barnes, Harp, & Jung, 2002). Based on seven estimates of test-retest correlations (various time periods), test-retest correlations range from $r$ = .34-.96 with a mean of $r$ = .70 for the state scale of the STAI and range

from $r$ = .82-.94 with a mean of $r$ = .88 for the trait scale of the STAI (Barnes et al., 2002).

There is evidence that the STAI has convergent and predictive validity (Bados et al., 2010; Hishinuma et al., 2001; Kabacoff, Segal, Hersen & Van Hasselt, 1997). Moderate to strong correlations ($r$s = .46-.61) have been found between the trait scale of the STAI and other measures of trait anxiety such as the Beck Anxiety Inventory (BAI; Beck & Steer, 1993; Sanz & Navarro, 2003), the anxiety subscale of the Depression Anxiety Stress Scales (DASS-21; Bados, Solanas, & Andrés, 2005; Lovibond & Lovibond, 1995), and the anxiety subscale of the Symptom Checklist-90-Revised (SCL-90-R; Bados et al., 2010; Derogatis, 1983; 2002). Further, the trait scale of the STAI can discriminate between individuals with a current anxiety disorder and those without an anxiety disorder (Kabacoff et al., 1997). Hishinuma and colleagues (2001) showed that scores on the state and trait versions of the STAI had both concurrent and predictive validity of anxiety disorder diagnoses in adolescents of Asian/Pacific Islander descent. Specifically, a factor composed of items that measure the presence of anxiety (e.g., "I feel nervous and restless") rather than the absence of anxiety (e.g., "I feel pleasant") was the best predictor of future anxiety disorder diagnoses.

Research on the divergent validity of the STAI indicates that the STAI lacks the ability to distinguish between depression and anxiety. Bados and colleagues (2010) found that correlations between the trait scale of the STAI and the Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979; Beck, Ward, Mendelson, Mock, & Erbaugh,

1961; Sanz & Vázquez, 1998), the depression subscale of the DASS-21, and the depression subscale of the SCL-90-R, were higher than correlations between the trait scale of the STAI and the BAI, the anxiety subscale of the DASS-21, and the anxiety subscale of the SCL-90-R, respectively. Little research has been conducted on the divergent validity of the STAI in relation to other constructs (e.g., personality features, social desirability).

Based on exploratory factor analyses of the trait version of the STAI, Bieling and colleagues (1998) divided the items into a 7-item anxiety subscale and a 13-item depression subscale (see Appendix A). Community volunteers scored an average of 10.20 ($SD$ = 2.45) and 23.18 ($SD$ = 4.58) on the anxiety and depression subscales of the trait version of the STAI, respectively. Individuals with an anxiety disorder scored an average of 16.39 to 18.59 ($SD$s = 4.01-4.67) and 31.00 to 38.34 ($SD$s = 5.59-9.57) on the anxiety and depression subscales of the trait version of the STAI, respectively (Bieling et al., 1998). The anxiety and depression subscales of the trait version of the STAI have been shown to have adequate internal consistencies ($\alpha$ = .88 for the depression subscale and $\alpha$ = .78 for the anxiety subscale). The anxiety subscale correlates more strongly than the depression subscale with the BAI and the anxiety and stress subscales of the DASS. The depression subscale correlates more strongly than the anxiety subscale with the depression subscale of the DASS, but not the BDI (Bieling et al, 1998).

Factor analyses of the STAI are inconsistent, with some researchers finding support for a two-factor model (i.e., state and trait anxiety; Oei, Evans, & Crook, 1990)

and others finding support for a four-factor model (i.e., state anxiety present, state anxiety absent, trait anxiety present, and trait anxiety absent; Maynard et al., 2010). Moreover, the trait version of the STAI has been shown to measure both anxiety (i.e., physiological hyperarousal) and depression (i.e., low positive affect; Bados et al., 2010; Bieling et al., 1998).

The reviewed studies indicate that the state and trait versions of the STAI have good internal consistencies in various samples and in a number of different environments (e.g., university, hospital, online). The trait version of the STAI also has good test-retest reliability. Although the STAI is correlated with other measures of anxiety, it has poor divergent validity with measures of depression. There is also no consensus on the factorial structure of the STAI.

Although the STAI covers many domains of anxiety (e.g., five criteria/criterion-based symptoms for generalized anxiety disorder; Okun, Stein, Bauman, & Silver, 1996), it lacks content validity as it does not distinguish between somatic and cognitive aspects of anxiety. This distinction is important since individuals with anxiety vary in their clinical presentations. Some individuals may experience more somatic symptoms while others may experience more cognitive symptoms, or the same individual may experience different anxiety symptoms in different situations (DeGood & Tait, 1987). The somatic-cognitive distinction may be important when considering the type of treatment that might be effective for an individual (e.g., cognitive restructuring vs. relaxation).

**Cognitive Somatic Anxiety Questionnaire.** The Cognitive Somatic Anxiety Questionnaire (CSAQ; Schwartz et al., 1978) is a 14-item self-report scale that measures trait anxiety symptoms. The CSAQ contains two 7-item subscales: a cognitive subscale ("I imagine terrifying scenes") and a somatic subscale (e.g., "I feel tense in my stomach"). Participants rate items on a 5-point scale ranging from 1 (*not at all*) to 5 (*very much so*). A sample of male and female undergraduate students scored an average of 16.20 (*SD* = 5.30) and 19.70 (*SD* = 5.10) on the cognitive subscale of the CSAQ, respectively, and an average of 15.00 (*SD* = 4.20) and 17.80 (*SD* = 5.00) on the somatic subscale of the CSAQ, respectively (DeGood & Tait, 1987). A sample of psychiatric inpatients (majority suffering from depression /anxiety) scored an average of 21.96 (*SD* = 6.99) on the cognitive subscale of the CSAQ and an average of 19.73 (*SD* = 5.56) on the somatic subscale of the CSAQ (Freedland & Carney, 1988).

The somatic and cognitive subscales of the CSAQ have been shown to have at least adequate internal consistencies (cognitive subscale αs = .81-.85; somatic subscale αs = .70-.81) in a number of samples. Moderate correlations have also been found between the subscales (*r*s = .42-.63; Crits-Christoph, 1986; DeGood & Tait, 1987; Freedland & Carney, 1988). The somatic and cognitive subscales of the CSAQ correlate moderately to strongly with the trait version of the STAI (*r* = .40 and *r* = .67, respectively; Schwartz et al., 1978) and the somatization subscale of the SCL-90 (*r*s = .24-.47 and *r*s = .29-.35, respectively; DeGood & Tait, 1987; Derogatis, Lipman, & Covi, 1973). The cognitive subscale of the CSAQ has also been found to correlate moderately

to strongly with the obsessive-compulsive subscale of the SCL-90 (*rs* = .40-.52; DeGood & Tait, 1987).

There is evidence that the CSAQ has predictive validity. Researchers (Norton & Johnson, 1983; Tamaren, Carney, & Allen, 1985) separated participants into groups based on their scores on the somatic and cognitive subscales of the CSAQ and then provided tailored psychological treatment to these participants that either matched (e.g., relaxation training for somatic anxiety) or mismatched (e.g., relaxation training for cognitive anxiety) their primary anxiety presentation. They found better treatment responses when the treatment matched the participants' primary anxiety presentation.

Limited research has been conducted on the divergent validity of the CSAQ. The CSAQ is weakly associated with health variables such as smoking, number of sick days, and number of health problems in college students (DeGood & Tait, 1987). Further, there is evidence that the somatic subscale of the CSAQ is related to heart rate after a simulated social situation while the cognitive scale is not (Heimberg, Gansler, Dodge, & Becker, 1987).

Factor analyses of the CSAQ across studies are inconsistent. Some researchers have found support for a two-factor model (i.e., cognitive and somatic factors; Delmonte & Ryan, 1983; Steptoe & Kearsley, 1990), while other researchers have found that a two-factor model did not adequately fit their data (Crits-Christoph, 1986; Freedland & Carney, 1988). No viable alternative models have been suggested.

The reviewed studies indicate that the CSAQ has adequate internal consistencies in several samples. There is also some preliminary evidence of the CSAQ's convergent and predictive validity. Although the CSAQ contains somatic and cognitive subscales, they have not been validated as state anxiety scales. Further, there is little evidence of their divergent validity. The CSAQ has also not been shown to have factorial invariance across samples.

**Trimodal Anxiety Questionnaire.** The Trimodal Anxiety Questionnaire/Lehrer and Woolfolk Anxiety Symptom Questionnaire (TAQ; Lehrer & Woolfolk, 1982) is another measure of trait anxiety that contains somatic and cognitive subscales. The TAQ is a 36-item self-report questionnaire that contains three subscales: somatic (16 items; "My heart pounds"), cognitive (11 items; "I dwell on mistakes that I make"), and behavioral (9 items; "I try to avoid starting conversations"). Participants rate items on a 9-point scale ranging from 0 (*never*) to 8 (*extremely often*). Because many researchers are interested only in the cognitive and somatic aspects of anxiety, the behavioral subscale of the TAQ is sometimes omitted from analyses (e.g., Steptoe & Kearsley, 1990). A sample of graduate students scored an average of 27.74 ($SD$ = 16.01) on the somatic subscale and an average of 32.54 ($SD$ = 16.05) on the cognitive subscale of the TAQ (Hall, 2009).

Limited psychometric research has been conducted on the TAQ. Internal consistency estimates for the two subscales in samples of adolescents, adults, and individuals with social anxiety disorder range from $\alpha$ = .87 to $\alpha$ = .92 for the somatic subscale, and $\alpha$s = .83 for the cognitive subscale (Scholing & Emmelkamp, 1992). A

strong correlation ($r$ = .59) has been found between the cognitive and somatic subscales of the TAQ (Steptoe & Kearsley, 1990).

Researchers have found support for the convergent validity of the TAQ subscales (Scholing & Emmelkamp, 1992; Steptoe & Kearsley, 1990). The somatic subscale of the TAQ is strongly correlated with the somatic subscale of the SCL-90 ($r$s = .75-.84), whereas the cognitive subscale of the TAQ is strongly correlated with the interpersonal sensitivity subscale of the SCL-90 ($r$s = .63-.74; Scholing & Emmelkamp, 1992). The TAQ cognitive and somatic subscales correlate strongly ($r$s = .61-.74) with the cognitive and somatic subscales of the CSAQ, respectively (Steptoe & Kearsley, 1990). The cognitive subscale of the TAQ correlates moderately ($r$s = .42-.46) with the Social Cognitions Inventory (van Kamp & Klip, 1981; Scholing & Emmelkamp, 1992). All three subscales of the TAQ can discriminate between individuals with social anxiety disorder and control samples (82.2% accurate classification); however, the behavioral subscale appears to discriminate better than the somatic or cognitive subscales (Scholing & Emmelkamp, 1992).

Factor analyses support a three-factor model of the TAQ with somatic, cognitive, and behavioural factors (Lehrer & Woolfolk, 1982). A validation study by Scholing and Emmelkamp (1992) confirmed the three-factor structure of the TAQ in adolescents, adults, and individuals with social anxiety disorder. In all three samples, the somatic factor explained the greatest amount of variance in the TAQ.

The reviewed studies indicate that the somatic and cognitive subscales of the TAQ have good internal consistencies in a limited number of samples. There is also some preliminary evidence of the TAQ's convergent validity. The divergent validity of the TAQ has not been sufficiently studied, nor has the TAQ been validated as a state anxiety scale. The factorial structure of the TAQ, however, appears consistent across a number of samples.

**State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA).** More recently, Ree and colleagues (2008) proposed a new measure of state and trait anxiety – the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA; see Appendix B). The STICSA consists of two identical 21-item scales (a state scale and trait scale) each of which contains two subscales: a 10-item cognitive anxiety subscale (e.g., "I think that the worst will happen") and an 11-item somatic anxiety subscale (e.g., "I feel trembly and shaky"). For the trait anxiety scale, the instructions to participants state that they should rate how they feel "in general" (p. 381), and for the state anxiety scale, how they "feel right now, at this very moment" (Grös, Antony, Simms, & McCabe, 2007, p. 380). Items are measured on a 4-point scale ranging from 1 (*not at all*) to 4 (*very much so*). A sample of undergraduate students scored an average of 17.10 ($SD$ = 7.20) on the cognitive subscale and an average of 16.90 ($SD$ = 6.70) on the somatic subscale of the trait version of the STICSA (Grös, Simms, & Antony, 2010). A sample of individuals with anxiety disorders (i.e., panic disorder, obsessive-compulsive disorder, social anxiety disorder) scored an average of 26.60 to 29.70 ($SD$s = 7.00-7.30) on the cognitive subscale and an

average of 22.40 to 23.70 (*SDs* = 6.50-7.30) on the somatic subscale of the trait version of the STICSA (Grös et al., 2007).

As the STICSA is relatively new, research on its psychometric properties is sparse. Preliminary studies indicate that the subscales (trait somatic anxiety, trait cognitive anxiety, state somatic anxiety, state cognitive anxiety) have at least adequate internal consistencies in university student samples (trait cognitive $\alpha = .75$, trait somatic $\alpha = .80$, state cognitive $\alpha = .84$, state somatic $\alpha = .75$; Ree et al., 2008). Grös and colleagues (2007) found higher internal consistencies in a sample of individuals with anxiety disorders: trait cognitive $\alpha = .87$, trait somatic $\alpha = .87$, state cognitive $\alpha = .88$, state somatic $\alpha = .88$. Adequate 2-month test-retest correlations have been found for the somatic and cognitive subscales of the trait version of the STICSA (trait cognitive $r = .66$; trait somatic $r = .60$; state cognitive $r = .49$; state somatic $r = .31$; Ree et al., 2008).

Grös and colleagues (2010) expanded on these initial psychometric studies by analyzing the scores of 127 target-informant dyads on the trait version of the STICSA. The targets were undergraduate students and the informants were close friends. Internal consistencies for the cognitive and somatic subscales of the trait version of the STICSA were high for both targets and informants (cognitive: $\alpha$s = .92-.94; somatic: $\alpha$s = .94). Strong correlations were found between the two subscales in both samples ($r = .83$ for targets and $r = .86$ for informants). Weak correlations were found, however, between target and informant scores on both the somatic ($r = .14$) and cognitive ($r = .26$) subscales

of the trait version of the STICSA. Informants' scores on both subscales were significantly lower than the targets' scores.

There is evidence that the state version of the STICSA has good convergent validity with the state version of the STAI ($r$ = .65) and that the trait scale of the STICSA has good convergent validity with the trait version of the STAI ($r$ = .66) and the anxiety subscale of the DASS ($r$ = .68; Grös et al., 2007; Ree et al, 2008). In a sample of undergraduate students, all correlations were significant ($r$s = .49-.85) between the cognitive and somatic subscales of the trait version of the STICSA and the following measures: the interoceptive avoidance subscale of the Albany Panic and Phobia Questionnaire (APPQ; Rapee, Craske, & Barlow, 1994/1995), the physiological arousal subscale of the Social Phobia Inventory (SPIN; Connor et al., 2000), the worry subscale of the Thought Control Questionnaire (Wells & Davies, 1994) , and the Social Thoughts and Beliefs Scale (Grös et al., 2010; Turner, Johnson, Beidel, Heiser, & Lydiard, 2003). Further, the correlations between the somatic subscale of the trait version of the STICSA and the interoceptive subscale of the APPQ and the physiological arousal subscale of the SPIN were higher than the correlations with the cognitive subscale of the trait version of the STICSA (Grös et al., 2010). This provides some preliminary evidence of the divergent validity of the STICSA subscales. There is also evidence that the trait version of the STICSA has adequate divergent validity with the depression subscale of the DASS ($r$ = .58) and the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996; Grös et al., 2007; Ree et al., 2008).

Ree and colleagues (2008) posit that the somatic and cognitive trait subscales of the STICSA are able to predict situations in which individuals will experience increases in state anxiety. In their study, they measured somatic and cognitive state anxiety before and during a cognitive stressor (i.e., examination period) and a somatic stressor (i.e., $CO_2$ inhalation). They found that scores on the cognitive subscale of the trait version of the STICSA predicted scores on both the cognitive and somatic subscales of the state version of the STICSA during the examination period, but not during the $CO_2$ inhalation. Conversely, scores on the somatic subscale of the trait version of the STICSA predicted scores on both the cognitive and somatic subscales of the state version of the STICSA during the $CO_2$ inhalation, but not during the examination period.

Factor analyses of the items of the state and trait versions of the STICSA support a two-factor cognitive-somatic model for both the state and trait versions of the STICSA (Ree et al., 2008; see Figure 1). Although Grös and colleagues (2010) also found support for the two-factor model of the trait version of the STICSA, they proposed several alternative models of the STICSA that combined the state and trait versions: a two-factor state-trait model of the STICSA (see Figure 2), a two-factor somatic-cognitive model of the STICSA (see Figure 3), and a four-factor state-trait somatic-cognitive model of the STICSA (see Figure 4). When investigating the fit of these models, only the four-factor model had an adequate fit to their data.

Although the STICSA was developed with the specific goal of measuring somatic and cognitive anxiety, it is also purported to be a global measure of anxiety. Adding an

overarching global anxiety factor to the currently supported model of the STICSA (i.e., four-factor model), therefore, seems appropriate (see Figure 5). This hierarchical model warrants further investigation.

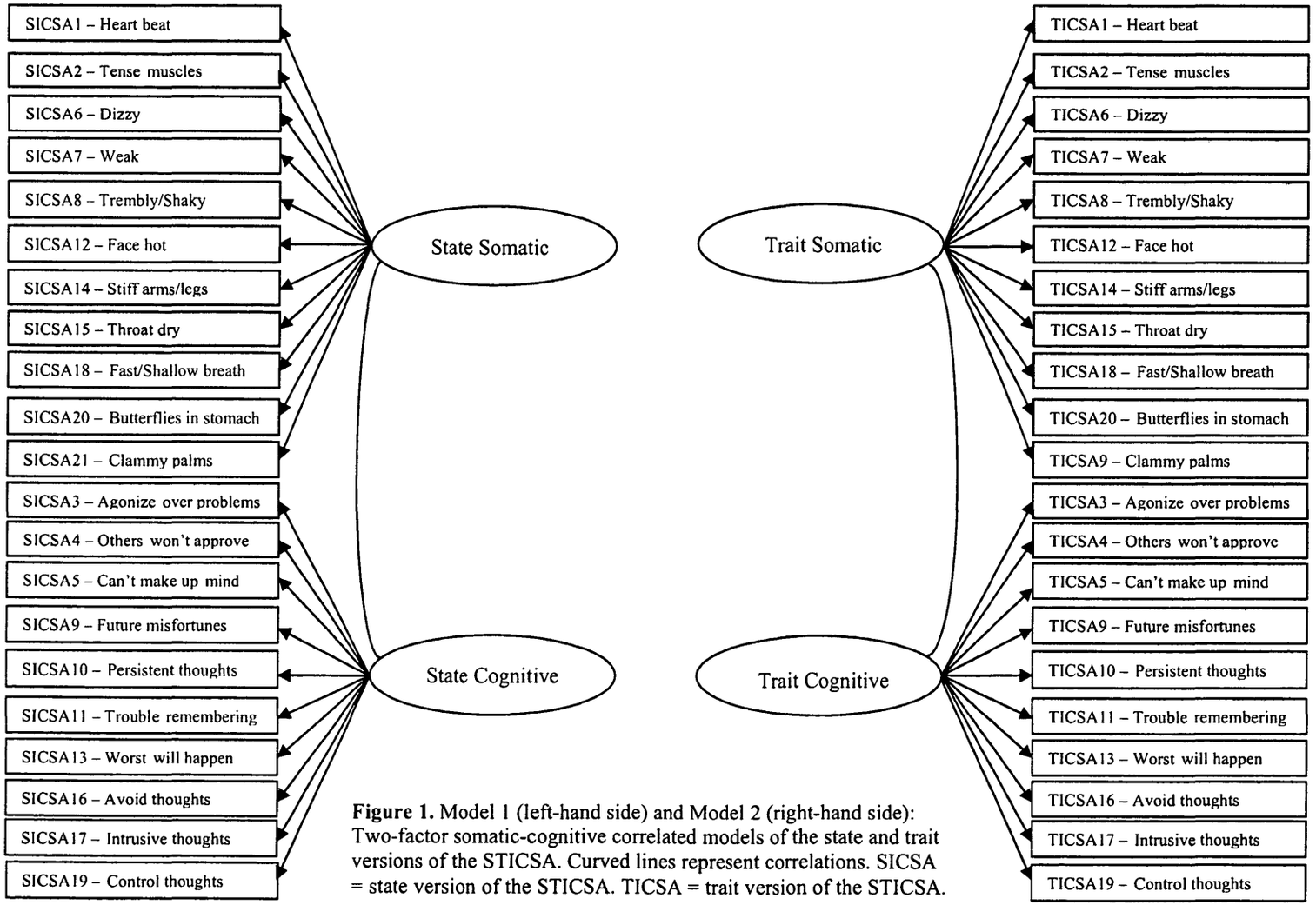


**Figure 1.** Model 1 (left-hand side) and Model 2 (right-hand side): Two-factor somatic-cognitive correlated models of the state and trait versions of the STICSA. Curved lines represent correlations. SICSA = state version of the STICSA. TICSA = trait version of the STICSA.

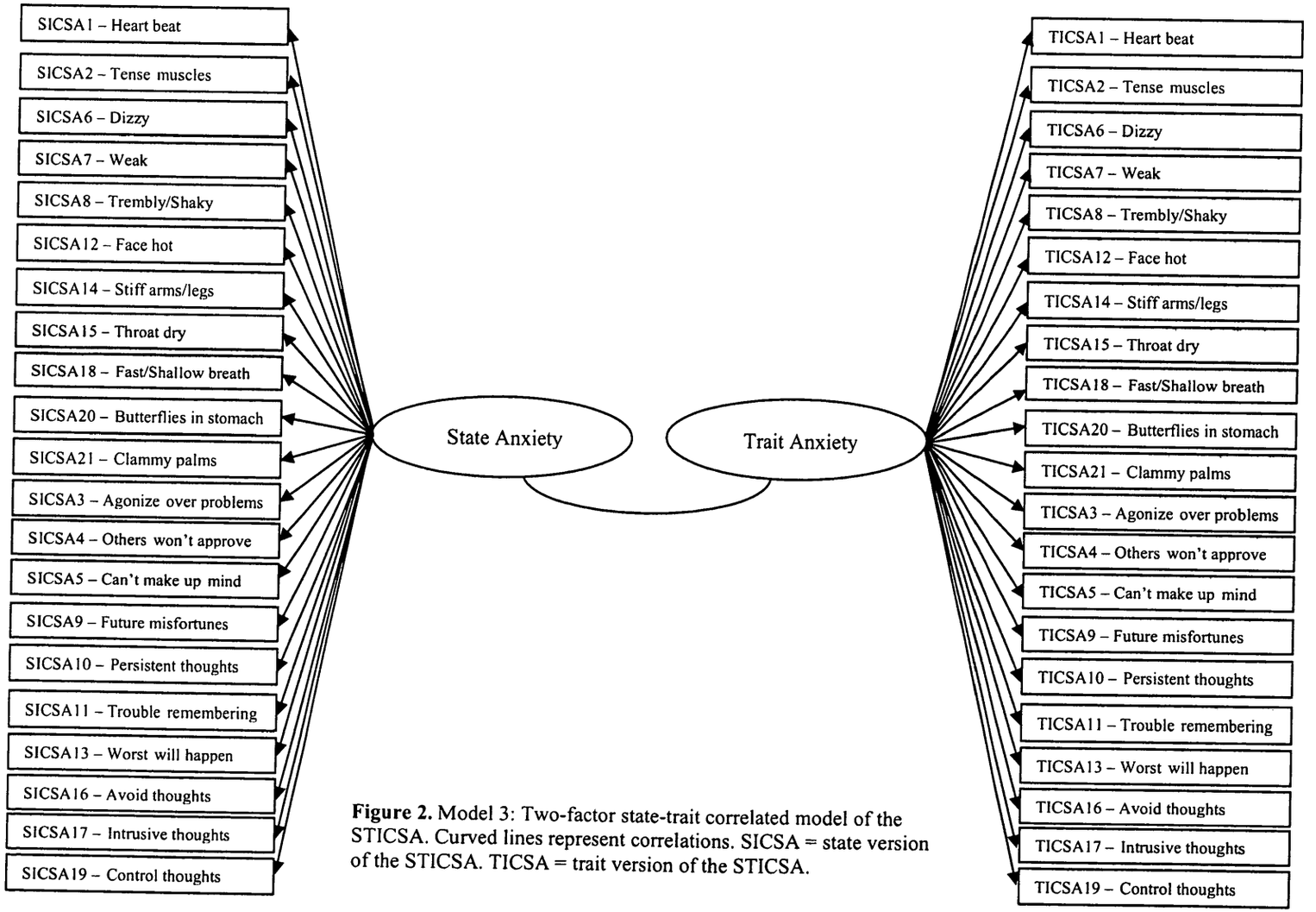


**Figure 2.** Model 3: Two-factor state-trait correlated model of the STICSA. Curved lines represent correlations. SICSA = state version of the STICSA. TICSA = trait version of the STICSA.

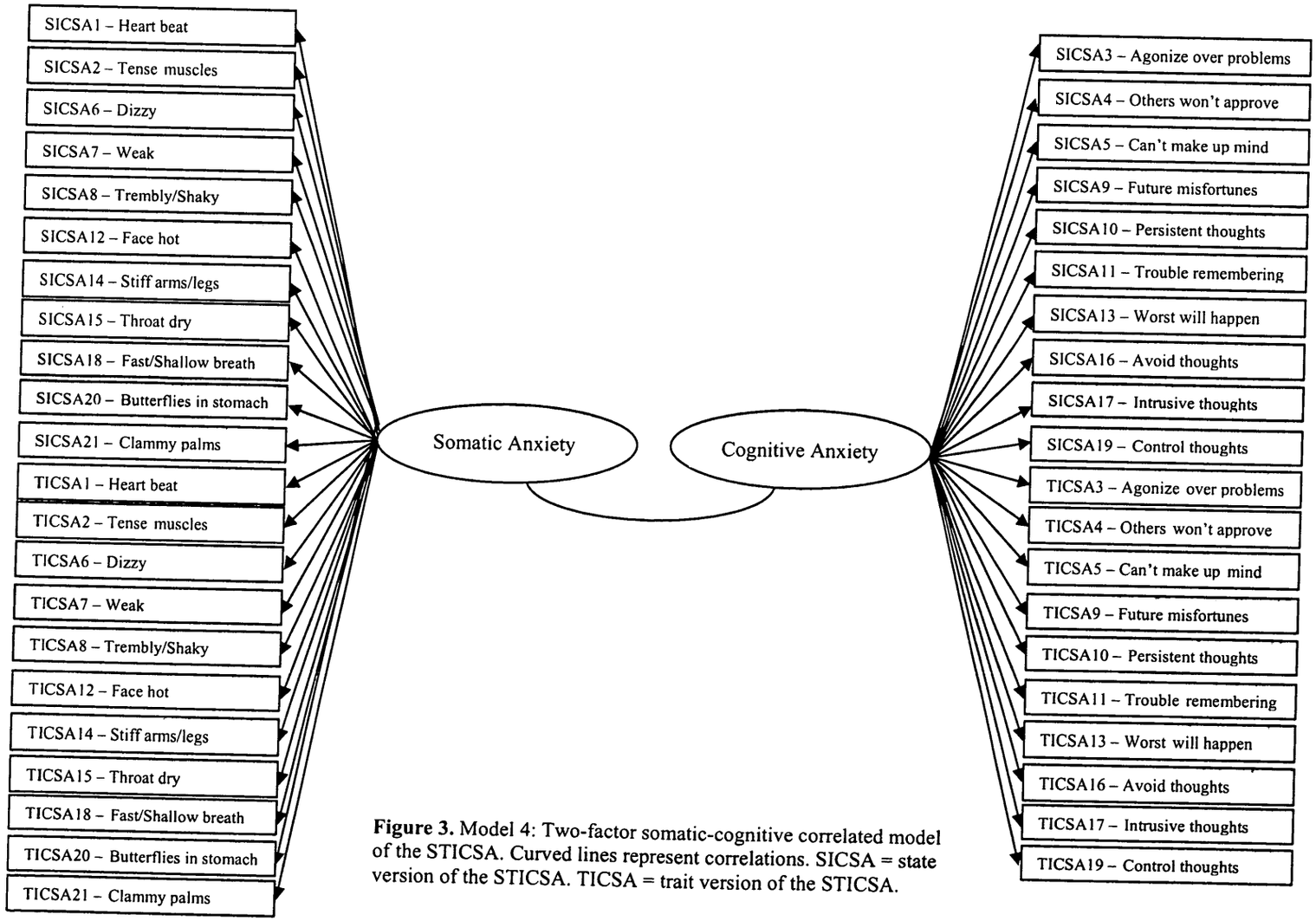


**Figure 3.** Model 4: Two-factor somatic-cognitive correlated model of the STICSA. Curved lines represent correlations. SICSA = state version of the STICSA. TICSA = trait version of the STICSA.

