

A Systematic Review of the Psychometric Properties of Trait Cognitive Self-Report Measures in Social Anxiety

Jo-Elle Stein¹ · Matthew Modini¹ · Caroline Hunt¹ · Maree J. Abbott¹

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Abstract Cognitive factors, including beliefs, thoughts and assumptions have been found to play an important role in the development and maintenance of Social Anxiety Disorder. Trait cognitive self-report measures of social anxiety are widely used in research and clinical settings. It is imperative that only measures with good psychometric properties are used in order to interpret assessment scores accurately, and to make valid and reliable conclusions. The present systematic review evaluated the psychometric properties of trait cognitive self-report measures of social anxiety. Relevant studies were identified via a comprehensive and systematic search of academic databases. The reported psychometric properties of included studies were analysed by applying an appraisal of adequacy tool developed by Terwee et al. (2007). Of the 3091 studies identified, 50 studies met the inclusion criteria, and they included 21 measures. Included studies demonstrated that a number of measures had some adequate psychometric properties, however, no measure fulfilled criteria for all psychometric properties according to the appraisal tool. Findings highlight the need to further establish the psychometric properties of cognitive self-report measures of social anxiety in clinical and research settings through additional empirical studies.

Keywords Social anxiety · Social phobia · Systematic review · Psychometric · Measures · Questionnaires · Cognitive · Self-report

✉ Maree J. Abbott
maree.abbott@sydney.edu.au

¹ School of Psychology, The University of Sydney, M02F, 94 Mallett St, Camperdown, NSW 2050, Australia

Social Anxiety Disorder is characterised by anxiety about social or performance situations, and involves a fear of being embarrassed or negatively evaluated when under scrutiny by others (American Psychiatric Association 2013). Epidemiological research has demonstrated that social anxiety is a common disorder, characterised by early onset (Kessler et al. 2005), comorbid psychopathology (Beesdo et al. 2007), and functional impairment (Stein and Kean 2000; Wittchen and Fehm 1999).

Cognitive models of social anxiety identify a number of underlying beliefs, assumptions, and unhelpful thinking patterns hypothesised to contribute to the development and maintenance of anxiety before, during and after social or performance situations (Clark and Wells 1995; Hofmann 2007; Rapee and Heimberg 1997). The cognitive model assumes that individuals with social anxiety tend to interpret social situations as dangerous, due to dysfunctional beliefs and assumptions that they hold about themselves and others (Clark and Wells 1995; Hofmann 2007). According to Clark and Wells (1995), individuals focus on the somatic and behavioural symptoms of anxiety in social situations and these symptoms become further sources of perceived danger and contribute to the maintenance of dysfunctional cognitions held by the individual. For example, noticing symptoms of blushing or tremor are interpreted as evidence that one looks foolish to others, and will be evaluated as such. Similarly, Rapee and Heimberg (1997) argue that attention during social situations focuses on internal sensations and non-overtly positive external information, such as neutral facial expressions, which are interpreted negatively. Individuals become preoccupied with these internal sensations and negative thoughts, which further maintain symptoms of anxiety. In addition, individuals assume that their view of themselves reflects how others see them (Clark and Wells 1995). Consequently, a processing bias is established, such that negative beliefs about

how one appears to others develops from self-perceptions, rather than from objective feedback. As a result, negative cognitions and anxious symptoms are further reinforced.

Clark and Wells (1995) established three categories of dysfunctional beliefs, which they proposed to be held by individuals with social anxiety. First, they argue that socially anxious individuals hold excessively high standards for their social performance. These standards lead to unhelpful thinking patterns, as individuals set standards too high to possibly achieve, resulting in concern over failure. Similarly, Rapee and Heimberg (1997) describe the discrepancy between the high standards held for social performance and an individual's belief that they are not able to attain such standards as problematic in social anxiety. Second, individuals with social anxiety have conditional beliefs concerning social evaluation. For example, they are hypothesised to assume that if someone does not like them, they are inherently flawed in some way. Finally, unconditional beliefs about the self are held as a consequence of negative beliefs about their own worth. These unconditional beliefs involve 'I am' statements, such as 'I am unworthy' or 'I am boring'. Clark and Wells (1995) suggest that these three categories of dysfunctional beliefs maintain anxiety and associated avoidance and safety strategy use.

Anticipatory processing is also evident in individuals with social anxiety, with thoughts prior to a socially threatening situation revolving around recollections of past perceived social failures, negative predictions about future social performance and the perceived consequences of such failure (Hofmann 2007). The anticipation of failure in future social situations results in increased negative perceptions of self, symptoms of anxiety and poorer performance in social settings (Clark and Wells 1995; Rapee and Heimberg 1997). As a consequence of negative self focused attention, individuals encode more threatening cues in social situations, thereby leading to anxious symptomatology and behaviours, such as avoidance, which further reinforce their negative view of self. In support of this theory, research has found that individuals who completed a modified dot-probe task and engaged in anticipatory processing were found to turn their attention inward toward physiological symptoms, which were perceived as threatening (Mills et al. 2014). Similarly, Hinrichsen and Clark (2003) found that participants high in social anxiety were more likely to engage in anticipatory anxiety and that these processes led to heightened levels of anxiety during a speech task, compared to controls. Moreover, compared to distraction, anticipatory processing in socially anxious individuals has been associated with greater levels of self-reported anxiety, increased skin conductance, stronger conditional and high standard beliefs and a greater negative self-image (Vassilopoulos, 2005; Wong and Moulds 2011). These results distinguish the mental processes socially anxious individuals engage in compared to controls, and suggest that these processes maintain anticipatory processing in future social situations.

Similarly, following a social situation, individuals engage in post-event processing where they ruminate about their perceived failure and focus on negative images of themselves (Clark and Wells 1995). Post-event rumination has been found to maintain state social anxiety following a speech task in both clinical (Abbott and Rapee 2004) and student populations (Wong and Moulds 2009). Socially anxious individuals have been found to engage in more post-event processing than controls and recalled more negative information about the event and oneself (Mellings and Alden 2000; Rachman et al. 2000). Furthermore, high socially anxious individuals tend to engage in greater negative rumination as a maladaptive coping response to negative social events compared to low socially anxious individuals (Kocovski et al. 2005). Consistent with these findings, studies have reported that socially anxious individuals engage in greater rumination and recall more negative information about oneself the day after a social event (Mellings and Alden 2000; Dannahy and Stopa 2007) and in the week following a speech task (Abbott and Rapee 2004; Penney and Abbott 2015; Perini et al. 2006). This tendency to engage in negative post-event rumination maintains individuals' negative mental representation as a social being and leads to negative predictions about future social situations (Brozovich and Heimberg 2008), essentially maintaining the vicious cycle of SAD.

Experimental paradigms have been used to demonstrate the association between social anxiety and cognitive biases. Stopa and Clark (2000) found that individuals with social anxiety were more likely than controls to make negative assumptions and interpretations of ambiguous social events. These individuals engaged in dysfunctional thinking by developing catastrophic consequences for these events. Mellings and Alden (2000) found that highly socially anxious individuals overestimated the visibility of anxious behaviours during a conversation with a confederate, compared to objective ratings by an independent assessor. Cognitive biases are further evident in an experiment conducted by Rapee and Lim (1992), where the discrepancy between socially anxious participants' ratings of their performance during a public speaking task, compared to observer ratings, were significantly greater for socially anxious participants, than controls. Studies have also demonstrated self-focused attention in socially anxious participants when giving a speech, as individuals directed their attention away from an external cue toward internal cues. Tanner et al. (2006) report that individuals with social anxiety had a greater number of negative thoughts about giving a speech compared to controls. Moreover, participants with social anxiety have been found to make negative appraisals immediately after a speech task, and maintain these appraisals by engaging in negative rumination a week later (Abbott and Rapee 2004). In addition, negative biases in attention and cognition have been shown across a range of tasks such as the emotional stroop test and tasks involving detection of

angry faces versus neutral or happy faces (Becker et al. 2001; Gilboa-Schechtman et al. 1999; Mogg et al. 2004). It is therefore evident that individuals with social anxiety have greater cognitive biases than controls.

Self-report measures of dysfunctional thinking styles in socially anxious individuals compliment experimental research aimed at assessing such biases. Assessment of cognitive factors in research and clinical settings may establish a deeper understanding of the important role that beliefs, assumptions and unhelpful thinking styles play in maintaining anxious symptomatology. It is vital that only measures with good psychometric properties are used in order to interpret assessment scores accurately, and to make valid and reliable conclusions.

