Psychometric properties of the Looming Maladaptive Style Questionnaire (LMSQ-R) in young Spanish adults

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Abstract

Background: The looming cognitive style (LCS) is a specific putative cognitive vulnerability to anxiety but not to depression. LCS is assessed by the Looming Maladaptive Style Questionnaire (LMSQ-R), which assesses a tendency to generate, maintain, and attend to internally generated scenarios of threats as rapidly increasing and headed in one's direction. This study investigated the structure, measurement invariance across subsamples, concurrent validity, consistency, and stability of a Spanish translation of the LMSQ-R. **Method:** LMSQ-R was examined in a large sample of Spanish students (n = 1,128, 56.47% women). A subsample of 675 was followed-up six months later. The participants also completed measures of social anxiety, generalized anxiety, and depression. **Results:** The results provide evidence from factor analyses confirming two second-order factors (social and physical threat). Multiple-group analysis indicated the measurement invariance of the model for men and women and for groups that displayed clinically significant generalized social anxiety and those that did not. Women scored higher on the LMSQ-R. Partial correlation analyses indicated that LMSQ-R scales were independently associated with symptoms of generalized and social anxiety but they were not independently associated with depression. **Conclusions:** The Spanish version of the LMSQ-R has shown good psychometric properties.

Keywords: Looming cognitive style, generalized anxiety, social anxiety and depression.

Resumen

Propiedades psicométricas del Cuestionario de Estilo Disfuncional de Looming (LMSQ-R) en jóvenes españoles. **Antecedentes:** el Estilo Cognitivo de Looming (ECL) es una vulnerabilidad cognitiva específica a la ansiedad pero no a la depresión. El ECL se evalúa con el Looming Maladaptive Style Questionnaire (LMSQ-R), que mide la tendencia interna a generar, mantener y atender escenarios en los que la amenaza aumenta dirigiéndose hacia la persona. Evaluamos la estructura, invarianza de medida entre submuestras, consistencia, estabilidad y validez concurrente de la adaptación al español del LMSQ-R. **Método:** el LMSQ-R se examinó en una muestra de estudiantes españoles (n = 1.128, 56,47% mujeres), evaluando a una submuestra de 675 seis meses después. Los participantes completaron medidas de ansiedad social, ansiedad generalizada y depresión. **Resultados:** los resultados obtenidos confirman una estructura de dos factores de segundo orden (amenaza social y física). Los análisis multigrupo indicaron la invarianza de medida a través de género y en un grupo con puntuaciones clínicas en ansiedad social y sin ellas. Las mujeres puntuaron más alto en el LMSQ-R. Las correlaciones indicaron la asociación de las escalas del LMSQ-R con los síntomas de ansiedad social y generalizada pero no se asociaban independientemente con la depresión. **Conclusiones:** la versión española del LMSQ-R ha demostrado buenos índices de fiabilidad y validez.

Palabras clave: Estilo Cognitivo de *Looming*, ansiedad generalizada, ansiedad social y depresión.

According to contemporary cognitive formulations, anxiety has its own unique disorder-specific cognitive content that differentiates it from depression. Anxiety is believed to be concerned with the harm appraisal of potential future threat, whereas depression is concerned with past loss, defeat, and failure (Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000). In principle, the distinction seems clear, but research has shown that it is difficult to identify the cognitive features of anxiety that reliably discriminate it from depression (see for meta-analysis Beck & Perkins, 2001). The looming vulnerability model of anxiety was proposed to reconceptualize the special and unique cognitive content for anxiety, and identify a distinct maladaptive cognitive style that creates vulnerability to anxiety and its disorders (Riskind et al., 2000; Williams, Shahar, Riskind, & Joiner, 2005). This model posits that, to understand anxiety, it is important to focus on the dynamic features of the experience of threat rather than on static harm appraisals, beliefs or predictions about the future (Riskind et al., 2000; Williams et al., 2005). This model differs from other cognitive models of anxiety in emphasizing the subjective perception of the temporal course of threat as changing and approaching and rapidly rising in risk.