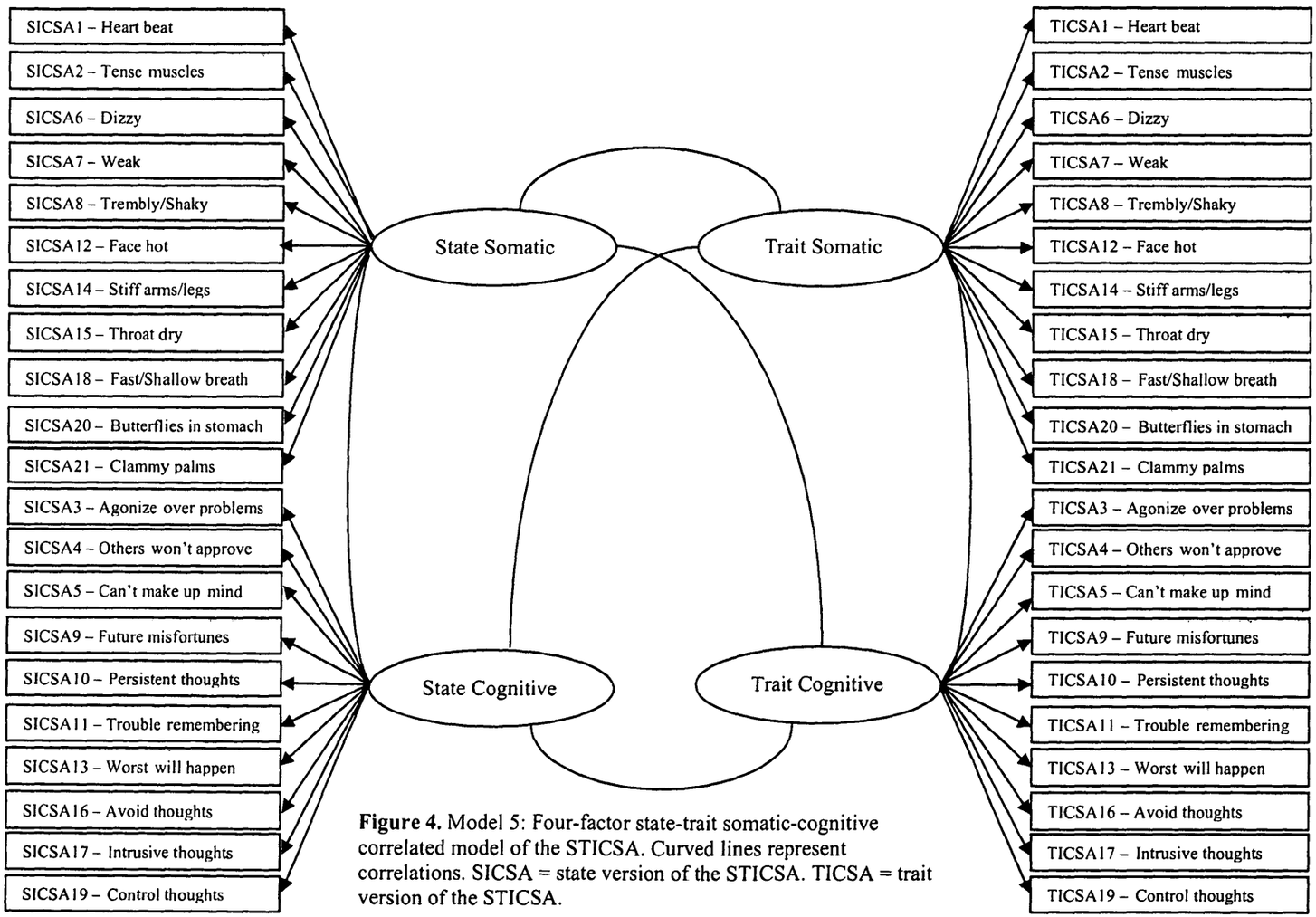


**Figure 4.** Model 5: Four-factor state-trait somatic-cognitive correlated model of the STICSA. Curved lines represent correlations. SICSA = state version of the STICSA. TICSA = trait version of the STICSA.

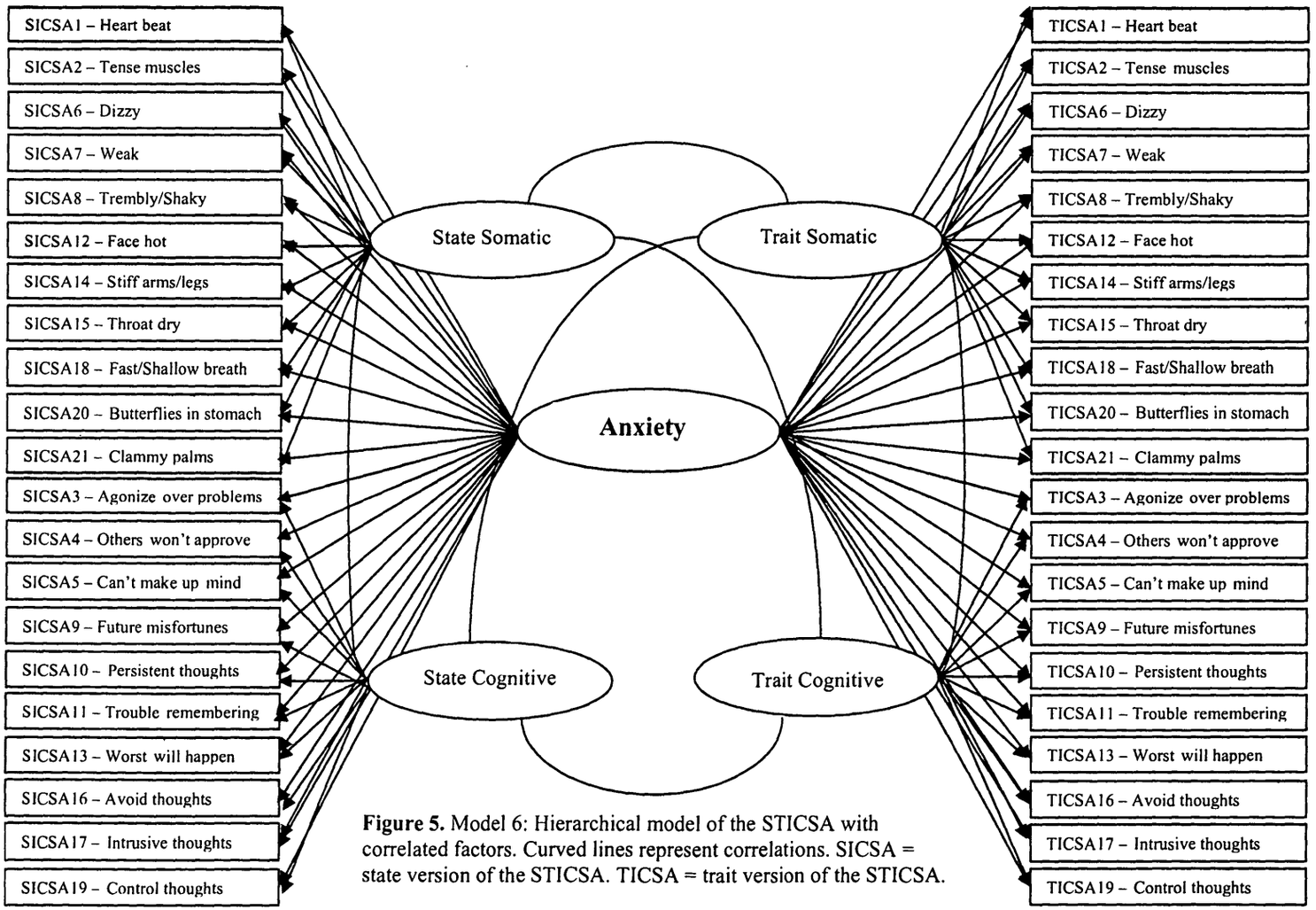


**Figure 5.** Model 6: Hierarchical model of the STICSA with correlated factors. Curved lines represent correlations. SICSA = state version of the STICSA. TICSA = trait version of the STICSA.

### 1.4 Study Rationale

It is important that researchers and health practitioners have access to reliable and valid measures of anxiety to be able to determine the prevalence of anxiety symptoms in the population and to identify individuals experiencing maladaptive forms of anxiety (at clinical and sub-clinical levels) who may be in need of psychiatric or psychological treatment. In addition, these measures are used in research to further our understanding of the nature of anxiety and to determine the efficacy of anxiety treatments (e.g., psychotherapies, medications).

Many self-report anxiety scales continue to be administered despite evidence of inadequate validity. The STAI lacks divergent validity as it is unable to distinguish anxiety from depression. Further, the majority of the items in the STAI load onto a depression factor rather than an anxiety factor (Bieling et al., 1998). The STAI also lacks content validity as it does not separate somatic and cognitive symptoms of anxiety. Alternatives to the STAI, like the CSAQ and TAQ, which contain somatic and cognitive subscales, were formulated over 30 years ago and have not been validated as state anxiety scales. Further, there is no evidence of their divergent validity.

The problematic validity issues with current self-report anxiety measures limit the ability of mental health practitioners and researchers to use these measures confidently for diagnosis and treatment planning, for determining participant inclusion/exclusion in research studies, and to further theory and knowledge of anxiety as a construct. It is clear that there is a need for a valid and reliable state and trait anxiety scale that measures both

somatic and cognitive anxiety. Further, the scale needs to show divergent validity with depression.

The STICSA contains state and trait subscales as well as somatic and cognitive subscales; however more research is needed to examine the reliability and validity of the STICSA. Only three published studies to date have investigated the psychometrics of the STICSA (Grös et al., 2007; Grös et al., 2010; Ree et al., 2008). Further research is needed to clarify the factor structure of the STICSA and to expand upon the convergent, divergent, and predictive validity of the STICSA and its subscales. Additionally, the theoretical implications and the clinical utility of the STICSA and its subscales need to be considered.

### 1.5 Overview of Studies

The current studies propose to further validate the STICSA and its subscales and to compare the STICSA with another commonly used self-report measure of anxiety, the STAI. The specific aims include: 1) comparing and contrasting the fit of six different factor models of the STICSA to data from a large sample of undergraduate students, 2) further investigating the convergent and divergent validity of the STICSA, 3) determining the STICSA's sensitivity to changes in anxiety after a social challenge, 4) determining whether scores on the trait version of the STICSA can predict scores on the state version of the STICSA after a social challenge, and 5) comparing and contrasting the validity of the STICSA with the STAI.

# 2. Study 1

## 2.1 Overview of Study

Study 1 investigated the factor structure of the STICSA and the reliability and validity of the STICSA and the STAI. Participants completed a battery of self-report questionnaires online. The battery included the STICSA, the STAI, and measures of global anxiety, social anxiety, depression, affect, personality features, and quality of life.

## 2.2 Hypotheses

**Factor structure.** It is hypothesized that the hierarchical model of the STICSA, including a global anxiety factor and four specific factors (state-somatic, state-cognitive, trait-somatic, and trait-cognitive; see Figure 5), will fit the data better than five alternative models. The five alternative models are 1) a two-factor model of the state version of the STICSA with correlated somatic and cognitive factors (Ree et al., 2008; see Figure 1); 2) a two-factor model of the trait version of the STICSA with correlated somatic and cognitive factors (Ree et al., 2008; see Figure 1); 3) a two-factor model of the STICSA with correlated state and trait factors (Grös et al; 2007; see Figure 2); 4) a two-factor model of the STICSA with correlated somatic and cognitive factors (Grös et al; 2007; see Figure 3); and 5) a four-factor correlated model of the STICSA including factors corresponding to the STICSA subscales (Grös et al., 2007; see Figure 4). Model fit will be judged using several fit indices including the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI).

**Convergent validity.** The state version of the STICSA (and its somatic and cognitive subscales) will be strongly positively correlated (*rs* > .50) with the state version of the STAI. They will also be moderately positively correlated (*rs* > .30) with the negative affect subscale of the state version of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988).

The trait version of the STICSA (and its somatic and cognitive subscales) will be strongly correlated with the trait version of the STAI. Further, they will be moderately positively correlated with the following scales: Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990), Generalized Anxiety Disorder-7 (GAD-7; Spitzer et al., 2006), Brief Fear of Negative Evaluation-Straightforward items (BFNE-S; Leary, 1983; Rodebaugh et al., 2004), the Social Interaction Anxiety Scale (SIAS), the Social Phobia Scale (SPS; Mattick & Clarke, 1998), and the negative affect subscale of the trait version of the PANAS.

The somatic subscale of the trait version of the STICSA will be strongly positively correlated with the physical concerns subscale of the ASI-3, the anxious arousal subscale of the Mood and Anxiety Symptom Questionnaire (MASQ; Watson & Clark, 1991), and the somatic subscales of the CSAQ and TAQ. It will also be moderately positively correlated with the anxiety subscale of the MASQ. The cognitive subscale of the trait version of the STICSA will be strongly positively correlated with the cognitive subscales of the CSAQ, TAQ and the Anxiety Sensitivity Index-3 (ASI-3; S. Taylor et al., 2007).

**Divergent validity.** The trait version of the STICSA (and its somatic and cognitive subscales) will be moderately positively correlated with depression measures, including the depression and anhedonic depression subscales of the MASQ, the BDI-II, and the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). They will also be moderately positively correlated with a measure of body shape dissatisfaction, the Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987). They will be weakly positively correlated ($rs \leq .10$) with a measure of desirable responding (the Balanced Inventory of Desirable Responding [BIDR]; Paulhus, 1994), and weakly negatively correlated ($rs < -.10$) with three measures of behavioral activation (drive, fun-seeking, reward responsiveness) from the Behavioral Inhibition System /Behavioral Activation System Scales (BIS/BAS Scales; Carver & White, 1994) and with the Impulsive Sensation Seeking Scale (ImpSS; Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). The trait scale and subscales of the STICSA are predicted to be less correlated with measures of depression than the trait version of the STAI.

**Personality features and quality of life.** The trait version of the STICSA (and its subscales) will be strongly positively correlated with a measure of neuroticism and moderately negatively correlated with measures of extraversion and agreeableness from the Mini-International Personality Item Pool Scales (Mini-IPIP; Donnellan, Oswald, Baird, & Lucas, 2006). They will also be moderately negatively correlated with measures of quality of life, including the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) and the four subscales (physical health, psychological, social

relationships, and environment) of the World Health Organization's Quality of Life-Brief (WHOQOL-BREF; The WHOQOL Group, 1998).

## 2.3 Method

**Participants.** A large sample ($N = 585$) of students enrolled in an introductory psychology course at York University in Toronto, Canada completed the study online. Data were collected from January 2011 to October 2011. Only data from participants who partially or fully completed the STICSA ($n = 560$) were used in the present study (see Table 1 for demographics). These participants did not differ significantly from participants who did not complete the STICSA on age, number of years in Canada, education, gender, ethnicity, religion, or sexual orientation. Participants were 17 years or age or older ($M = 20.91$ $SD = 4.91$) and identified predominantly as female (75.36%) and heterosexual (93.91%). Although the majority of participants were born in Canada (62.50%), a large number of participants ($n = 209$) were born in other countries (e.g., Pakistan, India, China, Iran). Participants who were not born in Canada reported living in Canada for an average of 10.58 years ($SD = 6.26$). All participants received 1% credit toward their introductory psychology course grade for completing the study.

**Measures.** See Table 2 for the mean scores and internal consistencies of all administered measures. Measures with coefficient alphas that were less than .65 in the current sample were considered unacceptable, as per recommendations from DeVellis (1991, 2003) and were not included in any further analyses.

Table 1

Demographic Characteristics of Online Sample (n = 560)

| Variable | Mean (*SD*) | % |
|---|---|---|
| Age[a] | 20.91 (4.91) | |
| Years in Canada[b] | 16.45 (6.83) | |
| Among Immigrant Participants[c] | 10.58 (6.26) | |
| Gender | | |
| Male | | 24.11 |
| Female | | 75.36 |
| Transgender (Female to Male, Male to Female) | | 0.54 |
| Sexual Orientation[d] | | |
| Heterosexual | | 93.91 |
| "Homosexual"[†] | | 1.61 |
| Bisexual | | 4.48 |
| Education | | |
| Some High School/High School Diploma | | 5.71 |
| Some University/College/ Technical School | | 89.11 |
| Bachelor's/Graduate Degree or Technical Certificate | | 5.18 |

| | |
|---|---|
| Ethnicity[e] | |
| White - European | 37.16 |
| African | 7.36 |
| South Asian | 20.83 |
| East Asian | 14.36 |
| Middle Eastern | 10.77 |
| Other Ethnicity (e.g., Hispanic, Aboriginal) | 1.97 |
| Mixed Ethnicity (e.g., East Asian/British) | 7.54 |
| Religion[a] | |
| Catholic | 23.79 |
| Protestant | 6.08 |
| Other Christian (e.g., Eastern Orthodox) | 12.88 |
| Jewish | 6.08 |
| Islamic | 16.10 |
| Hindu/Sikh | 9.48 |
| Other Religion (e.g., Buddhism, Agnostic) | 11.45 |
| None/Atheist | 14.13 |

*Note.* Some percentages may not add up to 100% due to rounding.
[a]$n = 559$. [b]$n = 553$. [c]$n = 207$. [d]$n = 558$. [e]$n = 557$.
†Please not that although the term homosexual was used in the questionnaire package, APA (2000) suggests avoiding using this term as it may perpetuate negative stereotypes.

Table 2

Descriptive Statistics and Internal Consistencies of Administered Measures

| Measure | *n* | Mean (*SD*) | α | 95% CI |
|---|---|---|---|---|
| SICSA | 543 | 33.57 (12.44) | .95 | .94-.95 |
| SICSA – Somatic | 547 | 15.86 (6.32) | .92 | .91-.93 |
| SICSA – Cognitive | 549 | 17.77 (7.15) | .92 | .91-.93 |
| TICSA | 548 | 36.10 (12.92) | .95 | .94-.95 |
| TICSA – Somatic | 550 | 16.89 (6.63) | .93 | .92-.94 |
| TICSA – Cognitive | 553 | 19.26 (7.40) | .92 | .91-.93 |
| STAI – State Version | 539 | 44.22 (10.89) | .90 | .89-.91 |
| STAI – State Version, Anxiety Items[a] | 548 | 14.13 (4.79) | .85 | .83-.87 |
| STAI – State Version, Depression Items[a] | 541 | 30.15 (7.54) | .88 | .86-.89 |
| STAI – Trait Version | 541 | 43.53 (10.32) | .91 | .90-.92 |
| STAI – Trait Version, Anxiety Items[a] | 549 | 14.43 (4.58) | .87 | .85-.89 |
| STAI – Trait Version, Depression Items[a] | 541 | 29.13 (7.14) | .89 | .87-.90 |
| ASI-3 – Physical Concerns | 547 | 5.49 (5.46) | .89 | .87-.90 |
| ASI-3 – Cognitive Concerns | 549 | 5.85 (5.70) | .90 | .89-.91 |
| CSAQ – Somatic | 545 | 15.97 (6.20) | .84 | .82-.86 |
| CSAQ – Cognitive | 547 | 18.00 (7.04) | .89 | .88-.90 |

| | | | | |
|---|---|---|---|---|
| TAQ – Somatic | 541 | 28.76 (24.95) | .95 | .94-.95 |
| TAQ – Cognitive | 549 | 31.75 (20.59) | .93 | .92-.94 |
| MASQ – General Distress: Anxiety | 547 | 24.53 (10.42) | .93 | .92-.94 |
| MASQ – Anxious Arousal | 549 | 29.12 (13.83) | .95 | .95-.96 |
| MASQ – General Distress: Depression | 547 | 29.12 (12.95) | .96 | .95-.96 |
| MASQ – Anhedonic Depression | 542 | 61.55 (18.32) | .95 | .94-.95 |
| PSWQ | 549 | 51.74 (13.98) | .93 | .92-.94 |
| GAD-7 | 548 | 7.12 (5.24) | .90 | .89-.91 |
| BFNE-S | 551 | 21.52 (8.76) | .96 | .95-.96 |
| SPS | 543 | 22.18 (16.11) | .94 | .94-.95 |
| SIAS | 539 | 29.87 (16.10) | .94 | .93-.95 |
| BDI-II | 542 | 13.77 (11.15) | .94 | .93-.94 |
| CES-D | 543 | 19.22 (11.43) | .91 | .90-.92 |
| BSQ | 542 | 87.68 (40.92) | .98 | .98-.98 |
| Mini-IPIP – Extraversion | 550 | 12.28 (3.49) | .74 | .71-.78 |
| Mini-IPIP – Agreeableness | 549 | 15.17 (2.95) | .69 | .65-.73 |
| Mini-IPIP – Conscientiousness[b] | 548 | 13.93 (2.95) | .60 | .54-.65 |
| Mini-IPIP – Neuroticism[b] | 547 | 12.14 (2.91) | .50 | .43-.57 |
| Mini-IPIP – Intellect/Imagination[b] | 549 | 14.27 (2.83) | .59 | .54-.65 |

| | | | | |
|---|---|---|---|---|
| ImpSS | 242 | 9.00 (4.53) | .83 | .80-.86 |
| BAS Scales – Drive | 243 | 8.90 (2.47) | .74 | .69-.79 |
| BAS Scales – Reward Responsiveness | 244 | 8.63 (2.93) | .80 | .76-.84 |
| BAS Scales – Fun-Seeking | 244 | 8.42 (2.58) | .71 | .65-.77 |
| PANAS – State Version: Positive Affect | 529 | 24.69 (9.36) | .92 | .90-.93 |
| PANAS – State Version: Negative Affect | 532 | 18.26 (8.25) | .92 | .91-.93 |
| PANAS – Trait Version: Positive Affect | 529 | 30.88 (8.23) | .91 | .90-.92 |
| PANAS – Trait Version: Negative Affect | 530 | 20.01 (7.67) | .91 | .89-.92 |
| SWLS | 552 | 23.64 (6.90) | .91 | .89-.92 |
| WHOQOL-BREF – Physical Health | 543 | 68.75 (16.95) | .79 | .76-.82 |
| WHOQOL-BREF – Psychological | 542 | 59.71 (18.61) | .83 | .81-.85 |
| WHOQOL-BREF – Social Relationships | 544 | 60.02 (23.56) | .76 | .72-.79 |
| WHOQOL-BREF – Environment | 545 | 67.48 (17.89) | .85 | .83-.86 |
| BIDR – Self-Deception[b] | 534 | 83.39 (11.30) | .62 | .58-.67 |
| BIDR – Impression Management | 532 | 79.39 (15.14) | .75 | .71-.78 |

*Note.* SICSA = State version of the State-Trait Inventory for Cognitive and Somatic Anxiety; TICSA = Trait version of the State-Trait Inventory for Cognitive and Somatic Anxiety; STAI = State-Trait Anxiety Inventory; ASI-3 = Anxiety Sensitivity Index-3; CSAQ = Cognitive Somatic Anxiety Questionnaire; TAQ = Trimodal Anxiety Questionnaire; MASQ = Mood Anixety Symptom Questionnaire; PSWQ = Penn State Worry Questionnaire; GAD-7 = Generalized Anxiety Disorder-7; BFNE-S = Brief Fear of Negative Evaluation Scale – Straightforward items; SPS = Social Phobia Scale; SIAS = Social Interaction Anxiety Scale; BDI-II = Beck Depression Inventory-II; CES-D = Center for

Epidemiologic Studies Depression Scale; BSQ = Body Shape Questionnaire; Mini IPIP = Mini-International Personality Item Pool Scales; ImpSS = Impulsive Sensation Seeking Scale; BAS Scales= Behavioral Activation System Scales; PANAS = Positive and Negative Affect Schedule; SWLS = The Satisfaction with Life Scale; WHOQOL-BREF = World Health Organization Quality of Life – Brief; BIDR = Balanced Inventory of Desirable Responding. Total *N* for the ImpSS and the BAS Scales are lower than the other measures as they were introduced into the questionnaire package at a later time.
[a]Bieling Antony, and Swinson (1998). [b]Measure excluded from analyses due to unacceptable internal consistency.

The following anxiety measures were reviewed in the introduction and administered to all participants: The State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA; Ree et al., 2008), the State-Trait Anxiety Inventory (STAI; Spielberger et al., 1983), the Cognitive Somatic Anxiety Questionnaire (CSAQ; Schwartz et al., 1978), and the somatic and cognitive subscales of the Trimodal Anxiety Questionnaire (TAQ; Lehrer & Woolfolk, 1982).

Demographics. Participants completed a self-report questionnaire including age, country of birth, number of years in Canada, gender, religion, ethnicity, education level, and sexual orientation.

Anxiety Sensitivity Index-3 (ASI-3; Taylor et al., 2007). The ASI-3 is an 18-item self-report scale derived from the original ASI (Reiss, Peterson, Gursky, & Mcnally, 1986) that measures individuals' sensitivity to and concern about anxiety symptoms. The ASI-3 contains three 6-item subscales: physical concerns (e.g., "It scares me when my heart beats rapidly"), cognitive concerns (e.g., "When my mind goes blank, I worry there is something terribly wrong with me"), and social concerns (e.g., "It is important to me not to appear nervous"). The social concerns subscale was not analyzed in the current study as participants completed social anxiety measures that contained similar items. Participants rate items on the ASI-3 on a 5-point scale ranging from 0 (*very little*) to 4 (*very much*). A sample of American undergraduate students scored an average of 2.90 ($SD$ = 3.72) and 2.46 ($SD$ = 3.61) on the physical concerns and cognitive concerns subscales, respectively (Osman et al., 2010). A sample of individuals with panic disorder

scored an average of 11.62 (*SD* = 6.56) and 9.44 (*SD* = 6.83) on the physical concerns and cognitive concerns subscales, respectively (Wheaton, Deacon, McGrath, Berman, & Abramowitz, 2012).

Acceptable internal consistencies have been found for the physical concerns ($\alpha$ = .79) and cognitive concerns ($\alpha$ = .83) subscales in samples of undergraduate students; higher internal consistencies have been found in samples of individuals with anxiety disorders (physical concerns: $\alpha$ = .86, cognitive concerns: $\alpha$ = .91; Taylor et al., 2007). Taylor and colleagues (2007) found that the three ASI-3 subscales had adequate internal consistencies in samples from Mexico, Spain, Netherlands, and France ($\alpha$s > .73). Wheaton and colleagues (2012) found very good internal consistencies for the physical and cognitive concerns subscales in a combined sample of individuals with and without anxiety disorders (physical concerns: $\alpha$ = .88; cognitive concerns $\alpha$ = .90). They also reported correlations among the ASI-3 subscales ranging from $r$ = .61 to $r$ = .67.

The three subscales of the ASI-3 correlate highly with the three subscales of the original ASI (Taylor et al., 2007). Total scores on the ASI-3 have strong correlations ($r$s = .52-.57) with the anxiety-specific subscales of the Symptom Assessment-45 (anxiety, phobic anxiety, obsessive-compulsive disorder, and paranoid anxiety disorder subscales; Davison et al., 1997), but also with a depression-specific subscale of the Symptom Assessment-45 (Osman et al., 2010). The physical concerns subscale of the ASI-3 correlates moderately ($r$ = .45) with the Short Health Anxiety Inventory (Salkovskis, Rimes, Warwick, & Clark, 2002), whereas the cognitive concerns subscale correlates

moderately ($r$ = .45) with the PSWQ (Wheaton et al., 2012). Individuals with clinical anxiety (i.e., panic disorder, obsessive-compulsive disorder, social anxiety disorder, generalized anxiety disorder) score significantly higher on the ASI-3 than controls, and individuals with panic disorder score significantly higher on the physical concerns subscale than individuals with other anxiety disorders (Taylor et al., 2007).

A three-factor model of the ASI-3 (i.e., physical, cognitive, and social factors) was supported by Taylor and colleagues (2007). There has been further support for the three-factor model of the ASI-3 (e.g. Osman et al., 2010; Wheaton et al., 2012); however there is also evidence that a bifactor model (i.e., an overarching general anxiety factor and three specific anxiety factors) may be a more appropriate model for some data (Kemper, Lutz, Bähr, Rüddel, & Hock, 2012; Osman et al., 2010).

Mood and Anxiety Symptom Questionnaire (MASQ; Watson & Clark, 1991). The MASQ is a self-report questionnaire assessing general distress. It originally consisted of 90 items that were divided into six subscales. However, further validation of the MASQ led to the deletion of certain items and the combining of two subscales (see Watson, Weber et al., 1995). The MASQ currently consists of 77 items divided into five subscales: general distress: mixed symptoms (GDM; 15 items; "Trouble concentrating"), general distress: depressive symptoms (GDD; 12 items; "Felt hopeless"), general distress: anxious symptoms (GDA; 11 items; "Unable to relax"), anxious arousal (AA; 17 items; "Cold or sweaty hands"), and anhedonic depression (AD; 22 items; "Felt slowed down"). The GDM subscale was not analyzed in the current study as it would not prove useful

when investigating the convergent and divergent validity of the STICSA and its subscales.

Participants rate how often they have experienced symptoms in the past week on a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*). A sample of male undergraduate students in Britain scored an average of 22.06 ($SD$ = 10.2) on the GDD, 19.63 ($SD$ = 7.7) on the GDA, 26.91 ($SD$ = 11.1) on the AA, and 54.72 ($SD$ = 16.5) on the AD subscales of the MASQ (female students' scores did not differ from the male students' scores; Reidy & Keogh, 1997). A sample of individuals with an anxiety disorder scored an average of 27.91 ($SD$ = 9.06) on the GDD, 24.88 ($SD$ = 8.14) on the GDA, 28.85 ($SD$ = 10.83) on the AA, and 66.47 ($SD$ = 15.83) on the AD subscale of the MASQ (Boschen & Oei, 2007). The average scores for individuals with depression were similar to the average scores for individuals with anxiety disorders on all the MASQ subscales except the GDD subscale. Depressed individuals scored significantly higher on the GDD subscale than anxious individuals (Boschen & Oei, 2007).

Internal consistencies of the MASQ subscales range from acceptable to excellent in samples of students, adults, and psychiatric patients ($\alpha$s = .66-.93; Boschen & Oei, 2006; Buckby, Yung, Cosgrave, & Killackey, 2007; Watson, Weber, et al., 1995). Correlations between the subscales range from moderate ($r$ = .45 for AD and AA) to very strong ($r$ = .81 for GDD and GDM; Boschen & Oei, 2006). The AA subscale of the MASQ correlates moderately ($r$ = .40) with the anxiety subscale of the Hospital Anxiety Depression Scale (HADS; Zigmond & Snaith, 1983) and the AD subscale of the MASQ

correlates strongly ($r$ = .72) with the depression subscale of the HADS (Reidy & Keogh, 1997). Further, the AD subscale correlates strongly ($r$ = .72) with the CES-D and can accurately predict the presence or absence of a mood disorder in young adults (Buckby et al., 2007).

There is some evidence that the MASQ does not have good divergent validity for anxiety. Individuals with a mood disorder and individuals with both an anxiety and a mood disorder scored higher on all MASQ subscales than individuals with only an Axis-I anxiety disorder in a sample of young adults (Buckby, Yung, Cosgrave, & Cotton, 2007). Further, in a sample of individuals receiving treatment for difficulties with mood and/or anxiety, there were no differences on the AA subscale between individuals with an anxiety disorder and those with no diagnosis (Boschen & Oei, 2007).

Factor analyses of the MASQ support Clark and Watson's (1991) tripartite model of anxiety and depression, which includes a factor of nonspecific symptoms of general distress (or high negative affect), a depression-specific factor (or low positive affect), and an anxiety-specific factor (or high physical hyper arousal; Keogh & Reidy, 2000; Watson, Clark et al., 1995). However, other researchers have not found support for this model (e.g., Boschen & Oei, 2006). In fact, Boschen and Oei (2006) tested several different models of the MASQ (e.g., two-factor model with depression and anxiety factors; five-factor model with the MASQ subscales as factors) in a sample of individuals with mood and anxiety disorders, but none of the models fit the data adequately.

Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990). The PSWQ is a 16-item self-report scale measuring the extent to which an individual worries. Participants rate items (e.g., "When I am under pressure I worry a lot") on a 5-point scale ranging from 1 (*not at all typical of me*) to 5 (*very typical of me*). A sample of undergraduate students scored an average of 48.39 ($SD$ = 13.87) on the PSWQ (Fresco, Heimberg, Mennin, & Turk, 2002). A sample of individuals with generalized anxiety disorder scored an average of 68.11 ($SD$ = 9.59) on the PSWQ (Brown, Antony, & Barlow, 1992). There is some evidence that females score more highly on the PSWQ than males (Meyer et al., 1990). Olatunji, Schottenbauer, Rodriguez, Glass, and Arnkoff (2007) found that females scored significantly higher on the PSWQ ($M$ = 42.05, $SD$ = 14.09) than males ($M$ = 37.40, $SD$ = 13.40). This gender difference, however, was not evident in individuals diagnosed with generalized anxiety disorder (Brown et al., 1992).

