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The development of Negative Self-Beliefs Inventory (NSBI): Cultural adaptation and psychometric validation

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Social anxiety is an emotional disorder common to various populations around the world. The newly developed Self-Beliefs Related to Social Anxiety Scale (SBSA) aims to assess three kinds of self-beliefs through 15 items that include self-related cognitive factors that evidently result in social anxiety. This study explored the psychometric characteristics of SBSA among 978 Chinese. An eight-item Negative Self-beliefs Inventory (NSBI) was developed through qualitative and quantitative analyses. Exploratory factor analysis, confirmatory factor analysis, and multi-group confirmatory factor analysis suggested that NSBI contained clear, meaningful, stable, and invariant three-factor structure consistent with the original SBSA. Further analyses showed that the three subscales and the entire scale exhibited high internal consistency (0.779–0.837), good criterion validity, and good convergent and divergent validity (i.e., negative associations with flourishing and positive associations with anxiety, depression, and stress). These findings indicated that NSBI is reliable and valid for measuring negative self-beliefs in the Chinese population. Higher total score of NSBI indicates the more serious negative self-beliefs. Limitations of the present study and implications for research and practice were also discussed. Further studies are needed to evaluate the predictive ability, incremental validity, and potential role of NSBI in clinical and large-scale populations.

Abstract

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3 newly developed Self-Beliefs Related to Social Anxiety Scale (SBSA) aims to assess three kinds
4 of self-beliefs through 15 items that include self-related cognitive factors that evidently result in
5 social anxiety. This study explored the psychometric characteristics of SBSA among 978
6 Chinese. An eight-item Negative Self-beliefs Inventory (NSBI) was developed through
7 qualitative and quantitative analyses. Exploratory factor analysis, confirmatory factor analysis,
8 and multi-group confirmatory factor analysis suggested that NSBI contained clear, meaningful,
9 stable, and invariant three-factor structure consistent with the original SBSA. Further analyses
10 showed that the three subscales and the entire scale exhibited high internal consistency (0.779–
11 0.837), good criterion validity, and good convergent and divergent validity (i.e., negative
12 associations with flourishing and positive associations with anxiety, depression, and stress).
13 These findings indicated that NSBI is reliable and valid for measuring negative self-beliefs in the
14 Chinese population. Higher total score of NSBI indicates the more serious negative self-beliefs.
15 Limitations of the present study and implications for research and practice were also discussed.
16 Further studies are needed to evaluate the predictive ability, incremental validity, and potential
17 role of NSBI in clinical and large-scale populations.

18 *Keywords:* self-beliefs, reliability, validity, measurement invariance, Negative Self-Beliefs
19 Inventory

20 **Title:** The Development of Negative Self-Beliefs Inventory (NSBI): Cultural Adaptation and
21 Psychometric Validation

22 **Introduction**

23 Mild anxiety or discomfort experienced by individuals when speaking in public or social
24 situations is a normal psychological reaction. However, when the anxiety or discomfort causes
25 severe distress and impairs normal social functioning, it may evolve into a mood disorder called
26 social anxiety disorder. Social anxiety is one of the major emotional disorders that is
27 characterized by remarkable and persistent fear of negative evaluation in social related contexts
28 (American Psychiatric Association 2013). In Western countries, the lifetime prevalence of social
29 anxiety disorder was estimated at 12.10% to 13.00% among different adult populations (Furmark
30 2002; Kessler et al. 2005; Polo et al. 2011). Very few studies have investigated the prevalence of
31 social anxiety disorder among the general Chinese adult population (Hofmann et al. 2010). A
32 recent large-scale research revealed that the 12-month and lifetime prevalence of social anxiety
33 disorder among 11,527 Chinese military personnel were 3.34% and 6.22%, respectively (Wang
34 et al. 2014). The low prevalence in China, as with other psychiatric disorders (e.g., depression,
35 Smith 2014), may be partly attributed to culture-related low detection rate (Hofmann et al. 2010;
36 Smith 2014).

37 Hofmann et al. (2010) examined the cultural factors related to social anxiety and
38 concluded that the degree of expression of social anxiety depends on the social norms, cultural
39 background, and ethnic/racial characteristics. Accordingly, culture-related factors need to be
40 carefully considered in different countries when conduct social anxiety-related assessment and
41 treatment (Hofmann et al. 2010). For instance, Caldwell-Harris & Ayçiçeği (2006) investigated
42 the effect of individualism-and-collectivism on the reported psychological distress in both

43 individualism and collectivism countries. The results indicated that the respondents living in
44 collectivism countries usually reported low symptoms on anxiety, depression, schizophrenia, and
45 antisocial personality disorder (Caldwell-Harris & Ayçiçeği 2006). Another study further found
46 that the participants in collectivistic cultures showed higher social anxiety levels and more
47 positive attitude to socially avoidant behaviors. These findings implied that it is important and
48 meaningful to conduct cultural adaptation when applied western (i.e., individualism countries)
49 social anxiety inventories into eastern countries (i.e., collectivism countries).