Over the past decade there has been an increase in the development and evaluation of trait self-report measures aimed at assessing the beliefs and thinking styles associated with social anxiety, including perceived standards, rumination, and conditional and unconditional beliefs about oneself and others. While the psychometric properties of self-report measures of trait social anxiety have been previously analysed and evaluated (Modini et al. 2015), research to date has yet to systematically assess the psychometric properties of cognitive trait self-report measures in the domain of social anxiety. Consequently, the primary aim of this systematic review is to comprehensively identify trait cognitive self-report measures, collate and evaluate the findings of identified studies that have investigated the psychometric properties of these measures, and finally to make recommendations regarding the utility of the identified measures.

The psychometric properties of cognitive trait self-report measures of social anxiety will be evaluated using a standardised and published tool developed by Terwee et al. (2007). This is an appraisal of adequacy tool which rates the psychometric properties of measures using nine quality criteria including content validity, internal consistency, criterion validity, construct validity, reproducibility (agreement), reproducibility (reliability), responsiveness, floor or ceiling effects, and interpretability. Terwee et al. (2007) refined previous criteria available for health status questionnaires (e.g., the Scientific Advisory Committee), in order for the reader to understand what constitutes good measurement properties. While this tool may appear overly stringent, it is vital that clear criteria are evaluated in order to select a high quality questionnaire for a specific purpose. In addition, the tool has been widely and effectively used in the social anxiety literature (Modini et al. 2015) and various other domains (Burton et al. 2015; Furlan et al. 2011; Kaur et al. 2016). The aim of this paper is to evaluate trait cognitive factors of social anxiety and compare and assess the qualities of a range of cognitive measures available in order to aid researchers and clinicians in selecting measures that are interpretable and psychometrically sound.

Method

Search Strategy

The search strategy followed guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al. 2009). Electronic databases including PsycINFO, MEDLINE and EMBASE were searched. A range of keywords relating to social anxiety, measurement, and psychometric terms including “Validation Studies” and “Factor Analysis” were used. The search strategies created for the three databases are available on request to the authors. The final search was conducted for all databases on 22/12/2015. In addition, the reference lists of all included studies were scanned to identify any additional relevant publications.

Inclusion and Exclusion Criteria

The criteria used for inclusion and exclusion was as follows:

- a) The measure had to be specifically developed in relation to cognitions, that is, beliefs, expectations, assumptions and thoughts related to social anxiety (excluding public speaking, state or trait-bases measures of social anxiety)
- b) Describe the development, validation and/or the psychometric investigation of a self-report cognitive measure of social anxiety (excluding non-psychometric studies such as a literature review or meta-analysis)
- c) Utilise an adult population (clinical or general) for development and validation purposes (excluding child and adolescent studies); and be
- d) Published in the English language (excluding non-English speaking publications) and in a peer-reviewed journal (excluding book chapters, non-peer reviewed publications and doctoral theses).

Selection Process

The selection process involved two independent reviewers (JS and MA) identifying ineligible papers by screening titles and abstracts against the inclusion and exclusion criteria, and identifying any duplicates. Of the remaining papers, the full text was obtained and analysed independently by the same two reviewers. Any discrepancies on the inclusion of papers at either stage were to be resolved by a discussion between the two reviewers. The agreement between the two reviewers was 93 %, which equates to an inter-rater agreement, $\kappa = .84$.

Appraisal of Quality

The psychometric properties of included studies were analysed by applying the criteria of adequacy for measurement

properties according to Terwee et al. (2007). This appraisal tool was developed to determine the methodological quality of studies (Terwee et al. 2007). The tool refines available quality criteria for studies on the development and evaluation of health status questionnaires, and has been successfully used in previous systematic reviews (Burton et al. 2015; Modini et al. 2015).

The quality appraisal tool used in the present study assesses nine measurement properties that include: (1) content validity, (2) internal consistency, (3) criterion validity, (4) construct validity, (5) reproducibility: agreement, (6) reproducibility: reliability, (7) responsiveness, (8) floor and ceiling effects, and (9) interpretability. Table 1 outlines the definition and adequacy criteria for each measurement property, which were rated for each measure as ‘+’ for being evaluated as good, ‘?’ for being intermediately evaluated, ‘-’ for being evaluated as poor and ‘0’ was assigned if no information on that criterion was identified. The criteria for internal consistency was modified so that studies could use the results of past factor analyses, rather than complete a new factor analysis, or alternatively use item response theory (IRT) analyses, when calculating Cronbach alphas. Terwee et al. (2007) indicate that all measurement properties are equally important, and as such, we followed the recommendation not to provide a summary or overall score.

The appraisal tool emphasises the importance of reviewing the methodological quality of a paper when assigning quality criteria ratings. If a doubtful design or method is present, for example if there is no clear description of the study design, then this paper should be given an intermediate rating (‘?’) when assigning quality criteria. This is important to take into account when assigning ratings, as it is more likely that papers with low methodological quality will report biased results.

Results

Results of Search Strategy

The initial search identified 3091 potential studies. There were 1289 duplicates, resulting in 1802 studies. Of these, 40 met the inclusion criteria. Ten additional studies were included after cross checking reference lists for articles of interest. Consequently, there were a total of 50 studies that were included in this systematic review. The selection process is summarised in Fig. 1 and studies included in this review are described in Table 3. The results of a Factor Analysis or IRT analysis carried out by the included studies are reported in Tables 2 and 3. Twenty-one measures of cognitive factors were identified. The measures covered three broad categories of cognitive constructs, including anticipatory and post-event (ASBQ, PCQ, PEP, PEP-Revised, PEPQ-R, PEP-extended,

Subjective Probability (Social) Scale), threat appraisals (ASC, BFNE, FNE, FPES), and beliefs about the self or others in a social context (CONSE-Q, DPSOS, IPSM, IEQ, NSPS, SAT, SISST, SBSA, SSPS, STABS).

Assessment of Psychometric Properties

Each study was assessed for its psychometric properties in line with the criteria set out by Terwee et al. (2007). This assessment was conducted by two reviewers independently (JS and AB), with agreement in regard to criteria of adequacy being 97 %, which equates to an inter-rater agreement, $\kappa = 0.95$. Disagreements were discussed between the two raters and consensus was reached, hence, a third rater was deemed unnecessary. Each included study was rated on all nine criteria and their individual ratings are available on request to the authors. Summary ratings of all measures are displayed in Table 4.

Content Validity Content validity refers to how accurately the construct of interest is reflected by the items in the measure. This is essential to ensure the questions are relevant to the construct (Terwee et al. 2007). Two studies presented evidence that the items were formulated after a literature study, a clear description was provided of the measurement aim and that the target population and experts were involved in item selection. These studies indicated that the SISST and the STABS possess adequate content validity.

Internal Consistency Internal consistency refers to the extent to which items in a measure are correlated. This is essential to ensure that they are measuring the same concept (Terwee et al. 2007). Twenty-seven studies demonstrated internal consistency. These studies applied factor analysis to determine whether the items formed one or more overall scale, with a Cronbach’s alpha between 0.70 and 0.95. These twenty-seven studies indicated that the ASBQ, ASC, BFNE, CONSE-Q, DPSOS, FNE, FPES, IPSM, PEPQ, PEPQ-R, PEPQ-Revised, PEPQ-Extended, SAT, SISST, SBSA and STABS all possess adequate internal consistency. The NSPS reported a Cronbach’s alpha outside of the satisfactory margin and was therefore given a ‘poor’ rating.

Criterion Validity Criterion validity refers to the extent to which scores on a measure relate to a gold standard. This ensures that the new measure is theoretically related to a well established measure (Terwee et al. 2007). There is no ‘gold’ standard cognitive social anxiety self-report measure with which to compare other measures. However, when an altered version of a measure is created, the original version can be said to be the gold standard and used as such for comparison

Table 1 Criteria of adequacy of psychometric properties (Terwee et al. 2007)