Internal consistencies for the PSWQ have been found to be excellent in samples of undergraduate students ($\alpha$s = .93–.94; Meyer et al., 1990) and in samples of individuals with generalized anxiety disorder, social anxiety disorder, obsessive-compulsive disorder, and panic disorder ($\alpha$s = .86–.94; Brown et al., 1992). PSWQ scores are relatively consistent over time in samples of undergraduate students, with test-retest correlations of $r$ = .74 and $r$ = .75, after 2 and 4 weeks, respectively (Meyer et al., 1990).

Meyer and colleagues (1990) found a stronger correlation between the PSWQ and the trait version of the STAI ($r$ = .64) than between the PSWQ and the BDI ($r$ = .36).

They also found strong correlations between the PSWQ and the cognitive ($r$ = .70) and somatic ($r$ = .55) subscales of the CSAQ. Among individuals with anxiety disorders, The PSWQ correlates moderately to strongly with the tension ($r$ = .54), anxiety ($r$ = .35), and depression ($r$ = .39) subscales of the Self-Analysis Questionnaire - Form 9 (Lovibond, 1983), and correlates negatively with Rapee, Craske, and Barlow's (1989) Emotional Control Questionnaire ($r$ = -.52; Brown et al., 1992). Individuals who meet criteria for generalized anxiety disorder score significantly higher on the PSWQ than individuals who meet some generalized anxiety disorder criteria, individuals who meet no generalized anxiety disorder criteria and individuals who meet criteria for post-traumatic stress disorder (Meyer et al., 1990).

Meyer and colleagues (1990) proposed a one-factor model for the PSWQ, only retaining items that loaded highly on one general factor. However, other researchers provide support for a two-factor model of the PSWQ, with a worry engagement factor incorporating the positively worded items and an absence of worry factor incorporating the reverse-scored items (e.g., Fresco et al., 2002; Olatunji et al., 2007). Brown (2003) concluded that the PSWQ is unidimensional but that it has specified method effects from the reverse-scored items.

Generalized Anxiety Disorder-7 (GAD-7; Spitzer et al., 2006). The GAD-7 is a seven-item self-report scale measuring symptoms of generalized anxiety disorder, including items measuring DSM-IV criteria for a diagnosis of generalized anxiety disorder (e.g., feeling nervous, inability to control worry). There is also an additional

question at the end of the scale pertaining to life interference. Individuals rate the frequency with which they have experienced certain symptoms (e.g., "Trouble relaxing") in the past 2 weeks on a 4-point scale ranging from 0 (*not at all*) to 3 (*nearly every day*). Individuals are grouped into categories based on their total scores: 0-4 = minimal, 5-9 = mild, 10-14 = moderate, and 15-21 = severe. Scores equal to or greater than 10 on the GAD-7 are considered in the range of generalized anxiety disorder (Spitzer et al. 2006). A cut-off score of 12 has also been suggested based on a web-based version of the GAD-7 (Donker, van Straten, Marks, & Cuijpers, 2011).

There is evidence that on average women score higher than men on the GAD-7, but their average scores still put them in the minimal category (Löwe et al., 2008). Individuals with and without generalized anxiety disorder scored an average of 13.96 (*SD* = 0.41) and 3.54 (*SD* = 0.32), respectively, on the GAD-7 (Ruiz et al., 2011). Internal consistencies range from good to excellent in non-clinical populations ($\alpha$ = .86–.92; Donker et al., 2011; Löwe et al., 2008; Spitzer et al., 2006). Spitzer and colleagues (2006) found a high 1-week test-retest correlation (ICC = .83) in a sample of individuals attending primary care facilities.

The GAD-7 correlates strongly with the BAI ($r$ = .73) and the anxiety checklist of the SCL-90 ($r$ = .74; Derogatis et al., 1973; Spitzer et al., 2006). It also correlates strongly with the Hamilton Rating Scale for Anxiety ($r$ = .85; Hamilton, 1959; Ruiz et al., 2011). Higher scores on the GAD-7 are associated with an increased number of physician visits and disability days (i.e., days where symptoms interfered with usual activities;

Spritzer et al., 2006). Further, as individuals' scores increase in categorical severity on the GAD-7, their scores on the mental and social quality of life subscales of the SF-20 (Stewart, Hays, & Ware, 1988) decrease significantly (Spitzer et al., 2006).

Although the GAD-7 correlates moderately to strongly with measures of depression (Löwe et al., 2008; Spitzer et al., 2006), a factor analysis of the combined items of the GAD-7 and the CES-D found that the items of the GAD-7 loaded on a separate anxiety factor (Donker et al., 2011). Löwe and colleagues (2008) found a moderate negative correlation ($r$ = -.43) between the GAD-7 and the Rosenberg Self-Esteem Scale (Rosenberg, 1965). Factor analyses have supported a one-factor model of the GAD-7 (Donker et al, 2011; Löwe et al., 2008).

Brief Fear of Negative Evaluation – Straightforwardly-worded items (BFNE-S; Leary, 1983; Rodebaugh et al., 2004). The BFNE-S is an eight-item self-report scale measuring an individual's fear of being negatively evaluated by others (e.g., "I often worry that I will say or do the wrong things"). Participants rate items on a 5-point scale ranging from 1 (*not at all characteristic of me*) to 5 (*extremely characteristic of me*). The BFNE-S is based on the Fear of Negative Evaluation Scale (FNE; Watson & Friend, 1969). Compared to the true-false items in the FNE, the items in the BFNE better discriminate over a wider range of the latent construct (i.e., social anxiety; Rodebaugh et al., 2004). Due to its superior psychometric properties, researchers have recommended the use of the BFNE-S over the FNE and BFNE, as it eliminates the reverse-coded items of the BFNE which are unrelated to social anxiety (e.g., Rodebaugh et al., 2004; Weeks

et al., 2005). A community sample (ages 18-59) scored an average of 17.92 (*SD* = 7.50) on the BFNE-S and samples of university students scored an average of 17.25 to 22.89 (*SD*s = 5.99-9.36) on the BFNE-S (Rodebaugh et al., 2011). A sample of individuals with social anxiety disorder scored an average of 26.98 (*SD* = 5.87) on the BFNE-S (Carleton, Collimore, McCabe, & Antony, 2011). Carleton and colleagues (2011) suggest that a score of 25 is indicative of social anxiety disorder.

The BFNE-S has high internal consistencies in community samples (α = .90-.94; Duke, Krishnan, Faith, & Storch, 2006; Weeks et al., 2005), student samples (αs > .91; Rodebaugh et al., 2011), and in a sample of individuals with social anxiety disorder (α = .92; Weeks et al, 2005). The BFNE-S correlates moderately to strongly with the Liebowitz Social Anxiety Scale (Liebowitz, 1987; *r* = .59), the SIAS (*r* = .46), the SPS (*r* = .40), and the social phobia subscale of the Fear Questionnaire (*r* = .40; Marks & Mathews, 1979; Weeks et al., 2005). It also correlates strongly (*r* = .51) with the PSWQ (Weeks et al, 2005). The BFNE-S has been shown to be sensitive to the effects of therapeutic treatment for social anxiety disorder (Weeks et al, 2005). The BFNE-S is only moderately correlated with the BDI-II (*r* = .35), the UCLA Loneliness Scale (*r* = .34; Duke et al., 2006; Russell, Peplau, & Cutrona, 1980), and the ASI (*r* = .27; Weeks et al., 2005).

A factor analysis of the original BFNE revealed a two-factor structure separating the positively and negatively-worded items (Rodebaugh et al., 2004). The two-factor model of the original BFNE has been supported, with a moderate negative correlation

between the two factors ($r$ = -.42; Weeks et al., 2005). As the reverse-worded factor was eliminated in the BFNE-S, factor analyses of the BFNE-S support a one-factor model (Carleton et al., 2011).

Social Interaction Anxiety Scale (SIAS) and Social Phobia Scale (SPS; Mattick & Clarke, 1998). The SIAS and SPS are companion self-report measures. The SIAS measures anxiety that is experienced when meeting and talking with other people (e.g., "I feel tense if I am alone with just one person"). The SPS measures anxiety that is experienced when a person is being observed by others or when a person undertakes certain tasks in front of others (e.g., "I become anxious if I have to write in front of others"). The SPS assesses scrutiny fears (e.g., eating, drinking, and writing in front of others) that are not often represented in social anxiety measures. Each scale consists of 20 items rated on a 4-point scale. Participants indicate how characteristic or true each statement is of them, ranging from 0 (*not at all*) to 4 (*extremely*). Scores greater than 36 on the SIAS and scores greater than 26 on the SPS are indicative of social anxiety disorder (Peters, 2000). A sample of undergraduate students scored an average of 19.0 ($SD$ = 10.1) on the SIAS and 14.1 ($SD$ = 10.2) on the SPS. A sample of individuals with social anxiety disorder scored an average of 34.6 ($SD$ = 16.4) on the SIAS and an average of 40.0 ($SD$ = 16.0) on the SPS (Mattick & Clarke, 1998).

The SIAS and SPS have high internal consistencies ($\alpha$s = .88-.93 and $\alpha$s = .89-.90, respectively) in samples of undergraduate students, community members, and individuals with social anxiety disorder (Mattick & Clarke, 1998; Osman, Gutierrez, Barrios,

Kopper, & Chiros, 1998). They also have excellent 4-week and 3-month test-retest reliabilities among individuals with social anxiety disorder (*r*s = .91-.93; Mattick & Clarke, 1998; Osman et al., 1998). Correlations between the SIAS and SPS range from *r* = .72 to *r* = .77 (Gore, Carter, & Parker, 2002; Mattick & Clarke, 1998; Peters, 2000).

The SIAS and SPS correlate strongly with the Social Phobia Anxiety Inventory (Beidel, Turner, Stanley, & Dancu, 1989), the FNE, the Social Avoidance and Distress Scale (Watson & Friend, 1969), and the social phobia subscale of the Fear Questionnaire (*r*s = .54-.85; Mattick & Clarke, 1998; Peters, 2000). The SIAS and SPS have adequate divergent validity, with weak correlations (*r* = -.05 to *r* = -.09) with the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960) and moderate to strong correlations (*r*s = .47-.54) with the BDI-Short Form (Beck & Beck, 1972; Mattick & Clarke, 1998). The SIAS and SPS can discriminate between individuals with social anxiety disorder, agoraphobia, and simple phobia, as well as between individuals with social anxiety disorder and control participants (Mattick & Clarke, 1998). The SIAS and SPS combined have also been shown to predict anxious responses to social challenges (e.g., Gore et al., 2002). Research supports a two-factor correlated model of the SIAS and SPS, with each scale encompassing one factor (Heidenreich, Schermelleh-Engel, Schramm, Hofmann, & Stangier, 2011; Osman et al., 1998).

Beck Depression Inventory-II (BDI-II; Beck et al., 1996). The BDI-II is a 21-item self-report scale measuring depressive symptomatology in the past 2 weeks. Participants choose one of four statements on a scale from 0 to 3 (e.g., "Sadness: 0 - I do not feel sad,

1 - I feel sad much of the time, 2 - I am sad all the time, and 3 - I am so sad or unhappy that I can't stand it"). Individuals are classified into categories based on their total scores: 0-13 = minimal, 14-19 = mild, 20-28 = moderate and 29-63 = severe. A sample of undergraduate students scored an average of 8.36 (*SD* = 7.16) on the BDI-II (Whisman, Perez, & Ramel, 2000). A sample of actively depressed individuals scored an average of 27.53 (*SD* = 9.79) on the BDI-II (Sprinkle et al., 2002). Gender differences have been detected on the BDI-II, with women tending to score higher than men (Osman et al., 1997; Steer, Ball, Ranieri, & Beck, 1997). No differences in mean scores were detected when comparing the paper-based and computerized forms of the BDI-II (Schulenberg & Yutrzenka, 2001).

Internal consistencies of the BDI-II are high in samples of psychiatric outpatients ($\alpha$s = .87–.93) and samples of undergraduate students ($\alpha$s = .89 - .93; Beck et al.,1996; Dozois, Dobson, & Ahnberg, 1998; Osman et al., 1997; Steer et al.,1997; Titov et al., 2011; Whisman et al., 2000). Test-retest correlations after 3 to 7 days range from $r$ = .60 to $r$ = .88 (Sprinkle et al., 2002). The BDI-II correlates strongly with the Patient Health Questionnaire-9 ($r$ = .72-.73; Kroenke, Spitzer, & Williams, 2001; Titov et al., 2011) and the depression subscales of the DASS and MASQ ($r$s = .70-.77; Osman et al., 1997). It also correlates strongly with the depression subscale of the SCL-90-R ($r$ = .89), which is significantly higher than its correlation with the anxiety subscale of the SCL-90-R ($r$ = .71; Steer et al., 1997). The BDI-II correlates moderately to strongly with the BAI and the

anxiety subscales of the DASS and MASQ (*r*s = .44-.56). A non-significant correlation was found between the BDI-II and a measure of social desirability (Osman et al., 1997).

Although the total score of the BDI-II is normally used to indicate overall depressive severity, researchers have not reached a consensus on the factor structure of the BDI-II. Some researchers have found support for a two-factor model of the BDI-II, including somatic and cognitive factors (e.g., Dozois et al., 1998; Quilty, Zhang, & Bagby, 2010; Titov et al., 2011; Whisman et al., 2000), while others have found support for models with three factors ( e.g., general distress, somatic and cognitive factors; Osman et al., 1997; Quilty et al., 2010; Ward, 2006).

Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is a 20-item self-report scale designed to measure depressive symptomatology in the general population. Participants indicate how frequently they have experienced certain symptoms (e.g., "I felt sad") within the last week. Items are rated on a 4-point scale ranging from 0 (*rarely or none of the time - less than 1 day*) to 3 (*most or all of the time - 5 to 7 days*). Total scores at or above 16 are considered indicative of depression (Radloff, 1977). A sample of undergraduate students scored an average of 14.40 (*SD* = 9.28) on the CES-D. A sample of depressed males and females scored an average of 20.00 (*SD* = 16.10) and 25.00 (*SD* = 16.20), respectively, on the CES-D (Santor, Zuroff, Ramsay, Cervantes, & Palacios, 1995). No differences in psychometric properties or factor structure were detected when comparing the paper-based and computerized forms of the CES-D (Herrero & Meneses, 2006).

The CES-D has high internal consistencies in samples of students, community members, and psychiatric patients (αs = .84-.90; Devins, Orme, Costello, & Binik, 1988; Orme, Reis, & Herz, 1986; Radloff, 1977) and adequate test-retest reliabilities over the span of 2 to 8 weeks (*rs* = .51-.67; Radloff, 1977) and 3 months (*r* = .61; Devins et al., 1988). The CES-D correlates strongly with the BDI-II in both university students and depressed individuals (*r*s = .86 and .87, respectively; Santor et al., 1995). It also correlates strongly with the Beck Hopelessness Scale (*r* = .52; Beck, Weissman, Lester, & Trexler, 1974; Cheung, Liu, & Yip, 2007) and the Rosenberg Self-Esteem Scale (*r* = .58; Orme et al., 1986). The CES-D can discriminate between psychiatric inpatients and individuals from the community (Radloff, 1977). In regard to divergent validity, The CES-D correlates weakly with a measure of social desirability (*r* = -.18 to *r* = -.20; Radloff, 1977). There is also evidence, however, that the CES-D correlates strongly with the trait version of the STAI (*r* = .71; Orme et al., 1986).

Although many researchers use the total score of the CES-D as an indication of depressive severity, Radloff (1977) reported a four-factor model for the CES-D. The model included factors corresponding to depressed affect, positive affect, somatic and retarded activity, and interpersonal issues. Other researchers have found support for this model (e.g., Devins et al., 1988; Johnson, Mcleod, Sharpe, & Johnston, 2008; Shafer, 2006).

Body Shape Questionnaire (BSQ; Cooper et al., 1987). The BSQ is a 34-item self-report scale assessing behaviours and cognitions associated with body appearance which

are often seen in individuals prone to eating disorders. Participants indicate how frequently they experience these behaviours and cognitions (e.g., "Has eating even a small amount of food made you feel fat?") in the past 4 weeks. Items are rated on a 6-point scale ranging from 1 (*never*) to 6 (*always).* A sample of female undergraduate students and a sample of female psychiatric patients with body image issues scored an average of 96.30 (*SD* = 32.80) and 129.90 (*SD* = 29.00), respectively, on the BSQ. A sample of obese men who are dieting scored an average of 86.60 (*SD* = 20.70) on the BSQ (Rosen, Jones, Ramirez, & Waxman, 1996).

The BSQ has high internal consistencies in samples of European Americans and Hispanic Americans ($\alpha$ = .98 and .97, respectively; Warren et al., 2008) and a high 3-week test-retest reliability in female undergraduate students (*r* = .88; Rosen et al., 1996). The BSQ correlates moderately (*r* = .35) with the Eating Attitudes Test (Garner & Garfinkel, 1979) and correlates strongly (*r* = .66) with the body dissatisfaction subscale of the Eating Disorder Inventory (Garner, Olmstead, & Polivy, 1983) in samples of bulimic patients (Cooper et al., 1987). It also correlates strongly with the Body Dysmorphic Disorder Examination (Rosen, Reiter, & Orosan, 1995) in samples of female undergraduate students and female therapy patients (*r* = .77 and .58, respectively; Rosen et al., 1996). The BSQ can discriminate between individuals with and without eating disorders or body image issues (Cooper et al, 1987; Rosen et al., 1996). The BSQ correlates moderately with the SIAS (*r* = .48) and Zung's (1965) Self-Rating Depression

Scale ($r$ = .27; Liao et al., 2010). Factor analysis supports a one-factor model of the BSQ (Warren et al., 2008).

Mini-International Personality Item Pool Scales (Mini-IPIP; Donnellan et al., 2006). The Mini-IPIP is a 20-item shortened form of the 50-item IPIP-Five Factor Model self-report scale (Goldberg et al., 2006) which measures personality characteristics. The Mini-IPIP has five 4-item subscales: extraversion (E; "I am the life of the party"), agreeableness (A; "I sympathize with others' feelings"), conscientiousness (C; "I like order"), neuroticism (N; "I get upset easily"), and intellect/imagination (I; "I have a vivid imagination"). Participants rate the accuracy of each statement on a 5-point scale ranging from 1 (*very inaccurate*) to 5 (*very accurate*). The following are mean subscale scores in a sample of undergraduate students from England and Wales: E: 12.99 ($SD$ = 3.83), A: 16.57 ($SD$ = 2.85), C: 13.22 ($SD$ = 3.53), N: 11.81 ($SD$ = 3.72), and I: 15.81 ($SD$ = 3.11; Cooper, Smillie, & Corr, 2010).

All the Mini-IPIP subscales have acceptable internal consistencies in samples of undergraduate students: E (αs = .77-.82), A (αs = .70-.75), C (αs = .68-.75), N (αs = .68-.72), and I (αs = .65-.70; Donnellan et al., 2006; Cooper et al., 2010). The subscales also have adequate 3-week test-retest reliabilities (E: $r$ = .87; A: $r$ = .62; C: $r$ = .75; N: $r$ = .80; I: $r$ = .77) and 3-month test-retest reliabilities (E: $r$ = .86; A: $r$ = .68; C: $r$ = .77; N: $r$ = .82; I: $r$ = .75) in a sample of undergraduate students (Donnellan et al., 2006). Absolute correlations between the subscales range from $r$ = .01 to $r$ = .34 (Donnellan et al., 2006; Cooper et al., 2010). The conscientiousness, neuroticism, and intellect/imagination

subscales were excluded from analyses in the current study due to unacceptable internal consistencies in the study sample (see Table 2).

The Mini-IPIP subscales correlate strongly with their parent subscales in the IPIP-Five Factor Model (*r*s = .85-.93) and correlate moderately to strongly (*r*s = .49-.81) with the subscales of the Big Five Inventory (Donnellan et al., 2006; John & Srivastava, 1999). The neuroticism subscale of the Mini-IPIP correlates moderately to strongly with a measure of self-esteem (RSES; $r = -.60$), a measure of behavioural inhibition (BIS subscale of the BIS/BAS Scales; $r = .42$), a measure of general trait anxiety (trait version of the STAI, $r = .77$), a measure of depression (CES-D, $r = .53$), and a measure of aggression ($r = .49$; Buss Perry Agression Scale; Buss & Perry, 1992; Donnellan et al., 2006). The extraversion subscale correlates strongly with a measure of behavioural activation (BAS of the BIS/BAS Scales, $r = .50$; Donnellan et al., 2006). A five-factor model of the Mini-IPIP (with factors corresponding to the five subscales) has been partially supported in the literature (i.e., acceptable values for some fit statistics but not others; Donnellan et al., 2006; Cooper et al., 2010).

Impulsive Sensation Seeking (ImpSS) – Zuckerman-Kuhlman Personality Questionnaire-III-Revised (ZKPQ-III-R; Zuckerman et al., 1993). The ZKPQ-III-R is a measure of personality characteristics that was devised through factor analysis of several personality questionnaires. One of its scales, Impulsive Sensation Seeking (ImpSS), is a 19-item self-report scale that measures both impulsiveness (e.g., "Before I begin a complicated job, I make careful plans") and sensation seeking (e.g., "I'll try anything

once"). Participants indicate whether each statement is true or false in terms of describing them as a person. A sample of male and female undergraduate students scored an average of 11.12 (*SD* = 3.68) and 9.81 (*SD* = 3.96) on the ImpSS, respectively (Zuckerman et al, 1993). A sample of male and female Spanish adults scored an average of 8.03 (*SD* = 4.27) and 7.51 (*SD* = 4.09) on the ImpSS, respectively (Gomà-i-Freixanet, Valero, Muro, & Albiol, 2008). There is a tendency for males to score higher on the ImpSS than females (McDaniel & Mahan, 2008). De Leo, Van Dam, Hobkirk and Earleywine (2011) caution that scores on the ImpSS may vary based on group membership (e.g., age, gender, ethnicity, education) independent of differences in impulsivity and sensation seeking.

The ImpSS has good internal consistencies in undergraduate student samples (αs = .74-.84; McDaniel & Mahan, 2008; Zuckerman et al., 1993) and community samples (αs = .80-.87; Gomà-i-Freixanet et al, 2008; McDaniel & Mahan, 2008). The ImpSS correlates strongly with the Brief Sensation Seeking Scale (*r* = .83; Hoyle, Stephenson, Palmgreen, Pugzles Lorch, & Donofrew, 2002; Stephenson, Hoyle, Palmgreen, & Slater, 2003). It also correlates strongly with the impulsivity subscale of the Buss and Plomin (1975) Emotionality, Activity, Sociability, and Impulsivity Temperament scales (*r* = .70), the Sensation Seeking Scale – Form V (*r* = .66; Zuckerman, 1979; Zuckerman, Eysenck, & Eysenck, 1978), and the ego (under) control subscale of the Block Ego Scales (*r* = .63; J. H. Block & Block, 1980; Zuckerman et al., 1993). The ImpSS also has predictive validity for alcohol use, smoking, and gambling (McDaniel & Mahon, 2008). The ImpSS correlates very weakly with the neuroticism factors of the Eysenck Personality

Questionnaire (EPQ; Eysenck, Eysenck, & Barrett, 1985) and the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992; Aluja, Garcia, & Garcia, 2002). Factor analyses reveal that the items of the ImpSS are separate from the other factors of the ZKPQ-III-R and load onto one factor (Zuckerman et al., 1993).

The Behavioural Inhibition System (BIS)/ Behavioural Activation System (BAS) Scales (Carver & White, 1994). The BIS/BAS is a 24-item self-report scale measuring behavioural inhibition and behavioural activation as well as affective reactions to reward and punishment. The BIS/BAS contains four subscales: BIS (seven items; "I worry about making mistakes"), BAS – drive (four items; "I go out of my way to get things I want"), BAS – fun seeking (four items; "I crave excitement and new sensations"), and BAS – reward responsiveness (five items; It would excite me to win a contest"). Four items are fillers. Participants rate how much the items describe them on a 4-point scale ranging from 1 (*very true for me*) to 4 (*very false for me*). The BIS subscale was not analyzed in the current study as the items were similar in nature to items found in the administered anxiety scales. A sample of college students scored an average of 12.05 ($SD$ = 2.36) on the BAS – drive subscale, 12.43 ($SD$ = 2.26) on the BAS – fun seeking subscale, and 17.59 ($SD$ = 2.14) on the BAS – reward responsiveness subscale. Women tend to score higher than men on the BAS – reward responsiveness subscale (Carver & White, 1994; Jorm et al., 1999).

The BIS/BAS scales have adequate internal consistencies in undergraduate student samples ($\alpha$s = .66-.80; Carver & White, 1994; Cooper, Gomez, & Aucote, 2007;

Ross, Millis, Bonebright, & Bailley, 2002) and in an Australian community sample (αs = .65-.80; Jorm et al., 1999). Eight-week test-retest reliabilities of the BIS/BAS scales in a sample of undergraduate students ranged from $r$ = .59 (BAS – reward responsiveness) to $r$ = .69 (BAS – fun seeking; Carver & White, 1994). Carver and White (1994) found moderate correlations between the BAS subscales ($r$s = .34-.41).

All three BAS subscales correlate moderately to strongly with Eysenck and Eysenck's (1985) measure of extraversion ($r$s = .39-.59; Carver & White, 1994). The BAS – drive and BAS – fun seeking subscales correlate moderately with the hypomania subscale of the Minnesota Multiphasic Personality Inventory (MMPI; $r$ = .33 and $r$ = .37, respectively; Carver & White, 1994; Hathaway & McKinley, 1943). The BAS – fun seeking subscale also correlates strongly with the novelty seeking subscale of the Tridimensional Personality Questionnaire ($r$ = .51; Carver & White, 1994; Cloninger, 1987). The BAS – drive subscale is a predictor of later happiness (Carver & White, 1994) and the BAS – fun seeking subscale is a predictor of later engagement in risky health behaviours (e.g., substance use, unprotected sexual intercourse; Voigt et al., 2009). Regarding divergent validity, the BAS subscales correlate very weakly with the Manifest Anxiety Scale ($r$s = -.10 - .13; Bendig, 1956) and with the negative affect subscale of the PANAS ($r$s = -.07 - .05; Carver & White, 1994).

Based on a factor analysis of the BIS/BAS items, Carver and White (1994) determined that the BIS/BAS has four factors corresponding to the BIS/BAS subscales. Other researchers have replicated or partially replicated this four-factor structure of the

BIS/BAS (e.g.,Campbell-Sills, Liverant, & Brown, 2004; Cooper et al.,2007; Jorm et al.,1999; Leone, Perugini, Bagozzi, Pierro, & Mannetti, 2001; Ross et al.,2002). No alternative models have been suggested.

Positive and Negative Affect Schedule (PANAS; Watson et al., 1988). The PANAS is a 20-item self-report scale measuring positive affect (10 items) and negative affect (10 items). Watson and colleagues (1988) defined positive affect as "the extent to which a person feels enthusiastic, active, and alert" and negative affect as "subjective distress and unpleasurable engagement that subsumes a variety of aversive mood states" (p.1063). Individuals rate positive descriptors (e.g., "interested") and negative descriptors (e.g., "afraid") based on how characteristic they are of them on a 5-point scale from 1 (*very slightly or not at all*) to 5 (*extremely*). In the current study, participants were asked to complete the PANAS scales twice, once describing how they feel in the moment (state version of PANAS) and once describing how they feel in general (trait version of PANAS). A sample of undergraduate students scored an average of 29.70 ($SD$ = 7.90) on the positive affect subscale and an average of 14.80 ($SD$ = 5.40) on the negative affect subscale of the state version of the PANAS; the same sample scored an average of 35.00 ($SD$ = 6.40) on the positive affect subscale and an average of 18.10 ($SD$ = 5.90) on the negative affect subscale of the trait version of the PANAS (Watson et al., 1988).

The positive and negative affect subscales of the state and trait versions of the PANAS have high internal consistencies in undergraduate student samples ($\alpha$s = .86-.90 for positive affect; $\alpha$s = .85-.87 for negative affect; Watson et al., 1988). A

generalizability analysis of over 100 studies that administered the PANAS (Leue & Lange, 2011) revealed high overall internal consistencies for the positive and negative affect subscales of the state and trait versions of the PANAS in both adult and student samples (αs = .85-.89 for positive affect; αs = .84-.86 for negative affect). Watson and colleagues (1988) reported 8-week test-retest reliabilities of $r$ = .54 and $r$ = .45 for the positive and negative affect subscales of the state version of the PANAS, respectively. As expected, they found higher 8-week test-retest reliabilities for the positive and negative affect subscales of the trait version of the PANAS ($r$ = .68 and $r$ = .71, respectively). The positive affect and negative affect subscales of the PANAS correlate negatively with each other ($r$ = -.15 to $r$ = -.17; Watson et al., 1988).

The positive affect subscale of the PANAS (rating based on past few weeks) correlates negatively with the Hopkins Symptom Checklist ($r$ = -.19; Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974), the BDI ($r$ = -.36), and the state version of the STAI ($r$ = -.35; Watson et al., 1988). The negative affect subscale of the PANAS (rating based on past few weeks) correlates strongly with the Hopkins Symptom Checklist ($r$ = .74), the BDI ($r$ = .58,), and the state version of the STAI ($r$ = .51; Watson et al., 1988). The positive affect subscale (based on the past week) correlates negatively with all subscales of the DASS and the HADS ($r$s = -.30 to -.52), whereas the negative affect subscale correlates positively with these subscales ($r$s = .44-.67; Crawford & Henry, 2004).

Watson and colleagues (1988) originally conducted a factor analysis of the combined state and trait versions of the PANAS and found two factors (i.e., positive

affect and negative affect). Other researchers have supported this two-factor solution of the PANAS (e.g., Crawford & Henry, 2004; Tuccitto, Giacobbi, & Leite, 2010). There is evidence, however, that the structure of the PANAS may vary based on time instructions (e.g., moment, day; Schmukle, Egloff, & Burns, 2002).

The Satisfaction with Life Scale (Diener et al., 1985). The SWLS is a five-item self-report scale measuring satisfaction with life. Participants rate how much they agree with the statements (e.g., "The conditions of my life are excellent") on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Individuals are grouped into categories based on their total scores: 5-9 = extremely dissatisfied, 15-19 = slightly dissatisfied, 20 = neutral, 21-25 = slightly satisfied and 26-30 = extremely satisfied (Pavot & Diener, 1993).