50 **Self-Beliefs of Social Anxiety**

51 Determining the risk factors of social anxiety is very important in developing intervention
52 programs and psychotherapies. Ng et al. (2014) conducted a systematic review of 17 evidence-
53 based studies and identified that negatively perceived self-related information (e.g., negative
54 self-imagery) is the key cognitive factor that increases social anxiety in both clinical and non-
55 clinical populations, as had been emphasized in different cognitive models of social anxiety
56 (Clark & Wells 1995; Hofmann 2007; Rapee & Heimberg 1997). For instance, Clark & Wells
57 (1995) stated that individuals' excessive attention to internal negative thoughts, feelings, and
58 physical sensations in social contexts would confirm their perceived negative impression and
59 beliefs of themselves that, in turn, would increase the level of anxiety. Similarly, Rapee &
60 Heimberg (1997) and Hofmann (2007) recognized that social anxiety results from a discrepancy
61 between individuals' negatively perceived self-related information and the assumed audiences'
62 high expectation. Therefore, these cognitive models of social anxiety and cognitive-behavior
63 therapies suggest that a reduction of negative self-related beliefs would positively relieve social
64 anxiety.

65 Based on the importance of cognitive factors in social anxiety, Wong & Moulds (2009)
66 developed the Self-Beliefs Related to Social Anxiety Scale (SBSA), which measures three types
67 of self-beliefs in social contexts proposed by Clark & Wells (1995). The scale consists 15 items
68 (i.e., four items for high standard beliefs on social performance, HSB; seven items for
69 conditional beliefs on social evaluation, CB; and four items for unconditional beliefs on the self,
70 UB). Preliminary psychometric evaluation demonstrated that the scale displays excellent
71 reliability (i.e., Cronbach's alpha > .82), satisfactory item-item and item-total correlations (i.e.,
72 Pearson correlations ranged from .72 to .89), meaningful factor structure, good convergent and
73 divergent validity, and acceptable incremental and discriminative validity (Wong & Moulds
74 2009; Wong & Moulds 2011; Wong et al. 2014). Nevertheless, the stability of the factor structure
75 was unclear. Wong & Moulds (2011) revealed a two-factor structure (i.e., CB and UB merged
76 into one factor, and HSB was the other factor) in exploratory factor analysis using 600 non-
77 clinical undergraduates, whereas the following confirmatory factor analysis (CFA) demonstrated
78 that the three-factor structure exhibited better fit than the two-factor model. Finally, they adopted
79 the three-factor model (Wong & Moulds 2011) that consistent with the Clark & Wells (1995)'s
80 theoretical model. Recently, Heeren et al. (2014) likewise examined the structural validity of
81 SBSA among a French-speaking community sample. Their study utilized CFA and revealed its
82 replicable three-factor structure, good reliability, and concurrent validity.

83 It should be noted that social anxiety-related assessment are culturally dependent
84 (Hofmann et al. 2010). Equivalence of concepts and inventory items should be evaluated and
85 adjusted before the western culture-based measurement can be applied into eastern countries.

86 **Equivalence of Inventories in Different Cultures**

87 Inconsistency in the obtained factor structures may be attributed to different
88 interpretations of the items, which were referred to as functional equivalence and conceptual
89 equivalence of items in previous studies (Cheung et al. 2011; Duan et al. 2012). The
90 aforementioned studies were also conducted in Western countries. No study has yet examined
91 the factor structure and psychometric characteristics of SBSA in Eastern cultures, hence there is
92 a need to examine the cognitive understanding of each item in the context of Chinese culture and
93 to re-explore and validate the factor structure.

94 Previous studies suggested that cultural adaptation should be considered to ensure
95 equivalence of inventories in different cultures (Ho et al. 2014b). Specifically, Johnson (1998)
96 proposed that cross-cultural equivalence of inventories should be obtained through four kinds of
97 equivalences, namely, linguistic, conceptual, metric, and functional equivalence. Linguistic
98 equivalence refers to the linguistic accuracy of each item in different cultures and emphasizes
99 quality of translation. Conceptual equivalence refers to similarity in participants' understanding
100 of factors and concepts despite coming from different cultures. Metric equivalence avoids the
101 floor and/or ceiling effects. Finally, functional equivalence indicates that the behavior and/or
102 thoughts described by the items are the same in different cultural contexts (Ho et al. 2014a; Ho et
103 al. 2014b; Johnson 1998).

