

**MEASUREMENT EQUIVALENCE OF SOCIAL ANXIETY SCALES:
TAIJIN KYOFUSHO MAY NOT BE AN
EAST ASIAN CULTURE-RELATED SYNDROME**

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ABSTRACT

Asians consistently report higher social anxiety symptoms but have lower prevalence rates, compared to Westerners. As cultural differences and measurement issues could both be potential sources for the discrepancy, it is important to examine whether score differences between cultural groups are due to measurement issues or genuine underlying differences in social anxiety. This study used 402 participants to examine the construct of social anxiety and measurement invariance of six social anxiety scales using exploratory and confirmatory factor analysis. Results supported scalar invariance of a three-factor bifactor model (comprised of Fear/Avoidance of Social Interaction, Fear of Negative Evaluation, and Taijin Kyofusho/fear of interpersonal relationships). Furthermore, multivariate analysis of covariance and moderation analysis revealed Asian Americans endorsed higher Fear/Avoidance of Social Interaction symptoms, but do not differ in Taijin Kyofusho and Fear of Negative Evaluation symptoms, compared to European Americans. This study showed when measurement bias is minimized, Asians still endorse higher symptoms of Fear/Avoidance of Social Interactions. Moreover, Taijin Kyofusho appears to be an aspect of social anxiety identified in more than one cultural group rather than a culture-related specific syndrome. Thus, it is important for clinicians and researchers to consider Taijin Kyofusho in the evaluation of social anxiety.

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CHAPTER 1

INTRODUCTION

Mental Health Disparity Among Minority Groups

The Office of the Surgeon General proposed that “the full potential of our diverse, multicultural society cannot be realized until all Americans, including racial and ethnic minorities, gain access to quality health care that meets their needs” (U.S. Department of Health and Human Services, 2001, p.3). The U.S. population is becoming more heterogeneous as the proportion of racial minority groups continues to grow (United States Census Bureau, 2000), and it is estimated that the proportion of all racial and ethnic minority groups (e.g., African American, Asian, Hispanic) will continue to increase (United States Census Bureau, 2012). Although minority groups have greater morbidity and mortality across different mental health conditions (Sinclair et al., 2002), there is an unexpected difference in access and usage of mental health services among minority members (Ashton et al. 2003; Fiscella et al., 2000). For example, in clinical settings, racial and ethnic minorities have less access to mental health services, and even when they do receive care, they are less likely to receive the same quality of care as their White counterparts (U.S. Department of Health and Human Services, 2001). There is also an inequality in existing knowledge regarding minority groups (Zvolensky, Garey, & Bakhshaie, 2017). In particular, minority members are under-represented in health studies and clinical trials (Fisher & Kalbaugh, 2011; Miranda et al., 2005; Redwood & Gill, 2013; Sheikh, 2006). As such, minority patients may not have equal access to the advantages of research including culturally adaptive treatments (Miranda et al., 2005) and assessment tools. Though there has been increasing recognition of the need to understand

the mental health of all cultural groups (Alacon et al., 2009), there is a scarcity of research on cultural minorities (Suinn & Borrayo, 2008). Specifically, less attention has been paid to cross-cultural assessment relative to the etiology and treatment of mental health disorders among racial minority members.

Cross-Cultural Assessment of Social Anxiety

Reducing the mental health disparity or the group differences in health outcome is now a nationwide plan (CDC, 2016; Ramírez, Ford, Stewart, & Teresi, 2005); but to meet this goal, it is critical to have cross-cultural research in assessment (Ramirez et al., 2005). Cross-cultural research in assessment is crucial because a pre-requisite to reducing the mental health disparity (Ramirez et al., 2005) is to have assessment tools that accurately assess and identify symptoms across different cultural groups. In research, addressing the potential issue of measurement bias, or the systematic error in measurement that overestimates or underestimates score differences (a detailed review of measurement bias is available on page 4–6), is important because conclusions about group differences drawn based on non-equivalent measures may be faulty (Pendergast, von der Embse, Kilgus, & Eklund, 2017; Reynolds & Ramsay, 2003; van de Vijver & Tanzer, 2004). As for clinicians, the use of non-measurement equivalent tools may potentially under-identify or over-identify specific group members (Hambrick et al., 2010) for treatment. For example, the Social Interactive Anxiety Scale (SIAS; Mattick & Clarke, 1998) is a widely used social anxiety scale. However, an examination of the psychometric properties of the SIAS revealed the scale is more precise for measuring social anxiety among Asians compared to European Americans, and least effective for African Americans (Hambrick et al., 2010).

Cross-cultural research in the assessment of social anxiety disorder (SAD) is particularly important because social anxiety is common and highly persistent without treatment (Cuthbert, 2002). However, assessment in SAD remains a challenge among cultural minority groups. Social anxiety is a global issue and is one of the most common anxiety disorders affecting individuals across different cultural groups (Kessler et al., 2005). The U.S. National Comorbidity Survey Replication indicates about 12.1% of the population will suffer from social anxiety at some point in their lifetime (Letamendi, Chavira, & Stein, 2009; Ruscio et al., 2008). The prevalence rates of social anxiety disorder (SAD) in epistemological studies consistently show that Westerners have a higher prevalence rate of social anxiety compared to non-Westerners (i.e., African American, Asian, Hispanic American; Grant et al., 2005). However, it is unclear whether the differences in social anxiety between Westerners and Asians are due to true differences in anxiety or measurement errors.

Social Anxiety Among Asians

Specifically, Asians are consistently reported to have the lowest prevalence rates of SAD relative to other cultural groups, but they are also more likely to report higher social anxiety symptoms compared to their White counterparts (Hornig & Coles, 2014). Prevalence rates studies reported are based on population based research that relies on national survey data collected from the general population in the U.S. using structured psychiatric interviews (e.g., National Comorbidity Survey; Kessler, McGonagle, & Zhao, 1994; Ruscio, et al., 2008). However, it is still unclear why Asians endorse higher levels of social anxiety symptoms, but lower prevalence rates compared to their White counterparts. Researchers considered the source of this discrepancy could be due to

cultural differences, measurement bias, diagnosis criteria, or a combination of all three (Lewis-Fernández et al., 2010). In recent years, differences in social anxiety between cultural groups have been recognized and have been an avenue of research (Stein & Matsunaga, 2001; Woody, Miao, & Kellman-McFarlane, 2014; Xie & Leong, 2008). For example, Japanese and Koreans exhibit *Taijin Kyofusho*, a form social anxiety that manifests from a fear of embarrassing or offending others in social interactions (Essau, Sasagawa, Chen, & Sakano, 2012; Hofmann, Asnaani, & Hinton, 2011; Kleinknecht, Dinnel, Kleinknecht, Hiruma, & Harada, 1997; Tarumi, Ichimiya, Yamada, Umesue, & Kuroki, 2004). However, psychometric research has also indicated social anxiety assessment tools may not be valid across cultural groups (including Asians and African Americans), making cross-cultural comparison between groups using social anxiety scales difficult (Good & Kleinman, 1985; Hambrick et al., 2010; Stein & Matsunaga, 2001). Since cultural differences and measurement issues could both be potential sources for the discrepancy, it is important to: (1) clarify whether the concept of social anxiety underlying Western-developed SAD measures may fully represent the construct of social anxiety across cultural groups, (2) examine which social anxiety measures may contain bias items that render cross-cultural comparison inappropriate and inaccurate, and (3) identify measures that may be more preferable for use with Asian American populations.

Measurement Bias

Measurement bias occurs when the score differences between groups results from nuisance factors rather than from true differences between groups on the underlying construct (e.g., social anxiety) on which the groups are being compared (van de Vijver & Tanzer, 2004). For example, bias could occur if Asian and White participants have

similar levels of underlying social anxiety symptoms, but Asians are reporting higher scores on social anxiety measures. Because measurement bias commonly occurs in cross-cultural assessment studies, it is important to examine the measurement equivalence of social anxiety scales before they can be used to make comparisons between cultural groups (van de Vijver & Tanzer, 2004). Three types of measurement bias (construct bias, method bias, and item bias) have been identified (Reynolds & Ramsay, 2003; van de Vijver & Tanzer, 2004), and they are discussed hereinafter.

Construct Bias

Construct bias could occur when the definition of social anxiety is not the same across cultural groups. When the construct of social anxiety is based on the Western definition of social anxiety, Western developed social anxiety measures may not include other aspects of social anxiety from non-Western context (van de Vijver & Tanzer, 2004). For example, the cultural-bound expression of social anxiety, *Taijin Kyofusho*, is not reflected in commonly used social anxiety measures [e.g., SIAS, Social Phobia Scale (SPS), Brief Fear of Negative Evaluation (BFNE)]; Therefore, Western-developed social anxiety scales may not capture culturally-bound social anxiety symptoms, such as *Taijin Kyofusho*.

Method Bias

Method bias includes the use of different methodology (e.g., interviews, self-reports) that yield different results, although the underlying construct is the same (van de Vijver & Tanzer, 2004). For example, to identify whether the discrepancy between low prevalence rate and high social anxiety symptoms among Asians were due to measurement differences, two reporting methods (i.e., interviews and self-reports) were

compared. Results yield mixed findings, with some studies indicating Asians reported higher social anxiety symptoms on self-reports compared to diagnostic interviews (Hornig & Cole, 2014), while others reported there was no difference in measurement methods (Okazak, 2000).

Item Bias

Item bias includes whether the item holds the same meaning or is appropriate to a particular culture. For example, avoiding making eye-contact is one indicator of social anxiety on the SIAS. However, Asian cultures, such as Japanese and Chinese, may view making eye-contact as inappropriate when communicating with their elders (e.g., teacher, parent). Hence, the response pattern to such items may differ between Asian and White participants (Hambrick et al., 2010). Indeed, research on item bias has gained considerable attention recently, with studies examining the measurement equivalence of social anxiety tools suggesting social anxiety scales may not be valid across cultural groups (Good & Kleinman, 1985; Hambrick et al., 2010).

Consequence of Bias

SAD measures that lack measurement invariance may lead to inaccurate conclusions drawn about group differences (van de Vijver & Tanzer, 2004). Construct bias such as under-sampling of items that represent the construct of social anxiety could lead to assessment tools not capturing aspects of social anxiety that are relevant to cultural minority groups (van de Vijver & Tanzer, 2004). For example, if commonly used social anxiety scales (SIAS, SPS) fail to include items relevant to cultural minority groups (e.g., TKS), then these social anxiety scales may not reflect the construct of social anxiety among Asians, and interpretation of group comparison could be erroneous.

Similarly, method bias could lead to a group's average scores to shift, and inferences regarding group differences may be inaccurate (van de Vijver & Tanzer, 2004). Although some group differences may in part be reflective of bias towards a certain cultural group, the direction and magnitude of bias may not be correctly drawn (Reynolds & Ramsay, 2003).

Summary

In essence, while social anxiety research has made significant progress in the past few decades, not everyone has equally benefited. Self-reports of SAD offer valuable information and have advanced considerably. Still, there is limited cross-cultural research in the assessment of social anxiety (i.e., measurement equivalence of commonly used social anxiety self-reports across cultural groups). The potential impact of construct and item bias is understudied and could be a potential source of the discrepancy between low prevalence rates and high social anxiety symptoms among Asians.

The present study expands the existing research base by examining the measurement equivalence of commonly used social anxiety instruments across multiple cultural groups. The potential for bias and non-equivalent assessment tools could lead to an inaccurate comparison of social anxiety symptoms between cultural groups. Thus, an examination of whether the construct of social anxiety is similar across cultural groups and whether existing social anxiety measures are equivalent is critical before group comparison could be made. The present study was designed to clarify whether construct bias and item bias exist in commonly used SAD tools and whether these social anxiety scales would be applicable for cross-cultural comparison. Additionally, this study aims to identify SAD measures that may be more appropriate for Asian Americans.

CHAPTER 2

LITERATURE REVIEW

Overview of Social Anxiety

Social Anxiety Disorder (SAD), also known as social phobia, is the third most common psychological disorder in the United States (Kessler, Berglund, Demler, & Walters, 2005). SAD is common (Kessler et al., 2005), pervasive, persistent, (Cairney et al., 2007; Cuthbert, 2002), and the symptoms can be debilitating – yet, SAD is often undertreated (Wang et al., 2005). When left untreated, social anxiety can lead to cognitive impairments, interfere with academic performance, and increase vulnerability to developing other disorders (Katzelnick et al., 2001). Assessment of social anxiety is needed for treatment planning, but this process relies on having assessment tools that can accurately identify social anxiety symptoms. As anxiety is a global issue – affecting individuals from different cultural backgrounds – for prevention and intervention purposes, it is important to have accurate assessments of social anxiety that are useful in measuring symptoms across different groups. The purpose of this study was to: (1) examine the factor structure of social anxiety among the general population, (2) identify the factor structure of social anxiety specific to Asian Americans, (3) examine the measurement equivalence of six social anxiety scales across different cultural groups, and (4) identify the SAD scales that may be more appropriate for Asian Americans.

Defining Social Anxiety

According to the DSM-5 (American Psychiatric Association, 2013), SAD is diagnosed in adults when they experience a fear of social situations that may expose them to the scrutiny of others.

The individual may fear showing anxiety symptoms that could be negatively evaluated by others, the fear is out of proportion to the actual threat posed, and that the social situation almost always provokes fear but that the individual would endure or avoid the social situation with intense fear. Symptoms are persistent (lasting 6 months or more) and cause significant distress, and symptoms are not attributable to the usage of substance or of another medical condition. (APA, 2013, p. 202-208)

In other words, social anxiety is characterized by excessive and persistent fear of social situations and avoidance of these situations (APA, 2013, p. 202-208). Accordingly, many social anxiety assessment tools are designed to capture these core features of social anxiety (e.g., fear of negative evaluations by others, avoidance of social situations and interactions; Watson & Friend, 1969).