Two samples of undergraduate students scored an average of 21.37 (*SD* = 7.22; Adler & Fagley, 2005) and 23.50 (*SD* = 6.43; Diener et al., 1985) on the SWLS. A sample of psychiatric patients scored an average of 20.10 (*SD* = 7.80) on the SWLS (Arrindell, van Nieuwenhuizen, & Luteijn, 2001). A meta-analysis of studies reporting the internal consistency of the SWLS revealed an average internal consistency of $\alpha = .78$ (Vassar, 2008). The SWLS has good 1-month and 2-month test-retest reliabilities in samples of undergraduate students (*rs* = .80-.84; Diener et al., 1985; Pavot, Diener, Colvin, & Sandvik, 1991; Steger, Frazier, Oishi, & Kaler, 2006).

The SWLS correlates moderately to strongly (*rs* = .46-.69) with the purpose subscale of the Meaning in Life Questionnaire (Steger et al., 2006), the Life Regard

Index (Battista & Almond, 1973), the Purpose in Life Test (Crumbaugh & Maholick, 1964), and the Life Orientation Test (Scheier & Carver, 1985; Steger et al., 2006). The SWLS correlates negatively with measures of perceived stress, suicidal ideation, and depression ($r$ = -.44 to $r$ = -.80) and positively with measures of self-esteem ($r$s = .55-.64; Pavot & Diener, 2008). No significant correlations were found between the SWLS and the Marlowe-Crowne Social Desirability Scale or Larsen's (1985) Affect Intensity Measure (Diener et al., 1985).

Diener and colleagues (1985) proposed a one-factor model of the SWLS. There is consistent support for the unidimensionality of the SWLS (e.g., Arrindell, Meeuwesen, & Huyse, 1991; Lewis, Shevlin, Bunting, & Joseph, 1995; Pavot et al., 1991). Hultell and Gustavsson (2008), however, found that the one-factor structure of the SWLS was not invariant across ages. The one-factor model fit the data from participants under the age of 35, but not the data from participants over the age of 35. In fact, one of the SWLS items ("So far I have gotten the important things I want in life") was positively correlated with age, and another item ("If I could live my life over I would change nothing") was negatively correlated with age.

The World Health Organization Quality of Life-Brief (WHOQOL- BREF; The WHOQOL Group, 1998). The WHOQOL-BREF is a 26-item self-report scale derived from the WHOQOL-100, a quality of life assessment (The WHOQOL Group, 1994). The scale consists of four domains pertaining to quality of life: physical health (seven items; e.g., "How well are you able to get around?"), psychological (six items; e.g., "How much

do you enjoy life?"), social relationships (three items; e.g., "How satisfied are you with your sex life?"), and environment (eight items; e.g., "How safe do you feel in your daily life?"). The scale also contains two items measuring global quality of life and satisfaction with health. Individuals respond to items based on the past 4 weeks. Items are rated on a 5-point scale ranging from 1 (*very poor/very dissatisfied/never*) to 5 (*very good/very satisfied/always*). Domain scores are calculated by taking the average score on each domain and multiplying by 4 (The WHOQOL Group, 1998). A sample of undergraduate students from the United Kingdom scored an average of 73.66 ($SD$ = 14.70) on the physical health subscale, 63.71 ($SD$ = 14.98) on the psychological subscale, 67.91 ($SD$ = 19.66) on the social relationships subscale and 63.94 ($SD$ = 12.76) on the environment subscale (Skevington & McCrate, 2011). There is evidence that women score higher on the social relationships subscale and lower on the physical health subscale than men (Skevington, Lotfy, & O'Connell, 2004). No differences in mean domain scores were detected when comparing the paper-based and computerized forms of the WHOQOL-BREF (Chen et al., 2009).

All the WHOQOL-BREF subscales have at least adequate internal consistencies in various community and student samples from around the world: physical health ($\alpha$s = .75-.87), psychological ($\alpha$s = .75-.87), social relationships ($\alpha$s = .60-.69), and environment ($\alpha$s = .79-.84; Chen et al., 2009; Hawthorne, Herrman, & Murphy, 2006; Skevington et al., 2004; The WHOQOL Group, 1998). Correlations among the subscales range from $r$ = .37 to $r$ = .64 (Hawthorne et al., 2006). The subscales have adequate 2-

week to 8-week test-retest reliabilities in healthy adult samples from around the world: physical health ($r$ = .66), psychological ($r$ = .72), social relationships ($r$ = .76), and environment ($r$ = .87). Individuals who report being ill or unhealthy (e.g., cancer, diabetes, depression) score lower on all domains of the WHOQOL-BREF than those who report being well or healthy (The WHOQOL Group, 1998; Skevington et al., 2004; Skevington & McCrate, 2011).

Skevington and McCrate (2011) compared the WHOQOL-BREF with the SF-36 (McHorney, Ware, & Raczek, 1993) and found a strong correlation between the physical health subscale of the WHOQOL-BREF and the physical functioning, pain, and vitality subscales of the SF-36 ($r$s = .72-.74). Further, they found strong correlations between the psychological subscale of the WHOQOL-BREF and the mental health, role emotional, and vitality subscales of the SF-36 ($r$s = .52-.70). Finally, they found a moderate correlation between the social relationships subscale of the WHOQOL-BREF and the social functioning subscale of the SF-36 ($r$ = .33).

The WHOQOL Group (1998) found support for a higher-order four-factor model of the WHOQOL-BREF (the four domains as factors that load onto one general quality of life factor) in samples from around the world. While other researchers have also provided support for a higher-order four-factor model of the WHOQOL-BREF (e.g., Chen et al., 2009; Skevington et al., 2004), there is evidence that this model may not fit data from a sample of American college students (e.g., D'Abundo, Orsini, Milroy, & Sidman, 2011).

Balanced Inventory of Desirable Responding (BIDR; Paulhus, 1994). The BIDR is a 40-item self-report scale measuring social desirability. The scale consists of two 20-item subscales: self-deception (SDE; honest self-reports that are positively biased) and impression management (IM; deliberate self-enhancement). Participants are asked to rate their agreement with a series of propositions (e.g., SDE: "I always know why I like things"; IM: "I never swear") on a 7-point scale ranging from 1 (*not true*) to 7 (*very true*). Subscales can be scored using the whole 1 to 7 scale or based on extreme scores (i.e., a score of 6 or 7 is given 1 point). Research by Stöber, Dette, and Musch (2002) and Vispoel and Tao (2012) suggest that scoring based on the 1 to 7 scale is more reliable and therefore this scoring procedure was used in the present study. A sample of German undergraduate students scored an average of 77.21 ($SD$ = 13.11) on the SDE and an average of 69.69 ($SD$ = 15.98) on the IM (scored 1 to 7; Stöber et al., 2002).

The SDE and IM subscales of the BIDR (scored 1 to 7) have acceptable internal consistencies in samples of undergraduate students ($\alpha$s = .69-.73 and $\alpha$s = .73-.83, respectively; Stöber et al., 2002; Vispoel & Tao, 2012). A reliability generalization analysis of over 30 different studies also found acceptable internal consistencies for both subscales ($\alpha$ = .68 and $\alpha$ = .74, respectively; Li & Bagger, 2007). The subscales have good 1-week test-retest reliabilities (scored 1 to 7) in a sample of undergraduate students ($r$ =.83 for SDE and $r$ = .86 for IM; Vispoel & Tao, 2012). Correlations between the two subscales are weak to moderate ($r$s = .20-.35; Stöber et al., 2002). In the present study,

the SDE subscale of the BIDR was excluded from analyses due to an unacceptable internal consistency in the study sample.

The IM subscale correlates moderately to strongly with other measures of impression management, including the Social Desirability Scale-17 ($r$ = .46; Stöber, 1999; 2001; Stöber et al., 2002), the lie and defensiveness subscales of the MMPI-II ($r$s = .51-.61), and the defensiveness and endorsement of excessive virtue subscales of the Psychological Symptom Inventory ($r$s = .54-.60; Ilfeld, 1976; Lanyon & Carle, 2007). The IM subscale is also negatively associated with the manifest anxiety subscale of the MMPI-II ($r$ = -.32 to $r$ = -.56; Butcher, 2005; Lanyon & Carle, 2007).

Paulhus (1984) originally proposed a two-factor model of the BIDR with impression management and self-deception enhancement factors. However, there is relatively little support for the two-factor model of the BIDR (but see Li & Reb, 2009). Leite and Beretvas (2005) found that both one-factor and two-factor models of the BIDR fit their data poorly. Paulhus and Reid (1991) have since suggested that the BIDR actually contains three separate factors: impression management, self-deception enhancement (claiming positive attributes), and self-deception denial (denying negative attributes).

**Procedure.** Participants signed up for Study 1 online through a university website. After signing up, they were given a link to an online survey which was administered using Qualtrics software (Qualtrics Labs, Inc., 2009). Before answering any questions, participants were asked to read an informed consent form and to indicate their

consent by clicking on an "I consent" button (see Appendix C). If a participant gave consent, he or she was able to access the study's battery of self-report questionnaires, which were presented in a random order (please note that state and trait versions of the same questionnaire were administered together with the state version administered first). Participants were informed that they could skip any questions they did not want to answer.

If any participant indicated having suicidal ideation or intentions on the BDI-II, they were directed to a separate page that asked them to contact the principal investigator (see Appendix D). After finishing the battery of self-report questionnaires, a debriefing form including a list of psychological resources (i.e., contact information for general medical/psychiatric inquiries, hospitals, distress lines) was presented to all participants (see Appendix E). Participants received 1% course credit toward their introduction to psychology course for participating.

**Data analysis**. Mplus (Version 5; Muthen & Muthen, 2011) was used to estimate all confirmatory factor analysis (CFA) models. Because the STICSA contains item responses on a Likert-type scale, the variables produced had categorical, ordinal distributions; therefore, CFA models were estimated from matrices of polychoric correlations. The mean and variance-adjusted weighted least squares (WLSMV) estimation method was used to estimate the proposed models of the STICSA. Values close to .06 for the RMSEA and values close to .95 for the TLI and CFI were considered indicative of good model fit (Hu & Bentler, 1998; 1999)

To investigate convergent and divergent validity, Pearson product-moment correlations were calculated between the STICSA and other administered measures. Correlations were described using Cohen's (1988) suggested descriptors: strong correlation = +/-.50; moderate correlation = +/-.30; weak correlation = +/-.10. Steiger's *Z* tests (Steiger, 1980) were conducted to compare the convergent and divergent validity of the STICSA and the STAI. Steiger's *Z* test (based on Fisher's *Z* transformation) is considered more appropriate than Hotelling's T-test when comparing paired correlation coefficients (Meng, Rosenthal, & Rubin, 1992).

## 2.4 Results

**Missing data.** Missing data from the total sample ($N = 585$) comprised less than 6.42% of any one variable and only 4.43% of all data points (excluding demographics). Three hundred eighty-four participants (68.57%) did not have any missing data. There were no evident patterns in the missing data. Participants who did not complete any of the 42 STICSA items were excluded from all analyses ($n = 25$). For the CFAs, a form of pairwise deletion was used to deal with the missing data in the remaining 560 participants (see Asparouhov & Muthén, 2010). Missing data comprised less than 2.90% of any one variable and only 1.52% of all data points. For all other analyses, only complete questionnaire data were used.

**Normality.** As the proposed CFAs did not assume normality, normality of the individual STICSA questions was not investigated. Graphs of each total score variable (i.e., total scores on all scales and subscales) revealed that all variables had a relatively

normal distribution. All total score variables were within an acceptable range for skewness (between +/–2) and kurtosis (between +/–7).

**Factor structure.** Both the four-factor and hierarchical models for the 42 STICSA items fit the sample data well (see Models 5 and 6 in Table 3). The RMSEAs for the two models were close to.06 and the CFIs and TLIs were close to .95. The hierarchical model had a slightly higher CFI (.92) and a slightly lower RMSEA (.065) than the four-factor model (CFI = .91; RMSEA = .071). Both models had very high TLIs. The fit indices for the four-factor and hierarchical models were superior to those of the four alternative models. Given these results, these two models were considered the models that best fit the sample data. See Tables 4 and 5 for the factor loadings and factor correlations of these models. All factor loadings were large and significant ($p$ <.001).

Additional analyses were computed with the hierarchical model to determine whether the global anxiety factor is uniquely related to other variables. Steiger's Z-tests revealed that the global anxiety factor is more highly correlated than the four specific factors with a measure of global anxiety (anxiety subscale of the MASQ; $p$s < .0002), a measure of social performance anxiety (SPS; $p$s< .0004), and a measure of negative affect (negative affect subscale of the trait version of the PANAS; $p$s < .0006). This indicates that the global anxiety factor is not redundant with any of the four other factors in the hierarchical model.

Table 3

Fit Indices for STICSA Models (n = 560)

| Model | $\chi^2$ | *df* | *p* | RMSEA | 95% CI population | CFI | TLI |
|---|---|---|---|---|---|---|---|
| 1. SICSA – Two factors (Somatic-Cognitive)[ab] | 357.64 | 71 | <.01 | .09 | .07-.10 | .91 | .99 |
| 2. TICSA – Two factors (Somatic-Cognitive)[ab] | 357.66 | 72 | <.01 | .08 | .07-.09 | .92 | .99 |
| 3. STICSA – Two-factors (State-Trait)[c] | 1054.84 | 107 | <.01 | .13 | .12-.13 | .76 | .97 |
| 4. STICSA – Two factors (Somatic-Cognitive)[c] | 683.75 | 119 | <.01 | .09 | .08-.10 | .86 | .98 |
| 5. STICSA – Four factors[c] | 472.47 | 124 | <.01 | .07 | .06-.08 | .91 | .99 |
| 6. STICSA – Hierarchical[d] | 438.43 | 131 | <.01 | .07 | .06-.07 | .92 | .99 |

*Note.* STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; SICSA = State version of the STICSA; TICSA = Trait version of the STICSA; RMSEA = Root Mean Square Error of Approximation; CI = Confidence interval; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index.
[a]*n* = 558. [b]Models tested by Ree, French, MacLeod, and Locke (2008); see Figure 1.
[c]Models tested by Grös, Antony, Simms, and McCabe (2007); see Figures 2, 3, and 4.
[d]Alternative model proposed in current study; see Figure 5.

Table 4

Standardized (Unstardardized) Factor Loadings: Four-Factor STICSA Model (n = 560)*

| Item/Variable | State-Somatic | State-Cognitive | Trait-Somatic | Trait-Cognitive |
|---|---|---|---|---|
| SICSA1 | .81 (1.00) | | | |
| SICSA2 | .80 (0.98) | | | |
| SICSA6 | .82 (1.02) | | | |
| SICSA7 | .83 (1.03) | | | |
| SICSA8 | .90 (1.12) | | | |
| SICSA12 | .78 (0.97) | | | |
| SICSA14 | .82 (1.02) | | | |
| SICSA15 | .81 (1.01) | | | |
| SICSA18 | .91 (1.13) | | | |
| SICSA20 | .84 (1.04) | | | |
| SICSA21 | .78 (0.97) | | | |
| SICSA3 | | .79 (1.00) | | |
| SICSA4 | | .83 (1.05) | | |
| SICSA5 | | .78 (0.98) | | |
| SICSA9 | | .85 (1.07) | | |
| SICSA10 | | .76 (0.96) | | |
| SICSA11 | | .81 (1.02) | | |
| SICSA13 | | .89 (1.12) | | |
| SICSA16 | | .73 (0.92) | | |
| SICSA17 | | .82 (1.04) | | |
| SICSA19 | | .87 (1.09) | | |
| TICSA1 | | | .76 (1.00) | |
| TICSA2 | | | .81 (1.07) | |
| TICSA6 | | | .84 (1.10) | |
| TICSA7 | | | .87 (1.15) | |
| TICSA8 | | | .87 (1.15) | |
| TICSA12 | | | .77 (1.01) | |

| | | |
|---|---|---|
| TICSA14 | .89 (1.17) | |
| TICSA15 | .80 (1.05) | |
| TICSA18 | .88 (1.16) | |
| TICSA20 | .80 (1.05) | |
| TICSA21 | .80 (1.05) | |
| TICSA3 | | .84 (1.00) |
| TICSA4 | | .78 (0.93) |
| TICSA5 | | .75 (0.89) |
| TICSA9 | | .85 (1.01) |
| TICSA10 | | .79 (0.94) |
| TICSA11 | | .75 (0.89) |
| TICSA13 | | .88 (1.04) |
| TICSA16 | | .76 (0.90) |
| TICSA17 | | .83 (0.99) |
| TICSA19 | | .82 (0.98) |

| Factor Correlations | *r* | *SE* | *p* |
|---|---|---|---|
| State Somatic - State Cognitive | .82 (.52) | .02 (.03) | <.001 |
| State Somatic - Trait Somatic | .89 (.54) | .01 (.03) | <.001 |
| State Somatic - Trait Cognitive | .68 (.46) | .03 (.03) | <.001 |
| State Cognitive - Trait Somatic | .74 (.44) | .03 (.03) | <.001 |
| State Cognitive - Trait Cognitive | .90 (.60) | .01 (.03) | <.001 |
| Trait Somatic - Trait Cognitive | .80 (.51) | .02 (.03) | <.001 |

*Note.* SICSA = State version of the State-Trait Inventory for Cognitive and Somatic Anxiety; TICSA = Trait version of the State-Trait Inventory for Cognitive and Somatic Anxiety.

*All factor loadings are significant at $p < .001$ (including correlated residuals not shown in table).

Table 5

Standardized (Unstardardized) Factor Loadings: Hierarchical STICSA Model (n = 560)*

| Item/Variable | Anxiety | State-Somatic | State-Cognitive | Trait-Somatic | Trait-Cognitive |
|---|---|---|---|---|---|
| SICSA1 | .57 (1.14) | .60 (1.00) | | | |
| SICSA2 | .71 (1.42) | .35 (0.59) | | | |
| SICSA6 | .67 (1.34) | .47 (0.79) | | | |
| SICSA7 | .82 (1.63) | .25 (0.41) | | | |
| SICSA8 | .76 (1.50) | .49 (0.81) | | | |
| SICSA12 | .61 (1.20) | .51 (0.85) | | | |
| SICSA14 | .80 (1.58) | .26 (0.44) | | | |
| SICSA15 | .71 (1.42) | .39 (0.64) | | | |
| SICSA18 | .73 (1.44) | .56 (0.93) | | | |
| SICSA20 | .53 (1.05) | .74 (1.23) | | | |
| SICSA21 | .59 (1.17) | .53 (0.88) | | | |
| SICSA3 | .50 (1.00). | | .62 (1.00) | | |
| SICSA4 | .51 (1.02) | | .67 (1.08) | | |
| SICSA5 | .47 (0.94) | | .64 (1.03) | | |
| SICSA9 | .56 (1.12) | | .64 (1.02) | | |
| SICSA10 | .43 (0.85) | | .67 (1.08) | | |
| SICSA11 | .67 (1.32) | | .43 (0.69) | | |
| SICSA13 | .66 (1.32) | | .57 (0.91) | | |
| SICSA16 | .59 (1.18) | | .41 (0.65) | | |
| SICSA17 | .51 (1.02) | | .66 (1.06) | | |
| SICSA19 | .57 (1.13) | | .66 (1.05) | | |
| TICSA1 | .56 (1.12) | | | .53 (1.00) | |
| TICSA2 | .72 (1.44) | | | .37 (0.70) | |
| TICSA6 | .69 (1.37) | | | .48 (0.90) | |
| TICSA7 | .80 (1.59) | | | .36 (0.68) | |
| TICSA8 | .70 (1.39) | | | .52 (0.99) | |

| | | | |
|---|---|---|---|
| TICSA12 | .56 (1.11) | .55 (1.04) | |
| TICSA14 | .81 (1.61) | .38 (0.72) | |
| TICSA15 | .65 (1.30) | .46 (0.87) | |
| TICSA18 | .65 (1.29) | .61 (1.17) | |
| TICSA20 | .47 (0.94) | .74 (1.40) | |
| TICSA21 | .54 (1.07) | .62 (1.19) | |
| TICSA3 | .57 (1.13) | | .61 (1.00) |
| TICSA4 | .49 (0.97) | | .62 (1.02) |
| TICSA5 | .49 (0.97) | | .56 (0.93) |
| TICSA9 | .56 (1.10) | | .64 (1.05) |
| TICSA10 | .40 (0.79) | | .74 (1.22) |
| TICSA11 | .59 (1.18) | | .42 (0.69) |
| TICSA13 | .55 (1.09) | | .69 (1.13) |
| TICSA16 | .56 (1.12) | | .48 (0.79) |
| TICSA17 | .46 (0.91) | | .73 (1.19) |
| TICSA19 | .47 (0.93) | | .70 (1.16) |

| Factor Correlations | *r* | *SE* | *p* |
|---|---|---|---|
| State Somatic - State Cognitive | .62 (.23) | .06 (.05) | <.001 |
| State Somatic - Trait Somatic | .70 (.22) | .05 (.05) | <.001 |
| State Somatic - Trait Cognitive | .37 (.13) | .08 (.05) | .003 |
| State Cognitive - Trait Somatic | .44 (.15) | .07 (.04) | <.001 |
| State Cognitive - Trait Cognitive | .82 (.31) | .02 (.05) | <.001 |
| Trait Somatic - Trait Cognitive | .62 (.20) | .06 (.04) | <.001 |

*Note.* SICSA = State version of the State-Trait Inventory for Cognitive and Somatic Anxiety; TICSA = Trait version of the State-Trait Inventory for Cognitive and Somatic Anxiety.

*All factor loadings are significant at $p < .001$. Correlated residuals (not shown in table) significant at $p < .05$.

Both the two-factor somatic-cognitive model for the 21 state items of the STICSA and the two-factor somatic-cognitive model for the 21 trait items of the STICSA evidenced a marginal fit to the sample data (see Models 1 and 2 in Table 3). The RMSEAs for both models were slightly higher than the recommended value. However, the CFIs and TLIs for both models were close to .95 and all factor loadings were significant ($p < .001$).

The two-factor state-trait model for the 42 STICSA items had an inadequate fit to the sample data (see Model 3 in Table 3). The RMSEA was substantially higher than the recommended value and the CFI was substantially lower than the recommended value. However, the TLI was > .95 and all factor loadings were significant ($p < .001$). The two-factor somatic-cognitive model for the 42 STICSA items also had an inadequate fit to the data (see Model 4 in Table 3). The RMSEA was slightly higher than the recommended value and the CFI was lower than the recommended value. However, the TLI was > .95 and all factor loadings were significant ($p < .001$).

**Internal consistency and correlations**. The state and trait versions of the STICSA had excellent internal consistencies ($\alpha$s = .95; see Table 2). The somatic and cognitive subscales of both the state and trait versions of the STICSA also had excellent internal consistencies ($\alpha$s = .92-93). The somatic and cognitive subscales correlated strongly with each other within both the state and trait versions of the STICSA ($r$s $\geq$ .70; see Table 6). The subscales (somatic and cognitive) correlated very strongly with their parent scales (state version and trait version; $r$s > .90). Total scores on the state and trait

Table 6

Zero-Order Correlations Investigating the Convergent Validity of the State and Trait Versions of the STICSA and STAI*

| Measure | SICSA | SICSA-S | SICSA-C | TICSA | TICSA-S | TICSA-C | STAIS | STAIS-anx | STAIT | STAIT-anx | STAIS-dep | STAIT-dep | ASI-P | ASI-C | CSAQ-S | CSAQ-C | TAQ-S | TAQ-C | MASQ-A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SICSA-S | .91 | - | | | | | | | | | | | | | | | | | |
| SICSA-C | .93 | .71 | - | | | | | | | | | | | | | | | | |
| TICSA | .85 | .75 | .82 | - | | | | | | | | | | | | | | | |
| TICSA-S | .79 | .82 | .65 | .91 | - | | | | | | | | | | | | | | |
| TICSA-C | .78 | .58 | .86 | .93 | .70 | - | | | | | | | | | | | | | |
| STAIS | .65 | .48 | .70 | .61 | .47 | .65 | - | | | | | | | | | | | | |
| STAIS-anx | .63 | .49 | .67 | .59 | .47 | .61 | .81 | - | | | | | | | | | | | |
| STAIT | .55 | .40 | .60 | .60 | .47 | .64 | .83 | .67 | - | | | | | | | | | | |
| STAIT-anx | .55 | .40 | .60 | .60 | .46 | .62 | .69 | .79 | .81 | - | | | | | | | | | |
| STAIS-dep | .53 | .39 | .58 | .52 | .38 | .56 | .93 | .54 | .78 | .50 | - | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STAIT-dep | .45 | .33 | .48 | .49 | .38 | .52 | .76 | .46 | .93 | .52 | .81 | - | | | | | | | |
| ASI-P | .44 | .44 | .39 | .47 | .50 | .37 | .41 | .40 | .44 | .42 | .33 | .37 | - | | | | | | |
| ASI-C | .55 | .48 | .54 | .58 | .53 | .54 | .55 | .53 | .58 | .56 | .46 | .48 | .74 | - | | | | | |
| CSAQ-S | .56 | .56 | .49 | .60 | .61 | .51 | .43 | .44 | .44 | .47 | .34 | .33 | .53 | .53 | - | | | | |
| CSAQ-C | .61 | .48 | .64 | .66 | .52 | .69 | .60 | .60 | .61 | .65 | .49 | .47 | .49 | .60 | .75 | - | | | |
| TAQ-S | .65 | .64 | .56 | .69 | .72 | .56 | .50 | .46 | .51 | .46 | .42 | .44 | .57 | .56 | .61 | .55 | - | | |
| TAQ-C | .64 | .47 | .70 | .71 | .54 | .75 | .65 | .60 | .67 | .65 | .57 | .55 | .45 | .57 | .53 | .72 | .73 | - | |
| MASQ-A | .61 | .55 | .57 | .58 | .55 | .52 | .61 | .59 | .55 | .54 | .51 | .45 | .45 | .52 | .59 | .56 | .64 | .59 | - |
| MASQ-Ar | .63 | .66 | .51 | .63 | .69 | .49 | .47 | .45 | .43 | .42 | .39 | .36 | .53 | .55 | .59 | .50 | .70 | .51 | .72 |

*Note.* *N*s range from $n = 524$ to $n = 548$. SICSA = State version of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA); SICSA-S = Somatic subscale of the SICSA; SICSA-C = Cognitive subscale of the SICSA; TICSA = Trait version of the STICSA; TICSA-S = Somatic subscale of the TICSA; TICSA-C = Cognitive subscale of the TICSA; STAIS = State version of the State-Trait Anxiety Inventory; STAIS-anx = Anxiety items of the STAIS; STAIT = Trait version of the STAI; STAIT-anx = Anxiety items of the STAIT; STAIS-dep = Depression items of the STAIS; STAIT-dep = Depression items of the STAIT; ASI-P = Physical concerns subscale of the Anxiety Sensitivity Index-3 (ASI-3); ASI-C = Cognitive concerns subscale of the ASI-3; CSAQ-S = Somatic subscale of the Cognitive Somatic Anxiety Questionnaire (CSAQ); CSAQ-C = Cognitive subscale of the CSAQ; TAQ-S = Somatic subscale of the Trimodal Anxiety Questionnaire (TAQ); TAQ-C = Cognitive subscale of the TAQ; MASQ-A = Anxious symptoms subscale of the Mood Anxiety Symptom Questionnaire (MASQ); MASQ-Ar = Anxious arousal subscale of the MASQ.

*All correlations are significant at $p < .0001$.

versions of the STICSA were strongly correlated, as were scores on the cognitive subscales across state and trait versions and scores on the somatic subscales across state and trait versions ($r$s > .80).

**Convergent validity.** As a large number of correlations was computed to investigate convergent and divergent validity ($N$ = 453), a Bonferroni correction was applied to the critical significance level of $p < .05$, resulting in a new critical significance level of $p < .0001$. Pearson product-moment correlations investigating convergent validity of the STICSA and STAI are presented in Tables 6, 7, and 8.

The state version of the STICSA was strongly positively correlated with the state version of the STAI ($r$ = .65). The trait version of the STICSA was strongly positively correlated with the trait version of STAI and the anxiety subscale of the MASQ ($r$s ≥ .58). The cognitive subscales of the state and trait versions of the STICSA were more strongly associated with the state and trait versions of the STAI than the somatic subscales of the state and trait versions of the STICSA (difference in $r$s ranged from .14 to .22; $p < .05$). Similar results were found when using only the seven-item anxiety subscale of the STAI (see Bieling et al., 1998). The somatic subscale of the trait version of the STICSA was strongly positively correlated with the somatic subscales of the ASI-3, CSAQ, and TAQ as well as with the anxious arousal subscale of the MASQ ($r$s ≥ .50). The cognitive subscale of the trait version of the STICSA was also moderately to strongly correlated with these subscales, but to a lesser extent (difference in $r$s ranged from .10 to .20; $p < .05$). The cognitive subscale of the trait version of the STICSA was strongly

Table 7

Zero-Order Correlations Investigating the Convergent Validity of the Trait Versions of the STICSA and STAI*

| Measure | TICSA | TICSA-S | TICSA-C | STAIT | STAIT - anx | STAIT - dep | PSWQ | GAD-7 | BFNE-S | SPS |
|---|---|---|---|---|---|---|---|---|---|---|
| PSWQ | .48 | .33 | .54 | .61 | .61 | .49 | - | | | |
| GAD-7 | .63 | .52 | .64 | .63 | .62 | .52 | .66 | - | | |
| BFNE-S | .55 | .41 | .60 | .59 | .57 | .49 | .57 | .54 | - | |
| SPS | .58 | .53 | .54 | .57 | .52 | .49 | .43 | .52 | .65 | - |
| SIAS | .56 | .45 | .58 | .61 | .52 | .55 | .45 | .52 | .68 | .79 |

*Note.* *N*s range from $n = 523$ to $n = 545$. TICSA = Trait version of State-Trait Inventory for Cognitive and Somatic Anxiety; TICSA-S = Somatic subscale of TICSA; TICSA-C = Cognitive subscale of TICSA; STAIT = Trait version of the STAI; STAIT-anx = Anxiety items of the trait version of the STAI; STAIT-dep = Depression items of the trait version of the STAI; PSWQ = Penn State Worry Questionnaire; GAD-7 = Generalized Anxiety Disorder-7; BFNE-S = Brief Fear of Negative Evaluation Scale – Straightforward items; SPS = Social Phobia Scale; SIAS = Social Interaction Anxiety Scale.

*All correlations are significant at $p < .0001$.

