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A cross-cultural replication of an interactive model of anxiety sensitivity relevant to suicide

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Abstract

Recent findings indicate a relationship between anxiety sensitivity (AS) and suicide in a variety of populations in the United States. However, the link between AS and suicide has not been evaluated in other cultures. Suicide rates in Russia are among the highest worldwide making it an excellent choice to evaluate the cross-cultural robustness of these findings. The current investigation sought to replicate and extend the investigation of AS subfactors (i.e., cognitive, physical, and their interaction) in relation to suicidality in a sample of Russian adults. Participants were 390 adults recruited from Moscow using a geographic sampling method. Findings from the current study indicate that the interaction of AS cognitive concerns and AS physical concerns are associated with elevated rates of suicidality and previous suicide attempt, above and beyond negative affectivity and hazardous alcohol use. Clinicians may benefit from implementing AS reduction strategies with individuals who endorse elevated suicide risk as well as elevated AS cognitive concerns and low AS physical concerns.

1. Introduction

In the last 45 years suicide rates have increased by 60% worldwide (WHO, 2009). One of the countries with the highest suicide rates is Russia, where over 800,000 deaths by suicide have occurred since the fall of communism (Chaykovskaya, 2011). According to the most recent data, Russia has from the 2nd to 6th highest rates of suicide in the world (Chaykovskaya, 2011; WHO, 2009). The current suicide rate of 30.1 per 100,000 people is 50% higher than the worldwide average (WHO, 2009). Despite these elevated rates of suicide, examination of readily malleable risk factors for suicide among Russians has been extremely limited.

Although information about suicide rates was concealed during the communist era, the fall of communism has allowed for more recent studies to evaluate the association between suicide and heavy alcohol use in Russia (Stickley et al., 2011). Stickley and colleagues

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(2011) found that increases in heavy drinking were associated with significant increases in death by suicide, both in the modern era (1956–2005) and the late 19th century (1870–1894). Given the vast social, economic, and political differences between these two periods, the authors suggest that the alcohol-suicide relationship in Russia is particularly strong. Pridemore (2006) also found the same relationship between alcohol and increased suicide in a Russian sample. This investigation indicated that spirits (i.e. vodka), which may comprise 70–80% of all alcohol consumed in Russia, are especially relevant to the association between heavy drinking and suicide (Pridemore & Chamlin, 2006).

Anxiety sensitivity (AS), a cognitive vulnerability factor for many psychiatric disorders, has emerged a potential risk factor for death by suicide. AS is defined as a fear of the sensations that result from anxiety (Reiss et al., 1986), and is made up of three lower order factors which refer to fears of the physical, cognitive, and social consequences of anxiety (Zinbarg et al., 1997). It is associated with the development of a range of psychopathology including anxiety and mood disorders (Schmidt et al., 2006) and substance use disorders (Lejuez et al., 2006; Schmidt et al., 2007). Previous empirical work shows that measurement of AS in Russian samples is comparable to US samples (Kotov et al., 2005; Zvolensky et al., 2003; Zvolensky et al., 2005).

An emerging body of research indicates that the cognitive concerns subfactor of AS is significantly associated with elevated suicidal ideation (Capron et al., 2012a; Capron et al., 2012b; Schmidt et al., 2001). AS cognitive concerns refer to fears of mental incapacitation or losing control of mental processes in the context of stress or anxiety symptoms. Extant work has revealed that AS cognitive concerns appear to be associated primarily with suicidal ideation (Capron et al., 2012a; Capron et al., 2012c; Schmidt et al., 2001). The association between AS cognitive concerns and suicidal ideation is consistent with recent positive feedback models of suicide suggesting that those vulnerable to catastrophic cognitions (“I might lose control of my mind”), such as individuals with high AS cognitive concerns, are at increased risk of suicidal ideation. The Katz et al. (2011) model suggests that limbic-autonomic arousal and catastrophic thinking are mutually activating, thereby creating a positive feedback loop. Within this cycle, catastrophic ideation (e.g., high AS) becomes amplified over time, eventually producing suicidal ideation as the individual struggles to cope with the mounting distress.