Property	Definition	Criteria of adequacy ^{a, b}
1. Content validity	The degree to which the content of an instrument is an adequate reflection of the construct to be measured	(+) Items were formulated after a literature study AND a clear description is provided of the measurement aim, the target population, the concepts that are being measured, and the item selection AND target population and experts were involved in item selection; (?) A clear description of above-mentioned aspects is lacking OR only target population involved OR doubtful design or method; (-) No target population involvement; (0) No information found on target population and experts involvement.
2. Internal Consistency	The degree which items are intercorrelated, thus measuring the same construct.	(+) Factor analyses (or IRT) performed (or results of past ones taken into consideration) an adequate sample size (7 times the number of items) AND Cronbach's alpha(s) between 0.70 and 0.95 for each scale (?) Cronbach's alpha(s) presented without factor analysis considered OR doubtful design or method; (-) Cronbach's alpha(s) <0.70 or > 0.95; (0) No information found on internal consistency.
3. Criterion Validity	The degree to which the scores of an instrument are an adequate reflection of a 'gold standard'	(+) Convincing arguments that gold standard is "gold" AND correlation with gold standard ≥ 0.70 ; (?) ≥ 0.70 correlation presented without convincing arguments that gold standard is "gold" OR doubtful design or method; (-) Correlation with gold standard <0.70; (0) No information found on criterion validity.
4. Construct Validity	The degree to which scores on a particular questionnaire relate to other measures in a manner that is consistent with theoretically derived hypotheses concerning the concepts that are being measures.	(+) Explicitly tested for AND at least 75% of the results are in expected direction and size; (?) Doubtful design or method (e.g., not explicitly tested); (-) Less than 75% of results as expected; (0) No information found on construct validity.
5. Reproducibility		
5.1. Agreement	The extent to which the scores on repeated measures are close to each other (absolute measurement error)	(+) SDC OR LOA < MIC OR convincing arguments that agreement is acceptable; (?) MIC not defined AND no convincing arguments that agreement is acceptable OR doubtful design or method (-) SDC > MIC OR MIC equals or inside LOA; (0) No information found on agreement.
5.2. Reliability	The extent to which patients can be distinguished from each other, despite measurement errors (relative measurement error)	(+) ICC or weighted Kappa > 0.70; (?) Doubtful design or method (e.g., time interval not mentioned or less valid measure than a Kappa used); (-) ICC or weighted Kappa < 0.70; (0) No information found on reliability.
6. Responsiveness	The ability of an instrument to detect clinically important changes over time in the construct to be measured	(+) Treatment program outlined and longitudinal expected changes presented AND/OR >75% of results are as expected OR SDC < MIC OR MIC outside the LOA OR RR > 1.96 OR AUC > 0.70; (?) Doubtful design or method; (-) SDC or SDC > MIC OR MIC equals or inside LOA OR RR < 1.96 OR AUC < 0.70; (0) No information found on responsiveness.
7. Floor and Ceiling Effects	The number of respondents who achieved the lowest or highest possible score	(+) <15% of the respondents achieved the highest or lowest possible scores; (?) Doubtful design or method; (-) >15% of the respondents achieved the highest or lowest possible scores, (0) No information found on interpretation.

Table 1 (continued)

Property	Definition	Criteria of adequacy ^{a, b}
8. Interpretability	Degree to which one can assign qualitative meaning to an instrument's quantitative scores or change in scores.	(+) Mean and SD scores presented for at least four relevant subgroups of patients and MIC defined; (?) Doubtful design or method (e.g. data provided on less than four subgroups or no MIC defined); (0) No information found on interpretation.

IRT Item Response Theory, *MIC* minimal important change, *SDC* smallest detectable change, *LOA* limits of agreement, *ICC* intraclass correlation, *AUC* area under the receiver operating characteristics curve, *RR* responsiveness ratio, *SD* standard deviation

^a + = positive rating; ? = indeterminate rating; - = negative rating; 0 = no information available

^b doubtful design or method = lacking of a clear description of the design or methods of the study, sample size smaller than 50 subjects (should be at least 50 in every (subgroup) analysis), or any important methodological weakness in the design or execution of the study

purposes (Mokkink et al. 2010). One study demonstrated that an altered version is highly correlated with the original version, concluding that the BFNE possessed adequate criterion validity.

Construct Validity Construct validity refers to the extent to which scores on a measure relate to others measures and are in correspondence with theoretically derived hypotheses related to the construct of interest (Terwee et al. 2007). Twenty-eight studies described evidence of construct validity. These studies indicate that the ASBQ, ASC, BFNE, CONSE-Q, DPSOS, FNE, FPES, IPSM, NSPS, PEPQ, PEPQ-R, PEPQ-Revised, PEPQ-Extended, SAT, SISST, SBSA, STABS and SUBJECTIVE PROBABILITY (SOCIAL) SCALE all possess construct validity.

Reproducibility – Agreement Agreement refers to the extent to which results on a measure remain stable over time. This ensures consistency of results (Terwee et al. 2007). Eleven studies assessed agreement, however, most reported a Pearson Correlation to demonstrate the relationship between repeated administrations of a measure. Terwee et al. (2007) consider this an inadequate method, on its own. In order to receive a positive rating according to Terwee et al. (2007), the absolute measurement error should be smaller than the minimal amount of change, hence the tool requires that the minimal important change factor (MIC) needs to be defined. However, no study defined the MIC or took systematic differences into account.

Reproducibility – Reliability Reliability refers to the extent to which patients can be distinguished from each other. For example, in order to discriminate between high or low socially anxious participants (Terwee et al. 2007). Three studies provided an *intraclass correlation coefficient* (*ICC*). These study indicated that the FPES, SISST, and STABS possess adequate reliability.

Responsiveness Responsiveness refers to the degree to which a measure is able to detect clinically important changes over time (Terwee et al. 2007). This is essential for example in clinical settings, in order to examine whether socially anxious symptoms are improving during or after therapy. Twelve studies were found to be responsive, demonstrating that scores on these measures decreased significantly following treatment. The intervention in the majority of studies was cognitive behavioural therapy. Results of these studies indicated that the ASC, BFNE, CONSE-Q, FPES, IPSM, NSPS, SISST, SPSP and STABS possess responsiveness.

Floor and Ceiling Effects Floor and ceiling effects occur if more than 15 % of respondents receive the lowest or highest

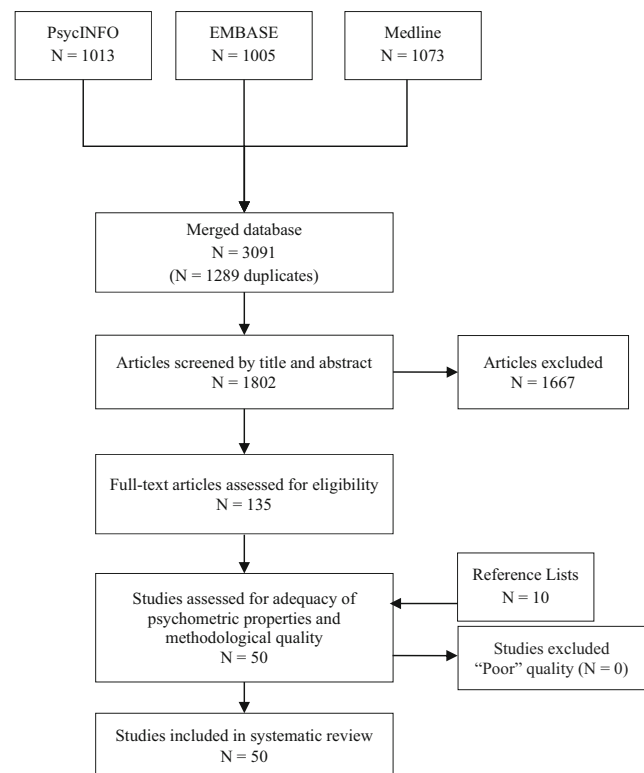
**Fig. 1** Flow diagram of study selection

Table 2 Included Study Descriptions

Questionnaire	Original Study (Y/N)	Factor Analysis or IRT	Study population #	Age (Mean)	Sex ratio (% female)
ASBQ					
Hirrichsen and Clark (2003)	Y		20 high and 20 low socially anxious undergraduate students	27.05; 26.65	55.0; 55.0
Study 1					
Study 2			20 high and 20 low socially anxious undergraduate students	22.85; 26.40	70.0; 40.0
Mills et al. (2013)	N	EFA indicated a two-factor model; preparation of social interactions and avoidance of social situations	861 undergraduate students	19.54	64.3
Study 1					
Study 2		CFA indicated a two-factor model; preparation and avoidance	485 undergraduate students	20.0	67.8
Study 3			59 high-socially anxious undergraduate students	19.18	75.0
ASC			204 participants with SAD	33.32	41.3
Schultz et al. (2006)	N	EFA of the ASC indicated a two-factor model; concerns with negative evaluation and rejection and concerns with physical Symptoms	550 undergraduate students and 86 participants with SAD	19.42; 35.94	-
Telch et al. (2004)	Y	EFA of the ASC indicated a three-factor model; negative evaluation, observable symptoms and social helplessness			
BFNE					
Carleton et al. (2007)	N	CFA indicated that using 8 of the 12-straight worded items (proposed by Carleton et al. (2006)) produced the most replicable factor structure. Labelled BFNE-II.	322 participants (83 = undergraduate students completed scale with paper and pencil, 239 = undergraduate students completed scale online).	22.9; 20.6	67; 79.1
Carleton et al. (2011)	N	CFA indicated that 8 item revisions, BFNE-S and BFNE-II, were superior to the 12 item BFNE-R. Recommends use of the 8-item variant that includes only the original straightforwardly worded items from the BFNE, the BFNE-S.	381 participants from an outpatient anxiety treatment centre	35.8	60.1
Carleton et al. (2006)	N	CFA supported findings by Rodebaugh et al. (2004) and Weeks and Heimberg (2005). However, CFA of the original 12 items with reversed-scored items transformed to be straightforwardly worded, resulted in an acceptable unitary model that conforms to the theoretical basis for the BFNE, without risking loss of sensitivity from item removal. Labelled the BFNE-R.	904 undergraduate students.	-	-
Collins et al. (2005)	N	CFA indicated one factor; negative evaluation	181 participants (SAD = 82, Panic Disorder = 99).	64.4	38
Duke et al. (2006)	N	CFA indicated a two factor solutions; positive and negative scored items.	355 community participants.	44	57.7
Leary (1983)	Y		350 undergraduate students	-	-
Rodebaugh et al. (2004)	N	CFA indicated a two factor solutions for FNE and BFNE; positive and negative scored items. Recommends usage of the 8 straightforwardly-worded BFNE items. Labelled the BFNE-S	915 undergraduate students (SAD = 60).	-	-
Rodebaugh et al. (2011)			289 older participants from the community; 200 middle aged participants from the community; 150 participants from an anxiety clinic; 708 students from university one; 3574 students from university two.	75.46; 41.22; 32.80; 19.16; 19.09	68; 75 40.4; 68; 67