Table 8

Zero-Order Correlations Investigating the Relation between Personality, Affect, and the STICSA and STAI

| Measure | SICSA | SICSA-S | SICSA-C | TICSA | TICSA-S | TICSA-C | STAIS | STAIS-anx | STAIT | STAIT-anx | STAIS-dep | STAIT-dep | IPIP-E | IPIP-A | PAN-Pos | PAN-Neg | PANT-Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IPIP-E | -.17* | -.12 | -.20* | -.20* | -.13 | -.24* | -.27* | -.14 | -.29* | -.18* | -.29* | -.30* | - | | | | |
| IPIP-A | -.18* | -.25* | -.10 | -.13 | -.21* | -.06 | -.12 | -.05 | -.15 | -.04 | -.16 | -.19* | .28* | - | | | |
| PAN-Pos | -.05 | .01 | -.10 | -.10 | -.01 | -.17* | -.32* | -.08 | -.32* | -.15 | -.41* | -.36* | .18* | .09 | - | | |
| PAN-Neg | .62* | .56* | .58* | .54* | .51* | .47* | .60* | .61* | .46* | .46* | .49* | .38* | -.17 | -.17 | .13 | - | |
| PANT-Pos | -.14 | -.08 | -.17* | -.15 | -.09 | -.19* | -.37* | -.13 | -.44* | -.17* | -.45* | -.52* | .25* | .22* | .67* | -.03 | - |
| PANT-Neg | .60* | .53* | .58* | .65* | .59* | .60* | .59* | .59* | .60* | .57* | .49* | .50* | -.20* | -.18* | .02 | .74* | -.06 |

*Note.* *N*s range from $n = 505$ to $n = 549$. SICSA = State version of State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA); SICSA-S = Somatic subscale of the SICSA; SICSA-C = Cognitive subscale of the SICSA; TICSA = Trait version of STICSA; TICSA-S = Somatic subscale of TICSA; TICSA-C = Cognitive subscale of TICSA; STAIS = State version of State-Trait Anxiety Inventory; STAIS-anx = Anxiety items of the STAIS; STAIT = Trait version of the STAI; STAIT-anx = Anxiety items of the STAIT; STAIS-dep = Depression items of the STAIS; STAIT-dep = Depression items of STAIT; IPIP-Extra = Extraversion subscale of the Mini-International Personality Item Pool Scales (Mini IPIP); IPIP-Agree = Agreeableness subscale of the Mini IPIP; PAN-Pos = Positive affect subscale of the state version of the Positive and Negative Affect

Schedule (PANAS); PAN-Neg = Negative affect subscale of the state version of the PANAS; PANT-Pos = Positive affect subscale of the trait version of the PANAS; PANT-Neg = Negative affect subscale of the state version of the PANAS.
$^{*}p < .0001$

positively correlated with the cognitive subscales of the ASI-3, CSAQ, and TAQ ($rs \geq$ .54). The somatic subscale of the trait version of the STICSA was also strongly correlated with the cognitive subscales of the CSAQ and TAQ, but to a lesser extent (difference in $rs$ ranged from .17 to .21; $p > .05$). The somatic and cognitive subscales of the trait version of the STICSA had similar correlations with the cognitive subscale of the ASI-3.

There was a moderate positive correlation ($r = .48$) between the trait version of the STICSA and a measure of worry (PSWQ). There were strong positive correlations between the trait version of the STICSA and a measure of generalized anxiety disorder symptoms (GAD-7), as well as between the trait version of the STICSA and measures of social anxiety symptoms (BFNE-S, SPS, SIAS; $rs \geq = .55$). Correlations between the cognitive subscale of the trait version of the STICSA and the PSWQ, GAD-7, BFNE-S, and SIAS were higher than correlations between the somatic subscale and these anxiety scales (difference in $rs$ ranged from .12 to .21; $p < .05$).

**Personality and affect.** There was a weak but significant negative correlation between the trait version of the STICSA and the extraversion subscale of the Mini-IPIP. The agreeableness subscale of the Mini-IPIP was not correlated with the trait version of the STICSA (see Table 8). There were strong positive correlations between the state version of the STICSA and the negative affect subscale of the state version of the PANAS and between the trait version of the STICSA and the negative affect subscale of the trait version of the PANAS ($rs > .60$). The positive affect subscales of the state and

trait versions of the PANAS were weakly correlated with the state and trait versions of the STICSA, respectively.

**Divergent validity.** Pearson product-moment correlations investigating divergent validity are presented in Table 9. The trait version of the STICSA was moderately to strongly positively correlated (*rs* = .44 -.64) with measures of depression (depression subscale of the STAI, depression subscale of the MASQ, anhedonic depression subscale of the MASQ, BDI-II, and CES-D). The cognitive subscale of the trait version of the STICSA correlated strongly with the depression scales (*r*s = .49-.65), whereas, the somatic subscale correlated moderately to strongly with the depression scales (*r*s = .31-.53).

There were moderate correlations (*r*s = .35-.41) between the trait version of the STICSA (and its subscales) and body shape dissatisfaction (BSQ). The trait version of the STICSA (and its subscales) did not correlate significantly with measures of behavioural activation (drive, fun, and reward responsiveness subscales of the BAS) or with a measure of impulsivity (ImpSS). The trait version of the STICSA (and its subscales) correlated very weakly with a measure of social desirability (impression management subscale of the BIDR).

**Quality of life.** Pearson product-moment correlations investigating the relation between the STICSA, STAI, and quality of life measures are presented in Table 10. The trait version of the STICSA and its subscales were moderately negatively correlated with a global measure of quality of life (SWLS) as well as with the physical health, social

Table 9

Zero-Order Correlations Investigating the Divergent Validity of the Trait Versions of the STICSA and STAI

| Measure | TICSA | TICSA-S | TICSA-C | STAIT | STAIT-anx | STAIT-dep | MASQ-Dp | MASQ-Ah | BDI-II | CES-D | BSQ | ImpSS | BAS-Drive | BAS-Fun | BAS-RR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STAIT-dep | .49* | .38* | .52* | .93* | .52* | - | | | | | | | | | |
| MASQ-Dp | .58* | .45* | .62* | .66* | .58* | .58* | - | | | | | | | | |
| MASQ-Ah | .44* | .31* | .49* | .66* | .47* | .66* | .68* | - | | | | | | | |
| BDI-II | .64* | .53* | .65* | .66* | .53* | .61* | .74* | .65* | - | | | | | | |
| CES-D | .59* | .47* | .61* | .70* | .57* | .64* | .75* | .72* | .75* | - | | | | | |
| BSQ | .41* | .35* | .41* | .44* | .35* | .41* | .48* | .41* | .46* | .45* | - | | | | |
| ImpSS | .01 | .04 | .00 | -.04 | -.09 | .01 | .00 | .00 | .09 | .05 | .06 | - | | | |
| BAS-Drive | .08 | .04 | .10 | .14 | .06 | .16 | .07 | .14 | .12 | .15 | .00 | -.22 | - | | |
| BAS-Fun | .11 | .12 | .07 | .16 | .10 | .16 | .04 | .13 | .09 | .14 | .03 | -.48* | .54* | - | |
| BAS-RR | .13 | .16 | .07 | .18 | .03 | .24 | .09 | .18 | .20 | .21 | .13 | .00 | .54* | .54* | - |
| BIDR-IM | -.14 | -.08 | -.17* | -.17* | -.18* | -.14 | -.20* | -.14 | -.17* | -.16 | -.19* | -.27* | .13 | .16 | .00 |

*Note.* *N*s range from $n = 232$ to $n = 541$. TICSA = Trait version of State-Trait Inventory for Cognitive and Somatic Anxiety; TICSA-S = Somatic subscale of TICSA; TICSA-C = Cognitive subscale of TICSA; STAIT = Trait version of the State-Trait Anxiety Inventory; STAIT-anx = Anxiety items from the STAIT; STAIT-dep = Depression items from the STAIT; MASQ-Dp = Depression subscale of the Mood Anxiety Symptom Questionnaire (MASQ); MASQ-Ah = Anhedonic depression subscale

of the MASQ; BDI-II = Beck Depression Inventory-II; CES-D = Center for Epidemiologic Studies Depression Scale; BSQ = Body Shape Questionnaire; ImpSS = Impulsive Sensation Seeking Scale; BAS-Drive = Drive subscale of the Behavioral Activation System Scales (BAS); BAS-Fun = Fun-seeking subscale of the BAS; BAS-RR = Reward responsiveness subscale of the BAS; BIDR-IM = Impression management subscale of the Balanced Inventory of Desirable Responding.
$^{*}p < .0001$.

Table 10

Zero-Order Correlations Investigating the Relation between Quality of Life and the Trait Versions of the STICSA and STAI*

| Measure | TICSA | TICSA-S | TICSA-C | STAIT | STAIT-anx | STAIT-dep | SWLS | WHO-Phys | WHO - Psych | WHO - Social |
|---|---|---|---|---|---|---|---|---|---|---|
| SWLS | -.46 | -.35 | -.49 | -.51 | -.33 | -.53 | - | | | |
| WHO - Psych | -.54 | -.40 | -.58 | -.70 | -.48 | -.71 | .65 | - | | |
| WHO - Phys | -.48 | -.42 | -.47 | -.59 | -.43 | -.57 | .46 | .66 | - | |
| WHO- Social | -.36 | -.27 | -.40 | -.45 | -.29 | -.46 | .47 | .60 | .50 | - |
| WHO- Envir | -.39 | -.34 | -.39 | -.49 | -.29 | -.52 | .52 | .61 | .67 | .45 |

*Note.* *N*s range from $n = 527$ to $n = 545$. TICSA = Trait version of State-Trait Inventory for Cognitive and Somatic Anxiety; TICSA-S = Somatic subscale of the TICSA; TICSA-C = Cognitive subscale of the TICSA; STAIT = Trait version of State-Trait Anxiety Inventory; STAIT-anx = Anxiety items of the STAIT; SWLS = Satisfaction with Life Scale; WHO-Psych = Psychological subscale of the World Health Organization Quality of Life – Brief (WHOQOL-BREF); WHO-Phys = Physical health subscale of the WHOQOL-BREF; WHO-Social = Social subscale of the WHOQOL-BREF; WHO-Envir = Environment subscale of the WHOQOL-BREF.

*All correlations are significant at $p < .0001$.

relationships, and environment subscales from another measure of quality of life (WHOQOL-BREF; $r$ = -.27 to $r$ = -.49). The trait version of the STICSA and its cognitive subscale were strongly negatively correlated with the psychological subscale of the WHOQOL-BREF ($r$s > -.50), whereas the somatic subscale of the trait version of the STICSA was only moderately negatively correlated with the psychological subscale of the WHOQOL-BREF ($r$ = -.40). The correlations between the somatic subscale of the trait version of the STICSA and the SWLS and the psychological and social relationships subscales of the WHOQOL were significantly lower than the correlations between the cognitive subscale of the trait version of the STICSA and these quality of life measures (difference in $r$s ranged from .13 to .18; $p < .05$).

**Anxiety and depression subscales of the STAI.** The state and trait versions of the STAI and its anxiety and depression subscales had high internal consistencies in the current study (αs > .85; see Table 2). The anxiety and depression subscales correlated strongly with each other within both the state and trait versions of the STAI ($r$s > .50). Total scores on the anxiety subscales of the state and trait versions of the STAI were strongly correlated, as were the total scores on the depression subscales ($r$s ≥ .79; see Table 6).

Steiger's $Z$ tests comparing the convergent and divergent validity of the anxiety and depression subscales of the STAI are presented in Tables 11 and 12. Because a large number of correlations was compared to investigate the validity of the STICSA and STAI ($N$ = 210), a Bonferroni correction was applied to the critical significance level of $p < .05$,

Table 11

STICSA and STAI - Comparison of Correlation Coefficients: Convergent Validity

| Measure | *n* | Comparison | *rs* | Steiger's *Z* | *p* (two-tailed) |
|---|---|---|---|---|---|
| ASI-P | 526 | TICSA vs. STAIT | .46* vs. .44* | 0.49 | .62 |
| | | TICSA vs. STAIT-anx | .46* vs. .42* | 1.28 | .20 |
| | | TICSA-S vs. STAIT | .49* vs. .44* | 1.33 | .18 |
| | | TICSA-S vs. STAIT-anx | .49* vs. .42* | 2.02 | .04 |
| | | STAIT-anx vs. STAIT-dep | .42* vs. .37* | 1.08 | .28 |
| ASI-C | 526 | TICSA vs. STAIT | .57* vs. .58* | -0.27 | .79 |
| | | TICSA vs. STAIT-anx | .57* vs. .56* | 0.49 | .62 |
| | | TICSA-C vs. STAIT | .54* vs. .58* | -1.49 | .14 |
| | | TICSA-C vs. STAIT-anx | .54* vs. .56* | -0.70 | .49 |
| | | STAIT-anx vs. STAIT-dep | .56* vs. .48* | 2.18 | .03 |
| CSAQ-S | 529 | TICSA vs. STAIT | .60* vs. .44* | 5.00 | **< .0002** |
| | | TICSA vs. STAIT-anx | .60* vs. .47* | 4.14 | **< .0002** |
| | | TICSA-S vs. STAIT | .60* vs. .44* | 4.50 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | .60* vs. .47* | 3.78 | **< .0002** |
| | | STAIT-anx vs. STAIT-dep | .47* vs. .34* | 3.45 | < .001 |
| CSAQ-C | 528 | TICSA vs. STAIT | .65* vs. .61* | 1.45 | .15 |
| | | TICSA vs. STAIT-anx | .65* vs. .65* | 0.15 | .88 |
| | | TICSA-C vs. STAIT | .68* vs. .61* | 2.62 | .01 |
| | | TICSA-C vs. STAIT-anx | .68* vs. .65* | 1.25 | .21 |
| | | STAIT-anx vs. STAIT-dep | .65* vs. .47* | 5.48 | **< .0002** |
| TAQ-S | 522 | TICSA vs. STAIT | .68* vs. .51* | 6.00 | **< .0002** |
| | | TICSA vs. STAIT (anx) | .68* vs. .47* | 7.23 | **< .0002** |
| | | TICSA-S vs. STAIT | .72* vs. .51* | 6.41 | **< .0002** |
| | | TICSA-S vs. STAIT (anx) | .72* vs. .47* | 7.51 | **< .0002** |
| | | STAIT (anx) vs. STAIT-dep | .47* vs. .44* | 0.79 | .43 |
| TAQ-C | 526 | TICSA vs. STAIT | .70* vs. .67* | 1.33 | .18 |
| | | TICSA vs. STAIT-anx | .70* vs. .66* | 1.74 | .08 |
| | | TICSA-C vs. STAIT | .75* vs. .67* | 3.50 | < .001 |
| | | TICSA-C vs. STAIT-anx | .75* vs. .66* | 3.88 | **< .0002** |
| | | STAIT-anx vs. STAIT-dep | .66* vs. .55* | 3.57 | < .001 |
| MASQ-Ar | 526 | TICSA vs. STAIT | .62* vs. .43* | 5.90 | **< .0002** |
| | | TICSA vs. STAIT-anx | .62* vs. .42* | 6.19 | **< .0002** |
| | | TICSA-S vs. STAIT | .68* vs. .43* | 7.19 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | .68* vs. .42* | 7.46 | **< .0002** |
| | | STAIT-anx vs. STAIT-dep | .42* vs. .35* | 1.71 | .09 |
| MASQ-A | 525 | TICSA vs. STAIT | .57* vs. .55* | 0.82 | .41 |
| | | TICSA vs. STAIT-anx | .57* vs. .55* | 0.87 | .39 |
| | | TICSA-S vs. STAIT | .54* vs. .55* | -0.21 | .83 |
| | | TICSA-S vs. STAIT-anx | .54* vs. .55* | -0.17 | .87 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | TICSA-C vs. STAIT | .52* | vs. .55* | -1.09 | .28 |
| | | TICSA-C vs. STAIT-anx | .52* | vs. .55* | -1.03 | .31 |
| | | STAIT-anx vs. STAIT-dep | .55* | vs. .44* | 2.96 | .003 |
| PSWQ | 528 | TICSA vs. STAIT | .49* | vs. .61* | -3.99 | **< .0002** |
| | | TICSA vs. STAIT-anx | .49* | vs. .62* | -4.10 | **< .0002** |
| | | TICSA-S vs. STAIT | .34* | vs. .61* | -7.29 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | .34* | vs. .62* | -7.40 | **< .0002** |
| | | TICSA-C vs. STAIT | .55* | vs. .61* | -2.13 | .03 |
| | | TICSA-C vs. STAIT-anx | .55* | vs. .62* | -2.25 | .02 |
| | | STAIT-anx vs. STAIT-dep | .62* | vs. .49* | 3.80 | **< .0002** |
| GAD-7 | 526 | TICSA vs. STAIT | .63* | vs. .63* | -0.13 | .90 |
| | | TICSA vs. STAIT-anx | .63* | vs. .63* | 0.08 | .94 |
| | | TICSA-S vs. STAIT | .52* | vs. .63* | -3.41 | < .001 |
| | | TICSA-S vs. STAIT-anx | .52* | vs. .63* | -3.22 | .001 |
| | | TICSA-C vs. STAIT | .64* | vs. .63* | 0.06 | .95 |
| | | TICSA-C vs. STAIT-anx | .64* | vs. .63* | 0.28 | .78 |
| | | STAIT-anx vs. STAIT-dep | .63* | vs. .52* | 3.48 | .001 |
| BFNE-S | 528 | TICSA vs. STAIT | .54* | vs. .59* | -1.65 | .10 |
| | | TICSA vs. STAIT-anx | .54* | vs. .57* | -1.01 | .31 |
| | | TICSA-S vs. STAIT | .39* | vs. .59* | -5.44 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | .39* | vs. .57* | -4.88 | **< .0002** |
| | | TICSA-C vs. STAIT | .60* | vs. .59* | 0.15 | .88 |
| | | TICSA-C vs. STAIT-anx | .60* | vs. .57* | 0.80 | .42 |
| | | STAIT-anx vs. STAIT-dep | .57* | vs. .49* | 2.47 | .01 |
| SPS | 524 | TICSA vs. STAIT | .58* | vs. .57* | 0.17 | .87 |
| | | TICSA vs. STAIT-anx | .58* | vs. .52* | 1.83 | .07 |
| | | TICSA-S vs. STAIT | .52* | vs. .57* | -1.32 | .19 |
| | | TICSA-S vs. STAIT-anx | .52* | vs. .52* | 0.14 | .89 |
| | | TICSA-C vs. STAIT | .54* | vs. .57* | -1.18 | .24 |
| | | TICSA-C vs. STAIT-anx | .54* | vs. .52* | 0.56 | .58 |
| | | STAIT-anx vs. STAIT-dep | .52* | vs. .49* | 0.72 | .47 |
| SIAS | 517 | TICSA vs. STAIT | .55* | vs. .61* | -2.04 | .04 |
| | | TICSA vs. STAIT-anx | .55* | vs. .53* | 0.80 | .42 |
| | | TICSA-S vs. STAIT | .44* | vs. .61* | -4.82 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | .44* | vs. .53* | -2.33 | .02 |
| | | TICSA-C vs. STAIT | .57* | vs. .61* | -1.54 | .12 |
| | | TICSA-C vs. STAIT-anx | .57* | vs. .53* | 1.41 | .16 |
| | | STAIT-anx vs. STAIT-dep | .53* | vs. .55* | -0.70 | .48 |
| PANAS - Pos | 500 | SICSA vs. STAIS | -.05 | vs. -.33* | -7.44 | **< .0002** |
| | | SICSA vs. STAIS-anx | -.05 | vs. -.09 | -0.86 | .39 |
| | | SICSA-S vs. STAIS | .01 | vs. -.33* | -7.00 | **< .0002** |
| | | SICSA-S vs. STAIS-anx | .01 | vs. -.09 | -1.61 | .11 |
| | | SICSA-C vs. STAIS | -.11 | vs. -.33* | -6.59 | **< .0002** |
| | | SICSA-C vs. STAIS-anx | -.11 | vs. -.09 | 0.58 | .56 |
| | | STAIS-anx vs. STAIS-dep | -.09 | vs. -.42* | -8.19 | **< .0002** |
| PANAS - Neg | 503 | SICSA vs. STAIS | .62* | vs. .60* | 1.00 | .32 |
| | | SICSA vs. STAIS-anx | .62* | vs. .60* | 0.79 | .43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | SICSA-S vs. STAIS | .57* | vs. .60* | -0.73 | .47 |
| | | SICSA-S vs. STAIS-anx | .57* | vs. .60* | -0.91 | .36 |
| | | SICSA-C vs. STAIS | .58* | vs. .60* | -0.49 | .63 |
| | | SICSA-C vs. STAIS-anx | .58* | vs. .60* | -0.69 | .49 |
| | | STAIS-anx vs. STAIS-dep | .60* | vs. .48* | 3.50 | < .001 |
| PANAST - Pos | 513 | TICSA vs. STAIT | -.15 | vs. -.44* | -7.69 | **< .0002** |
| | | TICSA vs. STAIT-anx | -.15 | vs. -.18* | -0.61 | .54 |
| | | TICSA-S vs. STAIT | -.09 | vs. -.44* | -8.10 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | -.09 | vs. -.18* | -2.00 | .05 |
| | | TICSA-C vs. STAIT | -.19* | vs. -.44* | -7.03 | **< .0002** |
| | | TICSA-C vs. STAIT-anx | -.19* | vs. -.18* | 0.34 | .74 |
| | | STAIT-anx vs. STAIT-dep | -.18* | vs. -.52* | -8.83 | **< .0002** |
| PANAST - Neg | 513 | TICSA vs. STAIT | .64* | vs. .60* | 1.51 | .13 |
| | | TICSA vs. STAIT-anx | .64* | vs. .57* | 2.30 | .02 |
| | | TICSA-S vs. STAIT | .58* | vs. .60* | -0.40 | .69 |
| | | TICSA-S vs. STAIT-anx | .58* | vs. .57* | 0.30 | .76 |
| | | TICSA-C vs. STAIT | .59* | vs. .60* | -0.19 | .85 |
| | | TICSA-C vs. STAIT-anx | .59* | vs. .57* | 0.64 | .52 |
| | | STAIT-anx vs. STAIT-dep | .57* | vs. .50* | 2.22 | .03 |

*Note.* TICSA = Trait version of State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA); TICSA-S = Somatic subscale of the TICSA; TICSA-C = Cognitive subscale of the TICSA; SICSA = State version of the STICSA; SICSA-S = Somatic subscale of the SICSA; SICSA-C = Cognitive subscale of the SICSA; STAIT = Trait version of the State-Trait Anxiety Inventory (STAI); STAIT-anx: Anxiety items from the STAIT; STAIT-dep: Depression items from the STAIT; STAIS = State version of the STAI; STAIS-anx = Anxiety items from the STAIS; STAIT-dep: Depression items from the STAIS; ASI-P = Physical concerns subscale of the Anxiety Sensitivity Index-3 (ASI-3); ASI-C = Cognitive concerns subscale of ASI-3; CSAQ-S = Somatic subscale of the Cognitive Somatic Anxiety Questionnaire (CSAQ); CSAQ-C = Cognitive subscale of the CSAQ; TAQ-S = Somatic subscale of the Trimodal Anxiety Questionnaire (TAQ); TAQ-C = Cognitive subscale of the TAQ; MASQ-A = Anxious symptoms subscale of Mood Anxiety Symptom Questionnaire (MASQ); MASQ-Ar = Anxious arousal subscale of MASQ; PSWQ = Penn State Worry Questionnaire; GAD-7 = Generalized Anxiety Disorder-7; BFNE-S = Brief Fear of Negative Evaluation Scale – Straightforward items; SPS = Social Phobia Scale; SIAS = Social Interaction Anxiety Scale. PANAS-Pos = Positive affect subscale of the state version of the Positive and Negative Affect Schedule (PANAS); PANAS-Neg = Negative affect subscale of the state version of the PANAS; PANAST-Pos = Positive affect subscale of the trait version of the PANAS; PANAST-Neg = Negative affect subscale of the trait version of the PANAS;
*Correlation coefficient significant at $p < .0001$.

Table 12

STICSA and STAI - Comparison of Correlation Coefficients: Divergent Validity

| Measure | *n* | Comparison | *r*s | Steiger's *Z* | *p* (two-tailed) |
|---|---|---|---|---|---|
| MASQ-Dp | 525 | TICSA vs. STAIT | .58* vs. .66* | -2.95 | .003 |
| | | TICSA vs. STAIT-anx | .58* vs. .58* | -0.17 | .87 |
| | | TICSA-S vs. STAIT | .44* vs. .66* | -6.34 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | .44* vs. .58* | -3.87 | **< .0002** |
| | | TICSA-C vs. STAIT | .61* vs. .66* | -1.76 | .08 |
| | | TICSA-C vs. STAIT-anx | .61* vs. .58* | 1.11 | .27 |
| | | STAIT-anx vs. STAIT-dep | .58* vs. .58* | -0.06 | .95 |
| MASQ-Ah | 522 | TICSA vs. STAIT | .44* vs. .66* | -7.11 | **< .0002** |
| | | TICSA vs. STAIT-anx | .44* vs. .47* | -0.77 | .44 |
| | | TICSA-S vs. STAIT | .31* vs. .66* | -9.47 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | .31* vs. .47* | -3.95 | **< .0002** |
| | | TICSA-C vs. STAIT | .49* vs. .66* | -5.76 | **< .0002** |
| | | TICSA-C vs. STAIT-anx | .49* vs. .47* | 0.80 | .42 |
| | | STAIT-anx vs. STAIT-dep | .47* vs. .66* | -5.95 | **< .0002** |
| BDI-II | 520 | TICSA vs. STAIT | .63* vs. .66* | -0.92 | .36 |
| | | TICSA vs. STAIT-anx | .63* vs. .53* | 3.31 | .001 |
| | | TICSA-S vs. STAIT | .52* vs. .66* | -4.05 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | .52* vs. .53* | -0.31 | .75 |
| | | TICSA-C vs. STAIT | .64* vs. .66* | -0.83 | .41 |
| | | TICSA-C vs. STAIT-anx | .64* vs. .53* | 3.55 | < .001 |
| | | STAIT-anx vs. STAIT-dep | .53* vs. .61* | -2.42 | .02 |
| CES-D | 523 | TICSA vs. STAIT | .59* vs. .70* | -3.83 | **< .0002** |
| | | TICSA vs. STAIT-anx | .59* vs. .57* | 0.70 | .49 |
| | | TICSA-S vs. STAIT | .47* vs. .70* | -6.79 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | .47* vs. .57* | -2.76 | .01 |
| | | TICSA-C vs. STAIT | .61* vs. .70* | -3.27 | .001 |
| | | TICSA-C vs. STAIT-anx | .61* vs. .57* | 1.40 | .16 |
| | | STAIT-anx vs. STAIT-dep | .57* vs. .64* | -2.29 | .02 |
| BSQ | 523 | TICSA vs. STAIT | .40* vs. .44* | -1.12 | .26 |
| | | TICSA vs. STAIT-anx | .40* vs. .36* | 1.13 | .26 |
| | | TICSA-S vs. STAIT | .33* vs. .44* | -2.58 | .01 |
| | | TICSA-S vs. STAIT-anx | .33* vs. .36* | -0.60 | .55 |
| | | TICSA-C vs. STAIT | .40* vs. .44* | -1.17 | .24 |
| | | TICSA-C vs. STAIT-anx | .40* vs. .36* | 1.17 | .24 |
| | | STAIT-anx vs. STAIT-dep | .36* vs. .40* | -1.19 | .24 |
| ImpSS | 233 | TICSA vs. STAIT | -.01 vs. -.04 | -0.49 | .62 |
| | | TICSA vs. STAIT-anx | -.01 vs. -.10 | -1.55 | .12 |
| | | TICSA-S vs. STAIT | .02 vs. -.04 | -0.17 | .87 |
| | | TICSA-S vs. STAIT-anx | .02 vs. -.10 | -1.08 | .28 |
| | | TICSA-C vs. STAIT | -.03 vs. -.04 | -0.04 | .97 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | TICSA-C vs. STAIT-anx | -.03 | vs. -.10 | -1.12 | .26 |
| | | STAIT-anx vs. STAIT-dep | -.10 | vs. .01 | 1.39 | .17 |
| BAS-Drive | 233 | TICSA vs. STAIT | .08 | vs. .14 | -1.04 | .30 |
| | | TICSA vs. STAIT-anx | .08 | vs. .06 | 0.22 | .82 |
| | | TICSA-S vs. STAIT | .03 | vs. .14 | -1.65 | .10 |
| | | TICSA-S vs. STAIT-anx | .03 | vs. .06 | -0.56 | .57 |
| | | TICSA-C vs. STAIT | .11 | vs. .14 | -0.49 | .62 |
| | | TICSA-C vs. STAIT-anx | .11 | vs. .06 | 0.82 | .41 |
| | | STAIT-anx vs. STAIT-dep | .06 | vs. .16 | -1.51 | .13 |
| BAS-Fun | 234 | TICSA vs. STAIT | .12 | vs. .16 | -0.73 | .46 |
| | | TICSA vs. STAIT-anx | .12 | vs. .12 | 0.02 | .98 |
| | | TICSA-S vs. STAIT | .12 | vs. .16 | -0.62 | .54 |
| | | TICSA-S vs. STAIT-anx | .12 | vs. .12 | 0.05 | .96 |
| | | TICSA-C vs. STAIT | .10 | vs. .16 | -1.09 | .27 |
| | | TICSA-C vs. STAIT-anx | .10 | vs. .12 | -0.33 | .74 |
| | | STAIT-anx vs. STAIT-dep | .12 | vs. .16 | -0.67 | .50 |
| BAS-RR | 234 | TICSA vs. STAIT | .10 | vs. .18 | -1.32 | .19 |
| | | TICSA vs. STAIT-anx | .10 | vs. .02 | 1.35 | .18 |
| | | TICSA-S vs. STAIT | .13 | vs. .18 | -0.70 | .48 |
| | | TICSA-S vs. STAIT-anx | .13 | vs. .02 | 1.64 | .10 |
| | | TICSA-C vs. STAIT | .05 | vs. .18 | -2.09 | .04 |
| | | TICSA-C vs. STAIT-anx | .05 | vs. .02 | 0.62 | .53 |
| | | STAIT-anx vs. STAIT-dep | .02 | vs. .24 | -3.55 | < .001 |
| BIDR-IM | 517 | TICSA vs. STAIT | -.12 | vs. -.18* | -1.41 | .16 |
| | | TICSA vs. STAIT-anx | -.12 | vs. -.17* | -1.32 | .19 |
| | | TICSA-S vs. STAIT | -.07 | vs. -.18* | -2.45 | .01 |
| | | TICSA-S vs. STAIT-anx | -.07 | vs. -.17* | -2.38 | .02 |
| | | TICSA-C vs. STAIT | -.15 | vs. -.18* | -0.60 | .55 |
| | | TICSA-C vs. STAIT-anx | -.15 | vs. -.17* | -0.51 | .61 |
| | | STAIT-anx vs. STAIT-dep | -.17* | vs. -.14 | 0.69 | .49 |

*Note.* TICSA = Trait version of State-Trait Inventory for Cognitive and Somatic Anxiety; TICSA-S = Somatic subscale of the TICSA; TICSA-C = Cognitive subscale of the TICSA; STAIT = Trait version of State-Trait Anxiety Inventory (STAI); STAIT-anx: Anxiety items from STAIT; STAIT-dep = Depression items from the STAIT; MASQ-Dp = Depression subscale of the Mood Anxiety Symptom Questionnaire (MASQ); MASQ-Ah = Anhedonic depression subscale of the MASQ; BDI-II = Beck Depression Inventory-II; CES-D = Center for Epidemiologic Studies Depression Scale; BSQ = Body Shape Questionnaire; ImpSS = Impulsive Sensation Seeking Scale; BAS-Drive = Drive subscale of the Behavioral Activation System Scales (BAS); BAS-Fun = Fun-seeking subscale of the BAS; BAS-RR = Reward responsiveness subscale of the BAS; BIDR-IM = Impression management subscale of the Balanced Inventory of Desirable Responding.
*Correlation coefficient significant at $p < .0001$

resulting in a new critical significance level of $p < .0002$. The anxiety subscale of the trait version of the STAI was more strongly positively correlated with a measure of worry (PSWQ) and a measure of cognitive anxiety (cognitive subscale of the CSAQ) than the depression subscale of the trait version of the STAI. There were no differences in correlations with measures of anxiety sensitivity (ASI-3), somatic anxiety (e.g., somatic subscales of the CSAQ and TAQ, arousal subscale of MASQ), or social anxiety (e.g., SIAS, SPS). The anxiety subscale of the STAI had slightly higher correlations with the anxiety subscale of the MASQ, the GAD-7, the BFNE-S and the negative affect scales of the state and trait versions of the PANAS than the depression subscale; however, these differences were not significant. Compared to the anxiety subscales of the state and trait versions of the STAI, the depression subscales of the state and trait versions of the STAI were more strongly negatively correlated with the positive affect subscales of the state and trait versions of the PANAS, respectively.