Similarly, the AS physical concerns subfactor appears to be related to suicide attempt in the context of elevated AS cognitive concerns. Individuals with high AS physical concerns report things such as “It scares me when my heart beats rapidly” and “It scares me when I feel shaky”. In a sample of clinical outpatients who screened positive for PTSD, individuals with high AS cognitive concerns and low AS physical concerns were significantly more likely to have had a previous suicide attempt (Capron et al., 2012b). This finding is theoretically consistent with the interpersonal-psychological theory of suicide, specifically the concept of acquired capability (Joiner, 2005; Van Orden et al., 2010). The acquired capability for suicide is defined as a fearlessness of death and high tolerance for self-inflicted pain learned through repeatedly experiencing painful and otherwise provocative events (non-suicidal self-injury, combat exposure, numerous physical fights, etc.). Previous work has found that those high in AS have elevated fear of pain (Ocanes et al., 2010). This

suggests those with elevated AS physical concerns would be protected from suicide attempt because these individuals seem unlikely to seek out the painful and provocative experiences proposed by the interpersonal-psychological theory to be essential in acquiring the capability for suicide. Alternatively, individuals with low AS-physical concerns may be more willing to engage in these arousing activities and in the presence of suicidal ideation may be at elevated risk for suicide attempt.

Despite the extant work linking AS subfactors to elevated suicidality, there are still a number of notable gaps in the literature. First, the role of AS physical concerns in predicting suicide-related outcomes needs clarification. AS physical concerns interacted with AS cognitive concerns to predict suicide attempt among clinical outpatients screening for PTSD (Capron et al., 2012b). However, this interaction was not found using the IDAS suicidality subscale among samples of HIV positive individuals (Capron et al., 2012d) or cigarette smokers (Capron et al., 2012c). Based on the proposed theoretical connection between AS physical concerns and acquired capability for suicide, the lack of finding may be explained by the dependent variable (IDAS suicidality subscale) reflecting suicidal ideation rather than more serious suicide related outcomes, such as suicide attempt. Additionally, a limitation in the current literature is the lack of investigation in populations outside the United States. Cross-cultural examination of the AS-suicide relationship could allow us to ascertain whether this relationship is specific to the residents of the United States or whether this is a global phenomenon.

The current study sought to address these gaps in the extant AS – suicide literature by examining the association between AS cognitive concerns, AS physical concerns, and their interaction with both (1) a comprehensive measure of suicidality (BSS) and (2) previous suicide attempt, in a community sample of Russians. Russia's suicide rates are among the highest in the world and the current work on risk factors among Russians who die by suicide is limited to heavy alcohol use. Therefore, we controlled for hazardous alcohol use in all analyses.

Based on the extant work between AS cognitive concerns and suicidality (Capron et al., 2012c) we predicted that AS cognitive concerns would moderate the relationship between AS physical concerns and suicidality, such that those with high AS cognitive concerns and low AS physical concerns would be at the greatest risk of elevated suicidality. Based on the interpersonal-psychological theory of suicide, specifically the construct of acquired capability, and the extant literature on AS subfactors and suicide attempt (Capron et al., 2012b), we hypothesized that AS physical concerns would moderate the effect of AS cognitive concerns in predicting suicide attempt history.

2. Method

2.1 Participants

The sample was drawn from the population of adult residents of Moscow. Participants were recruited during the spring and summer of 2002 using a geographic sampling method (see Zvolensky et al., 2003, for a complete description). The final sample consisted of 390 participants representative of residents of Moscow, and was matched to the census on age

and income with no more than one percentage point difference for each demographic category. We were not able to match the sample perfectly on education and somewhat over-sampled individuals with college education. Overall, the participants average age was 43.55 years ($SD = 16.4$ years), 50.5% were female, and 61.8% were college educated.

2.2 Measures

Assessment adaptation procedures. All measures were adapted using a multistage procedure in accordance with contemporary standards for instrument translation. This adaptation process is fully explained in a separate report (see Kotov et al., 2005, for details). The adapted instruments were found to be psychometrically equivalent to the original measures.

Anxiety Sensitivity Index (ASI) is a 16-item questionnaire in which respondents indicate on a five-point Likert-type scale (0 = *very little* to 4 = *very much*) the degree to which they fear the sensations associated with anxiety symptoms (Reiss et al., 1986). The ASI has three lower-order factors that all load on a single higher-order factor across diverse populations (Zinbarg et al., 1997). The lower-order factors represent physical, cognitive, and social concerns, and the higher-order factor represents the global AS construct. The ASI has demonstrated good internal consistency across diverse populations (Peterson and Reiss, 1993), including Russians (Kotov et al., 2005); the measure was comparably reliable in the present investigation, with a coefficient alpha of .88 for global AS and .87, .79 and .61 for the physical, cognitive, and social concerns subfactors respectively.

Positive and Negative Affect Schedule – Negative Affect (PANAS) is a widely used 20-item self-report inventory designed to measure global emotional states at the time of assessment (Watson et al. 1988). Items fall into two 10-item subscales that assess positive and negative affect (PA and NA, respectively). Coefficient alpha for the PANAS-NA in this sample was .89, indicating good internal consistency.