Table 2 (continued)

Questionnaire	Original Study (Y/N)	Factor Analysis or IRT	Study population #	Age (Mean)	Sex ratio (% female)
Weeks and Heimberg (2005)	N	Two factor value (positive and negative scored items). In line with Rodebaugh et al. (2004a, b) recommendation of the BFNE-S.	197 participants (SAD = 165, non-anxious controls = 32).	32.9; 33.1	41.2; 43.8
Woods and Rodebaugh (2005)	N	WLSMV indicated a 1-factor model; negative evaluation	292 undergraduate students	22.4	77.7
Wilson and Rapee (2005a)	Y	EFA indicated a three factor solution; belief that other would perceive one in a negative manner, belief that event was an indication of negative self characteristics, belief that event would have adverse long-term consequences	128 participants (56 participants with SAD without mood disorder, 40 participants with SAD with mood disorder, 32 controls)	37.0; 34.3; 33.8	48.2; 52.5; 68.7
Wilson and Rapee (2005b)			36 clinical participants with SAD	36.0	50.0
DPSOS					
Weeks (2010)	Y	Confirmatory structural model indicated a two-factor model; other oriented attributions and self-oriented attributions	585 undergraduate students	19.6	67.5
Study 1			28 undergraduate students (SAD = 14, non-anxious controls = 14)	19.11	64.3
Study 2					
FNE					
Oei et al. (1991)	N	Factor analysis indicated a two factor model; SAD subscale loaded on the avoidant behaviour and distress factor of social anxiety and the FNE loaded on the fear of negative evaluation factor of social anxiety	265 participants who had been referred for anxiety	38.2	70
Rodebaugh et al. (2012)	N		77 undergraduate students	20.32	75
Stopa and Clark (2001)	N		535 participants	21.06 (M); 21.98 (F)	57.2
Turner et al. (1987)	N		206 outpatients with an anxiety disorder.	-	-
Watson and Friend (1969)	Y		297 undergraduate students.	-	-
Woods and Rodebaugh (2005)	N	WLSMV adjusted indicated a 1-factor model; negative evaluation	-	-	-
FPES					
Weeks et al. (2008)	Y	Confirmatory structural model indicated a single latent factor; positive evaluation	1711 undergraduate students	19.18	72
Weeks et al. (2012)	N	CFA indicated a single factor; positive evaluation	226 participants with SAD; 42 non-anxious control participants	32.12; 32.93	47.8; 52.4
Rodebaugh et al. (2012)	N	CFA indicated a single-factor model; positive evaluation	77 undergraduate students	20.32	75
IEQ					
Wilson and Rapee (2005c)	Y		60 participants (35 participants with SAD; 25 controls)	32.3; 35.2	51.4; 64.0
IPSM					
Boyce and Parker (1989)		PCA indicated a five-factor solution; interpersonal awareness, need for approval, separation anxiety, timidity and fragile inner-self	Participants included a non-psychiatric group of general practice attenders; 81 nursing and social work students; 30 medical students; 122 outpatients for mood disorders.	40.4; 25.6; 23.0; 44.4	66; 85; 43; 69
Harb et al. (2002)	N	EFA indicated a three-factor solution; interpersonal worry and dependency, low self-esteem and unassertive interpersonal behaviour	201 participants with SAD; 34 community control group	33.38; 32.86	41.7; 47.1
NSPS					
Moscovitch and Huyder (2011)	Y			19.9; 20.6	72.9; 68.3

Table 2 (continued)

Questionnaire	Original Study (Y/N)	Factor Analysis or IRT	Study population #	Age (Mean)	Sex ratio (% female)
		EFA indicated a three-factor solution for group one; concerns about social competence, concerns about physical appearance, concerns about showing signs of anxiety. CFA indicated a 3-factor model for group 2; social competence, physical appearance and signs of anxiety.	Two groups of undergraduate participants ($n = 225$; $n = 316$)		
Moscovitch et al. (2015)	N	CFA indicated a three-factor model reflecting concerns about: social competence, signs of anxiety and physical appearance	194 participants (62 with SAD, 51 with an anxiety disorder other than SAD and 81 healthy controls).		54-71
PCQ					
Foa et al. (1996)	Y		30 participants (15 participants with SAD; 15 community members)	37.9; 30.7	66.7; 66.7
PEPQ					
Rachman et al. (2000)	Y	A PCA indicated a one factor model; post event processing	130 undergraduate students	19.8	73
PEPQ-R					
McEvoy and Kingsep (2006)	N	EFA indicated a one-factor model; post event processing	117 participants with SAD	35.23	44.4
PEPQ-Revised					
Kocovski and Rector (2007)	N	PCA indicated a single factor solution; post event processing	439 undergraduate students	20.61	76.10
PEPQ-Extended					
Wong (2015)	N	EFA indicated a 2-factor model; factor one reflected cognitive interference while factor two reflected negative aspects of the self and strategies to manage these negative aspects. CFA indicated a superior 3-factor model; cognitive interference, a negative self, and thoughts about the past.	560 undergraduate students	21.91	79.8
SAT					
Hartman (1984)	Y	PCA indicated a 4-factor model; thoughts of general psychological discomfort and social inadequacy, concern with others, awareness of distress, fear of negative evaluation, and perceptions of autonomic arousal and performance anxiety.	102 undergraduate and graduate students	21.6	72.5
SBSA					
Wong and Moulds 2009	Y		93 undergraduate students	20.55	60.2
Wong and Moulds (2011)	N	CFA indicated a 3-factor model; high standard beliefs, unconditional beliefs and conditional beliefs	600 undergraduate students	20.52	61.5
Wong et al. (2014)	N	CFA indicated a 3-factor model; high standard beliefs, unconditional beliefs and conditional beliefs	235 undergraduate students; 33 individuals with SAD	23.84; 22.73	79.1; 60.6
SISST					
Dodge et al. (1988)	N		28 participants with SAD	27.83	46.4
Glass and Furlong (1990)	N		101 participants with SAD	33	52.4
Glass et al. (1982)	Y	PCA on both samples ($N = 144$) indicated a 4-factor model; self-depreciation, positive anticipation, fear of negative evaluation and coping	80 undergraduate women (40 high and 40 low socially anxious); 64 undergraduate students.	-	100; 50
Heinrichs and Hofmann (2005)	N		58 participants with SAD	34.7	36

Table 2 (continued)

Questionnaire	Original Study (Y/N)	Factor Analysis or IRT	Study population #	Age (Mean)	Sex ratio (% female)
Osman et al. (1992)	N	Exploratory PCA indicated a two-factor model; negative self-statements and positive self-statements	321 undergraduate students	21.2	70.4
SSPS					
Heinrichs and Hofmann (2005)			58 participants with SAD	34.7	36
STABS					
Fergus et al. (2009)	N	CFA indicated a 2-factor model; social comparison and social ineptness	492 undergraduate students	18.9	44.5
Gros and Wong Sarver (2014)	N	CFA indicated a 2-factor model; social comparison and social ineptness	428 participants (206 with SAD, 222 healthy controls)	38.7	52.1
Study 1			106 participants with SAD	36.2	51.5
Study 2			300 participants (84 with SAD, 126 with other anxiety disorders, 90 healthy controls)	35.1	50.2
Turner et al. (2003)	Y	EFA indicated a 2-factor model; social comparison and social ineptness			
SUBJECTIVE PROBABILITY (SOCIAL) SCALE					
Lucock and Salkovskis (1988)	Y		24 participants (12 with SAD, 12 controls)	22.17; 20.5	58.3