The depression subscale of the STAI was more strongly positively associated with the anhedonic depression subscale of the MASQ than the anxiety subscale (see Table 12), but there were no differences between correlations with other measures of depression (i.e., depression subscale of the MASQ, BDI-II, CES-D). There was no difference in correlations with body dissatisfaction (BSQ). The anxiety and depression subscales were not significantly related to impulsivity (ImpSS) or behavioural activation (BAS subscales). The anxiety subscale had a very weak negative correlation with social

desirability, but was not correlated more strongly with social desirability than the depression subscale.

Steiger's *Z* tests comparing the relation between quality of life and the anxiety and depression subscales of the trait version of the STAI are presented in Table 13. Although both the anxiety and depression subscales were negatively correlated with quality of life measures, the depression subscale was more strongly negatively correlated with these measures. In particular, the depression subscale was very strongly correlated ($r$ = .71) with the psychological subscale of the WHOQOL-BREF.

**STICSA vs. STAI**. Steiger's *Z* tests comparing the convergent validity of the state and trait versions of the STICSA (and its subscales) and the state and trait versions of the STAI (and its anxiety subscale) are presented in Table 11. The trait version of the STICSA and its somatic subscale were more strongly correlated with measures of somatic anxiety (i.e., somatic subscale of CSAQ and TAQ, arousal subscale of MASQ) than the trait version of the STAI and its anxiety subscale. The cognitive subscale of the trait version of the STICSA was also more strongly correlated with the cognitive subscale of the TAQ than the anxiety subscale of the trait version of the STAI. The trait version of the STICSA (and it subscales) and the trait version of the STAI (and its anxiety subscale) had similar correlations with the physical and cognitive subscales of the ASI-3, the cognitive subscale of the CSAQ, and the anxiety subscale of the MASQ.

The trait version of the STAI (and its anxiety subscale) correlated more strongly with a measure of worry (PSWQ) than the trait version of the STICSA. However, the

Table 13

STICSA and STAI - Comparison of Correlation Coefficients: Quality of Life

| Measure | *n* | Comparison | *rs* | Steiger's *Z* | *p* *(two-tailed)* |
|---|---|---|---|---|---|
| SWLS | 528 | TICSA vs. STAIT | -.45* vs. -.51* | -2.07 | .04 |
| | | TICSA vs. STAIT-anx | -.45* vs. -.33* | 3.35 | < .001 |
| | | TICSA-S vs. STAIT | -.34* vs. -.51* | -4.48 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | -.34* vs. -.33* | 0.25 | .81 |
| | | TICSA-C vs. STAIT | -.48* vs. -.51* | -1.24 | .22 |
| | | TICSA-C vs. STAIT-anx | -.48* vs. -.33* | 4.37 | **< .0002** |
| | | STAIT-anx vs. STAIT-dep | -.33* vs. -.53* | -5.59 | **< .0002** |
| WHOQOL – Psychological | 522 | TICSA vs. STAIT | -.52* vs. -.70* | -6.21 | **< .0002** |
| | | TICSA vs. STAIT-anx | -.52* vs. -.49* | 1.16 | .24 |
| | | TICSA-S vs. STAIT | -..39* vs. -.70* | -9.01 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | -.39* vs. -.49* | -2.50 | .01 |
| | | TICSA-C vs. STAIT | -.57* vs. -.70* | -5.01 | **< .0002** |
| | | TICSA-C vs. STAIT-anx | -.57* vs. -.49* | 2.61 | .01 |
| | | STAIT-anx vs. STAIT-dep | -.49* vs. -.71* | -7.03 | **< .0002** |
| WHOQOL – Physical | 524 | TICSA vs. STAIT | -.48* vs. -.58* | -3.34 | .001 |
| | | TICSA vs. STAIT-anx | -.48* vs. -.43* | 1.26 | .21 |
| | | TICSA-S vs. STAIT | -.42* vs. -.58* | -4.50 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | -.42* vs. -.43* | -0.47 | .64 |
| | | TICSA-C vs. STAIT | -.46* vs. -.58* | -4.02 | **< .0002** |
| | | TICSA-C vs. STAIT-anx | -.46* vs. -.43* | 0.77 | .44 |
| | | STAIT-anx vs. STAIT-dep | -.43* vs. -.57* | -3.78 | **< .0002** |
| WHOQOL – Social | 524 | TICSA vs. STAIT | -.34* vs. -.44* | -2.92 | .003 |
| | | TICSA vs. STAIT-anx | -.34* vs. -.29* | 1.33 | .18 |
| | | TICSA-S vs. STAIT | -.25* vs. -.44* | -4.78 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | -.25* vs. -.29* | -1.08 | .28 |
| | | TICSA-C vs. STAIT | -.38* vs. -.44* | -2.05 | .04 |
| | | TICSA-C vs. STAIT-anx | -.38* vs. -.29* | 2.36 | .02 |
| | | STAIT-anx vs. STAIT-dep | -.29* vs. -.46* | -4.26 | **< .0002** |
| WHOQOL – Environment | 525 | TICSA vs. STAIT | -.38* vs. -.49* | -3.25 | .001 |
| | | TICSA vs. STAIT-anx | -.38* vs. -.29* | 2.33 | .02 |
| | | TICSA-S vs. STAIT | -.32* vs. -.49* | -4.15 | **< .0002** |
| | | TICSA-S vs. STAIT-anx | -.32* vs. -.29* | 0.71 | .48 |
| | | TICSA-C vs. STAIT | -.37* vs. -.49* | -3.60 | < .001 |
| | | TICSA-C vs. STAIT-anx | -.37* vs. -.29* | 2.20 | .03 |
| | | STAIT-anx vs. STAIT-dep | -.29* vs. -.52* | -6.13 | **< .0002** |

*Note.* TICSA = Trait version of State-Trait Inventory for Cognitive and Somatic Anxiety; TICSA-S = Somatic subscale of the TICSA; TICSA-C = Cognitive subscale of the TICSA; STAIT = Trait version of the State-Trait Anxiety Inventory; STAIT-anx = Anxiety items from the STAIT; STAIT-dep = Depression items from the STAIT; SWLS = Satisfaction with Life Scale; WHOQOL-Psychological = Psychological subscale of the

Brief Version of the World Health Organization Quality of Life Scale (WHOQOL-BREF); WHO-Physical = Physical health subscale of the WHOQOL-BREF; WHO-Social = Social relationships subscale of the WHOQOL-BREF; WHO-Environment = Environment subscale of the WHOQOL-BREF.
*Correlation coefficient significant at $p < .0001$

cognitive subscale of the STICSA correlated just as strongly with the PSWQ. Compared to the state and trait versions of the STICSA (and its subscales), the state and trait versions of the STAI were more strongly negatively correlated with the positive affect subscales of the state and trait versions of the PANAS, respectively. There were no meaningful differences between the trait version of the STICSA (and its subscales) and the trait version of the STAI (and its anxiety subscale) in correlations with the GAD-7, BFNE, SIAS, SPS, or negative affect subscales of the state and trait versions of the PANAS.

Steiger's *Z* tests comparing the divergent validity of the trait version of the STICSA (and its subscales) and the trait version of the STAI (and its anxiety subscale) are presented in Table 12. The STAI and its anxiety subscale were more strongly correlated with the depression subscale of the MASQ than the somatic subscale of the STICSA. The STAI (but not its anxiety subscale) was more strongly correlated with the anhedonic depression subscale of the MASQ than the STICSA and both its subscales. The STAI (but not its anxiety subscale) was more strongly correlated with the BDI-II than the somatic subscale of the STICSA and was more strongly correlated with the CES-D than both the trait version of the STICSA and its somatic subscale. The correlations between the cognitive subscale of the trait version of the STICSA and the depression measures were stronger than the correlations between the somatic subscale of the trait version of the STICSA and the depression measures (difference in *r*s ranged from .12 to .18; $p < .05$). There were no meaningful or interpretable differences in correlations

between the trait version of the STICSA (and its subscales) and the trait version of the STAI (and its anxiety subscale) and body shape dissatisfaction (BSQ), impulsivity (ImpSS), behavioural activation (all three subscales of the BAS), or social desirability (BIDR).

Steiger's *Z* tests comparing the correlations of the trait version of the STICSA (and its subscales) and trait version of the STAI (and its anxiety subscale) with measures of quality of life are presented in Table 13. Differences in correlations with one of the quality of life measures (SWLS) were inconsistent, with the STAI more strongly negatively correlated with the SWLS than the somatic subscale of the STICSA, but the cognitive subscale of the STICSA more strongly negatively correlated with the SWLS than the anxiety subscale of the STAI. The STAI was more strongly negatively correlated with the psychological and physical health subscales of the WHOQOL-BREF than the somatic and cognitive subscales of the STICSA. The trait version of the STICSA was less correlated with the psychological subscale of the WHOQOL-BREF than the trait version of the STAI, but was not significantly less correlated with the physical health subscale than the STAI. There were no meaningful or interpretable differences in correlations with the social relationships and environment subscales of the WHOQOL-BREF.

**Summary.** Six different models of the STICSA were estimated using data from a large sample of undergraduate students. Two models fit the sample data well: a four-factor model with state-somatic, state-cognitive, trait-somatic, and trait-cognitive factors corresponding to the four subscales of the STICSA, and a hierarchical model with a

global anxiety and four specific factors corresponding to the four subscales of the STICSA. The STICSA and its subscales had excellent internal consistencies in the study sample. Correlations provided evidence that the STICSA (and its subscales) had convergent and divergent validity. Compared to the STAI, the STICSA was more strongly correlated with measures of somatic anxiety and less strongly correlated with measures of depression, positive affect, and quality of life.

# 3. Study 2

## 3.1 Overview of Study

Study 2 investigated the sensitivity to changes in anxiety of the state versions of the STICSA and the STAI and the predictive validity of the trait versions of the STICSA and STAI. A scale that measures anxiety in the moment (i.e., state anxiety) should detect an increase or decrease in anxiety over short periods of time. Public speaking is one of the most common fears reported in community samples (e.g., Stein, Walker, & Forde, 1996). Many researchers have used public speaking (or the anticipation of public speaking) as a stressor to increase participants' anxiety levels (e.g., Feldman, Cohen, Hamrick, & Lepore, 2004). In the present study, participants completed both the STICSA and STAI before and after the introduction of a public speaking task. A control group also completed the measures at two time points.

## 3.2 Hypotheses

It is hypothesized that the total scores on the state version of the STICSA (and its subscales) and the state version of the STAI (and its anxiety subscale) will increase among participants who encounter the social challenge (i.e., public speaking task) compared to a control group. It is also hypothesized that trait scores on the STICSA (and its subscales) obtained before the social challenge will predict state scores on the STICSA (and its subscales) after the social challenge.

### 3.3 Method

**Participants.** Forty-one undergraduate students in a first-year psychology course at York University were recruited to participate in the study. Participants were 17 years of age or older ($M = 20.22$, $SD = 4.51$). The majority of participants were female (60.98%) and heterosexual (94.87%). More than a third of participants were born outside Canada (39.02%) and ethnicity and religion varied substantially within the sample (see Table 14 for demographics).

**Materials.** The same self-report measures administered in Study 1 were administered in Study 2. A FujiFilm Finepix F70 EXR digital camera was shown to participants who were asked to prepare a speech to indicate that their speech would be videotaped. Using a Dell 17-inch screen laptop, participants in the control group accessed YouTube and watched a 3-minute web-exclusive trailer for a series called *Human Planet* (British Broadcasting Corporation [BBC], 2011).

**Procedure.** Participants signed up for Study 2 online through a university website. The study was administered to 10 small groups of participants (group size range = 1-6; $M = 4.10$). When participants arrived, they read through and signed a consent form (see Part I in Appendix F) that informed them that they would be asked to fill out a battery of self-report measures. After completing the measures, all participants read through another informed consent form (see Part II in Appendix F) indicating that half of

Table 14

Demographic Characteristics of Experiment Sample (N = 41)

| Measure | Mean (SD) | % |
|---|---|---|
| Age[a] | 20.22 (4.51) | |
| Years in Canada[a] | 16.07 (8.10) | |
| Among Immigrant Participants[b] | 11.69 (8.90) | |
| Gender | | |
| Male | | 39.02 |
| Female | | 60.98 |
| Transgender (Female to Male, Male to Female) | | 0.00 |
| Sexual Orientation[a] | | |
| Heterosexual | | 94.87 |
| "Homosexual"[†] | | 5.13 |
| Bisexual | | 0.00 |
| Education | | |
| Some High school/High School Diploma | | 19.51 |
| Some University/College/Technical School | | 75.61 |
| Bachelor's/Graduate Degree or Technical Certificate | | 4.88 |

| | |
|---|---|
| Ethnicity | |
| White - European | 31.71 |
| African | 14.63 |
| South Asian | 17.07 |
| East Asian | 17.07 |
| Middle Eastern | 9.76 |
| Other Ethnicity (e.g., Hispanic, Aboriginal) | 4.88 |
| Mixed Ethnicity (e.g., East Asian/British) | 4.88 |
| Religion[c] | |
| Catholic | 20.00 |
| Protestant | 2.50 |
| Other Christian (e.g., Eastern Orthodox) | 17.50 |
| Jewish | 7.50 |
| Islamic | 5.00 |
| Hindu/Sikh | 12.50 |
| Other Religion (e.g., Buddhism, Agnostic) | 15.00 |
| None/Atheist | 20.00 |

*Note.* [a]$n = 39$; [b]$n = 16$; [c]$n = 40$.
†Please not that although the term homosexual was used in the questionnaire package, APA (2000) suggests avoiding using this term as it may perpetuate negative stereotypes.

them would be randomly assigned to prepare a speech and the other half would be asked to watch a trailer for a TV series on cultures around the world.

The group of participants assigned to prepare a speech was told that they had 3 minutes to prepare a 3-minute speech on any topic of their choosing. They were also told that their speech would be videotaped with a camera and judged for content and clarity by a group of their peers. Participants were shown the camera before they started preparing their speeches. The other group of participants was asked to watch a 3-minute trailer of a BBC TV series about humans around the world (BBC, 2011). After the 3 minutes, all participants were asked to complete the state versions of the STICSA and STAI again.

After completing the STICSA and STAI for the second time, participants who were told that they would be giving a speech were told that they were not required to make a speech. All participants received a debriefing form explaining the purpose of the study and contact information for psychological resources around Toronto, Ontario (see Appendix G). Participants received 1% course credit toward their introduction to psychology course for participating.

**Data analysis plan.** To determine whether the experimental group experienced an increase in state anxiety scores on the STICSA (and its somatic and cognitive subscales) compared to the control group, a repeated measures ANOVA was computed with time as the within-subjects variable (Pre vs. Post) and group (Experimental vs. Control) as the between-subjects variable. Identical analyses were conducted with the state version of the

STAI (and its anxiety subscale). Further, linear multiple regression models were estimated using data from the experimental group to investigate whether trait scores on the STICSA (and its subscales) predicted state scores on the STICSA (and its subscales) after a social challenge while controlling for baseline state scores. Identical analyses were conducted with trait scores on the STAI (and its anxiety subscale).

### 3.4 Results

**Missing data.** Missing data comprised less than 4.90% of any one variable and only 0.59% of all data points (excluding demographics). Twenty participants (48.78%) completed all questionnaires. There were no evident patterns in the missing data. Multiple imputations were used to account for missing data in the analyses. Five imputations were calculated based on all other variables in the study (excluding demographics). Analyses were conducted separately on each imputation and averaged to obtain results.

**Normality.** Each total score variable (i.e., total scores on measures) had a relatively normal distribution, with a skewness between +/-2.5 and a kurtosis between +/-8.

**Group differences.** There were no differences between the experimental and control groups in age, gender, education, ethnicity, religion, sexual orientation, or years lived in Canada. Prior to the experiment, the two groups also did not differ on measures of state and trait anxiety, social anxiety, depression, body dissatisfaction, extraversion, agreeableness, impulsivity, behavioural activation, positive and negative affect, quality of

life, or social desirability (see Table 15 for descriptive statistics and internal consistencies of all administered measures for the full sample).

**Internal consistency.** The state and trait versions of the STICSA had very good internal consistencies in the sample of undergraduate students (αs > .80; see Table 15). The somatic and cognitive subscales of the state version of the STICSA also had adequate internal consistencies (αs ≥ .75). The somatic and cognitive subscales of the trait version of the STICSA had excellent internal consistencies (αs > .90). The state and trait versions of the STAI had very good internal consistencies in the sample of undergraduate students (αs > .87; see Table 15). The anxiety subscale of the state and trait versions of the STAI had adequate internal consistencies (αs ≥ .70).

**Correlations.** Because a large number of correlations was computed ($N = 45$), a Bonferroni correction was applied to the critical significance level of $p < .05$, resulting in a new critical significance level of $p < .001$. Although there were moderate correlations between the somatic and cognitive subscales within the state and trait versions of the STICSA ($r$s ≥ .30; see Table 16), they were not significant. Total scores on the state and trait versions of the STICSA were strongly correlated, as were scores on the cognitive subscales across state and trait versions and scores on the somatic subscales across state and trait versions ($r$s > .60). There were also strong correlations between the state versions of the STICSA and STAI and between the trait versions of the STICSA and STAI ($r$s ≥ .69). Similar correlations were obtained when using the anxiety subscale of the STAI instead of the total score. The cognitive subscales of the state and trait versions

Table 15

Descriptive Statistics and Internal Consistencies of Administered Measures: Pre and Post

| Measure | Mean (*SD*) | *N* | α | 95% CI |
|---|---|---|---|---|
| Pre-SICSA | 33.17 (7.50) | 41 | .83 | .75-.90 |
| Pre-SICSA Somatic | 14.83 (3.38) | 41 | .75 | .62-.85 |
| Pre-SICSA Cognitive | 18.34 (5.72) | 41 | .84 | .75-.90 |
| Post-SICSA[a] | - | 41 | .93 | .89-.96 |
| Post-SICSA Somatic[a] | - | 41 | .90 | .85-.94 |
| Post-SICSA Cognitive[a] | - | 41 | .89 | .83-.93 |
| TICSA | 35.23 (10.78) | 39 | .93 | .89-.96 |
| TICSA-Somatic | 14.90 (5.46) | 39 | .92 | .88-.95 |
| TICSA-Cognitive | 20.33 (7.02) | 39 | .91 | .86-.95 |
| Pre-STAIS | 43.41 (9.85) | 41 | .87 | .81-.92 |
| Pre-STAIS – Anxiety Items[b] | 14.43 (4.05) | 41 | .70 | .54-.82 |
| Post-STAIS[a] | - | 41 | .91 | .86-.94 |
| Post-STAIS – Anxiety Items[ab] | - | 41 | .79 | .68-.88 |
| STAIT | 41.88 (12.02) | 40 | .93 | .90-.96 |
| STAIT – Anxiety Items[b] | 14.63 (4.66) | 40 | .84 | .75-.90 |
| ASI-Physical | 4.56 (5.33) | 41 | .88 | .81-.93 |
| ASI-Cognitive | 5.27 (5.29) | 41 | .85 | .77-.91 |
| CSAQ-Somatic | 12.62 (4.86) | 41 | .79 | .68-.88 |
| CSAQ-Cognitive | 17.24 (6.33) | 41 | .85 | .77-.91 |
| TAQ-Somatic | 18.98 (18.57) | 41 | .92 | .88-.95 |

| | | | | |
|---|---|---|---|---|
| TAQ-Cognitive | 31.00 (19.28) | 41 | .91 | .86-.95 |
| MASQ-Anxiety | 20.28 (7.57) | 41 | .86 | .79-.92 |
| MASQ-Anxious Arousal | 24.46 (8.74) | 41 | .89 | .83-.93 |
| MASQ-Depression | 25.80 (11.00) | 41 | .92 | .88-.95 |
| MASQ-Anhedonic Depression | 55.73 (16.14) | 41 | .93 | .89-.95 |
| PSWQ | 47.63 (12.16) | 41 | .88 | .81-.93 |
| GAD-7 | 6.44 (5.20) | 41 | .91 | .86-.95 |
| BFNE-S | 19.95 (7.45) | 41 | .93 | .89-.96 |
| SPS | 24.05 (14.12) | 41 | .89 | .84-.94 |
| SIAS | 29.84 (15.28) | 41 | .91 | .87-.95 |
| BDI-II | 12.80 (10.10) | 41 | .92 | .88-.95 |
| CES-D | 15.22 (10.84) | 41 | .90 | .86-.94 |
| BSQ | 80.80 (46.50) | 41 | .98 | .97-.99 |
| Mini-IPIP – Extraversion | 12.46 (3.84) | 41 | .79 | .66-.88 |
| Mini-IPIP – Agreeableness | 15.63 (2.87) | 41 | .71 | .53-.83 |
| Mini-IPIP – Conscientiousness[c] | 14.10 (3.08) | 41 | .57 | .30-.75 |
| Mini-IPIP – Neuroticism[c] | 11.98 (3.34) | 41 | .55 | .28-.74 |
| Mini-IPIP – Intellect/Imagination[c] | 14.46 (2.86) | 41 | .50 | .20-.71 |
| ImpSS | 9.84 (3.92) | 41 | .79 | .68-.87 |
| BAS Scales – Drive[c] | 8.94 (2.50) | 41 | .65 | .43-.79 |
| BAS Scales – Fun-Seeking[c] | 7.39 (2.06) | 41 | .48 | .16-.70 |
| BAS Scales – Reward Response | 7.12 (2.43) | 41 | .67 | .47-.80 |
| PANAS –Positive Affect | 27.34 (10.07) | 41 | .92 | .88-.95 |

| | | | | |
|---|---|---|---|---|
| PANAS –Negative Affect | 15.62 (6.20) | 41 | .87 | .80-.92 |
| PANAST –Positive Affect | 32.60 (8.52) | 40 | .89 | .83-.93 |
| PANAST – Negative Affect | 17.38 (6.36) | 40 | .88 | .82-.93 |
| SWLS | 18.29 (7.49) | 41 | .89 | .82-.93 |
| WHOQOL-BREF – Physical Health | 20.93 (4.30) | 41 | .75 | .61-.85 |
| WHOQOL-BREF – Psychological[c] | 19.85 (3.76) | 41 | .65 | .45-.79 |
| WHOQOL-BREF – Social Relationships | 10.54 (3.11) | 41 | .84 | .73-.91 |
| WHOQOL-BREF – Environment | 29.85 (6.36) | 41 | .86 | .79-.92 |
| BIDR – Self-Deception | 85.19 (16.37) | 41 | .80 | .70-.88 |
| BIDR – Impression Management | 75.16 (16.59) | 41 | .77 | .65-.86 |

*Note.* Pre = before the social challenge. Post = after the social challenge. SICSA = State version of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA); TICSA = Trait version of the STICSA; STAIS = State version of the State-Trait Anxiety Inventory (STAI); STAIT = Trait version of the STAI; ASI = Anxiety Sensitivity Index-3; CSAQ = Cognitive Somatic Anxiety Questionnaire (CSAQ); TAQ = Trimodal Anxiety Questionnaire; MASQ = Mood Anxiety Symptom Questionnaire; PSWQ = Penn State Worry Questionnaire; GAD-7 = Generalized Anxiety Disorder-7; BFNE-S = Brief Fear of Negative Evaluation Scale – Straightforward items; SPS = Social Phobia Scale; SIAS = Social Interaction Anxiety Scale; BDI-II = Beck Depression Inventory-II; CES-D = Center for Epidemiologic Studies Depression Scale; BSQ = Body Shape Questionnaire; Mini IPIP = Mini-International Personality Item Pool Scales; ImpSS = Impulsive Sensation Seeking Scale; BAS Scales = Behavioral Activation System Scales; PANAS = State version of the Positive and Negative Affect Schedule (PANAS); PANAST = Trait version of the PANAS; SWLS = The Satisfaction with Life Scale; WHOQOL-BREF = World Health Organization Quality of Life – Brief; BIDR = Balanced Inventory of Desirable Responding.

[a]Mean scores not reported for full sample due to the effects of the social challenge. [b]Bieling Antony, and Swinson (1998). [c]Measure was excluded from analyses due to an unacceptable internal consistency.

Table 16

Zero-Order Correlations between the State and Trait Versions of the STICSA and STAI (n = 39)

| Measure | Pre SICSA | Pre SICSA-S | Pre SICSA-C | TICSA | TICSA-S | TICSA-C | Pre STAIS | Pre STAIS -Anx | STAIT |
|---|---|---|---|---|---|---|---|---|---|
| Pre SICSA-S | .68* | - | | | | | | | |
| Pre SICSA-C | .90* | .30 | - | | | | | | |
| TICSA | .73* | .44 | .69* | - | | | | | |
| TICSA-S | .59* | .62* | .41 | .82* | - | | | | |
| TICSA-C | .66* | .19 | .74* | .90* | .48 | - | | | |
| Pre STAIS | .70* | .25 | .76* | .62* | .30 | .72* | - | | |
| Pre STAIS – Anx | .63* | .36 | .61* | .58* | .43 | .56* | .82* | - | |
| STAIT | .68* | .27 | .73* | .69* | .37 | .77* | .91* | .78* | - |
| STAIT – Anx | .51* | .24 | .53* | .66* | .41 | .69* | .79* | .85* | .87* |

*Note.* Pre = before the social challenge. SICSA = State version of the State Trait Inventory of Cognitive and Somatic Anxiety (STICSA); SICSA-S = Somatic subscale of SICSA; SICSA-C = Cognitive subscale of SICSA; TICSA = Trait version of the STICSA; TICSA-S = Somatic subscale of TICSA; TICSA-C = Cognitive subscale of TICSA; STAIS = State version of State-Trait Anxiety Inventory (STAI); STAIS – Anx = Anxiety items from the STAIS; STAIT = Trait version of STAI; STAIT – Anx: Anxiety items from the STAIT. *$p$ <.001

of the STICSA were significantly correlated ($rs > .60$) with the state and trait versions of the STAI and its anxiety subscale, respectively. The somatic subscales of the state and trait versions of the STICSA were not significantly correlated ($rs \leq .41$) with the state and trait versions of the STAI or its anxiety subscale, respectively.

**Social challenge.** A repeated measures ANOVA with total score on the state version of the STICSA as the dependent variable, time point (pre vs. post) as the within-group variable, and group (control vs. experimental) as the between-group variable revealed a time point by group interaction, $F(1,39) = 12.22$, $p = .001$, partial $\eta^2 = .24$. Although the experimental group's mean score increased from 31.88 ($SD = 5.80$) to 35.52 ($SD = 11.28$) during the social challenge, the change was not significant ($p = .10$). The control group's mean score, however, significantly decreased from 34.53 ($SD = 8.90$) to 28.60 ($SD = 8.59$) over time with no social challenge, $p = .002$ (see Figure 6).