Research has found evidence that when faced with negative life stressors, individuals with high LCS may particularly prone to anxiety as compared to those who lack the LCS (Adler & Strunk, 2010; Riskind, Black, & Shahar, 2010). Moreover, elevated LCS is found in multiple anxiety disorders such as obsessive compulsive disorder, generalized anxiety, specific

phobias and social anxiety (Black et al., 2010; Brown & Stopa, 2008; Elwood, Riskind, & Olatunji, 2011; Riskind & Rector, 2007; Williams et al., 2005), but not in pure unipolar depression (Riskind & Williams, 2005).

The LCS is assessed with the Looming Maladaptive Style Questionnaire (LMSQ-R; Riskind et al., 2000). Considerable evidence has been found that the LMSQ-R discriminates anxiety from depression. The LMSQ-R correlates with anxiety when controlling for depression, but not with depression when controlling for anxiety (Riskind et al., 2000; Riskind, Tzur, Williams, Mann, & Shahar, 2007). The LMSQ-R distinguishes generalized anxiety disorder from unipolar depression and nonclinical controls both in community and clinical samples (Riskind & Williams, 2005; Riskind et al., 2011). In addition, the LMSQ-R has obtained good internal consistency as well as good test-retest reliability over short time-periods of one week (Riskind et al., 2000; Riskind et al., 2007). Overall, the results indicate that LMSQ-R is a cognitive marker and measure of specific vulnerability that allows us to distinguish between anxiety and depression.

LMSQ-R has two subscales: physical and social. Physical looming assesses a cognitive bias to overestimate the approach of physical dangers (e.g., an object approaching quickly), whereas social looming assesses a bias to exaggerate the rapid approach of social threats (e.g., rejection). Although the two subscales highly correlate (.52 and .56; Reardon & Williams, 2007; Williams et al., 2005), social LMSQ-R is associated with social anxiety components more than physical LMSQ-R (Brown & Stopa, 2008; Williams et al., 2005), and patients with a social anxiety diagnosis score higher than patients with obsessive-compulsive disorder or panic diagnosis in social LMSQ-R but not in physical LMSQ-R (Riskind, Rector, & Cassin, 2011).

Although many studies use the LMSQ-R, there has been no research to date testing the putative two-factor structure of the instrument or its measurement invariance across distinct subsamples. Thus, the first objective of this study was to examine the validity of the LMSQ-R through the study of its structure and the examination of the existing associations between LMSQ-R scores and generalized anxiety, social anxiety, and depression symptoms. The second objective was to assess whether there are gender differences in LMSQ-R and to test the invariance of the measurement model of the LMSQ-R across gender and symptom severity. Females are generally at higher risk for anxiety disorders than men (McLean, Asnaani, Litz, & Hofmann, 2011) and, therefore, we examined whether females exhibit higher levels of the LMSQ-R. The last objective was to assess the reliability of the measure through the study of its internal consistency and long-term stability.

Method

Participants

A total of 1,128 young adults (56.47% women) participated in this study. They were students from a university and three vocational schools in Bizkaia (Spain). The 40 classrooms that participated in the study were randomly selected. Participants were between 16 and 25 years old (M_{age} = 19.50, SD_{age} = 2.48). A subsample of 675 participants was randomly selected to participate in a 6-month follow-up to test the stability of looming. There were no differences in any of the study variables between the students

who completed the follow-up and those who did not. The socio-economic levels were determined according to the Spanish Society of Epidemiology (2000): 26.9% low; 6.1% medium-low; 34.3% medium; 20.1% medium-high and 12.5% high.

Instruments

The Looming Maladaptive Style Questionnaire (LMSQ-R; Riskind et al., 2000) was used to measure LCS. The questionnaire consists of six scenarios describing potentially stressful situations and measures the tendency of a person to estimate the increased risk of the threat, and the progressive worsening or acceleration of it. There are three scenarios assessing physical looming (e. g., physical illnesses) and another three assessing social looming (e. g., public speaking). The items were translated into Spanish using a back-translation method (Muñiz, Elosua, & Hambleton, 2013) and one of the social scenarios was adapted to the Spanish culture. In the scenarios that are presented in the questionnaire, the individual must imagine each scene in detail and complete three questions about each scenario using a 5-point Likert response format. The individual scores are added such that the higher the score, the greater the LCS. The Spanish version of the questionnaire is available under request to the authors.

