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RESEARCH ARTICLE

Psychometric Properties of the Intolerance of Uncertainty Scale (IUS) in a Lithuanian-speaking population

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Research suggests that intolerance of uncertainty may be important in understanding worry and may play a key role in the etiology and maintenance of worry. Intolerance of uncertainty is measured using the Intolerance of Uncertainty Scale (IUS), which has been shown to be reliable and valid in many studies. The aim of the present study was to develop a Lithuanian version of this instrument. 228 university students completed the scale. The Lithuanian version of the IUS was found to have good psychometric properties. The IUS showed high internal consistency and good test-retest reliability over a five-week period, and good convergent and divergent validity when assessed with measures of trait anxiety, situational anxiety, and depression. Factor analysis indicated that the IUS has a two-factor structure that represents the beliefs that "uncertainty about the future is unfair" and that "uncertainty has negative behavioral and self-referent implications". In conclusion, it was found that the Lithuanian version of the IUS is a sound scale for assessing intolerance of uncertainty.

Keywords: Intolerance of Uncertainty Scale (IUS); generalized anxiety disorder; anxiety; depression

Generalized anxiety disorder (GAD) is a common anxiety disorder with a prevalence of 1.6 to 5% in the general population (Kessler et al., 2005; Kessler, Keller, & Wittchen, 2001; Wittchen, Zhao, Kessler, & Eaton, 1994). It is characterized by excessive and uncontrollable worry, is often chronic in course and highly disabling (Hoffman, Dukes, & Wittchen, 2008), and is associated with elevated general health care utilization (Wittchen, 2002). Cognitive behavior therapy (CBT) appears to be an effective treatment for GAD (Tafet et al., 2005). However, a large percentage of patients continue to experience significant symptoms following treatment. A more comprehensive understanding of the mechanisms underlying this disorder is required to improve the efficacy of treatment.

Over the past two decades a number of cognitive behavioral models have been proposed. One model, which has received considerable empirical support, is the Intolerance of Uncertainty Model (Dugas & Koerner 2005). It emphasizes the role of intolerance of uncertainty (IU) in the etiology of GAD. It proposes that negative beliefs about uncertainty (e.g., the belief that uncertainty has negative behavioral and self-referent implications) lead to difficulty dealing with uncertainty-inducing situations (e.g., situations that are novel, ambiguous or unpredictable), which in turn leads to excessive worry and GAD. Preliminary evidence for intolerance of uncertainty as a cognitive vulnerability contributing to the development of generalized anxiety disorder has shown evidence of manipulability (Dugas & Ladouceur, 2000; Ladouceur, Gosselin & Dugas, 2000), stability (Buhr & Dugas, 2002; Freeston et al., 1994), and temporal antecedence of IU with respect to worry and generalized anxiety (Dugas & Ladouceur, 2000).

The 27-item Intolerance of Uncertainty Scale (IUS) has been investigated and validated with various populations and has become one of the most used measures of IU (Buhr & Dugas, 2002; Freeston et al., 1994; Norton, 2005; Sexton & Dugas, 2009). IUS was initially developed in French (Freeston et al., 1994) and later translated to English (Buhr & Dugas, 2002) and Chinese (Yang, 2013). All versions of the IUS demonstrated excellent internal consistency, good five-week test-retest reliability (Buhr & Dugas, 2002; Freeston et al., 1994; Yang, 2013), and evidence of convergent and divergent validity. IU was associated with worry, anxiety and depression (Buhr & Dugas, 2003; Freeston et al., 1994; Yang, 2013). Studies examining the construct validity of IUS have demonstrated inconsistent results. Previous factor analyses of the IUS have identified several potential distinct negative beliefs about uncertainty, or factors. Exploratory factor analysis of the original French version of the IUS identified five negative beliefs about uncertainty: (a) uncertainty is unacceptable and should be avoided; (b) being uncertain reflects badly on a person; (c) uncertainty is frustrating; (d) uncertainty causes stress; and (e) uncertainty prevents action (Freeston et al., 1994). Subsequent exploratory factor analysis with the English and Chinese translations found a four-factor structure instead, comprising these

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four beliefs: (a) uncertainty leads to the inability to act; (b) uncertainty is stressful and upsetting; (c) unexpected events are negative and should be avoided; and (d) being uncertain about the future is unfair (Buhr & Dugas, 2002). Despite these initial findings, the specific beliefs about uncertainty identified in the Freeston et al. (1994) and Buhr and Dugas (2002) exploratory factor analyses have not been consistently derived or confirmed. Exploratory analyses in various ethnic groups were unable to replicate the item composition of either the four- or five-factor solutions (Berenbaum et al., 2005; Norton, 2005; Sexton & Dugas, 2009).