104 Traditionally, translation and back-translation, as well as confirmatory factor analysis
105 have been recognized as the most commonly used approaches in cross-cultural psychometric
106 evaluation studies. Nevertheless, several scholars (e.g., Hui & Triandis 1985; Kankaraš & Moors
107 2010) argued that only part linguistic and conceptual equivalence could be obtained through the
108 aforementioned traditional steps, and that the equality of translations, cultural relevance,
109 measurement equivalent of constructs, and validity of the adapted instrument need to be

110 additionally and carefully considered. The World Health Organization (2011) published a four-
111 step guideline for refining the original “translation and back-translation” method, which
112 emphasized the role of experts in moderating the equality of translations and partly compose the
113 deficiencies of traditional approach. Metric and functional equivalences can often be explored
114 through qualitative methods, such as group interview. However, very few researchers have done
115 so. Our previous experience demonstrated that the combination of these rules and methods is
116 helpful in ensuring the equivalence of measurement tools in different cultures. For instance,
117 Values in Action Inventory of Strengths (VIA-IS) is a widely used measurement for assessing
118 character strengths among diverse populations by using 240 items (Peterson & Seligman 2004).
119 However, the factor structures of the VIA-IS are various in different countries (Duan et al. 2012).
120 Further qualitative and quantitative inspections found that several items were common social
121 expectations that may lack sensitivity; several items may not be appropriate in representing the
122 spirituality-related culture in the Mainland China; and several items may represent socially
123 unacceptable behavior in Mainland China (cf. Duan et al. 2012; Ho et al. 2014a). After these
124 inappropriate items have been deleted, a cultural fit and stable strength-structure was obtained
125 (Duan et al. 2013).

126 **The Present Study**

127 We expect to achieve several objectives, namely to (1) obtain equality between the
128 English and Chinese translation and examine the cultural relevance of each item through
129 qualitative and quantitative analyses; (2) validate the Chinese version of SBSA and test its factor
130 structure, reliability, criterion validity, convergent validity, and divergent validity; specifically,
131 SBSA should show positive relations with trait anxiety, state anxiety, social anxiety, stress, and
132 depression; whereas show negative relations with psychological wellbeing (e.g., Flourishing); (3)

133 establish the cross-gender measurement invariance for meaningful comparisons between
134 different groups, which can guarantee similar latent constructs across groups (Vandenberg &
135 Lance 2000); and (4) to obtain solid psychometric evidence through a short form that is practical
136 and convenient to apply in the community, clinical, and large-scale settings for purposes of
137 research and intervention evaluation (Ziegler et al. 2014).

138 **Method**

139 **Participants and Procedures**

140 A total of 978 (428 males, 550 females; $M = 20.73$, $SD = 3.46$) participants from six
141 different universities were involved in this quantitative survey. Those universities are located in
142 Eastern, Central, and Western China; this distribution is helpful in balancing the economic and
143 social background of the participants. Participants with active physical and mental illnesses were
144 excluded. No participant reported serious medical history and long-term medication. The
145 participants were asked to provide written informed consent before completing the
146 questionnaires. The Institutional Review Board of the Southwest University approved this study.

147 The entire sample was divided into four independent subsamples; each subsample
148 completed a distinct questionnaire package created for specific research purposes to control the
149 source of common-method bias (Podsakoff et al. 2003; Podsakoff et al. 2012) and reduce
150 participants' cognitive load and fatigue (Rammstedt & Beierlein 2014). Subsample 1 ($n_1 = 330$;
151 171 males, 159 females; $M = 20.42$, $SD = 0.77$) completed the Chinese version of SBSA for
152 exploratory factor analysis; subsample 2 ($n_2 = 330$; 164 males, 166 females; $M = 20.40$, $SD =$
153 0.73) also completed the Chinese version of SBSA but for confirmatory factor analysis;
154 subsample 3 ($n_3 = 155$; 44 males, 111 females; $M = 21.45$, $SD = 6.12$) completed the short form
155 of SBSA, Liebowitz Social Anxiety Scale, and State-Trait Anxiety Inventory for examining

156 criterion validities; and subsample 4 ($n_4 = 163$; 49 males, 114 females; $M = 21.38$, $SD = 0.73$)
157 completed the short form of SBSA, Depression Anxiety Stress Scales, and Flourishing Scale for
158 examining convergent and divergent validities.

159 After the investigation was completed, the study objective and corresponding
160 interpretations were explained to the participants. Data were collected from May to November in
161 2014.

162 **Measurements**

163 **Self-Beliefs Related to Social Anxiety (SBSA).** SBSA is a 15-item self-reporting
164 questionnaire that assesses the strengths of self-perceived beliefs related to the self in social
165 contexts (Wong & Moulds 2009; Wong & Moulds 2011; Wong et al. 2014). It contains three
166 subscales (four-item HSB, seven-item CB, and four-item UB). Participants were asked to rate
167 each item on an 11-point Likert scale from 0 (do not agree at all) to 10 (strongly agree). Subscale
168 scores and total scores were calculated by summing up the scores of the corresponding items.
169 High scores reflect the strong strengths of self-beliefs.