Social Anxiety Questionnaire for Adults (SAQ-A30; Caballo, Salazar, Arias, Irurtia, & Calderero, 2010) was used to assess social anxiety. It contains 30 items, each one rated on a 5-point scale (1 = *nothing,* 5 = *very much*). The questionnaire has shown good internal consistency and validity (Caballo et al., 2010). In this study Cronbach's alpha was .91.

Symptoms Checklist-90-R (SCL-90-R; Derogatis, 2002) was used to measure depression and generalized anxiety symptoms. The depression subscale comprises 13 items and the generalized anxiety subscale 10 items. The response format is a 5-point scale: 0 (*absence of the symptom*) to 4 (*maximum disturbance*). The Spanish translation of this measure has good psychometric properties (Caparrós-Caparrós, Villar-Hoz, Juan-Ferrer, & Viñas-Poch, 2007). In our study, Cronbach's alphas were .89 for depression and .86 for generalized anxiety.

Procedure

The students were invited to participate in this study. The responses were anonymous and the participation was voluntary. All the students agreed to participate. The participants filled in the questionnaires in their classrooms, first answering the LMSQ-R and then the social anxiety, depression and generalized anxiety questionnaires. The questionnaires took between 45 and 60 minutes to complete. The measures at T1 were taken between September and October of 2011 and measures of T2 between March and April of 2012. To pair the questionnaires of T1 and T2, a code, known only by the participant, was used.

Data analysis

First, an exploratory factor analysis (EFA) was performed employing principal component analysis with direct oblimin oblique rotation to explore the factor structure of the LMSQ-R. Next, a confirmatory factor analysis (CFA) was carried out to confirm the latent structure of the LMSQ-R. The models were tested via maximum likelihood estimation with LISREL 8.8

(Jöreskog & Sörbom, 2006). Following the recommendations of Hu and Bentler (1999), goodness of fit was assessed by the comparative fit index (CFI; values of .95 or greater indicate that the model adequately fits the data), the root mean squared error of approximation (RMSEA; values of .06 or less indicate that the model adequately fits the data), and the standardized root-mean-square residual (SRMR; values of .08 or less indicate that the model adequately fits the data). In addition, we used Akaike's Information Criterion (AIC) and the Bayesian Information Criterion (BIC), each of which builds on the statistic χ^2 by penalizing it for the addition of parameters (Raftery, 1995). The scale of each construct was set using the effects-coding method (Little, Slegers, & Card, 2006). Multiple group analyses were carried out to examine the invariance of the model across gender and between anxious and non-anxious individuals. To test concurrent validity, zero order correlations and partial correlations between looming scales and generalized anxiety, social anxiety and depression were calculated. Lastly, we employed test-retest correlations to assess relative stability of the looming subscales and paired *t*-tests for mean levels of each looming subscale at baseline and follow-up to test the absolute stability.

Results

Factor structure

The Scree Test indicated a six-factor solution that accounted for 78.90% of the variance. The first-order solution coincides with the six vignettes or scenarios of the questionnaire. Factor loadings ranged between .80 and .93.

A confirmatory factor analysis was carried out to confirm the structure found. The fit indexes were excellent for the model, $\chi^2(120, N = 1128) = 333$, RMSEA = .040, 90% CI [.035, .045], CFI = .99, SRMR = .059, AIC = 434, BIC = 690.35. A one-factor model was calculated to compare it with the six-factor model. Fit indexes were considerably better for the six first-order correlated than for the one-factor model, which increased χ^2 significantly, $\Delta \chi^2(15, N = 1128) = 8542$, $p = .001$.