The concept of IU is still new in Lithuania. Until recently, IU was not researched in Lithuanian-speaking populations. In order to assess the relationship between IU and worry in Lithuanian populations, a Lithuanian version of the IUS must be developed and validated. The present study will examine the psychometric properties of a Lithuanian translation of the IUS in order to establish its reliability and validity.

Method

Objectives

The present study, which assesses the Lithuanian version of the IUS, followed a similar procedure to that used in the validation of the French version. The IUS was assessed for internal consistency, test–retest reliability, and construct validity.

Participants

The study involved 228 subjects; 135 female (59.2%) and 93 male (40.8%), with a mean age of 21.8 years (*SD* = 2.28 years, range = 18–27). The participants were recruited from various undergraduate courses. Students were invited to participate at the end of a regular undergraduate lecture and participation was voluntary.

Instruments

The IUS (Freeston et al., 1994) includes 27 items relating to the idea that uncertainty is unacceptable, reflects badly on a person, and leads to frustration, stress, and the inability to take action. Participants rated items on a five-point Likert scale ranging from 1= "not at all characteristic of me" to 5= "entirely characteristic of me". Examples of items include "Uncertainty makes me uneasy, anxious, or stressed" and "My mind can't be relaxed if I don't know what will happen tomorrow". The original (French) version of the measure has high internal consistency (α = 0.91), good test–retest reliability over a five-week period (r = 0.78) and demonstrated good convergent and divergent validity (Dugas, Freeston, & Ladouceur, 1997; Freeston et al., 1994).

The Beck Depression Inventory II (Beck, Steer, & Brown, 1996) is a 21-item self-report questionnaire, each item reflecting depressive symptoms. Participants indicate whether items are characteristic of how they have been feeling during the past two weeks. Examples of themes covered by the BDI-II include sadness, pessimism, loss of interest, suicidal thoughts, sleeping problems, and agitation. The Lithuanian version of BDI-II has high internal consistency in a university sample (α = 0.93) and good test-retest reliability (r = 0.85) over a one-week period (Balaišis, 2004).

The State-Trait Anxiety Inventory (Spielberger, 1983) consists of two 20-item self-report measures. The STAI State assesses how respondents feel "right now, at this moment" (e.g., "I feel upset") and the STAI Trait targets how respondents "generally feel" (e.g., "I am a steady person"). Respondents are asked to rate themselves on each item on the basis of a 4-point Likert scale, ranging from "not at all" to "very much so" for the STAI State and from "almost never" to "almost always" for the STAI Trait. The Lithuanian version of STAI is used in the Lithuanian Armed Forces (Puzinavičius, 2005) but the psychometric characteristics of the STAI in a university sample have been not researched yet.

Translation and cross-cultural adaptation

The process of translation and cross-cultural adaptation of the IUS was performed according to guidelines outlined by Beaton (Beaton et al., 2000). Two independent translators translated the IUS from English into Lithuanian. It was back translated by another independent translator. Then a pre-final pilot version of the IUS was created and tested on 50 psychology students who were asked what was meant by each item and the chosen response in order to verify whether the formulation of the items was clear. Then a final version of the scale was created.

Procedure

Participants were recruited through various undergraduate courses. The participants were told that the purpose of the study was to assess the relationship between worry and other emotional responses such as anxiety and depression. All participants were aware that they could withdraw from the study at any time without explanation or penalty.

Participants were asked to complete four questionnaires: the Intolerance of Uncertainty Scale (IUS), the Beck Depression Inventory II (BDI-II), the State-Trait Anxiety Inventory (STAI) and a demographic form. The questionnaires were ordered randomly and were completed during one 30-minute testing period. Various groups of participants were tested on several separate occasions.

These participants were also invited to participate in the second session (assessing test-retest reliability) five weeks later. Only the IUS was administered in the second session. A total of 114 students participated in the retest phase (85 students refused to participate in the retest phase and 29 students did not respond to retest invitations).