Beck Scale for Suicidal Ideation (BSS) is a 21-item questionnaire in which respondents indicate on a three-point Likert-type scale the degree to which they endorse suicide related constructs such as suicidal ideation, intent to die and previous suicide attempts (Beck & Steer, 1991). In the current study previous suicide attempt was measured by dichotomizing BSS item 20 (i.e. I have never attempted suicide or I have attempted suicide). Comparable one-item questions of suicide attempt history have been used in previous work (Capron et al., 2012s; Schmidt et al., 2001). The BSS has demonstrated high internal reliability across multiple populations (Beck & Steer, 1991). The internal consistency of the BSS in the present sample was excellent (coefficient alpha = .95).

Alcohol Use Disorders Identification Test (AUDIT) is a 10-item measure of hazardous drinking including alcohol consumption, dependence and negative consequences (Saunders et al., 1993). The AUDIT has been used previously in comparable studies of Russian citizens (Zvolensky et al., 2003, 2008) and has been shown to have excellent psychometric properties overall (Saunders et al., 1993). The internal consistency of the AUDIT in the current sample was excellent (coefficient alpha = .93).

3. Results

Means, standard deviations, and bivariate correlations for the included measures are shown in Table 1. The BSS was most strongly correlated with the AUDIT. This is consistent with the previously reviewed literature that suggests heavy alcohol use is a prominent risk factor for suicide among Russians. Additionally, the BSS was significantly associated with ASI-cognitive and ASI-global. However, neither ASI-physical or ASI-social were significantly associated with the BSS, suggesting most of the relationship between ASI-global and the BSS is being driven by ASI-cognitive. Suicidal ideation ($BSS > 1$) was found in 13.0% of the sample and 2.1% reported a past suicide attempt. In addition, the PANAS-NA was also most strongly correlated with the AS-cognitive subfactor. Finally, the BSS showed a non-normal distribution, as expected, because suicide is a low base-rate phenomenon. Due to the literature that suggests that skewness and kurtosis will not make substantive difference in the results of large samples, we did not transform the BSS for these analyses (Tabachnick & Fidell, 2007).

Multiple regression was performed to investigate the impact of a number of factors on suicidality as measured by the BSS. The model contained 5 independent variables (negative affectivity, AUDIT total, ASI-physical, ASI-cognitive, and the ASI-physical X ASI-cognitive interaction). All variables were mean centered prior to inclusion in the model. Negative affectivity was included to control for general mood/anxiety pathology. The AUDIT was included to control for the previously reviewed association between alcohol use problems and suicide in this population. The full model containing all predictors was statistically significant, $F(5,369) = 19.85, p < .001$. The covariates, negative affectivity ($t = 2.36, \beta = .15, p = .019, sr^2 = .01$) and AUDIT ($t = 6.12, \beta = .30, p < .001, sr^2 = .09$) were significantly associated with suicidality. After accounting for negative affectivity and the AUDIT, ASI-cognitive ($t = 5.12, \beta = .38, p < .001, sr^2 = .07$) and the ASI-physical X ASI-cognitive interaction ($t = -5.53, \beta = -.34, p < .001, sr^2 = .08$) were significantly associated with suicidality. ASI-physical ($t = -1.79, \beta = -.11, p = .07, sr^2 = .01$) had a marginally significant relationship.

In the next step, we probed the hypothesized 2-way interaction between ASI-physical and ASI-cognitive (See Figure 1). As predicted, at high levels of ASI-cognitive (1 *SD* above the mean) the effect of ASI-physical was significant ($t = -4.33, \beta = -.30, p < .001, sr^2 = .05$), such that those participants who had high levels of ASI-cognitive and low levels of ASI-physical were at the greatest risk of elevated suicidality. The effect of ASI-physical at low levels of ASI-cognitive was not significant, as predicted ($p = .233$).

To further elucidate the impact of the different AS subfactors with different aspects of suicidal behavior a direct logistic regression was performed to assess the impact of the ASI-physical by ASI-cognitive interaction on the likelihood that patients would report a past suicide attempt. The model contained 5 independent variables (negative affectivity, AUDIT, ASI-physical, ASI-cognitive, ASI-physical X ASI-cognitive interaction). The full model was a significant predictor of suicide attempt history, $\chi^2(df=3, n=377) = 13.02, p = .005$. Among covariates, AUDIT ($OR = 1.15, Wald = 9.08, p = .003$) was significantly associated with past suicide attempt, but negative affectivity was not ($OR = 1.09, Wald = 2.15, p = .$

143). The ASI-physical X ASI-cognitive interaction was significant ($OR = .947$, $Wald = 5.95$, $p = .015$). After covarying for the effects of negative affectivity, AUDIT and their interaction, the main effects of ASI-physical ($p = .922$) and ASI-cognitive ($p = .359$) were not significant predictors of past suicide attempt.