Please note due to social anxiety being defined as Social Anxiety Disorder (SAD) in DSM-V, if participants were given a diagnosis of Social Phobia from a previous DSM, their diagnosis was labelled as SAD in this table for continuity purposes

CFA confirmatory factor analysis, EFA exploratory factor analysis, PCA principal components analysis, IRT Item Response Theory, WLSMV Weighted least squares mean and variance, SAD Social Anxiety Disorder, GAD Generalised Anxiety Disorder

Table 3 Description of Questionnaires

Questionnaire	Construct	Number of Items	Response categories
Anticipatory Social Behaviours Questionnaire (ASBQ)	Assesses cognitive strategies individuals' use before a social event, including coping strategies such as avoidance, rehearsal strategies, and thinking about previous social situations. E.g. "I rehearse conversations in my mind"	12	1 (never) to 4 (always)
The Appraisal of Social Concerns (ASC)	Assesses individuals' worries about potentially negative consequences occurring in social situations. Respondents' have to rate the degree to which they would be concerned about a particular outcome occurring in a social situations, E.g. "Trembling", "Appearing Stupid" and "Sweating"	20	0 (not at all concerned) to 100 (extremely concerned)
Brief Fear of Negative Evaluation (BFNE)	Assesses apprehension about negative evaluation (social-evaluative anxiety). This is a shorter version of the FNE. E.g. "I am afraid that people will find fault with me"	12	1 (not at all characteristic of me) to 5 (extremely characteristic of me)
Fear of Negative Evaluation (FNE)	Assesses apprehension about negative evaluation (social-evaluative anxiety) E.g. "I am frequently afraid of other people noticing my shortcomings"	30	True/False
Interpretation of Events Questionnaire (IEQ)	Assesses the way in which people interpret social events E.g. "You ask a new acquaintance to the movies, but they decline. If this happened, I would believe that: - He/she think that I am dull (evaluation by others) - I am a dull person (self-evaluation) - I will never make any new friends (perceived future implications)	24	0 (strongly disbelieve) to 8 (strongly believe)
The Fear of Positive Evaluation Scale (FPES)	Assesses apprehension about positive evaluation E.g. "I generally feel uncomfortable when people give me compliments"	10	0 (not at all true) to 9 (very true)
The Disqualification of Positive Social Outcomes Scale (DPSOS)	Assesses cognitive tendencies to disqualify positive social experiences. E.g. "When I feel that I have made a strong impression on someone, I often feel that I could just as easily have made a poor impression on them"	15	0 (not at all true) to 9 (very true)
The Interpersonal Sensitivity Measure (IPSM)	Assesses hypersensitivity to interpersonal rejection. E.g. "I avoid saying what I think for fear of being rejected"	36	1 (very unlike me) to 4 (very like me)
The Negative Self-Portrayal Scale (NSPS)	Assesses the extent to which individuals are worried about self-attributes being negatively judged by critical others. E.g. "In social situations (in which I feel anxious), it will become obvious to other people that I am blushing"	27	1 (not at all concerned) to 5 (extremely concerned)
Post-Event Processing (PEP) Questionnaire	Assesses post-event processing, which is a negatively skewed mental review of a social situation recently experienced (cognitive rumination). E.g. "Did you try to resist thinking about the event?"	13	0 (not at all) to 100 (totally agree)
Post-Event Processing (PEP)- Revised	Assesses post-event processing, which is a negatively skewed mental review of a social situation recently experienced (cognitive rumination).	7	0 (not at all) to 100 (totally agree)
Post-Event Processing Questionnaire Revised (PEPQ-R)	Assesses post-event processing, which is a negatively skewed mental review of a social situation recently experienced (cognitive rumination). 'Did the thoughts about the event ever interfere with your concentration?'	14	0 (not at all) to 100 (totally agree)
Post-Event Processing (PEP)- Extended	Assesses post-event processing, which is a negatively skewed mental review of a social situation recently experienced (cognitive rumination).	17	0 (not at all) to 100 (very much so)
Probability/Cost Questionnaire (PCQ)	Assesses the probability that a hypothetical negative non-social and social event will occur and the cost associated with these events E.g. "Someone you know won't say hello to you"	40	0 (not at all likely-bad) to 8 (extremely likely-bad)
Social Anxiety Thoughts questionnaire (SAT)	Assesses the frequency individuals have self-relevant cognitions in relation to the experience of social distress. Participants are asked to indicate how frequently each thought has occurred to them in social situations during the past week.	117	1 (never) to 5 (always)

Table 3 (continued)

Questionnaire	Construct	Number of Items	Response categories
Social Interaction Self-Statement Test (SISST)	Assesses the frequency of positive and negative self-statements. Participants are asked to rate how frequently they may have experienced each thought before, during, or after a social interaction. E.g. “What I say will probably sound stupid”	30	1 (hardly ever had the thought) to 5 (very often had the thought)
Self-Beliefs Related to Social Anxiety Scale (SBSA)	Assesses the strength of beliefs about the self in a social context. It included the belief types presented by Clark and Wells (1995); excessively high standards for social performance, conditional beliefs about social evaluation and unconditional beliefs about the self. E.g. “If people know I am anxious, they will think I’m weak”	15	0 (do not agree at all) to 10 (strongly agree)
Subjective Probability (Social) Scale	Assesses the probability that unpleasant social events will occur E.g. “You will have a serious disagreement with a friend in the next six months”	24	Not at all likely to extremely likely
The Consequences of Negative Social Events Questionnaire (CONSE-Q)	Assesses the way in which individuals interpret negative social events E.g. “You go to a party, and spend a lot of time standing on your own. If this happened, I would believe that: The people here think that I am boring (negative evaluation by others) I am a boring person (negative self-evaluation) I will not make any new friends at this party (negative short-term consequences) I will never make any new friends (negative long-term consequences)	16	0 (strongly disbelieve) to 8 (strongly believe)
The Self-Statements During Public Speaking Questionnaire (SSPS)	Positive and Negative thoughts related to public speaking performance. E.g. “A failure in this situation would be more proof of my incapacity.”	10	0 (do not agree at all) to 5 (agree extremely with the statement)
The Social Thoughts and Beliefs Scale (STABS)	Assesses a broad domain of cognitions associated with social anxiety. E.g. “When I am in a social situation, I appear clumsy to other people”	21	1 (never characteristic) to 5 (always characteristic)

score on a measure. This is essential to assess as both floor and ceiling effects limit the range of data reported by a measure (Terwee et al. 2007). One study explicitly reported that less than 15 % of the respondents achieved the highest or lowest possible scores. This study indicated that the FNE possesses floor and ceiling effects.

Interpretability Interpretability refers to the extent to which qualitative meaning can be given to quantitative scores (Terwee et al. 2007). This is essential in order to guide the reader in interpreting and understanding scores on a measure. Five studies reported the mean scores and standard deviation for at least four relevant subgroups with an adequate sample. These relevant subgroups were typically either a community sample or participants with a different principal anxiety disorder diagnosis (for example, Generalized Anxiety Disorder). These studies indicated that the ASC, FNE, NSPS, and SISST possess adequate interpretability. This criterion in Terwee et al. is only said to possess sound interpretability if the study in isolation reported data for four individual

subgroups, however, it is also possible that a measure may assess four subgroups across different studies.

The SISST received the greatest number of positive ratings, being six out of nine. The STABS received five positive ratings. Four other measures, the ASC, BFNE, FNE and FPES received four positive ratings. The PCQ, SUBJECTIVE PROBABILITY (SOCIAL) SCALE and the SSPS received the least number of positive ratings, being one out of nine. Refer to Table 4 for an overview of ratings on psychometric properties according to Terwee et al. (2007) for each measure.