Separate repeated measures ANOVAs were also estimated with the STICSA subscales of the state version of the STICSA as the dependent measures. Analyses with the somatic subscale also revealed a time point by group interaction, $F(1,39) = 16.31$, $p < .001$, partial $\eta^2 = .29$, with a significant increase in the experimental group's mean score from 14.29 ($SD = 2.88$) to 18.81 ($SD = 6.62$), $p = .001$. There was a slight decrease in the control group's mean score from 15.40 ($SD = 3.83$) to 13.95 ($SD = 3.83$), but it was not significant, $p = .16$ (see Figure 7). Analyses with the cognitive subscale again revealed a time point by group interaction (see Figure 8), $F(1,39) = 5.48$, $p = .02$, partial $\eta^2 = .12$, with a significant decrease in the control group's mean score from 19.13 ($SD = 6.94$) to

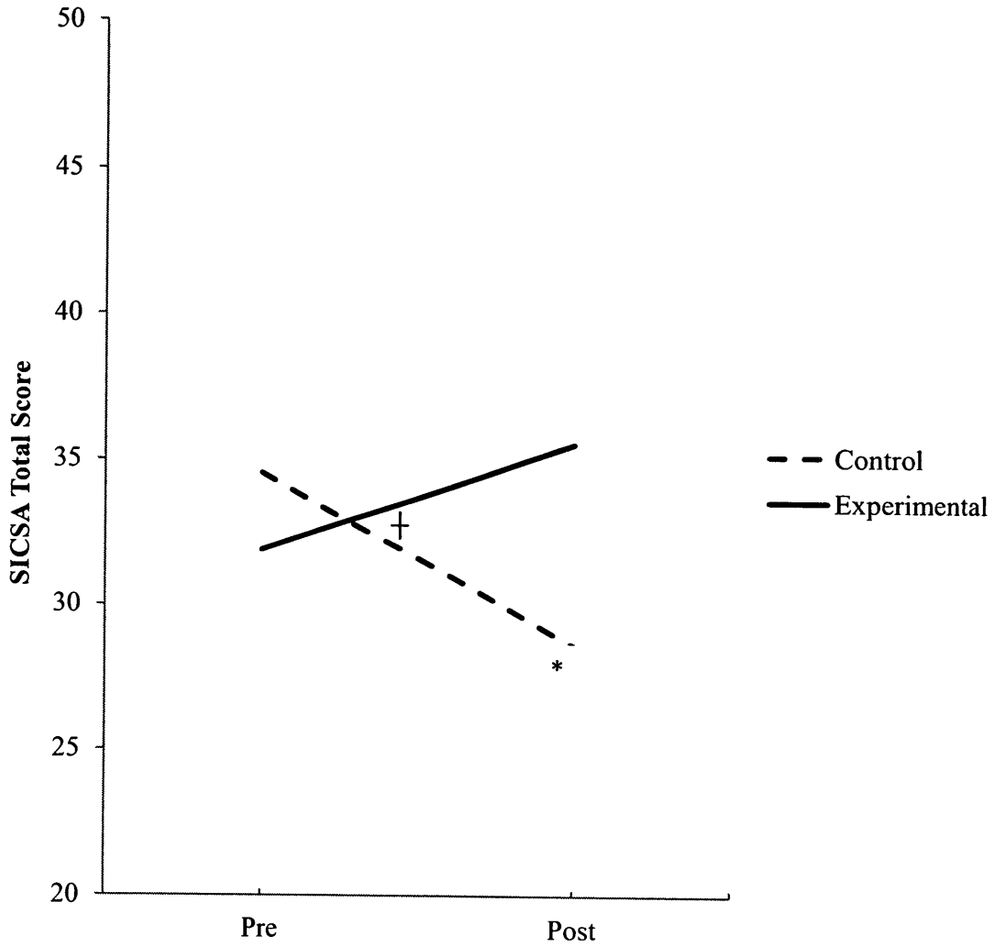


**Figure 6.** Mean total score on the state version of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA) in the experimental and control groups before and after the social challenge. SICSA = state version of the STICSA. Please note that the SICSA has a minimum score of 21 and maximum score of 84.
+ Significant interaction
* Significant decrease in scores

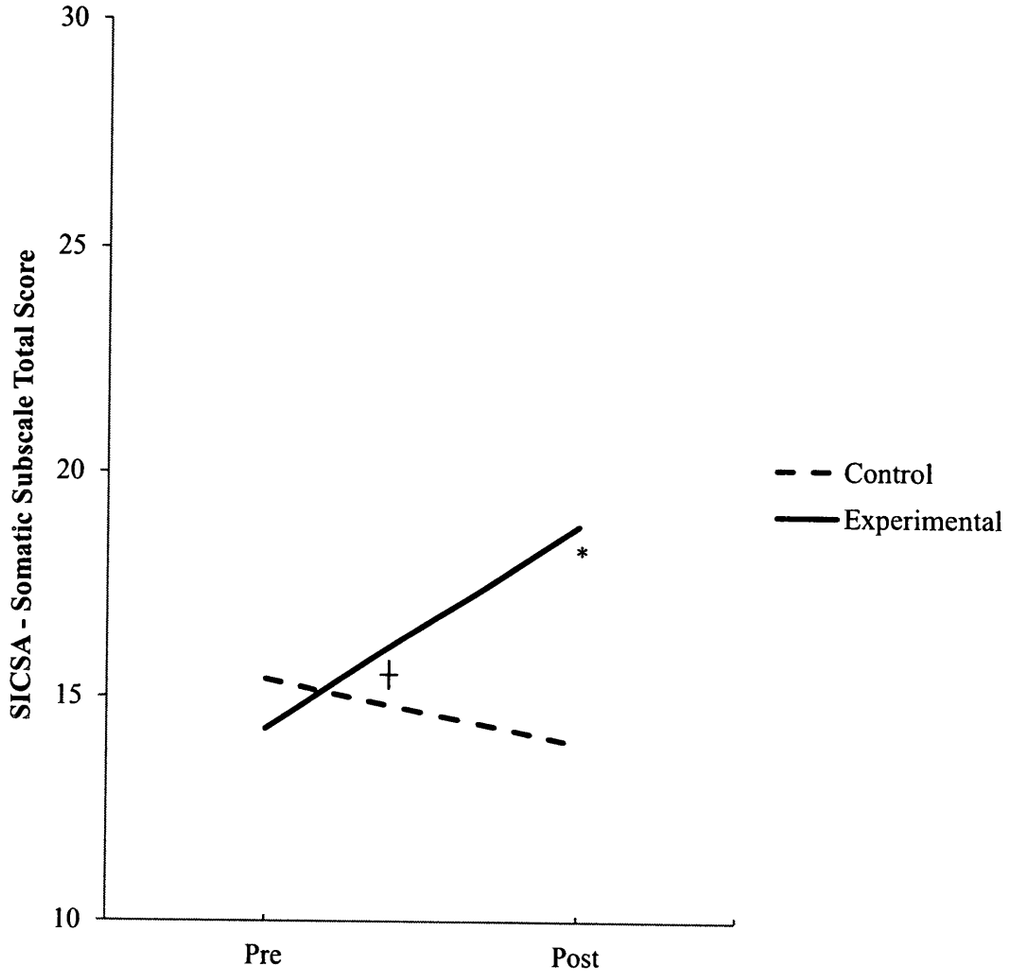


**Figure 7.** Mean total score on the somatic subscale of the state version of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA) in the experimental and control groups before and after the social challenge. SICSA = state version of STICSA. Please note that the somatic subscale of the SICSA has a minimum score of 10 and a maximum score of 40.

+ Significant interaction

* Significant increase in scores

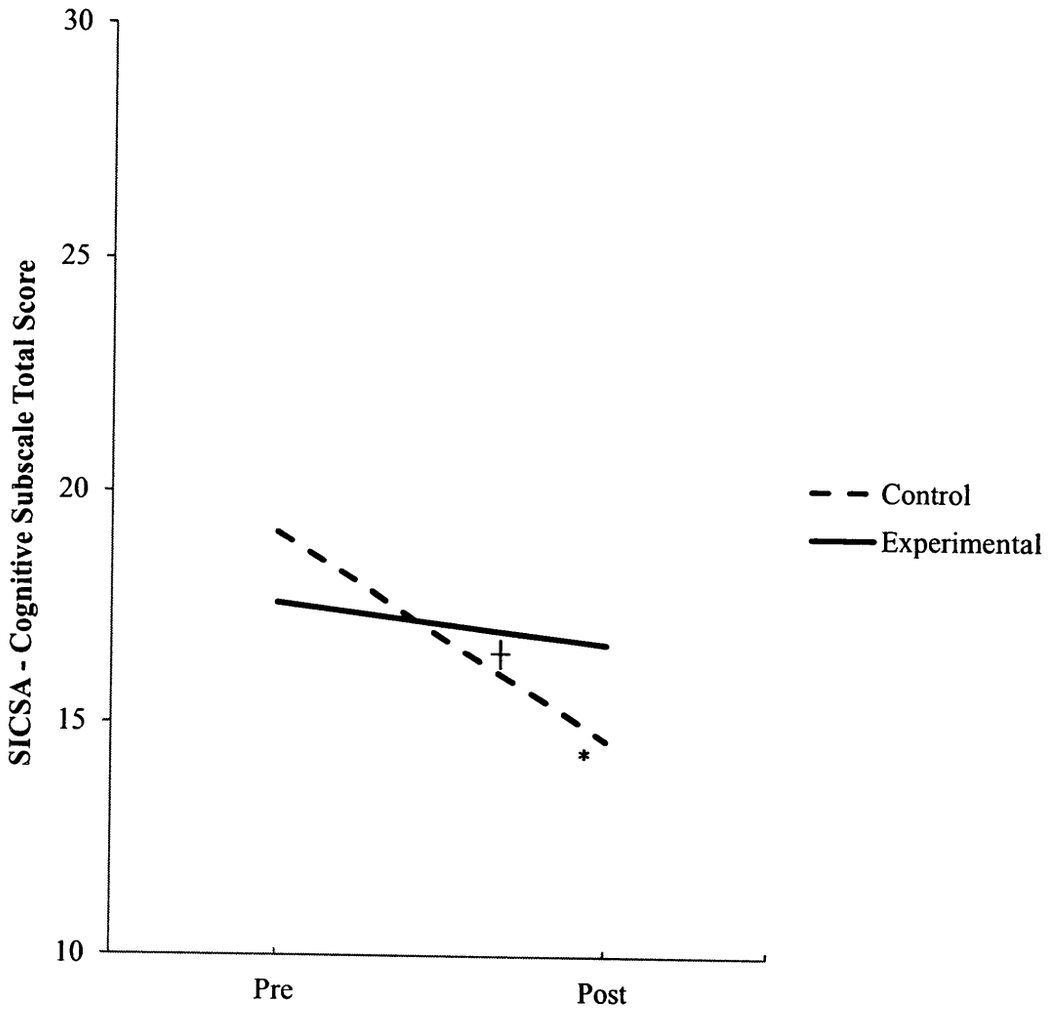


**Figure 8.** Mean total score on the cognitive subscale of the state version of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA) in the experimental and control groups before and after the social challenge. SICSA = state version of STICSA. Please note that the cognitive subscale of the STICSA has a minimum score of 11 and a maximum score of 44.
† Significant interaction
* Significant decrease in scores

14.65 ($SD$ = 5.95), $p < .001$. There was a slight decrease in the experimental group's mean score from 17.59 ($SD$ = 4.29) to 16.71 ($SD$ = 5.48), but it was not significant, $p$ = .46.

For comparative purposes, a repeated measures ANOVA with total score on the state version of the STAI as the dependent variable was also estimated. There was a main effect of time point, $F(1, 39) = 10.03$, p = .003, partial $\eta^2 = .20$, as the control group's mean score significantly decreased from 43.64 ($SD$ = 10.44) to 39.11 ($SD$ = 10.26), $p$ = .001. The experimental group's mean score also decreased from 43.19 ($SD$ = 9.52) to 41.32 ($SD$ = 12.21), but the change was not significant, $p$ = .28. There was no significant interaction, $F(1, 39) = 1.74$, p = .20, partial $\eta^2 = .04$ (see Figure 9). When a repeated measures ANOVA was estimated with only the anxiety items of the state version of the STAI as the dependent measure, there was a main effect of time point, $F(1, 39) = 9.28$, $p$ = .004, partial $\eta^2 = .19$, and still no significant interaction, $F(1, 39) = 1.03$, p = .27, partial $\eta^2 = .03$. The control group's mean score decreased significantly from 14.38 ($SD$ = 4.30) to 12.01 ($SD$ = 4.33), $p$ = .01. The experimental group's mean score also decreased from 14.48 ($SD$ = 3.89) to 13.38 ($SD$ = 3.87), but the change was not significant, $p$ = .16 (see Figure 10).

**Experimental group: Prediction of state scores after a social challenge.** A linear regression model was estimated with total score on the state version of the STICSA after the social challenge as the dependent variable and total scores on the state and trait versions of the STICSA before the social challenge as the independent variables. The trait

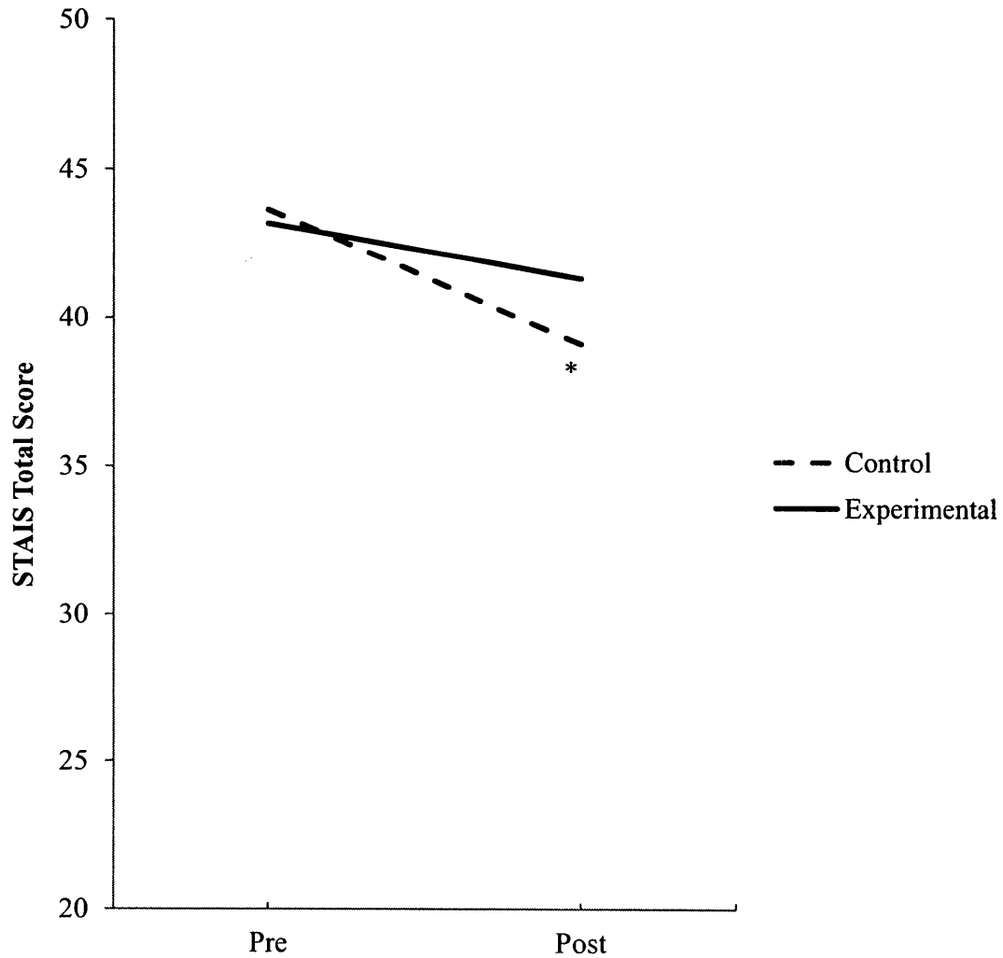


**Figure 9.** Mean total score on the state version of the State-Trait Anxiety Inventory (STAI) in the experimental and control groups before and after the social challenge. STAIS = state version of STAI. Please note that the STAIS has a minimum score of 20 and a maximum score of 80.
* Significant decrease in scores

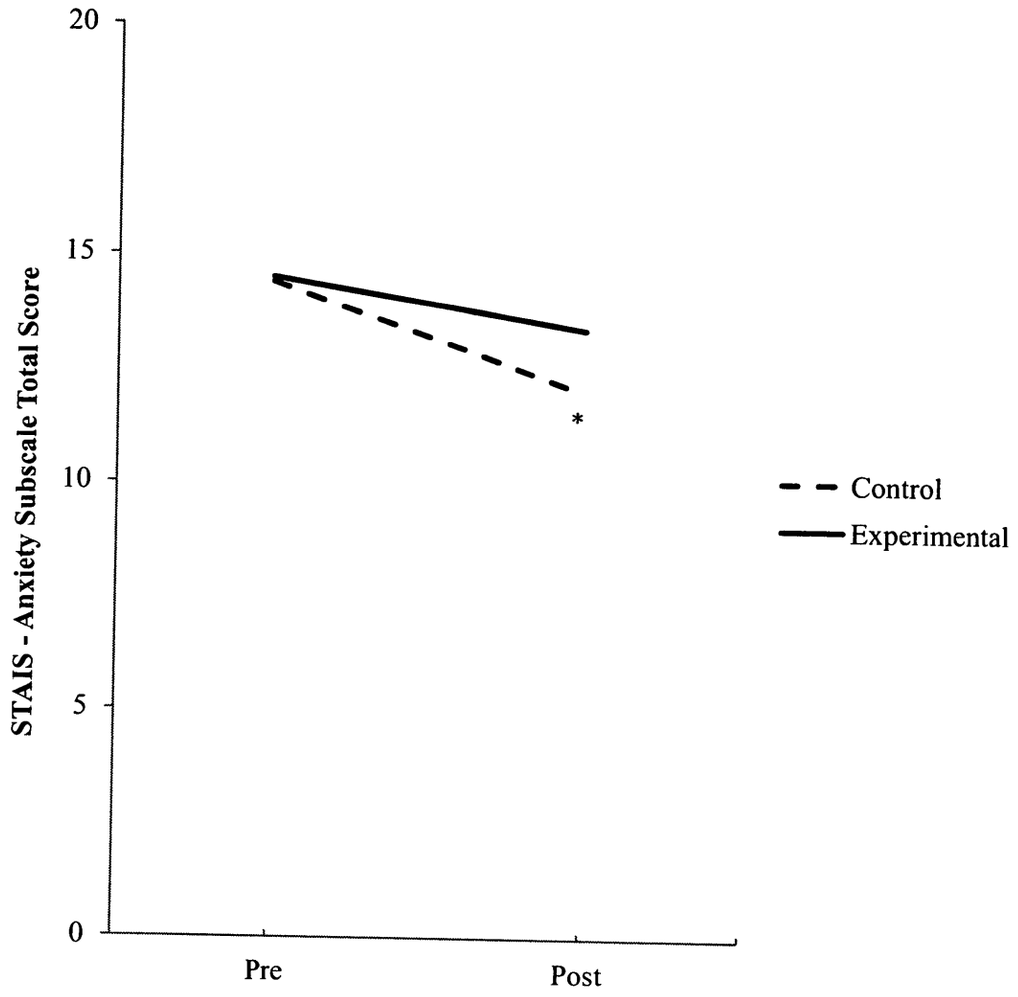


**Figure 10.** Mean total score on the anxiety subscale of the state version of the State-Trait Anxiety Inventory (STAI) in the experimental and control groups before and after the social challenge. STAIS = state version of STAI. Please note that the STAIS-Anxiety Subscale has a minimum score of 7 and a maximum score of 28.
* Significant decrease in scores

version of the STICSA accounted for unique variance in the model , $B = .96, p = .002$, whereas the state version of the STICSA before the social challenge did not, $B = .49, p = .15$. Approximately 54% (adjusted $R^2$) of the variation in total scores on the state version of the STICSA after the social challenge was explained by the model.

Separate linear regression models were also estimated with the somatic and cognitive subscales of the state version of the STICSA after the social challenge as dependent variables. In the first linear regression, the somatic subscale of the state version of the STICSA after the social challenge was the dependent variable and the somatic subscales of the state and trait versions of the STICSA before the social challenge were the independent variables. The somatic subscale of the trait version of the STICSA accounted for unique variance in the model, $B = .80, p = .01$, whereas the somatic subscale of the state version of the STICSA was a marginally significant unique predictor, $B = .87, p = .054$. Approximately 60% (adjusted $R^2$) of the variation in total scores on the somatic subscale of the state version of the STICSA after the social challenge was explained by the model.

In the second linear regression, the somatic subscale of the state version of the STICSA after the social challenge was the dependent variable and the cognitive subscales of the state and trait versions of the STICSA before the social challenge were the independent variables. Neither the cognitive subscale of the trait version of the STICSA, $B = .32, p = .31$, nor the cognitive subscale of the state version of the STICSA, $B = .04, p$

= .92, accounted for unique variance in the somatic subscale of the state version of the STICSA after the social challenge.

In the third linear regression, the cognitive subscale of the state version of the STICSA after the social challenge was the dependent variable and the cognitive subscales of the state and trait versions of the STICSA before the social challenge were the independent variables. The cognitive subscale of the trait version of the STICSA accounted for unique variance in the model, $B = .58, p = .01$, whereas the cognitive subscale of the state version did not, $B = .26, p = .32$. Approximately 41% (adjusted $R^2$) of the variation in total scores on the cognitive subscale of the state version of the STICSA after the social challenge was explained by the model.

In the fourth linear regression, the cognitive subscale of the state version of the STICSA after the social challenge was the dependent variable and the somatic subscales of the state and trait versions of the STICSA before the social challenge were the independent variables. Neither the somatic subscale of the trait version of the STICSA, $B = .38, p = .30$, nor the somatic subscale of the state version of the STICSA, $B = .32, p = .56$, accounted for unique variance in the state version of the STICSA after the social challenge.

For comparative purposes, linear regressions were also calculated with the state scores of the STAI (and its anxiety subscale) after the social challenge as the dependent variables. Neither the trait nor state versions of the STAI accounted for unique variance in the state version of the STAI after the social challenge ($B = .49, p = .22$ for trait; $B =$

.51, $p$ = .23 for state). The anxiety subscale of the state version of the STAI prior to the social challenge accounted for unique variance in scores on the anxiety subscale of the state version of the STAI after the social challenge, $B$ = .72, $p$ = .03, whereas the anxiety subscale of the trait version of the STAI did not, $B$ = -.12, $p$ = .70. Approximately 33% (adjusted $R^2$) of the variation in total scores on the anxiety subscale of the state version of the STAI after the social challenge was explained by the model.

**Summary.** An experiment was conducted wherein participants first filled out a battery of questionnaires and then were randomly assigned to either prepare to give a speech or watch a preview of a documentary television series. Participants rated their state anxiety before and after the experimental manipulation. Among participants asked to prepare a speech, there were increases in scores on the somatic subscale of the state version of the STICSA (but not its cognitive anxiety subscale) after the experimental manipulation, whereas there were decreases in scores on state version of the STICSA and its cognitive subscale among the control participants after the experimental manipulation. Scores on the state version of the STAI (and its anxiety subscale) decreased in the control group after the experimental manipulation. Analyses revealed that the trait version of the STICSA and its cognitive and somatic subscales accounted for unique variance in state anxiety scores among participants who prepared a speech. Scores on the trait version of the STAI did not account for unique variance in scores on the state version of the STAI among participants who prepared a speech.

# 4. General Discussion

## 4.1 Review of Findings

The present research provides further evidence that the STICSA is a reliable and valid measure of anxiety (see Table 17 for a description of the different types of reliability and validity). The state and trait versions of the STICSA and its subscales exhibited good internal consistencies in two samples of undergraduate students. Consistent with previous research with psychiatric patients (Grös et al., 2007), there was support for a four-factor model of the STICSA with factors corresponding to the somatic and cognitive subscales of the state and trait versions of the STICSA. Support was also found, however, for a hierarchical model of the STICSA with a global anxiety factor and four specific factors corresponding to the subscales of the STICSA.

Medium to large effect sizes between the STICSA (and its subscales) and measures of general anxiety, cognitive anxiety, somatic anxiety, social anxiety, worry, and negative affect provided evidence of the STICSA's convergent validity. Small effect sizes between the STICSA (and its subscales) and measures of impulsivity, behavioural activation, and social desirability provided evidence of the STICSA's divergent validity. In addition, small to medium effect sizes were found between the STICSA (and its subscales) and measures of quality of life.

Regarding the STICSA's relation to depression, there were small to medium effect sizes between the trait version of the STICSA and all depression measures ($R^2$ = .19-.41). Similar effect sizes were observed between the cognitive subscale of the trait

Table 17

Types of Reliability and Validity

| Psychometric Measure | Definition | Assessed[a] |
|---|---|---|
| Reliability | The overall consistency of a scale | |
| Internal Consistency | The consistency of results across items within a scale | Yes |
| Test-Retest Reliability | The degree to which scores on a scale are consistent over a certain period of time | No |
| Validity | The degree to which the scale measures what it claims to measure | |
| Content Validity | The degree to which the content of the scale matches the construct domain | No |
| Criterion-Related Validity | The degree to which the scale is related to a variable taken as representative of the construct (criterion variable) | |
| Concurrent Validity | The degree of association between the scale and a criterion variable measured at the same time | No |
| Predictive Validity | The degree of association between the scale and a criterion variable measured in the future | Yes |
| Construct Validity | The degree to which the scale is measuring the construct it claims to measure | |
| Convergent Validity | The degree to which a scale is associated with other scales that it is theoretically predicted to be associated with | Yes |
| Divergent Validity | The degree to which a scale is associated with other scales that it is theoretically NOT predicted to be associated with | Yes |
| Diagnostic Validity | The degree to which a scale can accurately classify individuals into diagnostic categories | No |

[a] This column indicates which types of reliability and validity were investigated in the present research.

version of the STICSA and all depression measures. Smaller effect sizes were found, however, between the somatic subscale of the trait version of the STICSA and the depression measures ($R^2$ = .10-.28), suggesting that this subscale may be important in distinguishing between anxiety and depression. Despite the strong correlations between the trait version of the STICSA and the depression measures, the STICSA and its subscales evidenced larger effect sizes ($R^2$ = .47-.56) with the somatic and cognitive subscales of another anxiety measure (TAQ) than with the depression measures, suggesting that the STICSA measures anxiety to a greater extent than depression.

In Study 2, results from an experiment investigating the sensitivity to change and predictive validity of the STICSA and the STAI indicated that the state version of the STICSA and its subscales were able to detect changes in state anxiety. As predicted, the experimental group's mean score increased on the somatic subscale of the state version of the STICSA after the social challenge. Scores on the state version of the STICSA and its cognitive subscale, however, did not increase in the experimental group after the introduction of a social challenge. Although the public speaking task was meant to be a general anxiety induction, it appeared to be a mainly somatic anxiety induction. Many individuals have physiological responses when given a speech task, and anxious arousal has been considered a subtype of speech anxiety (Finn, Sawyer, & Behnke, 2009). Although it is possible that the cognitive subscale was unable to detect increases in cognitive anxiety, it is also possible that the task elicited mainly somatic responses from participants, as the experimental group had limited time to engage in worry or rumination

about the task as they were asked to prepare a speech directly after the assignment of the task. Although anxiety tends to be high in the anticipatory stage before public speaking (Behnke & Sawyerk 1998), it can reduce when individuals are given the opportunity to work on the task directly after its assignment (Sawyer & Behnke, 1999).

During the experiment, the control group's scores on the state version of the STICSA (and cognitivesubscales) and the state version of the STAI (and its anxiety subscale) decreased, most likely due to habituation to the experimental setting (see Rankin et al., 2009). Contrary to expectations, scores on the state version of the STAI (and its anxiety items) did not increase in the experimental group. As the social challenge elicited mainly somatic anxiety in participants and the STAI is not purported to specifically measure somatic anxiety, it is possible that the STAI was unable to respond to changes in state somatic anxiety.

As predicted, scores on the trait scale of the STICSA accounted for unique variance in scores on the state scale of the STICSA after a social challenge, controlling for initial state scores. The cognitive and somatic subscales of the trait version of the STICSA were also predictors of state scores on the cognitive and somatic subscales, respectively, after the social challenge. This result is consistent with other research that suggests that trait anxiety affects state anxiety (e.g., Lau, Eley, & Stevenson, 2006). However, the double disassociation that was found by Ree and colleagues (2008; i.e., somatic trait scores predict increases in state scores only with somatic stressors and cognitive trait scores predict increases in state scores only with cognitive stressors) was

not replicated in that both the somatic and cognitive subscales of the trait version of the STICSA predicted changes in their respective state scores after the social challenge. In comparison, trait scores on the STAI (and its anxiety items) did not account for unique variance in state scores after the social challenge, although again this may have been due to the fact that the social challenge mainly elicited changes in somatic anxiety.

### 4.2 Factorial Validity of STICSA: Four-Factor Correlated Model vs. Hierarchical Model

The four-factor correlated model of the STICSA and the hierarchical model of the STICSA both fit the sample data well. Because the fit indices did not clearly indicate a preferable model, additional analyses were computed and the theoretical nature of the models was considered when choosing the most appropriate model for the STICSA items. Because the STICSA contains four subscales (i.e., state-somatic, state-cognitive, trait-somatic, trait-cognitive), four correlated factors corresponding to the four subscales is conceptually clear. However, the STICSA is also purported to be a measure of global anxiety. As such, a model of the STICSA based on theoretical considerations should include an overarching factor measuring global anxiety in addition to the four specific factors corresponding to the STICSA subscales. This model is the hierarchical model (see Figure 5) that was tested in the present study and found to have a good fit to the sample data. Additional analyses revealed that the global anxiety factor of the hierarchical model is more highly correlated than the specific factors with another measure of global anxiety, a measure of social performance anxiety, and a measure of negative affect. Given that the

hierarchical model is theoretically-driven and that the model's global anxiety factor appears to be differentially related to other constructs compared to the four specific factors, the hierarchical model is considered the model of best fit.

### 4.3 STICSA vs. STAI

**Somatic anxiety.** Based on the present research, the STICSA may be a more valid measure of somatic anxiety than the STAI. Analyses investigating the convergent validity of both the STICSA and STAI indicated that the trait version of the STAI and its anxiety subscale were not the best measures of somatic symptoms of anxiety, as they had significantly weaker correlations with three specific measures of somatic anxiety compared to the trait version of the STICSA (and its somatic subscale). As predicted, the state and trait versions of the STICSA and its cognitive subscales were strongly positively correlated with the state and trait versions of the STAI, respectively. The somatic subscales of the state and trait versions of the STICSA, however, were only moderately positively correlated with the state and trait versions of the STAI, respectively.

**Negative affect and depression.** Analyses indicated that although both the STICSA and STAI measure negative affect, the STAI also measures a lack of positive affect. Low positive affect is often associated with depression (Werner-Seidler, Banks, Dunn, & Moulds, 2013). As predicted, there were strong positive correlations between the state and trait versions of the STICSA and the negative affect subscale of the state and trait versions of the PANAS, respectively. In comparison, the state and trait versions of

the STAI were strongly positively correlated with the negative affect subscales of the state and trait versions of the PANAS and strongly negatively correlated with the positive affect subscales of the state and trait versions of the PANAS, respectively.

Although the trait version of the STICSA was strongly correlated with several depression measures, it was significantly less correlated to two measures of depression than the trait version of the STAI. Further, the somatic subscale of the trait version of the STICSA was significantly less correlated to all the depression measures than the trait version of the STAI (mixed results were found when using only the anxiety items of the STAI). Notably, correlations with the depression and anxiety subscales of the STAI did not differ except on one measure of anhedonic depression.

**Quality of life.** As expected, the trait versions of both the STICSA and STAI (and their subscales) were significantly negatively correlated with measures of quality of life. The trait version of the STAI, however, was very strongly negatively correlated ($r$ = -.70) with a measure of general psychological well-being, suggesting significant overlap with a broader measure of negative affect. Further, the depression subscale of the STAI was more strongly negatively correlated with measures of quality of life than the anxiety subscale of the STAI, suggesting a stronger association between depression and quality of life than anxiety and quality of life.

**Sensitivity to change and predictive validity.** An experimental manipulation showed that the state version of the STICSA, but not the STAI, was able to detect increases in somatic anxiety in a group of participants after the introduction of a social

challenge. If it is assumed that the public speaking task increased participants' anxiety (as it is one of the most common fears in the general population; Ruscio et al., 2008), then this indicates that the state version of the STAI is not sensitive to changes in somatic anxiety. Further, the experiment provided evidence that the trait version of the STICSA and its subscales have better predictive validity of state anxiety than the trait version of the STAI and its anxiety subscale. The trait version of the STICSA and its subscales accounted for unique variance in state scores after a social challenge, whereas the trait version of the STAI and its anxiety subscale did not.

### 4.4 Clinical Utility of the STICSA

The STICSA appears to be a valid and reliable measure of global anxiety, somatic anxiety, and cognitive anxiety. Every individual with an anxiety disorder presents with a relatively unique combination of symptoms of anxiety, which normally include somatic (e.g., sweating) and cognitive (e.g., worry) symptoms. Anxiety scales that provide only one score to represent an individual's anxiety symptoms (e.g., STAI, BAI) do not highlight this division of symptoms. As such, these scales may not significantly aid clinicians in determining a diagnosis or developing a tailored treatment plan.