Theories of Social Anxiety

Self-Presentation Theory and Sociometer Theory

Schlenker and Leary (1982) describe humans as social beings that worry about how others view them. Based on the Self-Presentation Theory of Social Anxiety (Schlenker & Leary, 1982), people are motivated to create a certain preferred impression of themselves to others. To do so, the individual is viewed as an “actor” that controls the type of image they are trying to display in front of the real or imagined audience by displaying a desirable impression and avoiding other impressions (Schlenker & Leary, 1982). And consistent with the Social Learning Theory, the audience’s (anticipated or imaged) reaction during the social interaction serves as feedback that determines whether the individual has reached their particular goal (e.g., presenting themselves in a socially desirable way) or not. Hence, individuals experience anxiety when they want to make a desirable impression during or before a social encounter but doubt they would be able to successfully make that impression (Schlenker & Leary, 1982). Leary and Downs’s

Sociometer Theory (1995) later extended Self-Presentation Theory, proposing anxiousness from self-presentation concerns only arise when the individual views the relationship as having “relational values”. Relational values are defined as whether the person perceives a relationship with another as being important or not, and whether the impression the individual is trying to make is important to the relationship. Hence, individuals experience social anxiety when they believe the impression they make will lower their relational value (Leary & Downs, 1995). Indeed, individuals with interdependent self-construal are more likely to value social relationships compared to individuals with independent self-construal, and have been reported to be at higher risk for social anxiety (Gardner, Gabriel, & Lee, 1999; Kiuchi, 2006). In sum, anxiety is triggered when an individual wants to make a particular impression (e.g., gain acceptance, avoid rejection), but does not believe they have the ability to do so. Self-Perception Theory has limited empirical support thus far, but recently, Catalino et al. (2012) have examined Self-Perception Theory from a within-person perspective (dispositional level) and between-person perspective (contextual level) among undergraduate students, suggesting self-perception theory may partially explain differences in social anxiety among people. While cross-cultural research on Self-Presentation Theory and Sociometer Theory of social anxiety is limited, there is growing support for the self-presentation of shyness (e.g., the presentation and intensity of shyness) between Americans and Asians (Jackson, Flaherty, & Kosuth, 2000). However, further research on the cultural differences relative to these theories is needed.

Cognitive Models and Cognitive-Behavioral Models

Cognitive models have received considerable support relative to Self-Presentation Theory. Inspired by Information-Processing Models, cognitive theories propose that anxiety arises from a pattern of thoughts (e.g., high expectations for social performance, negative views of the self, over-emphasis on the importance of approval from others). Individuals who are socially anxious may process social situations in a biased way, which partially maintains their anxiety. One of the first and most influential cognitive models is Beck, Emery, and Greenberg (1985)'s Dysfunctional Belief Theory, which suggests that social anxiety results from and are maintained by individuals holding dysfunctional beliefs (Musa & Lépine, 2000). When an individual who holds these dysfunctional beliefs enters a social situation, they will then experience physiological and somatic symptoms which in turn, will maintain their anxiety. Similarly, the Cognitive Model of Social Phobia proposed by Clark and Wells (1995) suggested that socially anxious individuals have exceedingly high expectations for their social performance, and they are concerned about the consequences of their performance, as their performance formulates their belief about the self. When in a threatening social situation, individuals who are anxious will also shift their attention from the environment to the self, which increases their awareness of social anxiety symptoms (e.g., fear), thereby affecting their interpretation of the social situation (Musa & Lépine, 2000). Moreover, they will engage in safety behaviors (e.g., avoiding eye contact) when in a threatening social situation to reduce negative evaluation (Clark & Wells, 1995; Musa & Lépine, 2000). Rapee and Heimberg (1997) expanded on this theory by proposing the Cognitive-Behavioral Model of Anxiety. According to the Cognitive-Behavioral Model of anxiety (Rapee &

Heimberg, 1997), social anxiety is marked by bias in processing social information and a negative evaluation of ambiguous social situations. When encountering a social situation, an individual who is socially anxious will generate a mental representation of the situation, but the focus of the attention is on the self (e.g., blushing) and on the external threats (e.g., potential negative evaluations). Perceived negative evaluation is then generated from the discrepancy between the social expectation and self-performance, which then give rise to cognitive, behavioral, and somatic symptoms of anxiety. Research in information processing bias has supported the Cognitive-Behavioral Theory, suggesting individuals suffering from anxiety are more likely to attend to, remember, and interpret ambiguous information as threatening (Amin, Foa, & Coles 1998; Bar-Haim et al., 2007; Musa & Lépine, 2000); Hence, individuals who are anxious are more likely to interpret a social situation as negative (Hirsch & Mathews, 1997), and overestimate danger in a social situation (Lucock & Salkovskis, 1988), will underestimate their social skills, rate themselves more negatively, or expect themselves to perform more poorly in social situations (Schlenker & Leary, 1982), and perceive themselves as having inadequate social skills (Cognitive Self-Evaluation model; Clark & Arkowitz, 1975; Rapee and Lim, 1992; Rehm & Marston, 1968). More recently, Hezel and McNally (2014) have found individuals with SAD are less likely to understand other's thoughts and feelings. But in contrast to individuals on the Autism Spectrum, individuals with SAD attribute more meaning to other's thoughts and feelings (Hezel & McNally, 2014). In essence, cognitive models (Clark & Wells, 1995; Hoffman, 2007; Rapee & Heimberg, 1997) suggest that individuals suffering from SAD have exaggerated emotional reactivity to social situations, are more likely to perceive threat from the evaluation of others, and

engage in safety behaviors to avoid threatening social situations. Studies on the cross-cultural differences in social anxiety using the Cognitive Behavioral Model is growing. For example, Rapee and Heimberg (1997) described the cultural factors that may influence social anxiety using the Cognitive Behavioral Model.

Summary of Social Anxiety Theories

Social anxiety theories suggest that people want others to perceive them in a certain way (Leary & Downs, 1995; Schlenker & Leary, 1982), so social anxiety arises in part from a fear of negative evaluation from others (Clark & Wells, 1995; Rapee & Heimberg, 1997). To avoid negative evaluation, people with SAD engage in and avoid certain behaviors (Wells et al., 1995). Individuals suffering from SAD are also more likely to have information processing bias, in which they attend to and interpret ambiguous situations as socially threatening (Heinrichs & Hofmann, 2001). Though individuals with SAD fear negative evaluations, they also perceive themselves as having poorer social skills (Lundh & Sperling, 2002; Stopa & Clark, 1993), which may heighten their fear and avoidance of social situations. In sum, social anxiety generally involves cognitive (e.g., fear of negative evaluation), behavioral (e.g., avoidance behaviors), and physical symptoms (e.g., increased heart rate, blushing).

Cultural Differences in Social Anxiety

Prevalence Rate/Diagnosis

While social anxiety is a universal phenomenon, the prevalence rate of SAD differs by cultural group. The prevalence of social anxiety varies widely. Based on the National Comorbidity Survey (NCS) and the National Comorbidity Survey Replication (NCS-R), a national mental health survey that uses structured diagnostic interview data

collected from 1990 to 1992, results indicate a 12.1 % lifetime prevalence rate of SAD and a 1-year prevalence rate between 7.1-7.9% in the U.S. (Kessler, McGonagle, Zhao et al., 1994; Ruscio et al., 2008). However, as reported by Hoffman et al. (2010), the prevalence rate among East Asians is reported to be lower. For example, the prevalence rate is 0.4% in Taiwan (Hwu, Yeh, & Chang, 1989), 0.2-0.6% in Korea (Lee et al., 1990), 0.2% in China (Shen et al., 2006), 0.8% in Japan (Kawakami et al., 2005). Though epidemiological studies consistently reveal that Asians have the lowest prevalence rate of social anxiety, contrary to this finding, Asians also tend to report higher levels of social anxiety symptoms. It is unclear whether the source of discrepancy between prevalence rate and levels of social anxiety symptoms among Asian could be attributed to measurement (statistical) bias or cultural differences in social anxiety.

Construct of SAD and the Cultural Expression

As social anxiety is related to cultural expectations and cultural norms, one source of the discrepancy might be attributable to the difference in the underlying meaning and/or expression of social anxiety across different cultures. Because a core characteristic of social anxiety is a fear of negative evaluation by others, social anxiety is related to social standards and role expectations, which vary by culture. Hence, social anxiety is culturally dependent (Hoffmann, Asnaani, & Hinton, 2010), making it challenging to assess social anxiety across cultures. For example, Western cultures (e.g., US American and European) describe social anxiety as arising from worries about embarrassing the *self*, whereas Eastern cultural groups (e.g., Japanese, Korean) are worried about embarrassing *others* (e.g., Taijin Kyofusho; Hofmann, Asnaani, & Hinton, 2010).

Though the cultural differences in social anxiety are now recognized and the consideration of cultural context is emphasized in the diagnosis of SAD (APA, 2013 p.189; Stein & Matsunaga, 2001), emerging research is also suggesting social anxiety assessment tools may not accurately capture social anxiety in the same way across different cultural groups (Hambrick et al., 2010; Stein & Matsunaga, 2001).

Assessment of Social Anxiety

Common Social Anxiety Measures: Self-Reports

There are various methods of assessing social anxiety such as clinical interviews, questionnaires (e.g., interviewer-rated scales, and self-report scales), role-playing, self-monitoring, thought-listing, and psychophysiological assessments. However, self-reporting questionnaires are important for identifying social anxiety and treatment monitoring (Mattick & Clark, 1998). Self-reports are efficient (e.g., quick to administer and score), can be repeatedly administered for progress monitoring of treatment (Hofmann, & DiBartolo, 2014; chapter 3), and still provide information regarding an individual's internal state; information that cannot be obtained using other methods (Reynolds, 1998). Hence, self-report measures are important in the assessment of social anxiety (Hofmann, & DiBartolo, 2014).

Some commonly used self-report measures of social anxiety with sound psychometric properties include the Social Phobia Inventory (SPIN; Conner et al., 2000), Social Interaction Anxiety Scale (SIAS), Social Phobia Scale (SPS), and Leibowitz Social Phobic Scale – Self Report (LSAS-SR), Fear of Negative Evaluation Scale (FNE), and the Brief Fear of Negative Evaluation (BFNE). Recently, with the emphasis on the consideration of cultural factors, the Taijin Kyofusho Scale (TKS) has also become

widely used with Asian populations. These self-reporting questionnaires can be divided into two broad categories: (1) general measures of SAD (instruments that measure specific social anxiety symptoms) and (2) measures of theoretically derived components of social anxiety (Hofmann & DiBartolo, 2014). Details of these scales are discussed hereinafter.

Brief Fear of Negative Evaluation-Straightforward

The Brief Fear of Negative Evaluation-Straightforward (BFNE; Leary, 1983; Rodebaugh et al., 2004) is a shortened version of The Fear of Negative Evaluation Scale (FNE), a theoretically based social anxiety scale (Watson & Friend, 1969). The BFNE reflects Schlenker and Leary's Self-Presentation Theory (1982), assessing the "fear and distress about social situations, avoidance of social situations, and fear of provoking negative evaluations from others" (Mattick & Clarke, 1998, pp. 456-457). Previous research supported the convergent validity of the BFNE scores with other measures of social anxiety and avoidance using the SPS, SIAS, and LSAS, and discriminant validity of the scores from other related construct including depression, worry, and bodily sensations from fear of anxiety (Weeks et al., 2005). The BFNE consists of two correlated factors: Straight-Forward (BFNE-S), and Reverse-Scored factor (BFNE-R). While the BFNE as a whole demonstrates good psychometric properties for clinical, community, and college samples, the BFNE-R subscale is not correlated with other measures of social anxiety (Harpole et al., 2015; Weeks et al., 2005). Thus, the BFNE-S is superior to the BFNE as the BFNE-R contains items that negatively impact the psychometric properties of the BFNE (Harpole et al., 2015; Weeks et al., 2005). Based on a Differential Item Functioning (DIF) analysis conducted by Harpole et al. (2015), the

BFNE-S demonstrates invariance across gender, but item nine (“I am usually worried about what kind of impression I make”) on the scale does not show invariances across White and African American participants (Harpole et al., 2015). Psychometric research on the BFNE using Asians has been limited. Although Harpole et al. (2015) included Asians in their DIF analysis of the BFNE-S, they acknowledged their small sample size may have reduced the power to detect the difference between racial groups.