Analytical strategy

Internal consistency was assessed by calculating Cronbach's alpha. Test-retest was assessed by calculating the correlation between separate administrations of the test over a five-week period. Construct validity was explored by investigating the associations of situational anxiety, trait anxiety, depression, age, and gender with IU. Correlations between the IUS, the BDI-II and STAI subscales were calculated. Independent samples t-tests were used

to test whether there were any differences between men and women on the IUS. A one-way ANOVA was used to test whether there were any differences between the age groups. It was expected that IU would be associated with situational anxiety, trait anxiety and depression, but not with age and gender. Also, to explore possible underlying dimensions of IU, an exploratory factor analysis was conducted.

Results

The Cronbach's alphas coefficients for the study scales and their subscales are presented in **Table 1**. The IUS demonstrated high internal consistency (Aiken, 2002). Also the test-retest reliability was 0.75, indicating satisfactory reliability (Pallant, 2003).

Correlation coefficients between IUS, BDI-II, STAI Trait and STAI State are presented in **Table 2**. As can be seen in Table 2 the IUS had significant correlations with BDI-II, STAI Trait, and STAI State.

Independent samples t-tests were used to test whether there were any differences between men and women on the IUS. No significant differences ($p = 0.658$) were found between men ($M = 67.1$; $SD = 19.63$) and women ($M = 67.75$; $SD = 19.49$). The one-way ANOVA was used to test whether there were any differences between the age groups. Age group comparisons are shown in **Table 3**. No significant differences were found ($p = 0.883$).

Variable	Cronbach alphas
IUS	0,96
BDI-II	0,81
STAI	0,87
STAI Trait	0,81
STAI State	0,92

Note: IUS: Intolerance of Uncertainty Scale; BDI-II: Beck Depression Inventory II; STAI: State-Trait Anxiety Inventory; STAI Trait: State-Trait Anxiety Inventory Trait Subscale; STAI State: State-Trait Anxiety Inventory Tolerance–Intolerance of Ambiguity Scale State Subscale.

Table 1: Cronbach's alphas for the IUS, BDI-II, STAI, STAI Trait and STAI State ($N = 228$)

Variable	IUS	BDI-II	STAI Trait	STAI State
IUS		.31**	.71**	.52**
BDI-II			.19*	.08
STAI Trait				.63**
STAI State				

Note: IUS: Intolerance of Uncertainty Scale; BDI-II: Beck Depression Inventory II; STAI Trait: State-Trait Anxiety Inventory Trait Subscale; STAI State: State-Trait Anxiety Inventory Tolerance–Intolerance of Ambiguity Scale State Subscale.

Gender has been partialled out of all correlations; $^{*}p < .01$; $^{**}p < .001$.

Table 2: Correlations among IUS, BDI-II, STAI Trait and STAI State ($N = 228$)

Age	IUS-total
18	68,00
19	65,81
20	68,09
21	67,77
22	69,13
23	67,57
24	67,37
25	66,86
26	68,00
27	62,00

Table 3: Mean Intolerance of Uncertainty Scale scores of different age groups

An exploratory principal components factor analysis was selected as the method of extraction. Kaiser's (1970) measure of sampling adequacy indicated that this intercorrelation matrix was appropriate for factor analysis (MSA = 0.94). Two factors were found with an eigenvalue >1 (i.e. 14.05 and 2.98). Also, the scree plot suggested that a two-factor solution may be suitable. Given the convergence of the results the two-factor solution was selected as the most appropriate.

Because the factors assess facets of the same underlying IU construct, they were expected to correlate to some degree. Promax (oblique) rotation was therefore employed. The resulting two-factor solution explained 63.1% of the variance and the factors showed a correlation of $r = 0.61$. The pattern matrix of the standardized regression coefficients for two factors is provided in **Table 4**. Keeping with the factor analysis of the French version, loadings of 0.30 or greater were considered significant. Factor 1 was composed of 12 items that assessed the beliefs that future events ought to be predictable and that uncertainty about the future is unfair and therefore frustrating or upsetting; this factor was labeled "Uncertainty About The Future is Unfair". Promax-rotated principal factor standardized regression coefficients from the pattern matrix are presented in **Table 1**. Factor 2 consisted of 15 items denoting the beliefs that uncertainty impairs performance and reflects poorly on an individual's character; this factor was labeled "Uncertainty Has Negative Behavioral and Self-Referent Implications".