Discussion

Before a cognitive self-report measure is used in research or clinical settings, it is essential that its methodological qualities are evaluated and considered adequate. This ensures that an appropriate measure, with good psychometric properties is selected when assessing cognitive aspects of social anxiety. Thus, the aim of this systematic review was to comprehensively

Table 4 Overview of Ratings on Psychometric Properties

Total Scores									
Questionnaire	Content Validity	Internal Consistency	Criterion Validity	Construct Validity	Reproducibility: Agreement	Reproducibility: Reliability	Responsiveness	Floor and Ceiling effects	Interpretability
ASBQ	0	+	0	+	0	0	0	0	?
ASC	–	+	0	+	?	0	+	0	+
BFNE	0	+	+	+	?	0	+	0	?
CONSE-Q	?	+	0	+	0	0	+	0	?
DPSOS	–	+	0	+	0	0	0	0	?
FNE	?	+	0	+	?	0	0	+	+
FPES	–	+	0	+	?	+	+	0	?
IEQ	?	?	0	0	0	0	0	0	?
IPSM	–	+	0	+	?	0	+	0	0
NSPS	–	–	0	+	?	0	+	0	+
PCQ	?	?	0	?	?	?	+	0	?
PEPQ	?	+	0	+	0	0	0	0	0
PEPQ-R	0	+	0	+	0	0	0	0	0
PEPQ-Revised	0	+	0	+	0	0	0	0	0
PEPQ-Extended	0	+	0	+	0	0	0	0	0
SAT	?	+	0	+	0	0	0	0	0
SBSA	0	+	0	+	?	0	0	0	?
SISST	+	+	0	+	0	+	+	0	+
SSPS	0	0	0	?	0	0	+	0	0
STABS	+	+	0	+	?	+	+	0	?
SUBJECTIVE PROBABILITY (SOCIAL) SCALE	?	0	0	+	0	0	–	0	?

identify cognitive self-report measures, evaluate their findings, and to make recommendations regarding their clinical usefulness. Of the twenty-one measures identified, the cognitive constructs assessed included anticipatory and post-event processing (ASBQ, PCQ, PEP, PEP-Revised, PEPQ-R, PEPQ-extended, Subjective Probability (Social) Scale), threat appraisals (ASC, BFNE, FNE, FPES), and beliefs about the self or others in a social context (CONSE-Q, DPSOS, IPSM, IEQ, NSPS, SAT, SISST, SBSA, SSPS, STABS).

The included studies were analysed on reported psychometric properties by applying the appraisal tool developed by Terwee et al. (2007). Results demonstrated that no cognitive self-report measure was given a positive rating across all nine domains of psychometric properties. The SISST received the greatest number of positive ratings, being six out of nine. The STABS received five positive ratings, while the ASC, BFNE, FNE and FPES received four positive ratings. It is possible to conclude that the SISST has the highest methodological quality of cognitive self-report measures of social anxiety that have been assessed to date. However, the measure lacks criterion validity, reproducibility (agreement), and no information was found on floor and ceiling effects. It is therefore important that no measure is given more support than another, until all nine areas have been more thoroughly assessed. That is, the ultimate quality for each measure cannot be truly known until research has assessed each measure

against each psychometric property. Such data may lead to necessary modifications to the measures. In the instance that a number of measures have perfect ratings across all 9 criteria, it will still be useful to compare across measures in order to select an appropriate measure for specific purposes in terms of the symptom or process being measured.

The measures that received the greatest number of positive ratings addressed a range of cognitive constructs. The ASC, FPES, FNE and BFNE measure social-evaluative threat and threat appraisals. Socially anxious individuals have been shown to be hyper-vigilant to social threat and encode more threatening cues in social situations, thereby leading to anxious symptomatology and behaviours (Becker et al. 2001). The SISST and STABS measure self-statements and cognitions directly related to social situations. Previous literature has highlighted the role of dysfunctional thoughts and self-focused attention in maintaining symptoms of social anxiety (Clark and Wells 1995; Hofmann 2007).

The present review utilised a standardised and systematic approach. Original measures were included, as well as short and revised forms of measures in order to evaluate a comprehensive and wide array of trait cognitive measures of social anxiety. The review demonstrates evidence of good inter-rater reliability in regard to the included studies in the review. Additionally, measures were evaluated on their methodological quality using a standardised and previously validated

quality assessment tool, which has been successfully used in previous social anxiety and health research (Burton et al. 2015; Modini et al. 2015).

When reviewing the results of the present review, it is important to take into account the limitations of the appraisal tool utilised (Terwee et al. 2007). First, the appraisal tool may be viewed as overly stringent, resulting in the low number of positive ratings for each study. For example, although many studies reported a Pearson Correlation for reproducibility (agreement), they were given an intermediate rating, as they did not report whether the measurement error was smaller than the minimal amount of change. Some may argue that this is an unnecessary stringency, as Pearson Correlation has been widely and successfully used in the past (Sainfort and Booske 2000). Less stringent criteria may allow for an overall higher number of positive ratings for each measure, resulting in stronger support of their future use. The authors of this tool themselves note that there is limited empirical data to support their quality criteria, which will likely receive further clarification with increased empirical data. It should also be noted that the use of this tool in past psychometric papers (Furlan et al. 2011; Kaur et al. 2016) is perhaps evidence that their criteria is generally well received and accepted. Moreover, the appraisal tool utilised allows the selection of high quality questionnaires and is a positive step towards identifying reliable and valid measures for a specific purpose. It further enables clear and unambiguous reporting of relevant psychometric properties. Second, many studies in this review did not report specific pre-defined hypotheses for testing construct validity, and were therefore given an intermediate rating. However, there was no clear criterion provided about how specific these hypotheses should be. Thus, decisions made about construct validity may be considered somewhat subjective. Future studies should refine the criteria by providing a clear explanation about how specific the hypotheses for testing construct validity should be. Third, there may be psychometric properties that are more or less important for a measure across the different domains, given both the setting and purpose for administering the measure. For example, for the IPSM, which measures anticipation of social situations, criterion validity may not be as important as responsiveness, as a clinician would perhaps be more interested in whether there are clinically important changes over time in a patient's anticipation levels, as opposed to ensuring that the measure was related to a gold standard. Similarly, for the SISST, any change in patient's positive and negative self-statements in regard to social events should be able to be detected over time in order to assess treatment outcomes. It could be argued that this is a more important criteria than floor and ceiling effects, as clinical changes are more beneficial in therapy than knowing how many respondents achieved the lowest and highest score on a measure. Similarly, for the ASBQ, construct validity may be more important in order to ensure that the assessed

anticipatory processing relates to other measures and is consistent with theoretically derived hypotheses, as opposed to reproducibility (reliability), which assesses the extent to which patients can be distinguished from each other. Finally, the tool is limited, as it does not include criteria for the method and results of studies utilising Item Response Theory (IRT). Future studies can extend on the current tool by including criteria specific to IRT. Another evaluation tool that focuses on methodological quality and includes IRT analyses is being developed (Mokkink et al. 2010). When this tool is completed it would be beneficial to apply their criteria to the included studies in this review.

The results of this review suggest opportunities for future research. First, the findings highlight the lack of assessed psychometric properties for cognitive self-report measures of social anxiety. It is important to note that this does not mean that the included measures in this review are not reliable or valid tools. The results of the present review highlight the need for further investigation of the psychometric properties of the included measures to establish whether they failed to receive more positive ratings due to lacking adequacy in those domains, or whether the measure is adequate but that there is a lack of evidence providing information on these domains. Future research is needed to provide more data on the different domains of Terwee et al. (2007) identified psychometric properties, in order to make recommendations regarding their clinical usefulness. Specifically, studies should provide data on construct validity, reproducibility, and floor and ceiling effects. Second, the review is limited to an adult population. As social anxiety occurs throughout the lifespan, future studies can expand on this review by evaluating self-report measures in child and adolescent populations. This will enable the selection of psychometrically adequate cognitive measures to be used in different age groups. Third, this review is further limited as it only includes cognitive self-report measures. However, the use of state based cognitive and symptom measures, such as the Performance Questionnaire (Rapee and Lim 1992) and the State Anxiety Rating (SAR) (Rapee and Abbott 2007), as well as measures of avoidance and safety behaviours, have traditionally been used as part of a broader clinical assessment of social anxiety and it would be beneficial to assess these categories of measures in future reviews. Fourth, this review does not take into account the purpose of researchers and clinicians in selecting a particular measure. While only a psychometrically appropriate and adequate measure should be selected, a measure should also only be chosen if it best fulfils the purpose of the researcher or clinician. Finally, while a plethora of empirical studies exist that may inadvertently provide some evidence of convergent validity and internal consistency data for the measures reviewed, these papers were not included as they are not specifically aimed at assessing psychometric properties, and rather present data that may be relevant as an adjunct to their specific aims. While it

was not feasible to include such papers in this review, their exclusion it is a notable limitation. However, this limitation is not a major concern given that the measures reviewed typically performed well on convergent validity and internal consistency, which are standardly reported in empirical studies that include trait cognitive self-report measures in the domain of social anxiety. The limitations of the present review mean that the results should be interpreted with caution; however, the evaluation utilised is in line with the majority of reviews evaluating psychometric properties.

The present review has attempted to provide a clear and thorough assessment of the psychometric properties of identified trait cognitive self-report measures of social anxiety. It is hopeful that the results of this review will encourage researchers and clinicians to select an evidence-based trait cognitive self-report measure. Despite no measure fulfilling all nine domains of the psychometric properties, researchers and clinicians will be able to quickly compare and evaluate the usefulness of different measures based on the identified psychometric domains that best compliment their specific aims. Future research should provide more data on the different domains to more fully determine the psychometric quality of each measure. While some measures demonstrate adequate psychometric properties, for now, there is no trait cognitive self-report measure that can be recommended over and above another.