Finally, we examined a second-order structure with two second-order factors corresponding to social LCS and physical LCS (see Figure 1). The fit indexes were excellent, $\chi^2(128, N = 1128) = 369$, RMSEA = .041, 90% CI [.036, .046], CFI = .99, SRMR = .070, AIC = 454, BIC = 670. These fit indexes were slightly poorer than those obtained by the six first-order factor structure, and the increase of χ^2 was significant, $\Delta \chi^2(8, N = 1128) = 28$, $p<.001$. However, according to the BIC, which penalizes the number of parameters more strongly than does the AIC, the hierarchical solution is a more parsimonious model and, thus, provides a good solution to the data. Factor loadings are presented in Figure 1. A second-order factor with a single second-order factor corresponding to looming was also calculated. Fit indexes were good $\chi^2(129, n = 1128) = 647$, RMSEA = .065, 90% CI [.060, .070], CFI = .97, SRMR = .039, AIC = 837, BIC = 942, but significantly poorer than those obtained for the two second-order factor structures, $\Delta \chi^2(1, n = 1128) = 278$, $p<.001$.

Gender differences

Gender differences in social, physical and total LMSQ-R scores were tested and are presented in Table 1. Both Levene and Kolmogorov-Smirnov tests were applied to assess, respectively, the homoscedasticity and normality assumptions on the distribution of LMSQ-R scores, concluding that data meets both assumptions. Females scored significantly higher than males in all the scales. Effect sizes were moderate. Furthermore, the overall prevalence of clinically significant generalized social anxiety, using the criteria of the SAQ-A30 (Caballo, Salazar, Irurtia, Arias, & Hofmann, 2012) was 36% and 24% for female and males, respectively.

We also investigated whether the measurement model of looming was equivalent across men and women through a multiple-group analysis. For this purpose, the following steps were carried out. First, we estimated the model for female and male separately. The fit indexes were adequate for male, $\chi^2(128, n = 480) = 158$, RMSEA = .052, 90% CI [.044 .060], NNFI = .98, CFI = .99, SRMR = .08, and for female participants, $\chi^2(128, n = 637) = 175$, RMSEA = .047, 90% CI [.040, .054], NNFI = .99, CFI = .99, SRMR= .07. Second, we tested the configural invariance of the model to demonstrate that the pattern of fixed and free parameters was equivalent across subsamples, $\chi^2(256, n = 1117) = 333$, RMSEA = .049, 90% CI [.044, .054], NNFI = .99, CFI = .99. Third, we performed a weak factorial invariance test, which implies that the relative factor loadings are equal across subsamples. This constriction did not increase χ^2 significantly, $\Delta \chi^2(18, N = 1117) = 15$, *ns*. Finally, we tested the invariance of the variances and covariances of latent variables in the model. This constriction did increase χ^2 significantly, $\Delta \chi^2(7, N = 1117) = 32$, $p<.001$, indicating that there were differences between male and female in some of these parameters. We examined each parameter separately to identify the differences. These analyses indicated that the covariance between the two second-order latent variables was higher for female than for male (.90 vs. .79), $\Delta \chi^2(1, N = 1117) = 5$, $p = .02$. The rest of parameters were equivalent.