170 **Liebowitz Social Anxiety Scale (LSAS).** LSAS is a 24-item self-reporting scale that
171 measures anxiety and the avoidance of various social performances and situations (Liebowitz
172 1987). For each social performance and situation, participants were required to rate their feelings
173 and behaviors on a four-point Likert scale ranging from 0 (never) to 3 (always). High scores of
174 the total scale indicate increased levels of social anxiety. The Chinese version of LSAS
175 processed good psychometric properties among both clinical and non-clinical populations (He &
176 Zhang 2004). The Cronbach's alpha of the current sample is .934.

177 **State-Trait Anxiety Inventory (STAI).** STAI is a widely used self-reporting inventory
178 for assessing the state (20 items) and trait (20 items) of anxiety among diverse populations

179 (Spielberger et al. 1970). Different instructions for the two subscales were provided to guide
180 participants in giving appropriate responses. All items were rated on a four-point Likert scale
181 ranging from 0 (never) to 3 (very obvious/always). The scores of two subscales were summed
182 separately; high scores reflected increased levels of state anxiety or trait anxiety. The Cronbach's
183 alpha of the state and trait subscales in the current sample are .893 and .847, respectively.

184 **Depression Anxiety Stress Scales (DASS).** Depression, anxiety, and stress over the past
185 week were assessed through a short version of DASS, which is a 21-item self-reporting scale that
186 contains three subscales (seven items per subscale) (Lovibond & Lovibond 1995). Previous
187 studies revealed its good internal consistency and factor structure (e.g., Antony et al. 1998). High
188 scores of the three subscales separately reflect high level or severity of depression or anxiety.
189 The Cronbach's alpha of the current study is .859.

190 **Flourishing Scale (FS).** FS is a new inventory that assesses the important aspects of the
191 functioning of human functioning through eight items (Diener et al., 2010), which reflects the
192 general psychological wellbeing of individuals. Participants used a seven-point Likert scale to
193 evaluate the items by using 1 (strongly disagree) to 7 (strongly agree). A high mean score of the
194 whole scale indicates a high degree of psychological wellbeing. Tang et al. (2014) demonstrated
195 its good psychometric characteristics among the Chinese. The Cronbach's alpha of the current
196 sample is .789.

197 **Translation of SBSA**

198 The steps recommended by Hambleton et al. (2004) and Sperber (2004) are
199 comprehensively considered to achieve linguistic equivalence in the present study. The first
200 author of this manuscript established a triangular group, including one PhD student majoring in
201 Psychology, one PhD student majoring in Sociology, and one psychology professor who severed

202 as moderator. All members are bilingual experts (i.e., English and Chinese). First, the original
203 SBSA was translated into Chinese by the psychology PhD student. The sociology PhD student
204 then back-translated the Chinese version of SBSA into English. The professor supervised the
205 entire translation process and was responsible for verifying the conformity of the translated
206 English items with the original ones, as well as the precision of the Chinese items. Discrepancies
207 were discussed thoroughly and revised by the triangular group and the first author.

208 **Data Analysis Plan**

209 Data analysis was composed of both qualitative and quantitative stages.

210 The qualitative stage aimed to conduct cognitive interview among undergraduates to
211 obtain feedback regarding the appropriateness and meanings of the SBSA items in the context of
212 Chinese culture. Previous studies (e.g., Duan et al. 2012) suggested that cognitive feedback from
213 the target group would be helpful in refining the translations and/or determining what culturally
214 inappropriate items to delete. The first author conducted interviews among 20 undergraduates
215 who were unaware of the purpose of the study and had not attended the quantitative survey. Four
216 types of standardized questions, which were used in previous studies, were presented to them
217 (Duan et al. 2012): (1) Please tell me whether you understand this item or not. What do you think
218 the item is asking? (2) What did you think about when you first read this item? (3) Do you
219 understand the description of response choices in the questionnaire? What is the meaning of
220 “strongly agree”? (And so on for other responses) Which one do you choose? Why? (4) Could
221 you select a response choice that reflects your true opinion of this item? Why? Questions (1) and
222 (2) assessed conceptual and functional equivalence, whereas Questions (3) and (4) assessed
223 metric equivalence.

224 During the quantitative analysis, the first step was to calculate for internal consistency
225 (i.e., Cronbach's alpha) by using the first subsample. Items that could improve the internal
226 consistency coefficient when deleted were considered to be removed. As what the original
227 authors did (Wong & Moulds 2009), maximum likelihood factor analysis with promax rotation
228 method was adopted to evaluate the factor structure. Confirmatory factor analysis and multi-
229 group confirmatory factor analysis were conducted using the second subsample to identify the
230 best-fit model and evaluate measurement invariance across genders. A short form with high
231 factor loadings, clear factor structure, and measurement invariance across different gender
232 groups was expected to be developed based on the above steps.