Social Interactive Anxiety Scale and Social Phobia Scale

The Social Interactive Anxiety Scale and Social Phobia Scale (SIAS & SPS; Mattick & Clarke, 1998) are companion measures of social anxiety, developed to measure commonly feared situations (Mattick & Clarke, 1998). The SIAS aims to assess social anxiety interactions while the SPS aims to assess social anxiety based on the anticipation of being observed by others. The SPS has three factors (general fear of being observed or scrutinized, specific fears, and fear of being viewed as “sick, ill, odd, or having lost control in front of others”), while the SIAS measures one factor (fear of social interaction). Though the SIAS and SPS are not developed based on any specific theoretical model (Hofmann & DiBartolo, 2014), the scales appear to correspond with the cognitive theories (e.g., fear of negative evaluation) and behavioral components (e.g., avoidance) of social anxiety. Strengths of the SIAS and SPS include a comprehensive range of social situations (Letamendi et al., 2009) and good psychometric properties (Hambrick et al., 2010; Mattick & Clarke, 1998). Specifically, the SIAS and SPS show good internal consistency (Cronbach’s alpha of 0.94 for both SPS and SIAS), test-retest reliability (range between .91 to .93 for the SPS, and 0.92 for SIAS for up to 12 weeks), discriminant validity with measures of state/trait anxiety and depression, convergent

validity with other measures of social anxiety (e.g., FNES, SADS), and are sensitive to treatment effects among a clinical, community, and college sample (Mattick & Clarke, 1998). However, other studies reported items on the SIAS and SPS have difficulty differentiating general worries from those fears specific to social anxiety (Brown et al., 1997). Moreover, although a one-factor and three-factor solution are generally supported for the SPS and SIAS, an examination of the construct equivalence of the SIAS and SPS using exploratory and confirmatory factor analysis has indicated the construct of social anxiety among African Americans may differ from European Americans (Carter, Sbrocco, Tang, Rekrut, & Condit, 2014; Olivares, García-López, Hidalgo, & Caballo, 2004). For example, a two-factor model of social anxiety is supported for European American participants (Olivares et al., 2004), but modification of the two-factor model (e.g., dropping reverse-scored items on the SIAS) is more appropriate for African Americans participants (Carter et al., 2014). Similarly, using DIF analysis, Hambrick et al. (2010) found the SIAS is non-equivalent across African Americans, Asian Americans, and European Americans. While psychometric studies with Asian American participants remains scarce, Hambrick et al. (2010) is the only study that examined the measurement equivalence of the SIAS with Asian participants.

Social Phobia Inventory

The Social Phobia Inventory (SPIN; Connor et al., 2000) was developed to screen for social anxiety (fear, avoidance, physiology). The SPIN is a companion measure to the Brief Social Phobia Scale (BSPS; Conner et al., 2000), which is an interview-based measure. The BSPS will not be further discussed here, as it is not a self-report measure, but information is available elsewhere (e.g., Davidson et al., 1997). While the SPIN does

not specifically reflect specific theories of social anxiety, the SPIN corresponds well with cognitive theories (e.g., fear of negative evaluation, avoidance of social situations).

Previous studies showed that SPIN scores demonstrate excellent internal reliability ($\alpha = .91$) and supporting evidence of three dimensions of social anxiety (avoidance behavior, physiological symptoms, and subjective fear) among clinical and nonclinical samples (Carleton et al., 2010). The SPIN demonstrates good internal reliability and test-retest reliability, and shows discriminant validity between SAD, panic disorder and agoraphobia, and obsessive-compulsive disorder. However, some items are reported to differ between sex, and the dimensions differ between the clinical and nonclinical sample (Carleton, Collimore, & Asmundson, 2007). For example, while one study suggested a three-factor structure of the SPIN (fear of undesirable evaluation, somatic symptoms, and social situation uncertainty), another study indicated a higher-order structure (Campbell-Sills, Espejo, Ayers, Roy-Byrne, & Stein, 2015). Cross-cultural psychometric research using the SPIN has been limited, with no study to my awareness, examining the measurement equivalence of the 17-item SPIN across cultural groups.

Liebowitz Social Anxiety Scale–Self Report

The Liebowitz Social Anxiety Scale is a clinician-administered (LSAS-CA) scale, and it is one of the most commonly used social anxiety assessment tools with strong psychometric properties (Baker, Heinrichs, Kim, & Hofmann, 2002). The Liebowitz Social Anxiety Scale-Self Report (LSAS-SR; Liebowitz, 1987) is a self-report version that aims to assess state social anxiety symptoms, including fear and avoidance of social situations within the last week. Though the LSAS does not reflect a specific social anxiety theory (Hofmann & DiBartolo, 2014), the LSAS appears to reflect the cognitive

(e.g., fear of negative evaluation) and behavioral symptoms (e.g., avoidance of social interaction) of social anxiety. One study found the LSAS-SR consisted of two subscales (i.e., fear of performance situations, and avoidance of social situations; Baker, Heinrichs, Kim, & Hofmann, 2002), while others have found four-factor structure (i.e., “social interaction, public speaking, observation by others”, and public eating and drinking; Slavkin, Holt, Heimberg, Jaccard, & Liebowitz, 1990; Safren et al., 1999). The LSAS-SR demonstrated good psychometric properties including internal consistency ($\alpha = .94$), convergent validity with other measures of social anxiety (e.g., clinician-administered LSAS version; SIAS, SPSS), and discriminant validity with depression among clinical and community samples (Fresco et al., 2001). Though response patterns were similar for Hispanic and White participants, African American participants were more likely to endorse social anxiety symptoms on the LSAS-SR than the LSAS-CA (Fresco et al., 2001). Moreover, there are mixed results relating to treatment sensitivity, with some studies demonstrating the LSAS-SR is sensitive to treatment effect (Baldwin, Bobes, Stein, Scharwaechter, & Faure, 1999), while others found the LSAS-SR is less sensitive to treatment effect compared to the LSAS-CA (Cox, Ross, Swinson, & Dorenfeld, 1998). Although there is extensive research on Asians using the LSAS, the measurement equivalence of the LSAS across cultural groups has only recently been examined in one study (Kubota et al., 2016).

Taijin Kyofusho Scale

The Taijin Kyofusho Scale (TKS; Kleinknecht et al., 1997) is a 31 item self-report scale aimed to measure Taijin Kyofusho (literally translated as “fear of interpersonal relationship”), the fear of embarrassing others. Taijin Kyofusho is a culture-

bound form of social anxiety reported in Non-Western countries with interdependent self-construal such as Japan, Korea, and Indonesia (Kleinknecht et al., 1997; Tarumi et al., 2004). Though the TKS Scale is widely used among Asian populations, psychometric studies of the TKS are relatively limited, and have only been examined on undergraduate students (Kleinknecht et al., 1997). Moreover, studies on the factor structure of the TKS Scale yield inconsistent findings. For example, Kleinknecht, Dinnel, Kleinknecht, Hiruma, and Harada (1997) examined the factor structure of the TKS Scale along with the SIAS and SPS, and results suggested three factors (Factor I primarily consisted of items from the TKS Scale, Factor II consisted of items from the SIAS, and Factor III consisted of items from the SPS). Cronbach's alphas were .93 for U.S. and .92 for Japanese participants (Kleinknecht et al., 1997). Contrary to Kleinknecht and colleagues' study, Tarumi, Ichimiya, Yamada, Umesue, and Kuroki (2004) have also conducted EFA, but found five factors. Although both studies were conducted using undergraduate students, the statistical method differed. Specifically, while Kleinknecht et al. (1997) submitted the SIAS, SPS, and TSK scales collectively for principal component analysis to examine the construct of social anxiety, Tarumi et al. (2004) conducted an EFA to examine the factor structure of the TSK alone. The TKS Scale is not based on a particular theoretical model, and has only been applied to non-Asian populations in psychometric studies comparing social anxiety among Asians and non-Asian populations (Woody et al., 2014).

Problems with Existing Research on Social Anxiety Assessment

Construct Bias

Though the factor structures of these scales have been well examined (Brown et al., 1997; Carleton et al., 2007; Hambrick et al., 2010; Harpole et al., 2015; Kleinknecht et al., 1997; Mattick & Clarke, 1998; Weeks et al., 2005), since there are different facets of social anxiety (e.g., fear of negative evaluation, fear of positive evaluation, avoidance of social situations, physical symptoms), these self-rating scales may not be measuring the same facets of social anxiety. Indeed, several of these scales have been criticized for capturing only certain aspects of social anxiety, and new social anxiety scales are often developed to remediate and capture other aspects of social anxiety (Leary, 1983, Mattick & Clark, 1998). For example, the SPIN measures three dimensions of social phobia including fear, avoidance, and physiology, while the SIAS measures social interaction anxiety, and the SPS measures the social anxiety when the individual is being observed by others. In sum, each of these scales seems to be capturing different aspects of social anxiety. When SAD scales have under-sampling of items representing the construct of social anxiety, construct bias could occur. In other words, if the definition of social anxiety differs across cultural groups and Western-developed measures fail to include other aspects of social anxiety, construct bias may occur.

Previous research (Kleinknecht et al., 1997) suggests that social anxiety as described in Western cultures may not fully capture social anxiety among Asians groups. For example, Kleinknecht et al. (1997) proposed two forms of social anxiety: (1) the DSM defined social anxiety, and (2) Taijin Kyofusho (TKS). To examine both forms of social anxiety, Kleinknecht et al. (1997) conducted factor analysis using items from the

TKS scale, SPS, and SIAS. The results of their factor analysis identified three facets of social anxiety—Factor I primarily comprised of the TKS items, Factor II comprised of the SPS items, and Factor III comprised of the SIAS items. However, statistical analysis was limited to exploratory factor analysis with principal components analysis (PCA), whereas confirmatory factor analysis was not conducted as a follow-up to confirm the factor structure. Relying only on PCA could be problematic as pattern loadings could be overrepresented while inter-correlation is diminished (Widaman, 1993). While EFA with principal axis factor partials out unique variances, PCA runs the analysis on the shared variance and inflates the factor loadings because of the errors (Snook & Gorsuch, 1989; Widaman, 1993). Therefore, it is important to examine the TKS scale using both EFA and CFA rather than solely relying on PCA. Furthermore, similar to much social anxiety assessment research, participants were limited to undergraduate students. Hence, it may be beneficial to examine the factor structure of the TKS scale along with other commonly used Western-developed social anxiety scales beyond college students.

A similar study examining the factor structure of social anxiety was conducted by Olivares et al. (2004). These researchers conducted EFA and CFA using the SPAI, SAS-A, FNE, and SAD and found a hierarchical structure with two subfactors of social anxiety across a clinical and non-clinical sample of adolescents (Olivares et al., 2004). The first factor is the “cognitive symptoms” and the second factor is “behavioral and somatic symptoms”. Though the scales are invariant across non-clinical (non-anxious) and clinical (anxious) sample, the participants were limited to high school students from Spain only. Further study is still needed to examine whether the same aspects of social anxiety are reflected in the different cultural groups, and whether items hold the same

meaning across cultural groups (e.g., does shy mean the same for both Asians and Caucasians?).

Measurement Invariance

Aside from cultural bias, the examination of item bias and whether social anxiety scales are equivalent across cultural groups, are equally important. One method to determine if SAD assessment tools are equivalent across cultural groups is to test for measurement invariance using multiple-group confirmatory factor analysis. Measurement invariance increases the confidence of mean score comparison across groups and is a prerequisite for scales before group mean comparison could be made (Vandenberg & Lance, 2000; Pendergast et al., 2017).

Previous research on measurement invariance has examined social anxiety scales, and the results indicated potential measurement bias between groups. For example, Hambrick et al. (2010) found the cultural group comparison using SIAS would be difficult because the SIAS is less effective at measuring social anxiety among African American individuals compared to White participants. In contrast, DIF results indicate the SIAS could be better at identifying social anxiety symptoms among Asians compared to European Americans (Hambrick et al., 2010). Likewise, Wong and Moulds (2014) examined the measurement equivalence of the BFNE and found this self-report scale is non-equivalent across Asian and European Americans.

Although these studies are valuable, there are many scales that have yet to be examined and many cultural groups that have been understudied. Hence, it would be valuable to have studies to examine the measurement invariance of some commonly used SAD instruments and to clarify whether the construct of SAD is the same across different

cultural groups. Moreover, past research has been limited to the studying of separate SAD scales across cultural groups (Hambrick et al., 2010; Wong & Moulds L., 2014), with relatively small Asian sample size and limited age range (Hambrick et al., 2010; Harpole et al., 2015; Olivares et al., 2004). Hence, it would be valuable to examine the factor structure of the commonly used social anxiety scales collectively and to examine the measurement equivalence of these scales across different cultural groups.

Present Study

Given that the factor structure of social anxiety may vary across different groups (e.g., clinical vs. non-clinical sample; Japanese vs. European), it would be valuable to examine the factor structure of social anxiety across different cultural groups. As an extension to the Kleinknecht et al. (1997) study, the present research examined the factor structure of social anxiety by submitting the TKS scale with other commonly used social anxiety scales collectively for exploratory and confirmatory factor analysis. Second, previous research has examined the measurement equivalence of social anxiety scales (e.g., SIAS), but has demonstrated that item bias may exist across ethnic groups (Hambrick et al., 2010). Hence, it may be fruitful to examine the measurement equivalence of other widely used social anxiety scales. This study examined five widely used Western-developed social anxiety scales along with the TKS scale. Finally, previous research has been limited in using primarily college students and collapsing all Asians into a single group. Consequently, this study expanded the research base by examining the factor structure of social anxiety scales using a wider age range and with Asian subgroups (e.g., Korean, Japanese, Chinese).

The purpose of this study is to: (1) examine the underlying factor structure of social anxiety among adults in the U.S. by jointly submitting the SPIN, SIAS, SPS, LSAS-SR, BFNE, and TKS Scale for exploratory (EFA) and confirmatory factor analysis (CFA), (2) identify a preferable factor structure of social anxiety for Asian Americans using CFA, (3) examine the measurement equivalence of the six social anxiety scales across different cultural groups (e.g., European Americans, African Americans, and Asian Americans) using multiple-group confirmatory factor analysis, and (4) identify the social anxiety scales that may be more appropriate for the Asian population.

Research Questions

Question 1: Will the factor structure of social anxiety scales correspond with the Self-Presentation and Sociometer Theory of social anxiety or the Cognitive Behavioral Models of social anxiety?