We then investigated the invariance of the measurement model of looming by comparing subgroups that have significant, clinically relevant social anxiety and those that do not. Using the cut-off scores provided for the CASO (Caballo et al., 2012), 332 participants (29.6%) met criteria for clinically significant generalized social anxiety. We examined whether the measurement model of looming was equivalent across participants who have clinically significant social anxiety and those who do not through a similar procedure to that used above. The fit indexes were adequate for clinically significant social anxious participants, $\chi^2(128, N = 332) = 90$, RMSEA = .054, 90% CI [.042, .066], NNFI = .98, CFI = .99, SRMR= .10, and non-anxious, $\chi^2(128, N = 796) = 225$, RMSEA = .047, 90% CI [.041, .052], NNFI = .99, CFI = .99, SRMR= .07. Second, we tested the configural invariance of the model to demonstrate that the pattern of fixed and free parameters was equivalent across subsamples, $\chi^2(256, N = 1128) = 315$, RMSEA = .047, 90% CI [.042, .052], NNFI = .99, CFI = .99. Third, we performed a weak factorial invariance test, which implies that the relative factor loadings are equal across subsamples. This constriction did not increase χ^2 significantly, $\Delta \chi^2(18, N = 1128) = 12$, *ns*. Finally, we tested the invariance of the variances and covariances of latent variables in the model. This constriction did not increase χ^2 significantly, $\Delta \chi^2(7, N = 1128) = 6$, *ns.* Thus, the analyses indicated that the measurement model of looming is invariant across a subgroup that exhibited significant and clinically relevant social anxiety, using cut-offs of measures, and a subgroup that did not.
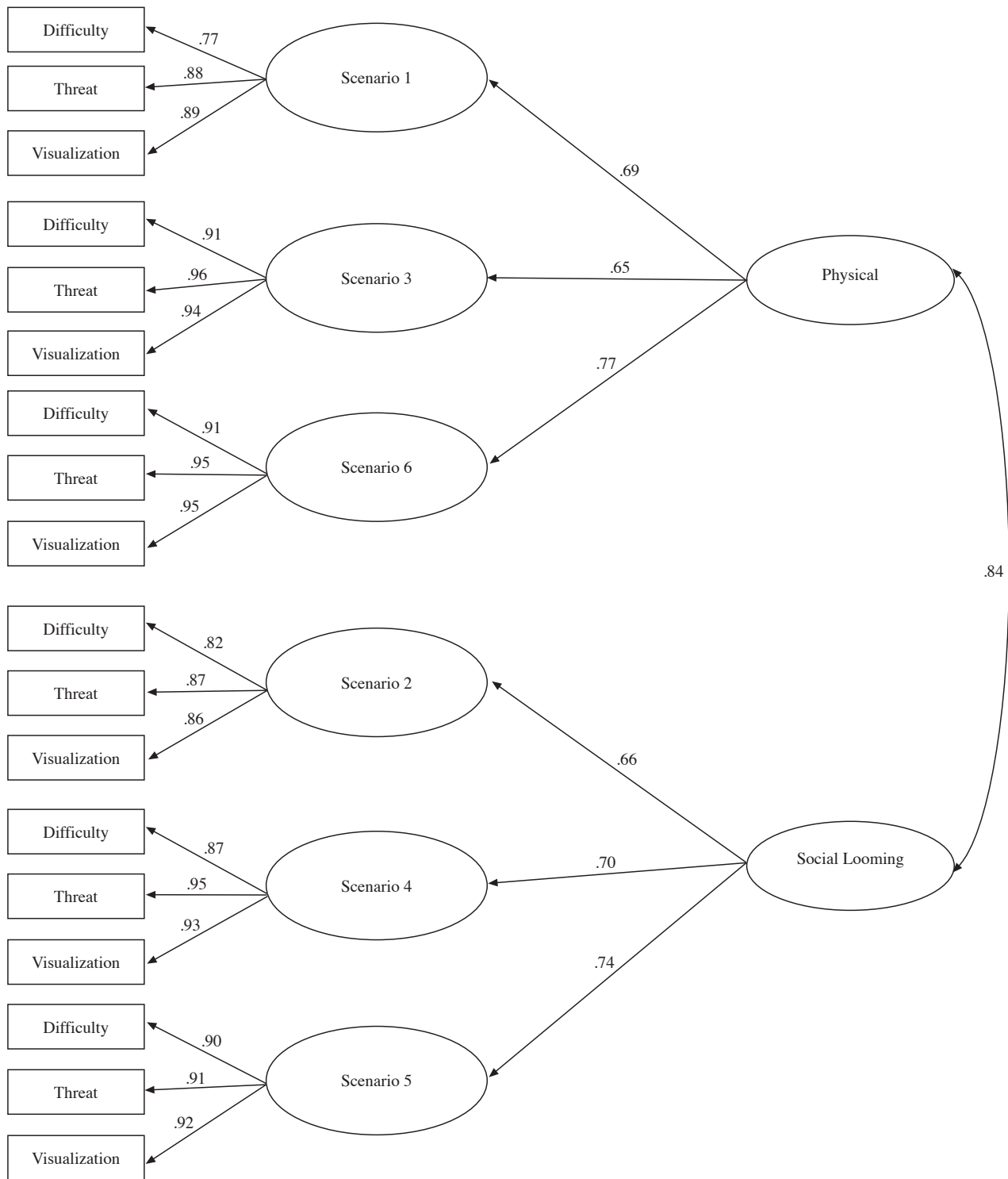
Figure 1. *Confirmatory factor analysis of the LMSQ-R*