233 Criterion validity, convergent validity, and divergent validity of the short form were
234 further tested using the third and fourth subsamples. Pearson correlations were calculated
235 between the short form and similar psychological variables (e.g., trait anxiety, state anxiety, and
236 social anxiety), psychological distress (e.g., depression, stress, and anxiety), and psychological
237 wellbeing (e.g., flourishing).

238 Data were analyzed using SPSS 21.0 and Mplus 7.0.

239 Results

240 Cognitive Interview

241 The results of cognitive feedback revealed that several items in the 15-item SBSA might
242 contain conceptual and functional issues, but no metric issue was proposed. Most participants
243 (n=18) indicated that Item 4 "I have to appear intelligent and witty" and Item 7 "I have to convey
244 a favorable impression" described strategies of impression management in Chinese culture rather
245 than self-beliefs because the information conveyed by the items met Chinese social expectations.
246 In other words, individuals in front of other people are always prone to impress and show their

247 good side. Accordingly, Item 4 and Item 7 are “positive behaviors” and “advisable beliefs”,
248 rather than the negative beliefs related to anxiety in Mainland China. Most of the participants
249 would rate highly on the two items. In addition, more than half of the respondents (n=12)
250 considered Item 3 “If people do not accept me, I’m worthless” and Item 5 “If someone does not
251 like me, it must be my fault” possibly refers to high-standard self-beliefs, which indicate that an
252 individual should be valuable and get people to like him/her. In other words, Items 3 and 5 may
253 be conceptually varied in Western and Eastern societies. Additionally, several participants (n =
254 9) thought that Item 1 “If I make mistakes, others will reject me” had uncertain meaning,
255 especially with regard to the word of “mistake”. The severity of the mistakes would affect their
256 rating of this item. For instance, some students said that if the mistake was really small or only
257 related to him/her selves, then others would not reject them; on the other hand, if the mistake was
258 really matter or impaired damaged the collective interest, then others would reject them. Thus the
259 “mistake” may contain different meanings to different individuals. Several students (n = 14) did
260 not understand why anxiety would be a sign of weakness (Item 8 “If people know I’m anxious,
261 they will think I’m weak.”). Accordingly, we assumed that these items (i.e., Items 1, 3, 5, 4, 7,
262 and 8) might lack sensitivity of assessment in Chinese culture, and that their removal will
263 improve the scale’s reliability and validity. Nevertheless, it should be noted that the items are not
264 directly removed based on the above cognitive interview results. Both qualitative and
265 quantitative results should be considered before the removing of the items.

266 **Internal Consistency**

267 The Cronbach’s alpha of the original 15-item scale was 0.880. However, the results
268 suggested that the alpha would increase to .888 if Item 4 was deleted. After Item 4 has been
269 removed, the results again suggested that the removal of Item 7 would increase the Cronbach’s

270 alpha to .891. Integrating the results of cognitive interviews, Items 4 and 7 were removed from
271 the 15-item pool.

272 **Exploratory Factor Analysis**

273 Maximum likelihood factor analysis with promax rotation method was performed among
274 the remaining 13 items. KMO = .895 and Bartlett's Test of Sphericity = 1978.376 ($p < .001$)
275 indicated that the current data pool was appropriate for analysis. Three factors were extracted,
276 but several items were cross-loaded. For instance, Item 1 was loaded on factors 2 (loading =
277 .487) and 3 (loading = .465); thus, Item 1 was removed. After several explorations, Items 2, 3, 5,
278 and 8 were removed as cross-loadings. The removed items were likewise questionable, as
279 reflected by the cognitive interviews. Finally, eight items were left (i.e., items 6, 9, 10, 11, 12,
280 13, 14, and 15) for the final factor analysis. The result indicated that the eight-item pool
281 remained appropriate for factor analysis (KMO = .851; Bartlett's Test of Sphericity = 1263.272,
282 $p < .001$), and a clear three-factor structure was obtained (Table 1). All factor loadings of the
283 eight items were higher than .67. Considering the content validity of the revised inventor with
284 regards to the original scale, the shortened scale was renamed as the Negative Self-beliefs
285 Inventory (NSBI). The Cronbach's alpha of the HSB subscale in the NSBI was .779, that of the
286 CB subscale was .784, and that of the UB subscale was .837. These results indicated that the
287 internal consistency of the NSBI was good (Maydeu-Olivares et al. 2007).