Hypothesis 1: It is hypothesized the overall factor structure of the scores on the social anxiety scales would support the Cognitive Behavioral Models of social anxiety.

Question 2: Could the hierarchical factor structure with two subfactors (cognitive, behavioral/somatic) proposed by Olivares et al. (2004) account for most of the variance in the construct of SAD in a community sample of adults?

Hypothesis 2: It is hypothesized the hierarchical factor structure with two subfactors would account for most of the variance in the construct of SAD in a community sample of adults.

Question 3: To what extent will the factor structure of Western-developed social anxiety scales hold for Asian participants?

Hypothesis 3: The factor structure of social anxiety would be comparable across European American, Asian American, and African American participants.

Question 4: What is an alternative model that would be more appropriate for Asian participants?

Hypothesis 4: Taijin Kyofusho items will comprise a meaningful factor for Asian participants.

Question 5: Will there be SAD scales that best capture the construct of SAD among Asians?

Hypothesis 5: The SIAS, SPS, and TKS scales may be better at capturing SAD among Asians compared to the BFNE, SPIN, and LSAS-SR.

CHAPTER 3
METHODOLOGY

Participants

Project MAPS

Participants in this study were drawn from a larger study (Project Mental Health Awareness and Perceptions Study; Project MAPS), which examined mental health stigma and social anxiety symptoms among individuals. Data collection occurred in spring 2018 to July 2019.

Recruitment

A database was created that consisted of a contact list of professional organizations, clubs, and community organizations geared toward specific cultural groups including East Asians, South Asians, African Americans, and general populations. Electronic flyers were distributed to organizations through their professional emails and social media sites to recruit Project MAPS participants.

Participant Characteristics

To qualify for this study, participants had to be able to read English and be age 18 and older. Participants in this study ($n = 602$) included 71% Female, 29% Male, age 18 to 83+ ($M = 27.47$; $SD = 9.40$). This study included 7% African American, 44% Asian, 42% European American, 3% Multi-racial, 1% reported “Other”, and 3% declined to respond.

Measures

Detailed psychometric information about each measure is available on page 17-21.

Demographic Questionnaire

All participants were asked to provide demographic information including age, sex, race, household income, and education level.

Brief Fear of Negative Evaluation-Straightforward

The Brief Fear of Negative Evaluation-Straightforward (BFNE; Leary, 1983; Rodebaugh et al., 2004) consisted of 12 items aimed to assess social anxiety. Using a 5-point Likert type scale (*1 = not at all characteristic of me, 2 = slightly characteristic of me, 3 = moderately characteristic of me, 4 = very characteristic of me, 5 = extremely characteristic of me*), participants were asked to rate how much each statement such as, “Other people’s opinions of me do not bother me” described them. Participants could obtain a final total score ranging from 12 to 60, with a higher score indicating having more social anxiety symptoms. This study’s Cronbach’s alpha is .906.

Social Interactive Anxiety Scale and Social Phobia Scale

The Social Interactive Anxiety Scale and Social Phobia Scale (SIAS & SPS; Mattick & Clarke, 1998) are companion measures of social anxiety. The SIAS and SPS are each a 20 item self-report rating scale intended to assess social anxiety. While the SIAS aimed to assess social interaction anxiety, the SPS measured respondents’ social anxiety as a result of being observed by others. On the SIAS and SPS, participants used a 5-point Likert type scale (*1 = not at all, 2 = slightly, 3 = moderately, 4 = very, 5 = extremely*) to rate the degree in which they endorse the social anxiety symptoms.

Participants could obtain a final total score ranging from 20 to 100 on each of the scales, with a higher score indicating having more social anxiety symptoms. The current study's Cronbach's alphas are .928 for the SIAS and .932 for the SPS.

Social Phobia Inventory

The Social Phobia Inventory (SPIN; Connor et al., 2000) is a 17-item self-rating scale used to measure social anxiety. The SPIN measures three dimensions of social anxiety including fear, avoidance, and physiology. Using a 5-point Likert-type scale (*1 = not at all, 2 = a little bit, 3 = somewhat, 4 = very much, 5 = extremely*), participants were asked to rate how much symptoms “bothered them during the past week.” Participants could obtain a final total score ranging from 17 to 85, with a higher score indicating having more social anxiety symptoms. Previous studies suggested the SPIN showed evidence of construct validity (Conner et al., 2000). The current study's Cronbach's alpha is .928.

Liebowitz Social Anxiety Scale-Self Report

The Liebowitz Social Anxiety Scale-Self Report (LSAS-SR; Liebowitz, 1987) is a widely used 36 item clinician-administered questionnaire measuring social anxiety. The LSAS-SR is a 24 item self-reporting version of the LSAS. The LSAS-SR aimed to assess two dimensions of social anxiety: (1) fear and (2) avoidance. On the Fear Subscale of the LSAS-SR, participants were asked to use a 4 point Likert-type scale (*1 = none, 2 = mild, 3 = moderate, 4 = severe*) to rate the severity of their fear on items such as “telephoning in public,” “participating in small groups.” On the Avoidance Subscale, participants use a 4-point Likert type scale (*1 = never, 2 = occasionally, 3 = often, 4 = usually*) to rate the frequency of their avoidance behavior in a given situation such as “talking to people in

authority,” and “calling someone you don’t know very well.” The participants could obtain a final composite score ranging from 48 to 192, with a higher score suggesting having more social anxiety symptoms. This study’s Cronbach’s alphas are .952, .924, and .900 for the LSAS-SR, Fear Subscale, and Avoidance Subscale, respectively.

Taijin Kyofusho Scale

The Taijin Kyofusho Scale (TKS; Kleinknecht et al., 1997) is a 31 item self-report scale aimed to measure social anxiety. Using a 7-point Likert type scale (*0=totally false, 7 = exactly true*), participants rated how much each statement such as, “I feel small and feel like apologizing to others,” describes them. Participant scores could range between 31 to 217, with higher scores indicating more social anxiety symptoms. The TKS scale was collapsed from a 7- point Likert-type scale to a 5- point Likert-type scale (combining 0=totally false with 1=false, and 5=true with 6=exactly true), because this will allow the TKS scale to be on a similar 5- point Likert-type scale as the SPIN, SIAS, SPS, and BFNE. Moreover, prior studies suggested participants perceived “totally false” similarly to “false,” and “true” closely to “exactly true” (Worcester & Burns, 1975). This study’s Cronbach’s alpha is .954.

Procedure

This study was approved by the Institutional Review Board (IRB) at Temple University. Participant responses were collected anonymously through online surveying using a battery of surveys consisting of five social anxiety scales along with questions regarding demographics of the participants.

Statistical Analysis

The sample was randomly divided into two subsamples: EFA subsample and CFA subsample. Using a similar approach as Kleinknecht et al. (1997), a factor analysis was conducted using the items from all six social anxiety scales collectively to examine the construct of social anxiety across cultural groups (hypotheses 1 and 2). Next, multiple group confirmatory factor analysis was used to determine to what degree are the factor structure of the scales equivalent across cultural groups and whether items bias exist (hypotheses 3, 4, and 5). Finally, MANCOVA and regression analysis were used to examine score differences between racial groups.

EFA

First, exploratory factor analysis (EFA) with polychoric correlation was conducted to examine the factor structure of the social anxiety scales using SPSS version 23. Principal axis factoring with promax rotation were used to extract the factors. Multiple methods were used for factor retention (Henson & Roberts, 2006) including the scree test (Cattell, 1966), minimum average partial (MAP; Velicer, 1976), parallel analysis (Horn, 1965), and theoretical convergence. *A priori* criterion for factor retention includes having pattern coefficients > 0.40 item salience and a minimum of three salient items per factor.

Single-Group CFA

The hypothesized factor structure of the social anxiety scales generated from EFA and were examined using CFA. Moreover, the theoretically derived alternative models of social anxiety (e.g., three correlated factor model, hierarchical two-factor model; Kleinknecht et al., 1997; Olivares et al., 2004) were examined. CFA was conducted using

WLSMV estimation on Mplus version 8.3 (Muthén & Muthén, 2012). First, a CFA (that includes Asian Americans and European Americans) was conducted to examine the model fit of the hypothesized factor structure of the social anxiety scales. Next, a model that demonstrated adequate fit was retained for single-group CFA analysis. To conduct the single-group CFA, a separate CFA was conducted for each of the cultural groups. Any cultural group with less than 200 participants were not included in the single-group CFA due to inadequate sample size. If the single-group CFA model demonstrated adequate fit across each cultural group, then invariance testing was conducted.

Model fit was examined using Chi-Square Goodness of Fit, Root Means Square Error of Approximation (RMSEA; Steiger & Lind, 1980), Comparative Fit Index (CFI; Bentler, 1990), and Tucker-Lewis Index (TLI; Tucker & Lewis, 1973). A priori criteria for acceptable model fit includes: a non-statistical significant chi-square, $RMSEA \leq 0.08$, $CFI \geq 0.90$, and $TLI \geq 0.90$ (Hu & Bentler, 1995), with chi-square holding the least weight because it is affected by large sample size (Kline, 2011). Models meeting measurement invariance criteria are based on the evaluation of changes in the chi-square, RMSEA, and CFI values between each model (i.e., configural, metric, scalar, and residual invariance). Specifically, when model fit worsens as increasing restrictive equality constraints are applied (i.e., chi-square values increased significantly at $p < .05$, $RMSEA > .015$, and $CFI \geq -.01$), the measure is considered non-invariant across groups at that specific level (Bryne, 2011; Chen, 2007; Meade, Johnson, & Braddy, 2008)

Multiple-Group CFA (MG-CFA)

MG-CFA was used to examine the degree of measurement invariance across cultural groups on the social anxiety scales. Several levels of measurement invariance

were examined such as configural invariance, metric invariance, and scalar/threshold invariance. Because research on whether residual invariance is a necessary requirement for mean comparison remains limited and controversial for ordinal data at this time (Pendergast et al., 2017), residual invariance was not examined in this study. Each level of measurement invariance on the social anxiety scales are assessed by using increasingly restrictive equality constraints. Nested models are compared by examining the changes in chi-square, RMSEA, and CFI values.

Multivariate Analysis of Covariance (MANCOVA)

MANCOVA was used to examine whether the different facets of social anxiety scores differ by race, after controlling for sex.

Moderation Analysis

Moderation analysis was conducted to examine whether sex moderates the relationship between race and social anxiety scores. Moderation analysis was also used to examine whether sex moderates the relationship between race and the different facets of social anxiety. A Bonferroni correction was applied to correct for type I error for the multiple separate analyses.

CHAPTER 4

RESULTS

Preliminary Data Analysis

A sample of 602 participants were randomly divided into EFA ($n = 200$) and CFA subsamples ($n = 402$). Missing data ranged between 5.1% to 17.5%. Missing data were determined to be missing completely at random (MCAR; Little, 1988), based on Little's test $\chi^2(13359) = 13614.14, p = .060$. Multiple imputation (MI; Rubin, 1987) was used to handle missing data. Compared to traditional methods (e.g., listwise deletion), MI could improve accuracy while retaining statistical power (Graham, 2007; Manly & Wells, 2015; Kang, 2013; Roth & Switzer, 1999; Rubin & Little, 2002, van Buuren, 2018). All variables (including predictors) were included in the imputation model (Graham, 2007; Nguyen, Carlin, & Lee, 2017; Pedersen et al., 2017; Schafer & Olsen, 1998; Sterne et al., 2009). Due to non-monotone pattern of missing values, the Fully Conditional Specification [i.e., Markov Chain Monte Carlo (MCMC)] computation method was applied (van Buuren et al. 2006; 2007; Zhang, 2003). MI with Predictive Mean Matching (PMM: Little, 1988; Rubin, 1986) is "robust against misspecification" (van Buuren, 2018, p. 84) and "produces the least biased estimates" compared to alternative methods (Marshall, Altman, & Holder, 2010; van Burren, 2018, p.84). Thus, MI with PMM was used where values are predicted based on complete donor cases to eliminate the issue with meaningless imputed values (i.e., negative anxiety scores), while providing realistic scores (Horton & Kleinman, 2007; van Buuren, 2018). Five imputed datasets were generated (Little & Rubin, 2002, p. 211–212; Pedersen et al., 2017; Rubin, 1987). As the

eigenvalues and factor structures for all datasets were comparable, one dataset was randomly selected and described.

Univariate descriptive statistics are displayed in Table 1. Skewness and kurtosis for the scale scores were within normal range (i.e., skewness < 2; kurtosis < 3; Kline, 2011).

Table 1

Descriptive Statistics of the Social Anxiety Scale Total Score

Scale	n	Range		M	SD	Skewness	Kurtosis
		Potential	Actual				
BFNE	602	12–60	12–60	38.22	10.11	0.08	–0.47
LSAS	602	48–192	48–175	92.97	24.51	0.57	0.08
Fear	602	24–96	24–90	48.48	13.32	0.42	–0.20
Anxiety	602	24–96	23–82	42.85	11.77	0.65	0.16
SIAS	602	20–100	20–93	49.84	15.81	0.46	–0.33
SPS	602	20–100	20–96	37.61	14.68	1.18	1.09
SPIN	602	17–85	17–83	38.48	13.99	0.61	–0.07
TKS	602	31–155	31–155	64.20	26.64	0.98	0.41

Note. SPIN = Social Phobia Inventory; BFNE = Brief Fear of Negative Evaluation; SIAS = Social Interaction Anxiety Scale; LSAS-SR = Leibowitz Social Phobic Scale – Self Report; TKS = Taijin Kyofusho Scale; SPS = Social Phobia Scale; M = Mean; SD = Standard Deviation.