Correlations among Looming, Anxiety, Social Anxiety and Depression

Correlations among looming and each psychological problem were significant (Table 2). However, as the psychological problems were highly related to each other we estimated partial correlations between each pair of variables (looming scale and psychological problem), partialing out the effects of the other two psychological problems.

As can be seen in Table 3, social LMSQ-R correlated only with social anxiety, whereas physical LMSQ-R and total LMSQ-R independently correlated both with social anxiety and generalized

anxiety. However, the LMSQ-R scales did not independently correlate with depression.

Internal consistency

Internal consistency for the LMSQ-R was assessed using Cronbach's alpha coefficients, being .94 for the total score, .84 for

Table 1 Gender differences in LMSQ-R					
	Females (N = 637)		**Males (N = 480)**		**t**	**Cohen's d**
	M	**SD**	**M**	**SD**		
Social-Looming	30.31	6.73	27.30	7.09	8.68*	0.45
Physical-Looming	30.05	6.46	27.00	6.38	7.24*	0.48
Total-Looming	60.36	11.72	54.24	11.59	7.84*	0.53

Note: * p<.001

Table 2 Correlations among study variables					
	1	**2**	**3**	**4**	**5**
1. Social-Looming	1				
2. Physical-Looming	.54**	1			
3. Social-Anxiety	.46**	.34**	1		
4. Depression	.30**	.22**	.33**	1	
5. Generalized-Anxiety	.13**	.32**	.23**	.47**	1

Note: ** p<.001; * p<.05

Table 3 Partial correlations among study variables			
	Social anxiety	**Generalized anxiety**	**Depression**
Social-Looming	.39**	.01	.08
Physical-Looming	.26**	.21**	.09
Total-Looming	.39**	.14*	.11

Note: ** p<.001; * p<.05

Table 4 Relative and absolute stability of looming variables					
	Relative stability	**Absolute stability**			
	Test-retest	**Time 1 Mean (SD)**	**Time 2 Mean (SD)**	**t**	**Cohen's d**	**p**
Follow-up sample (*n* = 675)						
Social-Looming	.52*	28.81 (6.46)	27.68 (6.82)	4.51	0.35	.000
Physical-Looming	.56*	29.28 (6.82)	28.60 (6.75)	2.77	0.21	.006
Total-Looming	.59*	58.09 (11.55)	56.27 (12.24)	4.36	0.34	.000
Clinical subsample (*n* = 154)						
Social-Looming	.38*	32.27 (5.55)	30.61 (5.87)	3.95	0.29	.000
Physical-Looming	.49*	31.92 (5.76)	30.85 (5.98)	2.74	0.18	.007
Total-Looming	.52*	64.19 (9.57)	61.47 (10.56)	4.17	0.27	.000

Note: * p<.001

social LMSQ-R and .85 for physical LMSQ-R. All were above the recommended .70 minimum demarcation criterion.

Stability of Looming

We examined the stability of the second-order factors over 6 months in the subsample of participants who were followed up. The test-retest correlations were from moderate to high (Table 4). The paired *t*-tests for mean levels at baseline and follow-up indicated significant differences in all the scales. Overall, effect sizes were small. Similar results were found in the subsample that exceeded the cut-off criteria for clinically relevant generalized social anxiety.