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Compliance with Ethical Standards

Conflict of Interest Jo-Elle Stein declares that she has no conflict of interest. Matthew Modini declares that he has no conflict of interest. Caroline Hunt declares that she has no conflict of interest. Maree J. Abbott declares that she has no conflict of interest.

Experiment Participants This article does not contain any studies with human participants or animals performed by any of the authors.

Informed Consent This article is a systematic literature review, and does not contain any studies with human participants or animals performed by any of the authors. Individual studies included in our review indicate their procedures regarding informed consent and these can be found in their manuscripts.

References

- Abbott, M. J., & Rapee, R. M. (2004). Post-event rumination and negative self-appraisal in social phobia before and after treatment. *Journal of Abnormal Psychology, 113*(1), 136.
- American Psychiatric Association (2013). Diagnostic and statistical manual of mental disorders (DSM-5). American Psychiatric Pub
- Becker, E. S., Rinck, M., Margraf, J., & Roth, W. T. (2001). The emotional Stroop effect in anxiety disorders: general emotionality or disorder specificity? *Journal of Anxiety Disorders, 15*(3), 147–159.
- Beesdo, K., Bittner, A., Pine, D. S., Stein, M. B., Höfler, M., Lieb, R., & Wittchen, H. U. (2007). Incidence of social anxiety disorder and the consistent risk for secondary depression in the first three decades of life. *Archives of General Psychiatry, 64*(8), 903–912.
- Boyce, P., & Parker, G. (1989). Development of a scale to measure interpersonal sensitivity. *Australasian Psychiatry, 23*(3), 341–351.
- Brozovich, F., & Heimberg, R. G. (2008). An analysis of post-event processing in social anxiety disorder. *Clinical Psychology Review, 28*(6), 891–903.
- Burton, A. L., Abbott, M. J., Modini, M., & Touyz, S. (2015). Psychometric evaluation of self-report measures of binge eating symptoms and related psychopathology: a systematic review of the literature. *International Journal of Eating Disorders, 42*(1), 1–12.
- Carleton, R., McCreary, D. R., Norton, P. J., & Asmundson, G. J. (2006). Brief fear of negative evaluation scale-revised. *Depression and Anxiety, 23*(5), 297–303.
- Carleton, R., Collimore, K. C., & Asmundson, G. J. (2007). Corrigendum to “social anxiety and fear of negative evaluation: construct validity of the BFNE-II”. *Journal of Anxiety Disorders, 21*(4), 600–601.
- Carleton, R. N., Collimore, K. C., McCabe, R. E., & Antony, M. M. (2011). Addressing revisions to the brief fear of negative evaluation scale: measuring fear of negative evaluation across anxiety and mood disorders. *Journal of Anxiety Disorders, 25*(6), 822–828.
- Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. *Social phobia: Diagnosis, Assessment, and Treatment, 41*(68), 00022–00023.
- Collins, K. A., Westra, H. A., Dozois, D. J., & Stewart, S. H. (2005). The validity of the brief version of the fear of negative evaluation scale. *Journal of Anxiety Disorders, 19*(3), 345–359.
- Dannahy, L., & Stopa, L. (2007). Post-event processing in social anxiety. *Behaviour Research and Therapy, 45*, 1207–1219.
- Dodge, C. S., Hope, D. A., Heimberg, R. G., & Becker, R. E. (1988). Evaluation of the social interaction self-statement test with a social phobic population. *Cognitive Therapy and Research, 12*(2), 211–222.
- Duke, D., Krishnan, M., Faith, M., & Storch, E. A. (2006). The psychometric properties of the brief fear of negative evaluation scale. *Journal of Anxiety Disorders, 20*(6), 807–817.
- Fergus, T. A., Valentiner, D. P., Kim, H.-S., & Stephenson, K. (2009). The social thoughts and beliefs scale: psychometric properties and its relation with interpersonal functioning in a non-clinical sample. *Cognitive Therapy and Research, 33*(4), 425–431.
- Foa, E. B., Franklin, M. E., Perry, K. J., & Herbert, J. D. (1996). Cognitive biases in generalized social phobia. *Journal of Abnormal Psychology, 105*(3), 433.
- Furlan, J. C., Noonan, V., Singh, A., & Fehlings, M. G. (2011). Assessment of disability in patients with acute traumatic spinal cord injury: a systematic review of the literature. *Journal of Neurotrauma, 28*(8), 1413–1430.
- Gilboa-Schechtman, E., Foa, E. B., & Amir, N. (1999). Attentional biases for facial expressions in social phobia: the face-in-the-crowd paradigm. *Cognition & Emotion, 13*(3), 305–318.
- Glass, C. R., & Furlong, M. (1990). Cognitive assessment of social anxiety: affective and behavioral correlates. *Cognitive Therapy and Research, 14*(4), 365–384.
- Glass, C. R., Merluzzi Th, V., Biever, J. L., & Larsen, K. H. (1982). Cognitive assessment of social anxiety: development and validation of a self-statement questionnaire. *Cognitive Therapy and Research, 6*(1), 37–55.
- Gros, D. F., & Wong Sarver, N. (2014). An investigation of the psychometric properties of the social thoughts and beliefs scale (STABS) and structure of cognitive symptoms in participants with social