Study 1

The purpose of study 1 was to examine the construct of social anxiety by submitting Western-developed social anxiety scales and the TKS scale collectively for factor analysis.

EFA

Skewness was within normal range (i.e., skewness <2) with elevated kurtosis (kurtosis >3) among three items at the item level. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO = 0.79) and Bartlett's Test of Sphericity ($\chi^2(10878) = 28747.16, p < 0.001$) suggested that factor analysis is appropriate.

For factor extraction, scree plot, MAP, and parallel analysis suggested one, eight, and 11 factors, respectively. The eight and 11 factor structures are not theoretically interpretable. Thus, the eight and 11 models were eliminated from further analysis.

Contrarily, previous research suggested a two-factor hierarchical model (Olivares et al., 2004) and a three-factor correlated model (Kleinknecht et al., 1997). Thus, three solutions were submitted for EFA: the one-factor (as suggested by the current study), the two-hierarchical factor, and the correlated three-factor solutions (as suggested by previous research: Kleinknecht et al., 1997, Olivares et al., 2004).

One-Factor Solution

The one-factor solution accounted for 34% of the variance. Communalities ranged from .16 to .63. The single factor ($\alpha = .984$) is comprised of 122 items with pattern coefficients ranging from .40 to .80. The one-factor solution appeared to be tapping primarily into Fear of Negative Evaluations and Fear of Social Interactions symptoms.

Items with the highest factor loading included “*I worry about what other people will think of me even when I know it doesn’t make any differences,*” “*I am frequently afraid of other people noticing my shortcomings,*” and “*I am afraid others will not approve of me.*”

Two-Factor Solution

The two-factor solution accounted for 42% of the variance. Communalities ranged from .20 to .64. Due to the additional social anxiety items included in this study, the resulting two-factor solution did not replicate Olivares et al.’s (2004) two-factor hierarchical solution. Factor I appeared to be tapping into fears and worries of social situations. Factor I ($\alpha = .976$) included 59 items, such as, “*Fear of acting, performing or giving a talk in front of an audience*” and “*Fear of being the center of attention.*” Pattern coefficients ranged from .41 to .93 for Factor I. Factor II was more representative of Taijin Kyofusho symptoms. Factor II ($\alpha = .950$) was comprised of 31 items and consisted primarily of TKS items such as, “*I am afraid that my sweating or having nervous perspiration will offend other people*” and “*I am afraid that my body odors will offend other people.*” Pattern coefficients ranged from .42 to .82 for Factor II. Moderate factor inter-correlations ($r = .63$) suggested a potential hierarchical or bifactor structure (Canivez, 2016).

Three-Factor Solution

The three-factor solution accounted for 43% of the variance. Communalities ranged from .15 to .70. However, due to the additional social anxiety items included in this study, the resulting three-factor solution did not replicate the theoretical CBT model (cognitive, behavioral, and physical symptoms) and the findings from the Kleinknecht et al. (1997) study. The three factors appeared to be tapping into the fear and avoidance of

social interactions, Taijin Kyofusho, and Fear of Negative Evaluation. As such, the three factors were named based on their item contents. Factor I, **Fear/Avoidance of Social Interactions** ($\alpha = .969$) included 44 items such as, “*Fear of being the center of attention*” and “*Avoid acting, performing or giving a talk in front of an audience.*” Pattern coefficients ranged from .42 to .89 for Factor I. Factor II, **Taijin Kyofusho/Fear of Offending Others** ($\alpha = .944$) comprised of 28 items and consisted primarily of TKS items (e.g., “*I am afraid that I will blush in front of other people and as a result offend them*” and “*I am afraid that eye-to-eye contact with other people will offend them*”). Pattern coefficients ranged from .42 to .78 for Factor II. Factor III, **Fear of Negative Evaluation** ($\alpha = .919$) included 12 items such as, “*Sometimes I think I am too concerned with what other people think of me*” and “*I often worry that I will say or do the wrong things.*” Pattern coefficients ranged from .42 to .83 for Factor III. Moderate factor inter-correlations ($r = .40$ to $.58$) suggested two competing potential structures: hierarchical or bifactor model (Canivez, 2016). The bifactor structure has the advantage of allowing for the interpretation of the general factor and subfactors’ direct influence on the indicators while the hierarchical model’s second-order factor’s effect on the indicators is obscured by the mediating first-order factor (Canivez, 2016). Although simulation research indicated bifactor models tend to demonstrate better fit than hierarchical models (Morgan, Hodge, Wells, & Watkin, 2015, p.15), a bifactor model is preferred when the “unique contribution of the general and subfactors in predicting external criteria” is of interest (Canivez, 2016, p.5; Chen, West, & Sousa, 2006). As such, a bifactor structure was examined. Overall, the one-factor, two-factor, and three-factor solutions yielded comparable pattern coefficients and factor reliability estimates. Still, the three-factor

solution produced more interpretable results. Over-factoring was also preferable to under-factoring (Fabrigar, Wegner, MacCallum, & Strahan, 1999). Therefore, the three-factor model was retained over the one-factor and two-factor models for bifactor testing.

Bifactor Solution

Using the Schmid and Leiman (SL, 1957) transformation procedure, a bifactor solution with one general factor and three subscale factors (Social Interaction, Taijin Kyofusho, Negative Evaluation) were orthogonalized in the MacOrtho program (Watkin, 2005). SL results indicate 28.5%, 3.4%, 7.3%, and 4.1% of the total variance was accounted by the general factor, Factor I, Factor II, and Factor III, respectively. Among the common variance, 56% was accounted by the general factor, 8.0% by Factor I (**Fear/Avoidance of Social Interactions**), 16.8% by Factor II (**Taijin Kyofusho/Fear of Offending Others**), and 9.4% by Factor III (**Fear of Negative Evaluation**). Reliability estimates using the omega hierarchical (ω_h) and omega-subscale (ω_s) were computed using Watkin's Omega software (2013). The omega coefficient for the general factor ($\omega_h = .720$) was high compared to the subfactors ($\omega_s = .156-.516$).

Summary of EFA Findings

Overall, the EFA results from the present study supported a three-factor bifactor solution (Fear/Avoidance of Social Interaction, Taijin Kyofusho, and Negative Fear Evaluation; See Table 2). The EFA results did not reproduce the Kleinknecht et al.'s (1997) three-factor model (Factor I= TKS items, Factor II = SPS items, Factor III = SIAS items). This may be attributed to the additional items included in this study. The EFA results also differed from Olivares et al.'s (2004) two-factor hierarchical model (Factor I

= cognitive, Factor II = behavioral/somatic) and the theoretical CBT Model (cognitive, behavioral, somatic) as the items did not load onto cognitive, behavioral, or somatic components. Therefore, the three-factor bifactor model (supported by the current EFA results), Olivares et al.'s (2004) hierarchical two-factor model, Kleinknecht et al.'s (1997) three factor model, and the theoretical CBT were submitted for CFA and compared.

CFA

CFA results indicated all tested models demonstrated good fit (See table 3): Olivares et al.'s (2004) two factor hierarchical model (CFI = .978, TLI = .978, RMSEA = .043, [90% CI = .042, .044]), correlated three-factor model (CFI = .982, TLI = .982, RMSEA = .043, [90% CI = .041, .044]), theoretical CBT model (CFI = .979, TLI = .978, RMSEA = .042, [90% CI = .041, .043]), and Kleinknecht et al.'s three-factor model (1997): CFI = .988, TLI = .987, RMSEA = .075, [90% CI = .071, .080]). However, the three-factor bifactor structure (CFI = .995, TLI = .995, RMSEA = .023, [90% CI = .020, .025]) was best supported by the data and demonstrated the best fit. Thus, the three-factor bifactor model was retained for MG-CFA. No post-hoc modifications were made.

Table 2

EFA Pattern Coefficient for the Three-Factor Model

Item	Description	Fear/Avoid Social Interactions	Taijin Kyofusho	Negative Evaluation Fear
LSAS15F	Fear of being the center of attention.	0.89	-0.17	-0.01
SPIN9	I avoid activities in which I am the center of attention	0.82	-0.06	-0.10
LSAS16F	Fear of speaking up at a meeting.	0.80	-0.19	0.08
LSAS20F	Fear of giving a report to a group.	0.80	-0.01	-0.13
LSAS15A	Avoid being the center of attention.	0.80	-0.02	-0.15
LSAS16A	Avoid speaking up at a meeting.	0.79	-0.14	-0.04
LSAS12F	Fear of meeting strangers.	0.77	-0.10	0.05
LSAS11F	Fear of talking with people you don't know very well.	0.74	-0.05	0.09
SPIN11	Avoid having to give speeches	0.74	-0.15	-0.01
LSAS20A	Avoid giving a report to a group.	0.73	0.03	-0.25

LSAS6A	Avoid acting, performing or giving a talk in front of an audience.	0.72	-0.12	-0.07
SPS18	I get tense when I speak in front of other people	0.69	-0.04	0.06
LSAS12A	Avoid meeting strangers.	0.69	0.13	-0.17
LSAS6F	Fear of acting, performing or giving a talk in front of an audience.	0.68	-0.24	0.08
LSAS14F	Fear of entering a room when others are already seated.	0.65	0.10	0.02
LSAS11A	Avoid talking with people you don't know very well.	0.65	0.09	-0.13
LSAS2F	Fear of participating in small groups.	0.64	-0.06	0.05
SIAS16	I am nervous mixing with people I don't know well	0.63	0.04	0.19
SPIN10	Talking to strangers scares me	0.62	0.10	0.02
SIAS10	I have difficulty talking with other people	0.61	0.19	0.07
LSAS14A	Avoid entering a room when others are already seated.	0.61	0.03	-0.06
SIAS19	I am tense mixing in a group	0.59	0.14	0.18
SIAS15	I find myself worrying that I won't know what to say in social situations	0.58	-0.02	0.24

LSAS5F	Fear of talking to people in authority.	0.57	-0.12	0.15
SPIN4	Avoid talking to people I don't know	0.57	0.07	0.02
SPS20	I feel awkward and tense if I know people are watching me	0.56	0.15	0.20
LSAS5A	Avoid talking to people in authority.	0.56	-0.04	0.03
SPIN14	I am afraid of doing things when people might be watching	0.55	0.08	0.19
SIAS7	When mixing socially, I am uncomfortable	0.54	0.20	0.09
SPIN16	Avoid speaking to anyone in authority	0.54	0.07	0.02
SPS6	I feel self-conscious if I have to enter a room where others are already seated.	0.52	0.10	0.13
SIAS4	I find difficulty mixing comfortably with the people I work with	0.52	0.11	0.10
SPIN3	Parties and social events scare me	0.52	0.22	0.07
LSAS8A	Avoid working while being observed.	0.50	-0.02	0.03
LSAS10F	Fear of calling someone you don't know very well.	0.49	-0.08	0.29
LSAS2A	Avoid participating in small groups.	0.49	0.10	-0.07

SIAS20	I am unsure whether to greet someone I know only slightly	0.48	0.10	0.15
LSAS7F	Fear of going to a party.	0.48	0.15	0.00
SIAS1	I get nervous if I have to speak with someone in authority (teacher, boss, etc.)	0.47	-0.07	0.35
LSAS8F	Fear of working while being observed.	0.46	-0.10	0.28
LSAS19A	Avoid looking at people you don't know very well in the eyes.	0.45	0.16	-0.13
SIAS2	Have difficulty making eye-contact with others	0.44	0.23	-0.11
LSAS18A	Avoid expressing a disagreement or disapproval to people you don't know very well.	0.43	-0.11	0.11
LSAS10A	Avoid calling someone you don't know very well.	0.42	0.04	0.19
TKS18	I am afraid that I will blush in front of other people and as a result offend them.	-0.07	0.81	-0.14
TKS23	I am afraid that when talking with others my stiff facial expressions will offend them.	0.02	0.78	-0.12
TKS28	I am afraid that eye-to-eye contact with other people will offend them.	0.07	0.72	-0.15
TKS29	When I talk with strangers, I am afraid that they might point out my faults.	-0.22	0.71	0.14
TKS10	I am afraid that when talking with others my trembling head, hands, and/or feet will offend them.	-0.05	0.70	-0.06

TKS14	Sometimes I cannot laugh when I talk with another person because I become very anxious and my face stiffens.	0.16	0.69	-0.18
TKS24	I am afraid that my sweating or having nervous perspiration will offend other people.	-0.28	0.68	0.10
TKS16	At a hair dresser's shop, I cannot stand for the hair dresser to look me in the face.	0.15	0.66	-0.15
TKS21	When I talk with my friends, I am afraid that they might point out my faults.	-0.09	0.65	0.18
TKS26	I am afraid that my staring at other people's body parts will offend them.	-0.14	0.65	0.06
TKS25	I am afraid that my body odors will offend other people.	-0.27	0.65	0.14
TKS6	I am afraid that when talking with others my trembling voice will offend them.	0.01	0.64	-0.02
TKS30	I am afraid that my physical appearance will in some way offend others.	-0.09	0.64	0.22
TKS11	I am afraid that my presence will offend others.	0.08	0.63	0.06
TKS7	Sometimes I stiffen or blush when I am with my friends.	0.03	0.63	0.00
TKS27	I am afraid that I will release intestinal gas in the presence of others and offend them as a result.	-0.25	0.62	0.05
SPS9	I get panicky that others might see me to be faint, sick or ill	0.14	0.59	-0.20
TKS22	When I am with others, I sometimes feel I am stupid and feel sorry for them for being with me.	0.06	0.57	0.19
TKS15	I am afraid my family will find out that something is wrong with me and that will trouble them.	0.08	0.54	0.03
TKS31	Sometimes I stiffen or blush when I am with strangers.	0.12	0.51	0.03