Discussion

Although numerous studies have used the LMSQ-R, the present study conducted a more thorough psychometric evaluation of the LMSQ-R than has been done in the past. As would be expected, the first-order factor structure of the LMSQ-R items yielded six factors that corresponded closely to the six scenarios of the questionnaire. More important, the putative second-order factor structure, where scenarios were grouped into the social LMSQ-R and physical LMSQ-R, also obtained excellent goodness-of-fit indexes and was more parsimonious. This second-order two-factor structure supports the theoretical distinction between the two broad domains of LCS (Riskind et al., 2000) as well as buttressing the results of prior studies that have used the social and physical LMSQ-R as separate LMSQ-R subscales (Brown & Stopa, 2008; Riskind et al., 2007; Williams et al., 2005; Riskind et al., 2011). Although several prior studies used SEM analyses on the LMSQ-R, these used social and physical looming score totals as indicators for a single latent looming style, whereas the present study has used individual items of the LMSQ-R as indicator variables for SEM.

An important finding of this study is that the measurement models of the LMSQ-R were invariant both across women and men and across clinically relevant generalized social anxious participants and non-anxious participants. The exception was a stronger association between social and physical looming factors in women than in men. In tandem with the largely invariant measurement models, women also had significantly higher scores on the LMSQ-R than men, consistent with the higher rates of several anxiety disorders among women (McLean et al., 2011). These results on gender differences in LMSQ-R may help to shed light on the greater propensity of females to develop anxiety disorders. The gender differences in LMSQ-R are particularly robust, given that the measurement model of the LMSQ-R was invariant in the multi-sample analyses across male and female subsamples. Consequently, future studies may find it fruitful to further examine whether gender differences in LCS contribute to explaining gender differences in the development and maintenance of anxiety symptoms.

The invariance of the measurement models across subsamples of clinically relevant generalized social anxious participants and non-anxious participants is also indicative of the strength and consistency of the measure. However, future research should confirm these findings in clinical samples. A further finding was that the measures of the LMSQ-R were moderately stable over a period of six months both in the general sample and in

a subsample of participants who scored high in social anxiety. The relative stability found for the LMSQ, along with the small effect sizes of differences between Time 1 and Time 2, support the idea that LMSQ-R functions as a moderately stable vulnerability schema (Riskind et al., 2000; Riskind et al., 2006). One caveat, however, is that such long-term stability correlations make it more difficult to differentiate true change in LCS from measurement error (Watson, 2004).

As hypothesized by the looming vulnerability model, the two subscales of the LMSQ-R exhibited cognitive specificity and differentiated anxiety from depression symptoms. These findings are consistent with prior studies (Brown & Stopa, 2008; Riskind et al., 2000; Riskind et al., 2011; Williams et al., 2005) and support the idea that despite the high anxiety-depression overlap (LeMoult & Joormann, 2012), anxiety and depression appear to be associated with at least partly distinct cognitive processes.

Also consistent with past findings, social LMSQ-R was associated only with social anxiety, which suggests that the tendency to build dynamic images of a progressive fear of being evaluated negatively is specific to social anxiety (Brown & Stopa, 2008; Riskind et al., 2011; Williams et al., 2005). In contrast, physical LMSQ-R was related to both generalized anxiety and social anxiety. Interestingly, the present results suggest that physical LMSQ-R is independently related both to social and generalized anxiety when the other is controlled. These findings are contrary to the findings of a prior study by Brown and Stopa (2008) with a nonclinical sample that no LMSQ-R component was correlated with generalized anxiety when controlling for social

anxiety (fear of negative evaluation). However, the present results may converge with those of Riskind et al. (2011), who found evidence that physical LMSQ-R is associated both with social anxiety disorder and generalized anxiety disorder in treatment-seeking clinical patients.

This study is not without limitations. First, the study is subject to all the usual limitations of self-report. Hence, future studies could benefit from using structured interviews to assess anxiety and depression. Second, caution is needed in generalizing the present findings to clinical patients with diagnosed anxiety disorders. In addition, future studies may examine whether measurement invariance is found across different types of anxiety disorders.

Despite these limitations, the present study used the largest sample of participants to date to evaluate the psychometric properties of the LMSQ-R. Moreover, the present study makes new contributions in showing the structural invariance of the LMSQ-R across gender and levels of severity of social anxiety. In conclusion, the LMSQ-R is a reliable and valid to assess in which scenarios the individual is more vulnerable. It also can be incorporated to intervention approaches derived from the looming vulnerability model (Riskind, Rector, & Taylor, 2012).

Acknowledgments

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