- anxiety disorder and healthy controls. *Journal of Anxiety Disorders*, 28(3), 283–290.
- Harb, G. C., Heimberg, R. G., Fresco, D. M., Schneier, F. R., & Liebowitz, M. R. (2002). The psychometric properties of the interpersonal sensitivity measure in social anxiety disorder. *Behaviour Research and Therapy*, 40(8), 961–979.
- Hartman, L. M. (1984). Cognitive components of social anxiety. *Journal of Clinical Psychology*, 40(1), 137–139.
- Heinrichs, N., & Hofmann, S. G. (2005). Cognitive assessment of social anxiety: a comparison of self-report and thought listing methods. *Cognitive Behaviour Therapy*, 34(1), 3–15.
- Hinrichsen, H., & Clark, D. M. (2003). Anticipatory processing in social anxiety: two pilot studies. *Journal of Behavior Therapy and Experimental Psychiatry*, 34(3–4), 205–218. doi:10.1016/s0005-7916(03)00050-8.
- Hofmann, S. G. (2007). Cognitive factors that maintain social anxiety disorder: a comprehensive model and its treatment implications. *Cognitive Behaviour Therapy*, 36(4), 193–209.
- Kaur, N., Belchior, P., Gelinis, I., & Bier, N. (2016). Critical appraisal of questionnaires to assess functional impairment in individuals with mild cognitive impairment. *International Psychogeriatrics/IPA*, 1–15.
- Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, 62(6), 593–602.
- Kocovski, N. L., & Rector, N. A. (2007). Predictors of post-event rumination related to social anxiety. *Cognitive Behaviour Therapy*, 36(2), 112–122.
- Kocovski, N., Endler, N., Rector, N., & Flett, G. (2005). Rumination and postevent processing in social anxiety. *Behaviour Research and Therapy*, 43, 971–984.
- Leary, M. R. (1983). Social anxiousness: the construct and its measurement. *Journal of Personality Assessment*, 47(1), 66–75.
- Lucock, M. P., & Salkovskis, P. M. (1988). Cognitive factors in social anxiety and its treatment. *Behaviour Research and Therapy*, 26(4), 297–302.
- McEvoy, P. M., & Kingsep, P. (2006). The post-event processing questionnaire in a clinical sample with social phobia. *Behaviour Research and Therapy*, 44(11), 1689–1697.
- Mellings, T. M., & Alden, L. E. (2000). Cognitive processes in social anxiety: the effects of self-focus, rumination and anticipatory processing. *Behaviour Research and Therapy*, 38(3), 243–257.
- Mills, A. C., Grant, D. M., Lechner, W. V., & Judah, M. R. (2013). Psychometric properties of the anticipatory social behaviours questionnaire. *Journal of Psychopathology and Behavioral Assessment*, 35(3), 346–355.
- Mills, A. C., Grant, D. M., Judah, M. R., & White, E. J. (2014). The influence of anticipatory processing on attentional biases in social anxiety. *Behavior Therapy*, 45(5), 720–729.
- Modini, M., Abbott, M. J., & Hunt, C. (2015). A systematic review of the psychometric properties of trait social anxiety self-report measures. *Journal of Psychopathology and Behavioral Assessment* 37(4), 645–662.
- Mogg, K., Philippot, P., & Bradley, B. P. (2004). Selective attention to angry faces in clinical social phobia. *Journal of Abnormal Psychology*, 113(1), 160.
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of Internal Medicine*, 151(4), 264–269.
- Mokkink, L. B., Terwee, C. B., Knol, D. L., Stratford, P. W., Alonso, J., Patrick, D. L., et al. (2010). The COSMIN checklist for evaluating the methodological quality of studies on measurement properties: a clarification of its content. *BMC Medical Research Methodology*, 10, 22. doi:10.1186/1471-2288-10-22.
- Moscovitch, D. A., & Huyder, V. (2011). The negative self-portrayal scale: development, validation, and application to social anxiety. *Behavior Therapy*, 42(2), 183–196.
- Moscovitch, D. A., Rowa, K., Paulitzki, J. R., Antony, M. M., & McCabe, R. E. (2015). What if I appear boring, anxious, or unattractive? Validation and treatment sensitivity of the negative self portrayal scale in clinical samples. *Cognitive Therapy and Research*, 39(2), 178–192.
- Oei, T. P., Kenna, D., & Evans, L. (1991). The reliability, validity and utility of the SAD and FNE scales for anxiety disorder patients. *Personality and Individual Differences*, 12(2), 111–116.
- Osman, A., Markway, K., & Osman, J. R. (1992). Psychometric properties of the Social Interaction Self-statement Test in a college sample. *Psychological Reports*, 71(3, Pt 2), 1171–1177.
- Penney, E., & Abbott, M. (2015). The impact of perceived standards on state anxiety, appraisal processes, and negative pre- and post-event rumination in social anxiety disorder. *Cognitive Therapy and Research*, 39, 162–177.
- Perini, S., Abbott, M., & Rapee, R. (2006). Perception of performance as a mediator in the relationship between social anxiety and negative post-event rumination. *Cognitive Therapy and Research*, 30(5), 645–659.
- Rachman, S., Grüter-Andrew, J., & Shafran, R. (2000). Post-event processing in social anxiety. *Behaviour Research and Therapy*, 38(6), 611–617.
- Rapee, R. M., & Abbott, M. J. (2007). Modeling relationships between cognitive variable during and following public speaking in participants with social phobia. *Behaviour Research and Therapy*, 45(12), 2977–2989.
- Rapee, R. M., & Heimberg, R. G. (1997). A cognitive-behavioral model of anxiety in social phobia. *Behaviour Research and Therapy*, 35(8), 741–756.
- Rapee, R. M., & Lim, L. (1992). Discrepancy between self-and observer ratings of performance in social phobics. *Journal of Abnormal Psychology*, 101(4), 728.
- Rodebaugh, T. L., Woods, C. M., Thissen, D. M., Heimberg, R. G., Chambless, D. L., & Rapee, R. M. (2004). More information from fewer questions: the factor structure and item properties of the original and brief fear of negative evaluation scale. *Psychological Assessment*, 16(2), 169–181.
- Rodebaugh, T. L., Heimberg, R. G., Brown, P. J., Fernandez, K. C., Blanco, C., Schneier, F. R., & Liebowitz, M. R. (2011). More reasons to be straightforward: findings and norms for two scales relevant to social anxiety. *Journal of Anxiety Disorders*, 25(5), 623–630.
- Rodebaugh, T. L., Weeks, J. W., Gordon, E. A., Langer, J. K., & Heimberg, R. G. (2012). The longitudinal relationship between fear of positive evaluation and fear of negative evaluation. *Anxiety, Stress & Coping: An International Journal*, 25(2), 167–182.
- Sainfort, F., & Booske, B. C. (2000). Measuring post-decision satisfaction. *Medical Decision Making*, 20(1), 51–61.
- Schultz, L. T., Heimberg, R. G., Rodebaugh, T. L., Schneier, F. R., Liebowitz, M. R., & Telch, M. J. (2006). The appraisal of social concerns scale: psychometric validation with a clinical sample of patients with social anxiety disorder. *Behavior Therapy*, 37(4), 393–405.
- Stein, M. B., & Kean, Y. M. (2000). Disability and quality of life in social phobia: epidemiologic findings. *American Journal of Psychiatry*, 157(10), 1606–1613.
- Stopa, L., & Clark, D. M. (2000). Social phobia and interpretation of social events. *Behaviour Research and Therapy*, 38(3), 273–283.
- Stopa, L., & Clark, D. M. (2001). Social phobia: comments on the viability and validity of an analogue research strategy and British norms for the fear of negative evaluation questionnaire. *Behavioural and Cognitive Psychotherapy*, 29(4), 423–430.

- Tanner, R. J., Stopa, L., & De Houwer, J. (2006). Implicit views of the self in social anxiety. *Behaviour Research and Therapy*, *44*(10), 1397–1409.
- Telch, M. J., Lucas, R. A., Smits, J. A. J., Powers, M. B., Heimberg, R., & Hart, T. (2004). Appraisal of social concerns: a cognitive assessment instrument for social phobia. *Depression and Anxiety*, *19*(4), 217–224.
- Terwee, C. B., Bot, S. D., de Boer, M. R., van der Windt, D. A., Knol, D. L., Dekker, J., et al. (2007). Quality criteria were proposed for measurement properties of health status questionnaires. *Journal of Clinical Epidemiology*, *60*(1), 34–42.
- Turner, S. M., McCanna, M., & Beidel, D. C. (1987). Validity of the social avoidance and distress and fear of negative evaluation scales. *Behaviour Research and Therapy*, *25*(2), 113–115.
- Turner, S. M., Johnson, M. R., Beidel, D. C., Heiser, N. A., & Lydiard, R. (2003). The social thoughts and beliefs scale: a new inventory for assessing cognitions in social phobia. *Psychological Assessment*, *15*(3), 384–391.
- Vassilopoulos, S. P. (2005). Anticipatory processing plays a role in maintaining social anxiety. *Anxiety, Stress, and Coping*, *18*(4), 321–332.
- Watson, D., & Friend, R. (1969). Measurement of social-evaluative anxiety. *Journal of Consulting and Clinical Psychology*, *33*(4), 448–457.
- Weeks, J. W. (2010). The disqualification of positive social outcomes scale: a novel assessment of a long-recognized cognitive tendency in social anxiety disorder. *Journal of Anxiety Disorders*, *24*(8), 856–865.
- Weeks, J. W., & Heimberg, R. G. (2005). Evaluation of the psychometric properties of the Beck depression inventory in a non-elderly adult sample of patients with generalized anxiety disorder. *Depression and Anxiety*, *22*(1), 41–44.
- Weeks, J. W., Heimberg, R. G., Rodebaugh, T. L., & Norton, P. J. (2008). Exploring the relationship between fear of positive evaluation and social anxiety. *Journal of Anxiety Disorders*, *22*(3), 386–400.
- Weeks, J. W., Heimberg, R. G., Rodebaugh, T. L., Goldin, P. R., & Gross, J. J. (2012). Psychometric evaluation of the fear of positive evaluation scale in patients with social anxiety disorder. *Psychological Assessment*, *24*(2), 301–312.
- Wilson, J. K., & Rapee, R. M. (2005a). The interpretation of negative social events in social phobia with versus without comorbid mood disorder. *Journal of Anxiety Disorders*, *19*(3), 245–274.
- Wilson, J. K., & Rapee, R. M. (2005b). The interpretation of negative social events in social phobia: changes during treatment and relationship to outcome. *Behaviour Research and Therapy*, *43*(3), 373–389.
- Wilson, J. K., & Rapee, R. M. (2005c). Interpretative biases in social phobia: content specificity and the effects of depression. *Cognitive Therapy and Research*, *29*(3), 315–331.
- Wittchen, H. U., & Fehm, L. (2003). Epidemiology and natural course of social fears and social phobia. *Acta Psychiatrica Scandinavica*, *108*(417), 4–18.
- Wong, Q. J. (2015). Psychometric evaluation of the English version of the extended post-event processing questionnaire. *Anxiety, Stress & Coping: An International Journal*, *28*(2), 215–225.
- Wong, Q. J., & Moulds, M. L. (2009). Impact of rumination versus distraction on anxiety and maladaptive self-beliefs in socially anxious individuals. *Behaviour Research and Therapy*, *47*(10), 861–867. doi:10.1016/j.brat.2009.06.014.
- Wong, Q. J. J., & Moulds, M. L. (2011). Erratum to: a new measure of the maladaptive self-beliefs in social anxiety: psychometric properties in a non-clinical sample. *Journal of Psychopathology and Behavioral Assessment*, *33*(2), 285–297. doi:10.1007/s10862-010-9208-3.
- Wong, Q. J., Moulds, M. L., & Rapee, R. M. (2014). Validation of the self-beliefs related to social anxiety scale: a replication and extension. *Assessment*, *21*(3), 300–311.
- Woods, C. M., & Rodebaugh, T. L. (2005). Factor structures of the original and brief fear of negative evaluation (FNE and BFNE) scales: correction to an erroneous footnote. *Psychological Assessment*, *17*(3), 385–386.