TKS17	I feel small and feel like apologizing to others.	0.14	0.49	0.23
SPS8	I would get tense if I had to sit facing other people on a bus or a train	0.33	0.48	-0.11
SPS5	I fear I may blush when I am with others	0.15	0.48	0.04
TKS8	I cannot help thinking how my eyes look when someone looks me in the eye.	0.17	0.46	0.02
SPS11	It would make me feel self-conscious to eat in front of a stranger at a restaurant	0.10	0.46	0.14
SPS10	I would find it difficult to drink something if in a group of people	0.14	0.45	-0.16
TKS19	I do not know where I should look when I talk with others.	0.31	0.42	-0.04
SPIN7	Sweating in front of people causes me distress	0.05	0.42	0.20
BFNE9	I am usually worried about what kind of impression I make.	-0.10	0.12	0.83
BFNE6	I am afraid that people will find fault with me.	0.02	0.09	0.79
BFNE11	Sometimes I think I am too concerned with what other people think of me.	0.00	0.10	0.75
BFNE12	I often worry that I will say or do the wrong things.	-0.03	0.15	0.74
BFNE3	I am frequently afraid of other people noticing my shortcomings.	0.06	0.01	0.74
BFNE1	I worry about what other people will think of me even when I know it doesn't make any difference.	0.05	0.04	0.73
BFNE8	When I am talking to someone, I worry about what they may be thinking about me.	0.01	0.09	0.72

BFNE5	I am afraid others will not approve of me.	0.10	0.04	0.72
SPIN5	Being criticized scares me a lot	0.09	0.12	0.51
SIAS17	I feel I'll say something embarrassing when talking	0.25	0.18	0.44
BFNE7*	Other people's opinions of me do not bother me.	0.01	-0.11	0.43
BFNE4*	I rarely worry about what kind of impression I am making on someone.	-0.04	-0.27	0.42

Note. *Reversed scored. Factor loadings >.40 are in boldface. SPIN = Social Phobia Inventory; BFNE = Brief Fear of Negative Evaluation; SIAS = Social Interaction Anxiety Scale; LSPS-SR = Leibowitz Social Phobic Scale – Self Report; TKS = Tajjin Kyofusho Scale; SPS = Social Phobia Scale.

Table 3

Confirmatory Factor Analysis Model Fit Indices for the Social Anxiety Scales

Model	Index					
	χ^2_M	df_M	p	RMSEA [90% CI]	CFI	TLI
1. Two-Factor Olivares	18521.33	10728	<.001	.043 [.042, .044]	.978	.978
2. Correlated Three-Factor with TKS	5876.60	3399	<.001	.043 [.041, .044]	.982	.982
3. Three-Factor Bifactor	4012.83	3318	<.001	.023 [.020, .025]	.995	.995
4. Three-Factor CBT	18460.24	10727	<.001	.042 [.041, .043]	.979	.978
5. Three-Factor Kleinknecht	987.85	251	<.001	.075 [.071, .800]	.988	.987

Note. χ^2_M = chi-square; df_M = degrees of freedom; RMSEA = root-mean-square error of approximation; CI = confidence interval; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; CBT = Cognitive Behavior Theory.

*MG-CFA**Three-Factor Bifactor*

The three-factor bifactor model was submitted for CFA, testing both the Asian and European American racial group separately with no equality constraints imposed (Meade, Johnson, & Braddy, 2008). As the model fell within the recommended fit statistics (CFI = .995, RMSEA = .023), the three-factor bifactor model was then submitted for configural invariance testing. However, the three-factor bifactor model failed to converge for both groups. Three separate modifications were then made: setting the intercorrelated factors to zero to reduce the number of estimated parameters, using theta rather than delta parameterization, and eliminating the bifactor component and testing the three-factor component separately. Though the first two approaches were unsuccessful, the three-factor model without the bifactor structure was successfully

computed. The correlated three-factor model demonstrated adequate CFA fit statistics and shares similar theoretical structure as its bifactor counterpart. Thus, the correlated three-factor model may be a more appropriate alternative model to examine and was retained for measurement invariance testing.

Correlated Three-Factor

The correlated three-factor model was submitted for CFA, testing both the Asian and European American racial group separately with no equality constraints imposed (Meade et al., 2008). As the model fell within the recommended fit statistics (CFI = .982, RMSEA = .043; See Table 4), the correlated three-factor model was submitted for configural invariance testing. Fit statistics $\chi^2(6798) = 7530.555, p < .001$, (CFI = .995, TLI = .995, RMSEA = .023, [90% CI = .020, .026]) of the correlated three-factor model suggested configural invariance was established. Factor loadings were then constrained to be equal across groups and submitted for metric invariance testing. Based on the fit statistics of the metric invariance model, the metric model did not differ significantly from the configural model, thus, supporting metric invariance. Then, factor loadings and thresholds were constrained across racial groups for scalar invariance testing, and change fit statistics revealed scalar invariance was supported. Overall, the more restrictive models did not differ from the less restrictive models (Δ CFI was $<.01$; Δ RMSEA $<.015$). Therefore, invariance at the scalar (strong) level was established.

Study 2

Study 1 supported a three-factor structure (Fear/Avoidance of Social Interactions, Tajjin Kyofusho, and Negative Evaluation Fear) with 84 items. However, due to the complexity of the correlated three-factor model and the current small sample size, the

parameters estimated need to be reduced for subsequent analyses. Moreover, reducing items increase model parsimony while remaining conceptually insightful and feasible to administer. As such, study 2 aimed to create an abbreviated version of the combined social anxiety scales, examine its measurement invariance, and compare the score differences between Asian and European Americans using this new short social anxiety scale. Fabrigar et al. (1999) recommended the use of EFA and CFA for scale development as best practice. Thus, study 2 utilized EFA and CFA to create a short form, MG-CFA, to examine the measurement invariance of the new scale across racial groups, and MANCOVA and regression analysis to examine whether Asians endorse higher social anxiety symptoms compared to European Americans. If Asians and European Americans differ in the combined social anxiety score, do they differ in symptoms of Negative Evaluation Fear, Social Interaction Fear/Avoidance, and/or Taijin Kyofusho?

Table 4

Measurement Invariance of the Three-Factor Model

Model	<i>N</i>	χ^2	<i>df</i>	<i>p</i>	$\Delta \chi^2$	$\frac{\Delta}{df}$	<i>p</i>	CFI	Δ CFI	TLI	RMSEA [90% CI]	Δ RMSEA
1. Three Factor CFA	402	5876.60	3399	.000				.982		.982	.043 [.041, .044]	
2. Asian	200	3885.28	3399	.000				.992		.992	.027 [.022, .031]	
3. White	202	3645.27	3399	.002				.997		.997	.019 [.012, .024]	
4. Configural	402	7530.56	6798	.000				.995		.995	.023 [.020, .026]	
5. Weak	402	8867.32	6879	.000	1336.76	81	.00	.986	.009	.986	.038 [.036, .040]	.015
6. Strong	402	8982.80	6960	.000	115.48	81	.00	.986	.000	.986	.038 [.036, .040]	.000

Note. χ^2_M = chi-square; *df*_M = degrees of freedom; Δ = change; CI = confidence interval; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = root-mean-square error of approximation; the change in chi-square was calculated using the Satorra-Bentler chi-square difference test in Mplus using DIFFTEST function; F = Factor.

Step 1: EFA of the 24 Items Short Scale

Using the EFA subsample, the 84 items (from study 1) were resubmitted for EFA. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO = .88) and Bartlett's Test of Sphericity ($\chi^2(276) = 3314.58, p < 0.001$) suggested that factor analysis is appropriate.

Three-Factor Solution

To reduce the number of items on the three-factor structure, items with factor loadings < 0.60 were removed and EFA was recomputed. Sixty items were removed from the scale because they did not have pattern coefficients > 0.60 . The final combined social anxiety scale was shortened into a 24-item scale, thus, named Combined Social Anxiety Scales-24 items (CSAS-24). The CSAS-24 consisted of three dimensions that mirrored the 84-item three-factor model from study 1. Factor I appeared to be tapping into avoidance behaviors and fear of social interactions and was named **Social Interactions Fear/Avoidance** ($\alpha = 0.903$). Factor I included eight items such as *"I fear being the center of attention,"* with pattern coefficients ranging between .634 to .828. Factor II, appeared to be tapping into the fear of offending others, and was named **Taijin Kyofusho** ($\alpha = 0.882$). Factor II was comprised of eight items such as *"I am afraid others will point out my faults,"* with pattern coefficients ranging between .602 to .798. Factor III, appeared to be tapping into Fear of Negative Evaluation from others, and was named **Negative Evaluation Fear** ($\alpha = .937$). Factor III included eight items, such as *"I often worry that I will say or do the wrong things,"* with pattern coefficients ranging between .736 to .893. The three-factor solution accounted for 57% of the variance. Communalities

ranged from .41 to .75. Moderate inter-factor correlations ($r = .38$ to $.46$) suggested a potential bifactor structure (Canivez, 2016). Cronbach's alpha for all 24 items is .924.

Table 5

EFA Factor Loading for the 24-Item CSAS Scale

Item	Description	Social Interaction Fear/Avoidance	Taijin Kyofusho	Evaluation Fear
LSAS15F	Fear of being the center of attention.	0.83	-0.05	0.09
LSAS16F	Fear of speaking up at a meeting.	0.79	-0.08	0.13
LSAS15A	Avoid being the center of attention.	0.75	0.08	0.03
LSAS16A	Avoid speaking up at a meeting.	0.75	-0.03	0.05
LSAS20F	Fear of giving a report to a group.	0.69	0.12	0.05
LSAS20A	Avoid giving a report to a group.	0.68	0.16	0.16
LSAS6A	Avoid acting, performing or giving a talk in front of an audience.	0.65	0.01	0.01
LSAS6F	Fear of acting, performing or giving a talk in front of an audience.	0.63	-0.12	0.13
TKS23	I am afraid that when talking with others my stiff facial expressions will offend them.	0.01	0.80	0.04
TKS18	I am afraid that I will blush in front of other people and as a result offend them.	0.00	0.77	0.07
TKS14	Sometimes I cannot laugh when I talk with another person because I become very anxious and my face stiffens.	0.13	0.76	0.11
TKS28	I am afraid that eye-to-eye contact with other people will offend them.	0.04	0.72	0.06
TKS16	At a hairdresser's shop, I cannot stand for the hairdresser to look me in the face.	0.07	0.66	0.02
TKS10	I am afraid that when talking with others my trembling head, hands, and/or feet will offend them.	0.01	0.63	0.03
TKS21	When I talk with my friends, I am afraid that they might point out my faults.	0.11	0.62	0.24

TKS29	When I talk with strangers, I am afraid that they might point out my faults.	0.12	0.60	0.19
BFNE9	I am usually worried about what kind of impression I make.	0.06	0.00	0.89
BFNE11	Sometimes I think I am too concerned with what other people think of me.	0.00	0.04	0.81
BFNE6	I am afraid that people will find fault with me.	0.04	0.01	0.80
BFNE8	When I am talking to someone, I worry about what they may be thinking about me.	0.01	0.02	0.80
BFNE3	I am frequently afraid of other people noticing my shortcomings.	0.03	-0.02	0.79
BFNE1	I worry about what other people will think of me even when I know it doesn't make any difference.	0.06	-0.03	0.78
BFNE12	I often worry that I will say or do the wrong things.	0.02	0.04	0.77
BFNE5	I am afraid others will not approve of me.	0.13	-0.03	0.74
Cronbach's alpha		0.90	0.88	0.94

Note. Factor loadings >.40 are in boldface. EFA = Exploratory Factor Analysis; CSAS = Combined Social Anxiety Scale; BFNE = Brief Fear of Negative Evaluation; LSPS-SR = Leibowitz Social Phobic Scale – Self Report; TKS = Taijin Kyofusho Scale;

Bifactor Solution

Using the Schmid and Leiman (SL, 1957) transformation procedure, a bifactor solution with one general factor and three subscale factors (Evaluation Fear, Social Interaction Avoidance/Fear, and Taijin Kyofusho) were orthogonalized in the MacOrtho program (Watkin, 2005). The general factor accounted for 23.9% of the total variance and 42% of the common variance. Factor I, Factor II, and Factor III accounted for additional 9.1%, 11.6%, and 11.9% of the total variance, respectively. Among the common variance, 16.1% was accounted for by Factor I (**Fear/Avoidance of Social Interactions**), 20.5% by Factor II (**Taijin Kyofusho/Fear of Offending Others**), and 21.1% by Factor III (**Fear of Negative Evaluation**). Reliability estimates using the omega hierarchical (ω_h) and omega-subscale (ω_s) were computed using Watkin's Omega software (2013). The omega coefficient for the general factor ($\omega = .630$) was comparable to the subscale factors ($\omega_s = .456-.618$), suggesting both the general and subscale factors "possess sufficient reliability variance to be interpreted" (Canivez, 2016, p.6).

Step 2: CFA of the 24 Items Short Scale

The three-factor bifactor model of the 24-item short scale was then submitted for CFA. Study 1 results also suggested a three-factor model for the 84-items. Hence, both the correlated three-factor model (as suggested from study 1) and three-factor bifactor model were examined using CFA and compared.

CFA results showed both models demonstrated adequate fit (See Table 6). The three-factor bifactor model (CFI = .990, TLI = .988, RMSEA = .072, [90% CI = .066, .078]) was better supported by the data and demonstrated the best fit. Thus, the three-

factor bifactor model was retained for MG-CFA (See Figure 1). No post-hoc modifications were made.