The STICSA provides clinicians with an overall anxiety score and two subscale scores: somatic anxiety and cognitive anxiety. Although other scales also provide somatic and cognitive anxiety subscale scores (e.g., CSAQ, TAQ), they only measure trait anxiety and the divergent validity of these scales is unknown. The subscale scores of the STICSA indicate which type of symptoms an individual is predominantly experiencing and can be

used to inform a clinician's diagnosis and treatment plan. For example, very high scores on the somatic anxiety subscale may indicate symptoms of panic disorder, whereas very high scores on the cognitive anxiety subscale may indicate symptoms of generalized anxiety disorder. The ability of the trait version of the STICSA (and its subscales) to predict state scores after an anxiety-provoking situation (e.g., Ree et al., 2008) could also be used by clinicians to determine how high an individual's anxiety level may rise during planned exposures.

Davidson and Schwartz (1976) theorized that matching treatment techniques to an individual's predominant anxiety symptoms would result in the best treatment response. For example, if an individual presents with predominantly somatic symptoms of anxiety (e.g., sweating, shaking), then he or she may respond best to somatic-based treatments (i.e., progressive muscle relaxation, exercise) whereas if an individual presents with predominantly cognitive symptoms of anxiety (e.g., excessive worry) then he or she may respond best to cognitive-based treatments (e.g., stress management, meditation). Research has supported the theory that matching treatment techniques to anxiety symptoms produces better outcomes than mismatched treatments (e.g., Norton & Johnson, 1983; Tamaren et al., 1985). Based on theory and research, scores on the STICSA subscales could help to determine which symptoms to target in treatment (e.g., relaxation techniques for those scoring high on somatic symptoms, cognitive challenging or meditation for those scoring high on cognitive symptoms).

### 4.5 Conceptual Considerations

The results from the current study are consistent with Clark and Watson's (1991) tripartite model of anxiety and depression. First, the STICSA and STAI (and its subscales) were moderately to strongly correlated with all measures of depression, as would be expected if anxiety and depression shared a common latent factor (i.e., general distress). Second, the somatic subscale of the STICSA was more highly correlated with other anxiety measures than depression measures and was less correlated with depression measures than the cognitive subscale of the STICSA. This supports Clark and Watson's theory that anxiety loads uniquely onto a somatic anxiety/tension factor. Finally, neither the STICSA nor its subscales correlated with a measure of positive affect, whereas measures of depression correlated negatively with a measure of positive affect. This supports Clark and Watson's theory that depression loads uniquely onto a low positive affect/anhedonia factor.

The psychometric results from the current study also suggest that the construct of anxiety can be divided into two subtypes: somatic and cognitive. These anxiety subtypes, although correlated, display different relationships with other constructs (e.g., depression, social anxiety). It should be noted however, that the relationship between somatic and cognitive anxiety could also be interactive. For example, experiencing certain somatic symptoms can lead to anxious cognitions (e.g., interpreting increased heart rate as having a heart attack) and experiencing certain anxious thoughts can lead to somatic responses (e.g., constant worrying that leads to muscle tension).

Somatic or cognitive anxiety symptoms may be more or less predominant depending on the type of anxiety disorder (see Antony & Stein, 2009). For example, individuals who react anxiously to physiological changes (i.e., panic disorder) could be classified under the somatic subtype of anxiety, whereas individuals who constantly worry (i.e., generalized anxiety disorder) could be classified under the cognitive subtype of anxiety. Social anxiety disorder includes social performance anxiety (i.e., fear of looking nervous, being humiliated), which often leads to somatic anxiety symptoms, and social interaction anxiety (i.e., fear of being judged), which often leads to cognitive anxiety symptoms. Social performance anxiety and social interaction anxiety can be interpreted as somatic and cognitive anxiety subtypes, respectively.

A similar distinction could also be made between individuals with generalized social anxiety disorder (e.g., anxiety in multiple social situations) and those with specific social anxiety disorder (e.g., public speaking anxiety only). Carter and Wu (2010) concluded that specific social anxiety disorder is based predominantly on the experience of fear and panic (i.e., somatic symptoms) whereas generalized social anxiety disorder is based predominantly on distress and is more related to depression and avoidant personality disorder (i.e., cognitive symptoms). Other anxiety disorders, such as post-traumatic stress disorder, also have symptom clusters that may correspond to somatic (e.g., hyperarousal) and cognitive (e.g., intrusive thoughts) subtypes (APA, 2000).

It is noteworthy that other constructs such as depression and anger could also be conceptualized as having somatic and cognitive subtypes. For example, individuals with

depression can experience somatic symptoms (e.g., fatigue, changes in appetite and sleep pattern) in addition to cognitive symptoms (e.g., hopelessness, lack of interest; APA, 2000). In fact, Whisman and colleagues (2000) conducted a factor analysis of the BDI-II with a large undergraduate sample and found two underlying factors in the BDI-II, one assessing cognitive-affective symptoms of depression and the other assessing somatic symptoms of depression. Further, a distinction has been made between anxious somatic depression (i.e., major depression with somatic features) and pure depression (i.e., major depression without somatic features; Silverstein 2002). Anxious somatic depression could be classified as a somatic subtype of depression whereas pure depression could be classified as a cognitive subtype of depression.

Similarly, individuals with anger management problems often experience symptoms of physiological arousal (e.g., increased heart rate) in addition to cognitive symptoms (e.g. hostile attributions; Feindler & Byers, 2006). Feindler and Byers' (2006) review of treatment approaches for anger-related problems presents cognitive therapy and relaxation strategies as separate treatments for anger. Cognitive symptoms of anger are targeted in cognitive therapy, whereas somatic symptoms of anger are targeted in relaxation training.

### 4.6 Limitations

**Sample.** The generalizability of the present findings is limited, as both samples were composed of ethnically diverse, highly educated young adults, the majority of whom were heterosexual and female. It is unknown whether similar results would be

found in clinical samples (e.g., generalized anxiety disorder, social anxiety disorder), samples including less educated individuals (e.g., high school dropouts), samples including older adults, predominantly male samples, samples including lesbian, gay, bisexual, and transgender individuals, or samples including people from one ethnic group. For example, the prevalence of anxiety disorders among women is over one and half times larger than the prevalence among men (Kessler et al., 2012; Maier et al., 1999). Furthermore, the prevalence of anxiety disorders among lesbian, gay, bisexual, and transgender individuals is estimated to be higher than the general population (Bostwick, Boyd, Hughes, & McCabe, 2010; Sandfort, de Graaf, Bijl, & Schnabel, 2001). Ethnicity also appears to play a role in the lifetime prevalence of anxiety disorders (Asnaani, Richey, Dimaite, Hinton, & Hofmann, 2010; Smith et al., 2006). These differences in prevalence rates could influence the results of factor analyses of the STICSA items and correlations between the STICSA and other measures. As clinically depressed individuals were not excluded from the current study, there may have been a high level of comorbidity between anxiety and depression in the two samples. This could have resulted in higher correlations between anxiety and depression measures than would have been obtained in samples that excluded clinically depressed individuals.

**Measures.** All measures administered in the present study were self-report measures. Interview-based measures or behavioural measures may have revealed different relationships between the study constructs. Several subscales were excluded from the present study due to unacceptable internal consistencies (e.g., neuroticism

subscale of Mini-IPIP; self-deception subscale of BIDR). Alternative scales measuring similar concepts may have achieved higher internal consistencies and may have provided more evidence of the STICSA's validity. For example, a personality measure with more items in each subscale (e.g., IPIP-50; Goldberg et al., 2006) would have probably achieved higher internal consistencies. Also, a popular measure of social desirability (e.g., Marlowe-Crowne Social Desirability Scale) could have been administered to supplement the BIDR.

**Method.** Although the order of measures was randomized in the online study, measures with state and trait versions were always administered with the state version first to preclude any affective influence the trait version could have on the state version. However, this methodology prevented the counterbalancing of these measures. As Study 1 was not longitudinal in nature, no causal conclusions can be made based on the findings. In Study 2, another type of anxiety-provoking situation (e.g., anticipation of electric shock) may have increased participants' anxiety levels more than a public speaking task. Further, giving participants more time in the anticipatory phase (e.g., 15 minutes) and not allowing them to focus on a task may have led to increases in cognitive anxiety. Finally, as the public speaking task appeared to result specifically in an increase in somatic anxiety, this may have led to results favouring the somatic subscale of the STICSA compared to the STAI.

## 4.7 Future Directions

Future research on the STICSA with clinical samples is needed to conclude whether the STICSA is a good measure to use in clinical settings. In particular, a CFA of the hierarchical model could be conducted using a large sample of individuals with anxiety disorders to compare the factor structure of the STICSA in a clinical sample to that of a community or student sample. In addition, future research could investigate whether the STICSA can discriminate between individuals with anxiety disorders, individuals with major depression, and normal controls. Researchers could conduct clinical diagnostic interviews (e.g., SCID; First et al., 2002) with participants and determine whether they meet criteria for a mood or anxiety disorder, and then ask them to fill out the STICSA. Scores on the STICSA could then be compared between individuals with different anxiety disorders (e.g., social anxiety disorder, generalized anxiety disorder, obsessive-compulsive disorder), between individuals with anxiety disorders and major depression, and between all clinical groups and a control group.

To further investigate convergent validity, interview-based measures of anxiety such as the ADIS, the Hamilton Rating Scale for Anxiety, or the Clinical Anxiety Scale (Westhuis & Thyer, 1989) could be administered to participants and then compared to scores on the STICSA and its subscales. In addition, sensitivity to changes in somatic anxiety could be investigated in more depth by comparing scores on the state version of the STICSA (and its subscales) with physiological measures of anxiety (e.g., heart rate, breathing rate, blood pressure, or galvanic skin response) before, during, and after

participants encounter an anxiety-provoking stimulus. For example, a study could be conducted where participants' blood pressure is measured before, during, and after a public speaking task. Based on previous research (e.g., Ree et al., 2008), it would be expected that increases in blood pressure would be more strongly associated with increases in the somatic anxiety subscale (e.g., racing heart, breathing rate) of the state version of the STICSA than the cognitive anxiety subscale (e.g., intrusive thoughts, trouble remembering) of the state version of the STICSA. Sensitivity to changes in cognitive anxiety could also be investigated in more depth by measuring anxiety before, during, and after a more cognitive-based stressor (e.g., stressful work situations, written examination).

### 4.8 Summary

Two studies were conducted to extend upon previous research on the reliability and validity of the STICSA, a self-report measure of state and trait somatic and cognitive anxiety. A CFA of data obtained from an online study provided evidence that the items of the STICSA load onto one global anxiety factor and four specific factors that correspond to the STICSA subscales. Support was also found for a four-factor model of the STICSA without the global anxiety factor. The STICSA and its subscales correlated strongly with other self-report measures of anxiety, weakly with measures of other constructs (e.g., impulsivity, social desirability), and negatively with measures of quality of life. The STICSA and its subscales correlated moderately to strongly with measures of depression; however, they correlated more strongly with another measure of anxiety. Comparison

between the STICSA and the STAI favored the STICSA as the better measure of somatic anxiety. An experiment provided evidence that the state version of the STICSA and its subscales can detect changes in anxiety and that trait scores on the STICSA and its subscales are predictive of changes in state scores after a social challenge. The results from the present study are consistent with Clark and Watson's (1991) tripartite model of anxiety and depression, with evidence for a unique somatic anxiety factor that has divergent validity with depression. Further research on the psychometrics of the STICSA is warranted given the possibility that it is a more valid anxiety scale compared to the STAI.

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## 6. Appendices

Appendix A: Subscales of the Trait Version of the State-Trait Anxiety Inventory (Bieling, Antony, & Swinson, 1998)

**Anxiety Subscale**

22. I feel nervous and restless
28. I feel that difficulties are piling up so that I can't overcome them
29. I worry too much over something that really doesn't matter
31. I have disturbing thoughts
37. Some unimportant thought runs through my mind and bothers me
38. I take disappointments so keenly that I can't put them out of my mind
40. I get in a state of tension or turmoil as I think over my recent concerns and interests

**Depression Subscale**

21. I feel pleasant
23. I feel satisfied with myself
24. I wish I could be as happy as others seem to be
25. I feel like a failure
26. I feel rested
27. I am 'calm, cool, and collected'
30. I am happy
32. I lack self-confidence
33. I feel secure
34. I make decisions easily
35. I feel inadequate
36. I am content
39. I am a steady person

Appendix B: State-Trait Inventory for Cognitive and Somatic Anxiety

**STICSA: Your Mood at this Moment**

Below is a list of statements which can be used to describe how people feel. Beside each statement are four numbers which indicate the degree with which each statement is self-descriptive of mood at this moment. Please read each statement carefully and circle the number which best **indicates how you feel right now, at this very moment,** even if this is not how you usually feel.

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| **Not at all** | **A little** | **Moderately** | **Very much so** |

| | |
|---|---|
| 1. My heart beats fast. | 1 2 3 4 |
| 2. My muscles are tense. | 1 2 3 4 |
| 3. I feel agonized over my problems. | 1 2 3 4 |
| 4. I think that others won't approve of me. | 1 2 3 4 |
| 5. I feel like I'm missing out on things because I can't make up my mind soon enough. | 1 2 3 4 |
| 6. I feel dizzy. | 1 2 3 4 |
| 7. My muscles feel weak. | 1 2 3 4 |
| 8. I feel trembly and shaky. | 1 2 3 4 |
| 9. I picture some future misfortune. | 1 2 3 4 |
| 10. I can't get some thoughts out of my mind. | 1 2 3 4 |
| 11. I have trouble remembering things. | 1 2 3 4 |
| 12. My face feels hot. | 1 2 3 4 |
| 13. I think that the worst will happen. | 1 2 3 4 |
| 14. My arms and legs feel stiff. | 1 2 3 4 |
| 15. My throat feels dry. | 1 2 3 4 |
| 16. I keep busy to avoid uncomfortable thoughts. | 1 2 3 4 |
| 17. I cannot concentrate without irrelevant thoughts intruding. | 1 2 3 4 |
| 18. My breathing is fast and shallow. | 1 2 3 4 |
| 19. I worry that I cannot control my thoughts as well as I would like to. | 1 2 3 4 |
| 20. I have butterflies in the stomach. | 1 2 3 4 |
| 21. My palms feel clammy. | 1 2 3 4 |

**STICSA: Your General Mood State**

Below is a list of statements which can be used to describe how people feel. Beside each statement are four numbers which indicate how often each statement is true of you. Please read each statement carefully and circle the number which best indicates how often, **in general**, the statement is true of you.

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| **Not at all** | **A little** | **Moderately** | **Very much so** |

| | | | | |
|---|---|---|---|---|
| 22. My heart beats fast. | 1 | 2 | 3 | 4 |
| 23. My muscles are tense. | 1 | 2 | 3 | 4 |
| 24. I feel agonized over my problems. | 1 | 2 | 3 | 4 |
| 25. I think that others won't approve of me. | 1 | 2 | 3 | 4 |
| 26. I feel like I'm missing out on things because I can't make up my mind soon. | 1 | 2 | 3 | 4 |
| 27. I feel dizzy. | 1 | 2 | 3 | 4 |
| 28. My muscles feel weak. | 1 | 2 | 3 | 4 |
| 29. I feel trembly and shaky. | 1 | 2 | 3 | 4 |
| 30. I picture some future misfortune. | 1 | 2 | 3 | 4 |
| 31. I can't get some thoughts out of my mind. | 1 | 2 | 3 | 4 |
| 32. I have trouble remembering things. | 1 | 2 | 3 | 4 |
| 33. My face feels hot. | 1 | 2 | 3 | 4 |
| 34. I think that the worst will happen. | 1 | 2 | 3 | 4 |
| 35. My arms and legs feel stiff. | 1 | 2 | 3 | 4 |
| 36. My throat feels dry. | 1 | 2 | 3 | 4 |
| 37. I keep busy to avoid uncomfortable thoughts. | 1 | 2 | 3 | 4 |
| 38. I cannot concentrate without irrelevant thoughts intruding. | 1 | 2 | 3 | 4 |
| 39. My breathing is fast and shallow. | 1 | 2 | 3 | 4 |
| 40. I worry that I cannot control my thoughts as well as I would like to. | 1 | 2 | 3 | 4 |
| 41. I have butterflies in the stomach. | 1 | 2 | 3 | 4 |
| 42. My palms feel clammy. | 1 | 2 | 3 | 4 |

Appendix C: Study 1 – Online Informed Consent Form

**Study Name**: State-Trait Inventory of Cognitive and Somatic Anxiety (STICSA): Psychometric Properties

**Researcher**: Karen Roberts, M.A.
Ph.D. IV, Clinical Psychology
047 Behavioural Science Building, York University
checkers@yorku.ca
416-979-5000 x 2180

**Purpose of the Research:** To determine whether the State-Trait Inventory of Cognitive and Somatic Anxiety, a measure of general anxiety, is structurally sound and useful, and to determine how it relates to other measures of psychological distress and personality.

**What You Will Be Asked to Do in the Research**: You will be asked to complete a battery of questionnaires online assessing your current level of psychological distress (e.g., STICSA, Beck Depression Inventory, Social Interaction Anxiety Scale). It is estimated that it will take 45 minutes to complete the questionnaires.

**Risks and Discomforts**: You may be uncomfortable answering questions about your current level of psychological distress. After participation, you will receive a debriefing form containing information about the study as well as a list of psychological resources around the city of Toronto. If you indicate any suicidal intentions or attempts, you will be asked to contact the researcher for further assistance and will be given referral options for treatment.

**Benefits of the Research and Benefits to You**: The research will evaluate the usefulness of a measure of anxiety that may be used by health practitioners in the future to determine a patient's level of distress. You will receive 1 credit toward your Psychology 1010 course at York University for participating.

**Voluntary Participation**: Your participation in the study is completely voluntary and you may choose to stop participating at any time. You may skip any questions that you do not wish to answer. Your decision not to volunteer will not influence the nature of your relationship with York University or status in your Psychology 1010 course either now, or in the future.

**Withdrawal from the Study**: You can stop participating in the study at any time, for any reason, if you so decide. If you decide to stop participating, you will still be eligible to receive the credit for agreeing to be in the project. Your decision to stop participating,

or to refuse to answer particular questions, will not affect your relationship with the researchers, York University, or any other group associated with this project. In the event you withdraw from the study, all associated data collected will be immediately destroyed wherever possible.

**Confidentiality**: All information you supply during the research will be anonymous. You will not be asked to divulge your name at any point; therefore your name will not be linked to any of your answers to the questions. Data will be collected online. Your data will be safely stored on a memory key that will be placed in a locked filing cabinet. Only research staff will have access to the data. The data will be stored for 10 years and will be erased after this time.

**Questions About the Research?** If you have questions about the research in general or about your role in the study, please feel free to contact me or my Graduate Supervisor - Dr. Trevor Hart either by telephone at (416) 979-5000 x 2179 or by e-mail (trevor.hart@psych.ryerson.ca). You may also contact my Graduate Program – Department of Psychology, 297 Behavioural Science Building, (416)736-2100 x 33983. This research has been reviewed and approved by the Human Participants Review Sub-Committee, York University's Ethics Review Board and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, or about your rights as a participant in the study, please contact the Sr. Manager & Policy Advisor for the Office of Research Ethics, 5th Floor, York Research Tower, York University (416-736-5914 or e-mail ore@yorku.ca).

**Legal Rights**:

I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by agreeing to participate. Clicking on the "I consent" button below indicates my consent to participate in State-Trait Inventory of Cognitive and Somatic Anxiety: Psychometric Properties conducted by Karen Roberts.

| **I consent to participate in State-Trait Inventory of Cognitive and Somatic Anxiety: Psychometric Properties** |
|---|

## Appendix D: Study 1 Beck Depression Inventory-II – Question #9

In the past week, you have indicated feeling that you would like to kill yourself or would kill yourself if you had the chance. Please contact the principal investigator (Karen Roberts – 416-979-5000 x 2179, checkers@yorku.ca) as soon as possible to discuss psychological resources that may be of help to you during this distressing time.

Appendix E: Study 1 – Online Debriefing Form

Thank you for your participation in the current study. This study was conducted in order to evaluate the usefulness of a measure of general anxiety – the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA). The STICSA assesses both state (i.e., in the moment) and trait (i.e., stable) anxiety as well as both somatic (e.g., dizziness) and cognitive (e.g., racing thoughts) symptoms of anxiety. Scores on the subscales of the STICSA will be analyzed for reliability and compared to other measures of psychological distress that have been used in past research (e.g., State-Trait Anxiety Inventory, Beck Depression Inventory).

We realize that some of the questions that were asked may have caused you some discomfort. If you feel that you are currently experiencing psychological distress and would like some help, please feel free to contact one of the following psychological resources around Toronto:

**General**

Telehealth Ontario: 1-866-797-0000

Ontario Psychological Association: 416-961-5552, info@psych.on.ca,

www.psych.on.ca

Centre for Addiction and Mental Health: 416-535-8501 (switchboard); For a mental health or addiction concern 416-595-6111 (Toronto) or 1-800-463-6273 (toll free),

www.camh.net

**Hospitals**

St. Michael's Hospital
Mental Health Services and Clinics
17 Cardinal Carter
30 Bond Street
Toronto, Ontario
Phone: 416-864-5120

Mount Sinai Hospital
Department of Psychiatry
Joseph and Wolf Lebovic Health Complex
600 University Avenue, 9th floor
Toronto, Ontario
Phone: 416-586-4800 ext. 4568

Toronto Western Hospital
Community Mental Health
399 Bathurst Street
East Wing, 9th Floor
Toronto, Ontario
Phone: 416-603-5747

Toronto East General Hospital
Mental Health Service
Outpatient Programs
825 Coxwell Avenue
Toronto, Ontario
Phone: 416-469-6310

***Distress lines***

Operated by various agencies are open 24 hours a day if you need to talk to someone.

**Toronto Distress Centres:** 416-408-4357

**Gerstein Centre:** 416-929-5200

**Distress Centre Peel:** 905-278-7208

**Durham Crisis Line:** 905-666-0483

**Oakville Distress Centre:** 905-849-4541

**Telecare (Mandarin & Cantonese):** 416-920-0497

Appendix F: Study 2 – Informed Consent Forms

**Part I**

**Study Name**: State-Trait Inventory of Cognitive and Somatic Anxiety (STICSA): Psychometric Properties

**Researcher**: Karen Roberts, M.A.
Ph.D. IV, Clinical Psychology
047 Behavioural Science Building, York University
checkers@yorku.ca
416-979-5000 x 2180

**Purpose of the Research:** To determine whether the State-Trait Inventory of Cognitive and Somatic Anxiety, a measure of general anxiety, is structurally sound and useful, and to determine how it relates to other measures of psychological distress and personality.

**What You Will Be Asked to Do in the Research**: You will be asked to complete a battery of questionnaires assessing your current level of psychological distress (e.g., STICSA, Beck Depression Inventory, Social Interaction Anxiety Scale). It is estimated that it will take 45 minutes to complete the questionnaires.

**Risks and Discomforts**: You may be uncomfortable answering questions about your current level of psychological distress. After participation, you will receive a debriefing form containing information about the study as well as a list of psychological resources around the city of Toronto. If you indicate any suicidal intentions or attempts, you will be given referral options for treatment.

**Benefits of the Research and Benefits to You**: The research will evaluate the usefulness of a measure of anxiety that may be used by health practitioners in the future to determine a patient's level of distress. You will receive 1 credit toward your Psychology 1010 course at York University for participating in the study.

**Voluntary Participation**: Your participation in the study is completely voluntary and you may choose to stop participating at any time. You may skip any questions that you do not wish to answer. Your decision not to volunteer will not influence the nature of your relationship with York University or status in your Psychology 1010 course either now, or in the future.

**Withdrawal from the Study**: You can stop participating in the study at any time, for any reason, if you so decide. If you decide to stop participating, you will still be eligible to receive the credit for agreeing to be in the project. Your decision to stop participating,

or to refuse to answer particular questions, will not affect your relationship with the researchers, York University, or any other group associated with this project. In the event you withdraw from the study, all associated data collected will be immediately destroyed wherever possible.

**Confidentiality**: All information you supply during the research will be anonymous. You will be given a participant number and your name will not be linked to your data. Your data will be safely stored in a locked filing cabinet. Only research staff will have access to the data. The data will be stored for 10 years and will be destroyed after this time.

**Questions About the Research?** If you have questions about the research in general or about your role in the study, please feel free to contact me or my Graduate Supervisor - Dr. Trevor Hart either by telephone at (416) 979-5000 x 2179 or by e-mail (trevor.hart@psych.ryerson.ca). You may also contact my Graduate Program – Department of Psychology, 297 Behavioural Science Building, (416)736-2100 x 33983. This research has been reviewed and approved by the Human Participants Review Sub-Committee, York University's Ethics Review Board and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, or about your rights as a participant in the study, please contact the Sr. Manager & Policy Advisor for the Office of Research Ethics, 5th Floor, York Research Tower, York University (416-736-5914 or e-mail ore@yorku.ca).

**Legal Rights and Signatures**:

I consent to participate in State-Trait Inventory of Cognitive and Somatic Anxiety: Psychometric Properties conducted by Karen Roberts. I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by agreeing to participate. My signature below indicates my consent.

**Signature** _____ **Date** _____
Participant

**Signature** _____ **Date** _____
Principal Investigator

**Part II**

**Study Name**: State-Trait Inventory of Cognitive and Somatic Anxiety (STICSA): Psychometric Properties

**Researcher**: Karen Roberts, M.A.
Ph.D. IV, Clinical Psychology
047 Behavioural Science Building, York University
checkers@yorku.ca
416-979-5000 x 2180

**Purpose of the Research:** To determine whether the State-Trait Inventory of Cognitive and Somatic Anxiety, a measure of general anxiety, is structurally sound and useful, and to determine how it relates to other measures of psychological distress and personality.

**What You Will Be Asked to Do in the Research**: You will be asked to either prepare and give a 3-minute speech on any topic of your choice or watch a 3-minute videotape. Afterward, you will be asked to fill out a questionnaire. It is estimated that it will take 15 minutes to complete this portion of the study.

**Risks and Discomforts**: You may experience an increase in anxiety during this study. After participation, you will receive a debriefing form containing information about the study as well as a list of psychological resources around the city of Toronto.

**Benefits of the Research and Benefits to You**: The research will evaluate the usefulness of a measure of anxiety that may be used by health practitioners in the future to determine a patient's level of distress. You will receive 1 credit toward your Psychology 1010 course at York University for participating in the study.

**Voluntary Participation**: Your participation in the study is completely voluntary and you may choose to stop participating at any time. You may skip any questions that you do not wish to answer. Your decision not to volunteer will not influence the nature of your relationship with York University or status in your Psychology 1010 course either now, or in the future.

**Withdrawal from the Study**: You can stop participating in the study at any time, for any reason, if you so decide. If you decide to stop participating, you will still be eligible to receive the credit for agreeing to be in the project. Your decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with the researchers, York University, or any other group associated with this project. In the event you withdraw from the study, all associated data collected will be immediately destroyed wherever possible.

**Confidentiality**: All information you supply during the research will be anonymous. You will be given a participant number and your name will not be linked to your data. Your data will be safely stored in a locked filing cabinet. Only research staff will have access to the data. The data will be stored for 10 years and will be destroyed after this time.

**Questions About the Research?** If you have questions about the research in general or about your role in the study, please feel free to contact me or my Graduate Supervisor - Dr. Trevor Hart either by telephone at (416) 979-5000 x 2179 or by e-mail (trevor.hart@psych.ryerson.ca). You may also contact my Graduate Program – Department of Psychology, 297 Behavioural Science Building, (416)736-2100 x 33983. This research has been reviewed and approved by the Human Participants Review Sub-Committee, York University's Ethics Review Board and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, or about your rights as a participant in the study, please contact the Sr. Manager & Policy Advisor for the Office of Research Ethics, 5th Floor, York Research Tower, York University (416-736-5914 or e-mail ore@yorku.ca).

**Legal Rights and Signatures**:

I consent to participate in State-Trait Inventory of Cognitive and Somatic Anxiety: Psychometric Properties conducted by Karen Roberts. I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by agreeing to participate. My signature below indicates my consent.

**Signature** _____ **Date** _____
Participant

**Signature** _____ **Date** _____
Principal Investigator

## Appendix G: Study 2 – Debriefing Form

### State-Trait Inventory of Cognitive and Somatic Anxiety (STICSA): Psychometric Properties

Thank you for your participation in the current study. This study was conducted in order to evaluate the usefulness of a measure of general anxiety – the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA). The STICSA assesses both state (i.e., in the moment) and trait (i.e., stable) anxiety as well as both somatic (e.g., dizziness) and cognitive (e.g., racing thoughts) symptoms of anxiety. Scores on the subscales of the STICSA will be analyzed for reliability and compared to other measures of psychological distress that have been used in past research (e.g., State-Trait Anxiety Inventory, Beck Depression Inventory). If you were asked to prepare a 3-minute speech, this was intended to increase your state anxiety level and to determine whether the STICSA could detect this increase in anxiety. We did not require you to complete the speech, as this would have prolonged your anxiety response. In addition, we could not tell you ahead of time that you would not be completing the speech, as this might have decreased your anxiety response. If you watched a videotape, you were part of the control group. Your scores on the STICSA will be compared to the experimental group's scores to determine whether the STICSA can detect increases in state anxiety.

We realize that some of the questions asked and the preparation of a speech may have caused some discomfort. If you feel that you are currently experiencing psychological distress and would like some help, please feel free to contact one of the following psychological resources around Toronto:

**General**

Telehealth Ontario: 1-866-797-0000

Ontario Psychological Association: 416-961-5552, info@psych.on.ca, www.psych.on.ca

Centre for Addiction and Mental Health: 416-535-8501 (switchboard); For a mental health or addiction concern 416-595-6111 (Toronto) or 1-800-463-6273 (toll free), www.camh.net

**Hospitals**

St. Michael's Hospital
Mental Health Services and Clinics
17 Cardinal Carter
30 Bond Street

Toronto Western Hospital
Community Mental Health
399 Bathurst Street
East Wing, 9th Floor

Toronto, Ontario
Phone: 416-864-5120

Mount Sinai Hospital
Department of Psychiatry
Joseph and Wolf Lebovic Health Complex
600 University Avenue, 9th floor
Toronto, Ontario
Phone: 416-586-4800 ext. 4568

Toronto, Ontario
Phone: 416-603-5747

Toronto East General Hospital
Mental Health Service
Outpatient Programs
825 Coxwell Avenue
Toronto, Ontario
Phone: 416-469-6310

***Distress lines***

Operated by various agencies are open 24 hours a day if you need to talk to someone.

**Toronto Distress Centres:** 416-408-4357

**Gerstein Centre:** 416-929-5200

**Distress Centre Peel:** 905-278-7208

**Durham Crisis Line:** 905-666-0483

**Oakville Distress Centre:** 905-849-4541

**Telecare (Mandarin & Cantonese):**
416-920-0497