288 **Confirmatory Factor Analysis**

289 Subsample 2 ($n_2 = 330$) was used to further investigate the factor structure of NSBI
290 through confirmatory factor analysis. Comparative Fit Index (CFI > .95), and Root-mean-square
291 Error of Approximation (RMSEA < .50 or .80) were adopted to evaluate the comparable models
292 and/or structural equation models (Hu & Bentler 1999). Following three previous studies

293 (Heeren et al. 2014; Wong & Moulds 2009; Wong & Moulds 2011; Wong et al. 2014), three
294 comparable models were constructed, including a three-factor model, a two-factor model (i.e.,
295 the items of CB subscale and UB subscale loaded on the same factor), and a single-factor model
296 (i.e., all items loaded on one factor). The goodness-of-fit indices of the three models are shown
297 in Table 2 and suggest that the three-factor model achieved the best fit in our sample.
298 Standardized path coefficients of the three-factor model are shown in Figure 1 and are significant
299 at .001 levels. All standardized item loadings were higher than .710. These results supported the
300 three-factor structure of NSBI among the Chinese undergraduate population.

301 **Multi-group Confirmatory Factor Analysis**

302 Meredith (1993) and Byrne (2012) recommended that measurement invariance could be
303 achieved by examining the four levels of equivalence from the weakest to the strongest,
304 including configural invariance, weak/metric factorial invariance, strong/scalar factorial
305 invariance, and the variance of the means of latent variables. Two criteria were used to determine
306 whether equivalence was maintained between a more restricted model and a less restricted one,
307 including the change in CFI (Δ CFI) and change in RMSEA (Δ RMSEA). Researchers suggested
308 that $|\Delta$ CFI| < .010 (Cheung & Rensvold 2002) and $|\Delta$ RMSEA| < .015 (Chen 2007) supported the
309 equivalence of measurement. Chen (2007) considered $|\Delta$ RMSEA| as an important supplement
310 indicator when the total sample size was larger than 300, as with the current one ($n_2 = 330$). The
311 results presented in Table 3 reveal acceptable changes in the CFI and RMSEA, which supported
312 the measurement equivalence of NSBI in the different gender groups.

313 **Criterion Validity**

314 Criterion validity was examined using the third subsample ($n_3 = 155$). Pearson correlation
315 results are shown in Table 4. In addition to the HSB subscale, the CB subscale, UB subscale, and

316 total scale of NSBI were positively related ($r = .160 - .357$) to other anxiety-related
317 measurements, including state anxiety, trait anxiety, and LSAS. Among the three subscales of
318 NSBI, the UB subscale displayed the highest correlation coefficients.

319 **Convergent and Divergent Validity**

320 Convergent and divergent validities were examined by calculating the Pearson
321 correlations between NSBI and both the negative and positive psychological outcomes. As
322 expected, all subscales and the entire scale exhibited negative relations with flourishing ($r = -$
323 $.108$ to $-.303$) and positive relations with depression, anxiety, and stress ($r = .235-.414$) (Table
324 5). All correlation coefficients were significant at $.001$ levels with the exception of the HSB
325 subscale.

326 **Discussion**

327 The aim of this study was to validate the culturally adapted SBSA. Through a series of
328 statistical analysis, an eight-item NSBI was developed and was proven to be capable of
329 providing stable and clear three-factor structure, acceptable reliability, good criterion,
330 convergent, and divergent validity.

331 A total of seven items (items 1, 2, 3, 4, 5, 7, and 8) were removed from the original 15-
332 item pool (Wong & Moulds 2009) through cognitive interview and exploratory factor analyses.
333 Previous related studies also found that several of these items were questionable. For instance, in
334 the deleted items, Heeren et al. (2014) indicated that the item loadings of Items 1, 4, and 7 in the
335 French version were lower than $.40$. Similarly, Items 4 and 7 exhibited the lowest item loadings
336 among all four items of the HSB subscale, and Item 2 was the lowest among all items of UB
337 subscale (Wong et al. 2014). The removal of these low loading items improved the factor
338 structure to some extent. Actually, both the removing and remaining items highlighted the role of

339 self-construals in cross-cultural social anxiety studies, which defined how people relate to others
340 and the social context (Hofmann et al. 2010). The removed items were all related to independent
341 self-construals (e.g., Item 4 “I have to appear intelligent and witty” and Item 7 “I have to convey
342 a favorable impression”), which were frequent in western countries or individualistic societies
343 and reflected the tendency of viewing self as autonomous from the social context; whereas the
344 remaining items were all related to interdependent self-construals (e.g. Item 6 “People think
345 badly of me” and Item 10 “If I don’t get everything right, I’ll be rejected”), which were common
346 in eastern countries or collectivist societies and reflected the tendency of viewing self as being
347 integrated with others and social context (Hofmann et al. 2010).