Step 3: MG-CFA of the 24-Item Short Scale

The three-factor bifactor model was submitted for CFA, testing both the Asian and European American racial groups separately with no equality constraints imposed (Meade et al., 2008). As the model fell within the recommended fit statistics, the three-factor bifactor model was then submitted for configural testing (See Table 7). Fit statistics $\chi^2(456) = 808.984$ $p < .001$, (CFI = .993, TLI = .991, RMSEA = .062, [90% CI = .055, .069]) of the three-factor bifactor model suggested configural invariance was established. Factor loadings were then constrained to be equal across groups and submitted for metric invariance testing. Based on the fit statistics of the metric invariance model, the metric model did not differ significantly from the configural model, thus, supporting metric invariance. Then, factor loadings and thresholds were constrained across racial groups for scalar invariance testing, and change fit statistics revealed scalar invariance was supported. Overall, the more restrictive models did not differ from the less restrictive models (Δ CFI was $<.01$, and Δ RMSEA was $<.015$). Therefore, invariance at the scalar (strong) level was established.

Step 4: Internal Consistency

The Cronbach's alpha for the CSAS-24 is .928. Cronbach's alpha for the three subscales are .936, .903, and .882, for the Fear of Negative Evaluation, Fear/Avoidance of Social Interaction, and Taijin Kyofusho, respectively.

Step 5: MANCOVA

Box's M Test of Equality of Covariance Matrices was non-significant $F(6, 1903048.430) = 1.646, p = .130$. This suggested the variance-covariance matrices were the same across the two racial groups, therefore meeting the assumption of homogeneity. No multivariate outliers were detected.

MANCOVA was then performed to examine whether the combined social anxiety scores differ by race, after accounting for sex as a covariate. Results indicated there was a statistically significant difference between European American and Asians on social anxiety after controlling for sex, $F(3, 511) = 2.954, p < .05$; Wilk's $\Lambda = .983$, partial $\eta^2 = .017$. Separate univariate ANOVAs revealed Asians differed from European Americans in Fear/Avoidance of Social Anxiety $F(1) = 7, p < .01$, partial $\eta^2 = .013$. There were no differences in Taijin Kyofusho and Fear of Negative Evaluation between European Americans and Asians. A Bonferroni correction was applied, and all significance levels were set to .0167 to correct for Type I errors. Post hoc comparisons using the Bonferroni test revealed the mean score for Asians was significantly different from European Americans on Fear/Avoidance of Social Interaction symptoms ($p < .01$; See Table 8). In other words, Asians tend to score higher on the Fear/Avoidance of Social Interaction subscale compared to European Americans.

Step 6: Moderation Analysis

Interestingly, when a MANOVA is performed without accounting for sex, the effect of race on social anxiety becomes non-significant, $F(3, 513) = 2.366, p = .070$; Wilk's $\Lambda = .986$, partial $\eta^2 = .01$. Thus, sex was then examined as a potential moderator

Table 6

Confirmatory Factor Analysis Fit Statistics for the CSAS-24

Model	χ^2_M	df_M	p	CFI	TLI	RMSEA [90% CI]
1. 1F	4492.753	252	<.001	.911	.902	.205 [.200, .210]
2. Correlated 3F	47787.781	276	<.001	.987	.986	.077 [.072, .083]
3. 3F Bifactor	704.675	228	<.001	.990	.988	.072 [.066, .078]

Note. CSAS-24 = Combined Social Anxiety Scale 24 items; χ^2_M = chi-square; df_M = degrees of freedom; RMSEA = root-mean-square error of approximation; CI = confidence interval; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; F = Factor.

Figure 1

Three-Factor Bifactor Model of the 24-Item Scale



Table 7

Measurement Invariance of the 24-item 3F Bifactor Model

Model	n	χ^2	<i>df</i>	<i>p</i>	$\Delta \chi^2$	$\frac{\Delta}{df}$	<i>p</i>	CFI	Δ CFI	TLI	RMSEA [90% CI]	Δ RMSEA
1. 3F Bifactor	202	704.675	228	<.001				.990		.988	.072 [.066, .078]	
2. Asian	202	361.599	228	<.001				.994		.993	.054 [.043, .065]	
3. White	202	447.386	228	<.001				.992		.990	.069 [.060, .079]	
4. Configural	402	808.984	456	<.001				.993		.991	.062 [.055, .069]	
5. Metric	402	1013.354	500	<.001	69.112	44	<.01	.990	.003	.989	.072 [.065, .078]	0.10
6. Scalar	402	977.442	560	<.001	-43.363	60	<.05	.992	.002	.992	.061 [.055, .067]	0.11

Note. χ^2_M = chi-square; *df*_M = degrees of freedom; Δ = change; CI = confidence interval; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = root-mean-square error of approximation; the change in chi-square was calculated using the Satorra-Bentler chi-square difference test.

Table 8

Descriptive Statistics of Raw Scores and Adjusted Mean Scores

	European American (<i>n</i> =252)		Asian (<i>n</i> =265)	
	Raw M (SD)	Adjusted M	Raw M (SD)	Adjusted M
Social Anxiety (CSAS-24)	53.06 (17.43)	--	54.67(15.98)	--
Negative Evaluation Fear	23.21(8.46)	20.097	23.03 (8.10)	23.078
Social Interaction Fear/Avoidance	17.06 (5.86)	16.949	18.19 (5.74)	18.295
Taijin Kyofusho	12.81(6.89)	12.792	13.45 (6.96)	13.468

Note. M = Mean; SD = Standard Deviation; CSAS-24 = Combined Social Anxiety Scale 24 items, *n* = number of participants; Adjusted M = mean after adjusting for the effect of sex.

of the relationship between race and social anxiety. Regression analysis with moderation was conducted using PROCESS macro (Hayes, 2013). First, moderation analysis was used to examine whether sex moderates the relationship between race and social anxiety (CSAS-24). Then, moderation was used to examine whether sex moderates the relationship between race and the three facets of social anxiety (Fear of Negative Evaluation, Taijin Kyofusho, and Fear/Avoidance of Social Interaction). Bonferroni correction was applied, and all significance levels were set to .0125 to account for the multiple separate regression analysis.

Social Anxiety (CSAS-24). Results indicated sex was not a significant predictor of social anxiety after the Bonferroni correction ($p = .013$). Race was not a significant predictor of social anxiety. The interaction of sex and race on social anxiety scores was non-significant, suggesting sex was not a significant moderator of the relationship between race and social anxiety.

Fear of Negative Evaluation. Sex was not a significant predictor of Fear of Negative Evaluation after the Bonferroni correction ($p = .027$). Race was not a significant predictor of Fear of Negative Evaluation. The interaction between race and sex was non-significant.

Fear and Avoidance of Social Interaction. Race and sex accounted for a small amount of variance in Fear and Avoidance of Social Interaction [$R^2 = .056$, $F(3,509) = 9.9641$, $p < .001$]. Race had a small effect ($r = .126$) on the Fear/Avoidance of Social Interaction, $b = 1.742$, $SE = .598$, $t(509) = 2.914$, $p < .01$. Asians on average, scored 1.742 points higher on the Fear/Avoidance of Social Interaction subscale compared to European Americans. Sex had a small effect ($r = -.110$) on the Fear and Avoidance of

Social Interaction, $b = -2.145$, $SE = .843$, $t(509) = -2.545$, $p = .01$. Males on average, scored 2.145 points lower on the Fear and Avoidance of Social Interaction subscale compared to Female. The interaction between race and sex was non-significant, suggesting the combination of being an Asian and Female did increase the risk of endorsing higher symptoms of fear and avoidance of social anxiety.

Fear. Race and sex accounted for a small amount of variance in Fear of Social Interaction [$R^2 = .059$, $F(3,509) = 10.69$, $p < .01$]. Race had a small effect ($r = .119$) on the Fear of Social Interaction, $b = .875$, $SE = .317$, $t(509) = 2.76$, $p < .01$. Asians on average, scored 0.875 points higher than European Americans on Fear of Social Interaction symptoms. Sex had a small effect ($r = -.127$) on Social Interaction, $b = -1.318$, $SE = .447$, $t(509) = -2.951$, $p < .01$). Males on average, scored 1.3184 points lower than Females on the Fear of Social Interaction symptoms. The interaction between race and sex was non-significant.

Avoidance. Race and sex accounted for a small amount of variance in the Avoidance of Social Interaction [$R^2 = .043$, $F(3, 509) = 7.57$, $p < .01$]. Race had a small effect ($r = .121$) on the Avoidance of Social Interaction, $b = .867$, $SE = .311$, $t(509) = 2.79$, $p < .01$. Asians on average, scored 0.87 points higher than European Americans on avoidance of social interaction symptoms. The main effect of sex on Avoidance of Social Interaction was non-significant. The interaction of sex and race was non-significant.

Taijin Kyofusho. The main effect of sex and race on Taijin Kyofusho was non-significant. The interaction of sex and race was non-significant.

CHAPTER 5

DISCUSSION

Purpose of the Study

Assessment tools that produce reliable and valid scores are vital to clinicians and researchers for the identification, treatment, and outcome monitoring of patients with behavioral and mental health concerns, such as social anxiety. Having assessment tools that could be used across multiple racial groups may promote more equal access to treatment (Fisher & Kalbaugh, 2011; Miranda et al., 2005; Redwood & Gill, 2013; Sheikh, 2006; Zvolensky et al., 2017). Contrarily, SAD measures that lack measurement invariance may lead to inaccurate conclusions drawn about group differences (van de Vijver & Tanzer, 2004). In research, Asians are consistently reported to have the lowest prevalence rates of SAD relative to other cultural groups, but they are also more likely to report higher social anxiety symptoms compared to their White counterparts (Horng & Coles, 2014). As cultural differences and measurement issues could both be potential sources for the discrepancy, it is important to examine whether score differences between Asian and European Americans are due to measurement bias or genuine underlying differences in social anxiety across racial groups. Thus, the primary goal of this study was to examine whether the construct of social anxiety is presented differently across racial groups. The secondary goal was to determine whether Asians' underlying social anxiety levels are higher compared to European Americans when measurement bias (construct bias and item bias) is minimized.

Findings

Overall, findings supported a three-factor bifactor model (comprised of Fear/Avoidance of Social Interaction, Taijin Kyofusho, and Negative Evaluation Fear) of social anxiety. Based on this model, Asians exhibit slightly higher Fear/Avoidance of Social Interaction symptoms compared to European Americans, but the two racial groups do not differ in Taijin Kyofusho and Fear of Negative Evaluation scores. Specific findings are discussed hereinafter.

Findings for Hypothesis One

Hypothesis one stated the overall factor structure of the scales would correspond with the Cognitive Behavioral Models of social anxiety. Hypothesis one was supported. The CFA results supported multiple models of social anxiety, including the CBT model. Although the CBT model was not retained for invariance testing, the CBT model was theoretically meaningful and demonstrated good fit, thus providing support for the Cognitive Behavior Theory of social anxiety.

Findings suggest there are multiple ways of conceptualizing social anxiety, and one perspective is to explain social anxiety as being composed of cognitive, behavioral, and somatic symptoms. Cognitive Behavioral Theory posits that individuals holding dysfunctional thoughts (e.g., interpret social situations and themselves more negatively; Lucock & Salkovskis, 1988; Schlenker & Leary, 1982) may experience somatic symptoms (e.g., blushing, sweating, heart acceleration) during threatening social situations and engage in safety behaviors (e.g., avoidance) to reduce their anxiety (Beck et al., 1985; Clark & Wells, 1995; Musa & Lépine, 2000). Therefore, SAD scales generally focus on capturing these core components. While the cognitive, behavioral, and

somatic symptoms are important aspects of social anxiety, this study suggests affective symptoms (Fear of Negative Evaluation) and Taijin Kyofusho should also be considered. The present findings are consistent with previous studies, that the Fear of Negative Evaluation (Clark & Wells, 1995) and Taijin Kyofusho (the fear of making others uncomfortable; Kleinknecht et al., 1997) are different aspects of social anxiety. The three-factor bifactor model is also consistent with Cognitive-Behavioral Theory; fear of negative evaluation and fear of offending others may give rise to negative thoughts about oneself (cognitive), avoidance of social situations (behavioral), and increased somatic symptoms (e.g., rapid heartrate) during social situations. Therefore, it is important to consider Fear of Negative Evaluation and Taijin Kyfusho in combination with cognitive, behavioral, and somatic symptoms when assessing for SAD.

Findings for Hypothesis Two

Hypothesis two stated the hierarchical factor structure with two subfactors (Olivares et al., 2004) would account for most of the variance in the construct of SAD. Hypothesis two was somewhat supported. CFA findings supported multiple models of social anxiety, including Olivares et al.'s hierarchical two subfactors (i.e., cognitive, behavioral/somatic) model—although this model was not retained for invariance testing.

The Olivares et al.'s (2004) hierarchical two subfactor model is similar to the CBT model, proposing that cognitive, behavioral, and somatic symptoms as core features of social anxiety. The emphasis of Olivares et al.'s (2004) hierarchical two subfactors model is that the underlying construct of social anxiety is influencing the scores on the cognitive and behavioral/somatic subscales.

Findings of Hypothesis Three

Hypothesis three stated the factor structure of social anxiety will be the same across racial groups. Though African Americans were not included in the analysis due to the small sample size, invariance testing supported hypothesis three. MG-CFA findings supported the configural model, suggesting a similar factor structure of social anxiety across European American and Asian American groups. Thus, social anxiety (comprised of Fear/Avoidance of Social Interaction, Taijin Kyofusho, and Negative Evaluation Fear) is conceptualized similarly across both racial groups.