Discussion

Overall, the results confirm the study's predictions. The Lithuanian version of the IUS has excellent internal consistency and good test–retest reliability. The study found that IU was significantly related to depression, trait anxiety and situational anxiety. IU was not influenced by age or gender. A two-factor structure was identified, which suggests that the items on the IUS represent the beliefs "uncertainty about the future is unfair

Item	Factor 1	Factor 2	h^2
Uncertainty stops me from having a firm opinion.	.23	**.78**	.88
Being uncertain means that a person is disorganized.	.07	**.89**	.88
Uncertainty makes life intolerable.	.32	**.72**	.90
Uncertainty keeps me from living a full life.	.55	**.37**	.55
When it's time to act, uncertainty paralyses me.	.55	**.33**	.63
Being uncertain means that I am not first rate.	-.01	**.92**	.86
When I am uncertain, I can't go forward.	.47	**.32**	.52
When I am uncertain I can't function very well.	.46	**.38**	.57
Unlike me, others always seem to know where they are going with their lives.	.54	**.34**	.64
Uncertainty makes me vulnerable, unhappy, or sad.	.29	**.52**	.54
The smallest doubt can stop me from acting.	.11	**.76**	.69
Being uncertain means that I lack confidence.	-.02	**.79**	.60
I think it's unfair that other people seem sure about their future.	-.46	**.93**	.55
Uncertainty keeps me from sleeping soundly.	-.05	**.59**	.33
I must get away from all uncertain situations.	-.18	**.83**	.53
It's unfair not having any guarantees in life	**.63**	.10	.49
My mind can't be relaxed if I don't know what will happen tomorrow.	**.59**	.46	.91
Uncertainty makes me uneasy, anxious, or stressed.	**.79**	-.14	.51
Unforeseen events upset me greatly.	**.65**	.07	.49
It frustrates me not having all the information I need.	**.74**	-.33	.83
One should always look ahead so as to avoid surprises.	**.59**	.22	.56
A small unforeseen event can spoil everything, even with the best of planning.	**.67**	.06	.49
I always want to know what the future has in store for me.	**.58**	.19	.49
I can't stand being taken by surprise.	**.84**	-.02	.69
I should be able to organize everything in advance.	**.71**	.07	.57
The ambiguities in life stress me.	**.79**	-.18	.49
I can't stand being undecided about my future.	**.91**	-.49	.83
Eigenvalues following rotation	**12.29**	**11.49**	

Table 4: Promax-Rotated Principal Factor Standardized Regression Coefficients and Final Communality Estimates (h^2) of the IUS ($n = 228$)

and spoils everything" and "uncertainty has negative behavioral and self-referent implications." These findings are inconsistent with those found for the original French version. The different results could be explained by the fact the Freeston et al. (1994) study does not meet the criteria of a high quality factor analytical paper (Birrell et al., 2011). The study was entirely exploratory and there were no previous findings on which assumptions could be based to guide the analysis, or to which the results could be compared. Further, many important details were not mentioned in the paper, such as the extraction or rotation that were utilized. Subsequent studies were unable to replicate the item composition of five-factor solution (Berenbaum et al., 2005; Norton, 2005; Sexton & Dugas, 2009). The results of the present study suggest that the Lithuanian version of the IUS might be used as a bifactorial assessment tool, but a follow-up study, which examines the factor structure of the Lithuanian version of the IUS using a substantially larger sample is needed.

At this point, the IUS appears to be a valid and reliable instrument for the assessment of intolerance of uncertainty. However, there are some limitations to the present study. Firstly, the participants in the study were undergraduate students and the results may not generalize to other populations. Although research in clinical samples using the IUS has demonstrated its ability to distinguish between GAD patients, patients suffering

from a variety of other anxiety disorders, and controls (Dugas et al., 1998; Ladouceur et al., 1999), further research is needed to replicate the present findings with the Lithuanian version in both community and clinical populations. Secondly, the non-clinical sample was not tested for anxiety disorders. Future studies are recommended to use a diagnostic interview to exclude those with psychopathology.

In summary, the present study has demonstrated the sound psychometric properties of the Lithuanian version of the IUS and support the use of this measure. Future research should attempt to focus on validating the Lithuanian version with different populations and attempt to establish further the specificity of the relationship between IU and worry. However, at this point it seems clear that the IUS, which has been shown to be a reliable and valid instrument, will play a key role in the further exploration of the relationship between IU and worry.

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