348 In addition, as discussed previously, a two-factor structure from exploratory factor
349 analysis was against the three-factor structure from confirmatory factor analysis (Wong &
350 Moulds 2011). After deleting several cross-loading items, the three-factor structure was clearly
351 obtained through exploratory factor analysis and further validated through exploratory factor
352 analysis (using another independent sample). Thus, the results supported the possibility of the
353 cross-loading phenomenon as the cause of inconsistency in the results of Wong & Moulds (2011)
354 and Wong & Moulds (2009). Reports from the revised eight-item NSBI also preliminarily
355 revealed measurement equivalence across gender groups. The overall fit of the four levels of
356 invariance models was acceptable, which means that indicators (i.e., items) load on similar
357 factors with equal factor loadings across different groups (Bontempo & Hofer 2007), and that the
358 corresponding factor intercepts and latent mean differences were equivalent across genders.
359 Thus, meaningful comparisons of the three factors of NSBI can be made in different gender
360 groups (Vandenberg & Lance 2000).

361 NSBI was expected to exhibit high correlation with LASA because the SBSA-CS
362 reflected social anxiety-related beliefs and a low correlation with state and trait anxiety.
363 However, the current study obtained unexpected results; SBSA-SF had a high correlation with
364 general anxiety (i.e., state and trait anxiety), and relative low correlation with LASA. This result
365 was likewise found in a French-speaking sample (Heeren et al. 2014). We considered the lack of
366 a clinical sample of social anxiety as the reason behind the above results because this study
367 recruited college students who may not exhibit high scores on social anxiety as participants. In
368 terms of relationship between NSBI and state/trait anxiety, UB subscale exhibited the highest
369 correlations with state/trait anxiety among the three subscales. The negative evaluation reflected
370 by the UB subscale was recognized as a trait-like vulnerability (Chase et al. 2010; Clark 2002;
371 Weeks & Howell 2012), which was associated with a wide range of emotional disorders (e.g.,
372 general anxiety, social anxiety, and depression). This association also explains why NSBI was
373 associated with depression in the present study as well as in previous ones (Heeren et al. 2014;
374 Wong et al. 2014). NSBI was also negatively related to flourishing and positively related to
375 stress. All of these results indicate acceptable convergent and discriminant validities.

376 Many studies have found similar cognitive patterns and co-occurrences between
377 individuals with social phobia and depressive disorders (Dozois & Frewen 2006; Wittchen &
378 Fehm 2001). This observation could be another possible explanation as to why NSBI was
379 associated with anxiety and depression. Numerous studies demonstrated that rumination was a
380 cognitive trigger of depression, and reduced rumination thinking had a positive effect on
381 depressive symptoms (e.g., Smith & Alloy 2009; Zawadzki et al. 2013). If the self-beliefs
382 assessed by NSBI were important cognitive factors of social anxiety, and if these self-beliefs
383 differed with rumination in conceptual and functional levels, then we can further hypothesize

384 that rumination, compared to self-beliefs related to social anxiety, occupies incremental validity
385 when predicting depression, and that compared to ruminations, self-beliefs related to social
386 anxiety occupy incremental validity when predicting social anxiety. Verifying the above
387 hypotheses and clarifying the relationship between rumination and self-beliefs require further
388 examination through a longitudinal research design and clinical samples in the future.

389 Several limitations of this study should be identified. The major limitation of this study is
390 the use of university student sample and did not involve clinical participants. Hence, this
391 sampling limits the generalizability of the results to all Chinese adults. Furthermore, some of the
392 items being removed in the cognitive debriefing may indicate their immaturity about the social
393 norm and society expectation in Chinese context. Future studies should re-examine the reliability
394 and validity of NSBI with a clinical sample of people suffering from social anxiety disorder
395 and/or a community sample. Second, limited validities were examined in the current study.
396 Future studies should examine whether NSBI exhibits incremental validities when compared to
397 other factors (e.g., rumination) in predicting social anxiety. Third, longitudinal studies should be
398 conducted to clarify the mediation role of NSBI before a meaningful intervention program can be
399 developed. Finally, the short version of SBSA was obtained among the Chinese population.
400 Although the short form of the scale was effective and timesaving in large-scale social surveys
401 (Rammstedt & Beierlein 2014), psychometric evaluations in other countries, especially in
402 Western countries, should be evaluated further.

403 Our findings indicate that an eight-item Negative Self-beliefs Inventory (NSBI) provides
404 reliable and valid observations on three kinds of maladaptive self-beliefs (Clark & Wells 1995).
405 According to the above findings, NSBI is related to psychological distress including depression,

406 anxiety, and stress. A higher total score of NSBI reflects more serious negative self-beliefs,
407 which in turn associates with higher level of psychological distress.

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Table 1 (on next page)

Table 1 *Maximum Likelihood Factor Analysis of the Negative Self-beliefs Inventory. ($n_1 = 330$)*

Note. UB = Unconditional beliefs about self; CB = Conditional beliefs concerning social evaluation; HSB = High standards for social performance.