To reduce construct bias, this study used multiple SAD scales that may capture different facets of social anxiety and submitted them jointly for factor analysis and measurement equivalence testing. The resulting three-factor bifactor model of social anxiety implied Asians and European Americans have the same underlying construct of social anxiety (Social Interaction Fear/Avoidance, Taijin Kyofusho, and Negative Evaluation Fear). Furthermore, evidence of scalar invariance not only suggested that these three facets of social anxiety appear to be exhibited by both European Americans and Asian Americans, but scores of social anxiety can be compared across racial groups. Previous research indicated social anxiety levels may differ between Asians and European Americans (Horng, & Coles, 2014; Okazaki, 2000; Okazaki et al., 2000), while recent studies suggested social anxiety scales may contain measurement bias items that contributed to these differences, thus, rendering racial comparison challenging (Hambrick et al., 2010). This study identified that the construct of social anxiety could be similar across racial groups while revealing that Asians tend to endorse more Fear/Avoidance of Social Interaction symptoms compared to European Americans. These results open the

possibility that previous studies using social anxiety scales concentrating more on Fear/Avoidance of Social Interaction symptoms may yield greater overall anxiety score differences between racial groups, whereas studies that used scales with limited Fear/Avoidance of Social Interaction items may find the same level of social anxiety scores between races. Findings of this study do not refute evidence of measurement non-equivalence that contribute to score differences (Hambrick et al., 2010; Kubota et al., 2016), but suggest score differences between racial groups may at least partially be due to meaningful differences in the Fear/Avoidance of Social Interaction.

Findings of Hypothesis Four

Hypothesis four suggested Taijin Kyofusho items will comprise a meaningful factor for Asian participants. Hypothesis four was supported. CFA results suggest the inclusion of Taijin Kyofusho yields a better fit than comparison models (without Taijin Kyofusho), indicating the inclusion of Taijin Kyofusho items would be more appropriate when assessing social anxiety than without Taijin Kyofusho items when involving Asians. Because strong (i.e., scalar) invariance is supported, this implies individuals with the same underlying social anxiety score will have the same score on the SAD measures regardless of their racial group membership.

Findings of Hypothesis Five

Hypothesis five stated the SIAS, SPS, and TKS scales may be better at capturing the construct of SAD among Asians compared to the BFNE, SPIN, and LSAS-SR. Hypothesis five was not supported. While both study 1 and 2 supported a three-factor structure (Fear/Avoidance of Social Interaction, Taijin Kyofusho, and Fear of Negative Evaluation), study 2 revealed the three factors of social anxiety are comprised of the

LSAS-SR, TKS, and BFNE scales. This suggests LSAS-SR, TKS, and BFNE as individual scales each captured an aspect of the construct of SAD across Asians and European Americans.

However, no one existing scale captures all facets of the construct of social anxiety across cultures. For example, Harpole et al. (2015) found group differences among European Americans and African American participants on one item of the original BFNE scale, but the study's small sample size reduced the power to detect group differences among Asians. Previous research on the LSAS-SR also suggested non-equivalence across an Australian and Japanese sample (Kubota et al., 2016). Therefore, evidence of measurement non-equivalence across Asians and European Americans on the original LSAS-SR and the BFNE scales is scarce. As such, it is important for clinicians to use multiple measures when assessing social anxiety. If current findings are replicated, perhaps new SAD measures may be needed.

Additional Findings

Interestingly, the MANCOVA and regression results revealed Asians and European Americans do not differ in Taijin Kyofusho symptoms. It is possible that Asians and European Americans are equally likely to endorse Taijin Kyofusho, but it is underreported in Western countries because this form of social anxiety is not reflected in Western developed social anxiety scales and diagnostic interviews. Based on Japan's diagnostic classification system, Taijin Kyofusho consists of four sub-types: (1) phobia of blushing, (2) phobia of deformed face/body, (3) phobia of eye contact, and (4) phobia of one's own foul body odor (Iwata et al., 2011; Suzuki, Takei, Kawai, Minabe, & Mori, 2003). Two of the four subtypes of Taijin Kyofusho could be classified under other

DSM-IV criteria (Iwata et al., 2011; Suzuki et al., 2003). For example, phobia of a deformed face/body shares similar characteristics as Body Dysmorphic Disorder (a type of somatoform disorder) and phobia of one's own odor could be categorized as Olfactory Reference Syndrome (Iwata et al., 2011; Suzuki et al., 2003). Both Body Dysmorphic Disorder and Olfactory Reference Syndrome are reclassified under Obsessive-Compulsive and Related Disorder in the DSM-5. Only phobia of blushing is a symptom generally assessed by social anxiety scales (Iwata et al., 2011; Suzuki et al., 2003). Hence, Taijin Kyofusho subtypes may be reflected in other forms of psychopathology among Western populations rather than being a unique syndrome of East Asians. In other words, Asians and European Americans are equally likely to endorse certain subtypes of Taijin Kyofusho. However, these subtypes are classified under the diagnostic categories of Other Specified Obsessive-Compulsive and Related Disorder in the DSM-5 (APA; p. 264). Thus, these Taijin Kyofusho symptoms are not captured in social anxiety scales among European Americans.

However, it is noteworthy to mention acculturation was not assessed in this study. It is possible this sample may be more acculturated than international or new immigrant participants. Thus, although findings from this study suggest Taijin Kyofusho may not differ between Asians and European Americans, this may be confounded by the higher acculturation among the U.S. Asian sample. Thus, further research in the Taijin Kyofusho subtypes across cultural group is warranted.

Also, this study showed Asians reported slightly higher symptoms of fear and avoidance of social interaction. Although previous research investigating the variation of SAD among Australian, Swedish, and U.S. samples found no difference in the Fear of

Negative Evaluation and Fear of Social Interaction, Heimburg et al. (1997) revealed the differences lie in the type of feared social situation across racial groups. For example, Latino Americans are more likely to report observation fears (e.g., using a public restroom) relative to European Americans (as cited in Marques et al., 2011). Therefore, it is likely the type of feared social situation and/or interactions may vary among Asians and European Americans. That is, the different types of social interactions feared by the different racial groups may have contributed to their score differences. Only further study on the type of feared/avoided social interactions among European American and other racial minority group could answer this question more conclusively.

Implications

This study has important clinical implications. First, this study showed Taijin Kyofusho is an aspect of social anxiety identified in more than one cultural group (APA, 2013; Vriends, Pfaltz, Novianti, & Hadiyono, 2013), implying Taijin Kyofusho may not be an East Asian culture-related specific syndrome. Thus, it is important to replicate these findings in future research. If future studies also replicate the current finding, measures of social anxiety need to include Taijin Kyofusho. This may be a meaningful aspect of social anxiety that was first identified in Asians but is now also observed in other cultural groups. Moreover, if Taijin Kyofusho subtypes may be reflected in other forms of psychopathology other than social anxiety among Western cultural groups (Iwata et al., 2011; Suzuki et al., 2003), it is important to examine potential classification of Taijin Kyofusho subtypes in the DSM.

Second, this study identified a potential SAD scale that could assess social anxiety comparably across different cultural groups. Previous research indicated accurate

cross-cultural comparison has been difficult to achieve, in part, due to the unavailability of measurement invariant tools (Hambrick et al., 2010; Marques, Robinaugh, LeBlanc, & Hinton, 2011). Non-equivalent SAD tools could underestimate true scores and lead to the inability to identify individuals in need of treatment or overestimate scores and lead to valuable resources allocated to a less needed population (Hambrick et al., 2010).

Preliminary findings from this study suggested the CSAS-24 demonstrated evidence of reliability and structural validity scores among Asian and European Americans. Thus, the CSAS-24 appears to be a promising tool in the assessment of social anxiety. It is important for clinicians and researchers to have SAD assessment tools that could be used not only with European Americans but also among other cultural minority groups because social anxiety is a global issue affecting individuals across different cultural groups (Kessler et al., 2005). Having assessment tools that accurately assess and identify symptoms across different cultural groups is a pre-requisite, but necessary, step to reducing the mental health disparity (Ramirez et al., 2005).

Finally, this study expanded the construct of social anxiety and clarified whether cross-cultural differences of social anxiety are due to true underlying differences in social anxiety or presentation differences of the same underlying social anxiety disorder across racial groups (Marques et al., 2011). Findings supported a three-factor bifactor model (comprised of Fear/Avoidance of Social Interaction, Taijin Kyofusho, and Negative Evaluation Fear) of social anxiety among both racial groups and demonstrated Asians and European Americans are equally likely to endorse Taijin Kyofusho symptoms. This study demonstrated when measurement bias (i.e., construct and item bias) is minimized, score differences in the Fear/Avoidance of Social Interaction still exist. Hence, preliminary

findings supported genuine underlying differences of Fear/Avoidance of Social Interaction symptoms, rather than the differences in the presentation of social anxiety across cultures. This has important clinical and research implications. When genuine differences exist, this suggests there may be differences in the “risk factors for the development and maintenance of SAD” (Marques et al., 2011, p. 315).

Strengths

There are several strengths to this study. First, to my knowledge, this is the first study to examine the factor structure of social anxiety among a national sample of Asians by collectively submitting the SPIN, SIAS, SPS, LSAS-SR, BFNE, and TKS scales for EFA, CFA, and MGCFA. Kleinknecht et al. (1997) developed the TKS scale and were the first to examine the TKS scale along with other social anxiety scales. However, this study expanded to other commonly used social anxiety scales (SPIN, LSAS) and included a measure of negative evaluation (BFNE). By accounting for Taijin Kyofusho, a more representative model of social anxiety among Asian and European Americans appeared to encompass Negative Evaluation Fear, Taijin Kyofusho, and Fear/Avoidance of Social Interaction. Second, this study demonstrated Taijin Kyofusho may be equally likely to be present in the European American population. There is scarce research on Taijin Kyofusho among European Americans, but this study revealed Taijin Kyofusho may be a core component of SAD (even among European Americans). Thus, the three-factor bifactor model (with Taijin Kyofusho) may be a meaningful model for further research. Third, this study combined and shortened existing SAD scales using EFA and CFA, which are best practices approaches for scale development (Fabrigar et al., 1999). The development of the CSAS-24 may allow for the comparison of social anxiety scores

across Asian and European Americans. Finally, while previous measurement invariance studies involved primarily undergraduate students, participants in this study included a wide age of Asians living across the United States.

Limitations and Future Directions

Despite promising findings, this study is also subject to several limitations. The sample size limitation caused the scale to be truncated and required the examination of the three factor bifactor model into two parts (unidimensional and correlated three-factor). The sample size limitation also inhibited the examination of Asian subcultural groups. Thus, additional research should include larger sample size to reexamine the three-factor bifactor model and include a larger subcultural group of the Asian population to determine whether the response pattern among subcultural groups differs. One such example would be to explore whether TKS is only observed among Korean and Japanese, or would TKS be exhibited among other East Asians (e.g., Chinese) or South Asians? Second, this study examined social anxiety among a community sample, but future studies could investigate the difference between community and clinical samples. Third, this study may have included Asians that are more acculturated compared to an international sample. Hence, future study should examine whether acculturation may have confounded the scores on the Taijin Kyofusho subscale. Fourth, despite the benefits of self-report questionnaires, they are also more susceptible to bias (e.g., recall bias), social desirability, and demand characteristics. Therefore, future studies should include multiple forms of data collection such as diagnostic interviews. Fifth, this study included participants age 18 and older and did not examine the influence of age on social anxiety scores. Additional research to include younger participants and to examine how age may

affect social anxiety scores may be beneficial. Sixth, this study examined the measurement invariance of the social anxiety scales conjointly, but future research should continue to examine the measurement equivalence of the social anxiety scales separately. Seventh, as cut-off scores among the different scales could differ, future studies using Item-Response Theory (IRT) or non-IRT methods could “link” the scales to each other to identify whether the scales may have different cut-off scores that contribute to the discrepancy of symptom differences (Choi, Dvhhsly, Cook, & Cella, 2014). Finally, the CSAS-24 appears to be a promising short SAD scale, but more psychometric examinations are needed including the diagnostic accuracy of the CSAS-24, the measurement invariance of the CSAS-24 across time and gender, and correlation of the CSAS-24 with other SAD scales.

Conclusion

This study examined whether the construct of social anxiety was similar across racial groups and clarified whether cross-cultural differences in social anxiety are due to genuine differences in social anxiety. After examining six social anxiety scales, results supported the three-factor bifactor structure of social anxiety (Taijin Kyfusho, Fear of Negative Evaluation, and Fear/Avoidance of Social Interaction) and demonstrated scalar invariance across Asian and European Americans. This suggests there is no evidence of environmental factors (e.g., cultural norms) that may influence the participants to systematically rate items lower or higher on the social anxiety scales. Despite the same underlying construct of social anxiety, Asians still tend to endorse slightly more Fear/Avoidance of Social Interaction symptoms (but not Negative Evaluation Fear and Taijin Kyofusho symptoms) compared to European Americans. Previous research

regarded Taijin Kyofusho as a culture-related specific syndrome (Kleinknecht et al., 1997; Tarumi et al., 2004), but this study suggests Taijin Kyofusho is an aspect of social anxiety observed in more than one cultural group. However, future research should examine the influence of acculturation on the Taijin Kyofusho symptoms. Regardless, this study points to the need for clinicians and researchers to consider Taijin Kyofusho in the evaluation of social anxiety.

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