1 Table 1

2 *Maximum Likelihood Factor Analysis of the Negative Self-beliefs Inventory. (n₁ = 330)*

	Items	Factor		
		UB	CB	HSB
Item 9	人们认为我是差劲的 [People think I'm inferior]	.856		
Item 14	人们不尊重我 [People don't respect me]	.784		
Item 6	人们认为我很糟糕 [People think badly of me]	.765		
Item 12	如果人们看到我焦虑，他们会对我失望 [If people see me anxious, they'll put me down]		.813	
Item 13	如我不说一些有趣的事情，人们就不会喜欢我 [If I don't say something interesting, people won't like me]		.708	
Item 10	如果我不把所有事情弄好，我就会受到排斥 [If I don't get everything right, I'll be rejected]		.694	
Item 15	我需要被所有人喜欢 [I need to be liked by everyone]			.995
Item 11	我必须得到所有人的认可 [I must get everyone's approval]			.673
	% of Variance	26.88%	33.76%	5.77%

3 *Note.* UB = Unconditional beliefs about self; CB = Conditional beliefs concerning social
 4 evaluation; HSB = High standards for social performance.

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Table 2 (on next page)

Table 2 *Goodness-of-fit Indices for Confirmatory Factor Analysis. ($n_2 = 330$)*

1 Table 2

2 *Goodness-of-fit Indices for Confirmatory Factor Analysis. ($n_2 = 330$)*

	Goodness-of-fit Indices			
	CFI	TLI	RMSEA	90% CI
Three-factor Model	.961	.935	.079	[.055, .104]
Two-factor Model	.854	.785	.171	[.150, .193]
Single Factor Model	.740	.636	.222	[.202, 243]

3

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Table 3 (on next page)

Table 3 *Invariance Test Across Gender of NSBI. ($n_2 = 330$)*

Note. Model One = configural model; Model Two = equal loadings model; Model Three = equal loadings + intercepts model; Model Four = equal loadings + intercepts + means model.

1 Table 3

2 *Invariance Test Across Gender of NSBI. (n₂ = 330)*

	χ^2	<i>df</i>	CFI	\DeltaCFI	RMSEA	\DeltaRMSEA
Gender Group						
Model One	64.958	34	.965	-	.074	-
Model Two	72.588	39	.962	.003	.072	.002
Model Three	81.425	44	.958	.004	.072	.000
Model Four	93.211	47	.948	.010	.077	.005

3 *Note.* Model One = configural model; Model Two = equal loadings model; Model Three = equal
 4 loadings + intercepts model; Model Four = equal loadings + intercepts + means model.

5

Table 4 (on next page)

Table 4 *Pearson Correlations between the NSBI and Other Anxiety Related Scales. ($n_3 = 155$)*

Notes. UB = Unconditional beliefs about self; CB = Conditional beliefs concerning social evaluation; HSB = High standards for social performance; LSAS = Liebowitz Social Anxiety Scale. * $p < .05$; ** $p < .01$;

1 Table 4

2 *Pearson Correlations between the NSBI and Other Anxiety Related Scales. (n₃ = 155)*

	HSB	CB	UB	NSBI
State Anxiety	.129	.212**	.336**	.269**
Trait Anxiety	.169*	.196*	.357**	.286**
LSAS	.052	.198*	.220**	.189*

3 *Notes.* UB = Unconditional beliefs about self; CB = Conditional beliefs concerning social
 4 evaluation; HSB = High standards for social performance; LSAS = Liebowitz Social Anxiety
 5 Scale.

6 * $p < .05$; ** $p < .01$;

7

Table 5 (on next page)

Table 5 *Pearson Correlations between the NSBI and Psychological Outcomes. ($n_4 = 163$)*

Notes. UB = Unconditional beliefs about self; CB = Conditional beliefs concerning social evaluation; HSB = High standards for social performance. ** $p < .01$.

1 Table 5

2 *Pearson Correlations between the NSBI and Psychological Outcomes. (n₄ = 163)*

	HSB	CB	UB	NSBI
Flourishing	-.108	-.239**	-.303**	-.261**
Anxiety	.272**	.235**	.273**	.308**
Depression	.241**	.299**	.296**	.334**
Stress	.300**	.384**	.348**	.414**

3 *Notes.* UB = Unconditional beliefs about self; CB = Conditional beliefs concerning social

4 evaluation; HSB = High standards for social performance.

5 ** $p < .01$.

6

1

Figure 1. Confirmatory Factor Analysis Model of the Negative Self-Beliefs Inventory with Standardized Path Coefficients.

Note. ub = Unconditional beliefs about self; cb = Conditional beliefs concerning social evaluation; hsb= High standards for social performance.