In the next step, we probed the hypothesized 2-way interaction between ASI-physical and ASI-cognitive (See Figure 2). As predicted, at low levels of ASI-physical (1 SD below the mean) the effect of ASI-cognitive was significant ($OR = 1.64$, $Wald = 5.35$, $p = .021$) such that at low levels of ASI-physical and high levels of ASI-cognitive an individual was significantly more likely to have attempted suicide. Also as predicted, the effect of ASI-cognitive at high levels of ASI-physical was not significant ($p = .220$).

4. Discussion

The results of this investigation suggest that high AS cognitive concerns interact with low AS physical concerns to predict elevated suicidality among a community sample living in Russia. This result replicates Capron and colleagues (2012b) who found that the combination of high AS cognitive concerns and low AS physical concerns predicted previous suicide attempt among a sample of clinical outpatients with significant PTSD symptomatology. Further, these results help clarify the distinct roles of AS cognitive concerns and AS physical concerns in relation to increasingly severe suicide related outcomes.

The current findings add to a growing literature that suggests that AS cognitive concerns are associated with increased suicidality. By replicating this finding in a cross-cultural sample the current study adds to the increasing evidence that the AS cognitive-suicide relationship is not limited to specific subpopulations. In addition to Russians and clinic outpatients, the extant literature now reveals a significant association between AS cognitive concerns and suicidality among cigarette smokers (Capron et al., 2012c), HIV positive individuals (Capron et al., 2012d), US Air Force cadets (Capron et al., 2012b) and panic disorder patients (Schmidt et al., 2001).

The results also further clarify the role of AS physical concerns in relationship to the AS-suicide association. As predicted, based on the construct acquired capability from the interpersonal-psychological theory of suicide, the present study found that at low levels of AS physical concerns, individuals with high AS cognitive concerns are likely to have greater odds of a suicide attempt history. This makes sense given that those with high AS physical concerns are very unlikely to seek out the repeated painful and provocative events hypothesized by Joiner (2005) to be necessary in developing acquired capability. However, future studies should directly test this hypothesis by looking at the association of AS physical concerns with measures of acquired capability, such as the Acquired Capability for Suicide Scale (ACSS; Van Orden et al., 2008).

Given the high rates of suicide in Russia, it is promising that the results of this investigation implicate AS cognitive concerns as a mechanism that may account for increased suicide risk, above and beyond hazardous alcohol use, because AS has been shown to be amenable

to rapid amelioration. The utilization of brief interventions featuring psychoeducation and interoceptive exposure exercises have consistently reduced total AS and AS subfactors (Feldner et al., 2008; Keough & Schmidt, in press; Schmidt et al., 2007). Clinicians may benefit from implementing these AS reduction strategies with individuals who endorse elevated suicide risk as well as elevated ASI-cognitive scores.

It is important to note a few limitations of the present study. First, is the possibility that the relationship between the AS cognitive concerns by AS physical concerns interaction and suicide attempt may not generalize to actual death by suicide. However, suicide attempt history is the strongest predictor of death by suicide (Suominen et al., 2004). Second, the design of the study precluded us from examining the causal roles of AS subfactors in suicidality among the sample. Specifically, we were unable to ascertain whether these high AS cognitive and low AS physical scores preceded increased suicidality and whether modification of AS might reduce suicide risk. Future large-scale prospective studies are needed to help clarify these relationships. Third, the ASI was developed to measure AS as a unitary construct. Although the ASI is used frequently to look at AS subfactors (Schmidt et al., 2001; Stewart et al., 1997, Schmidt et al., 1999), it would have been ideal to measure the AS subfactors with the Anxiety Sensitivity Index-3 (Taylor et al., 2007). However, extant work has shown that AS cognitive concerns are consistently associated with suicide related outcomes whether being assessed with the ASI (Capron et al., 2012a) or the ASI-3 (Capron et al., 2012d). Fourth, our suicide attempt item came from the BSS (i.e. BSS item 20). It would have been preferable to measure it separately. However, using this method to measure suicide attempts has been used previously (Van Orden et al., 2008). Another limitation is that current AS levels may not be comparable to those during the time period when previous suicide attempts occurred. However, AS has been shown to be a trait-like construct that is stable over time (Maller & Reiss, 1992), unless treated (Keough & Schmidt, in press). Fifth, a further limitation of the study is lack of psychiatric diagnoses. However, we have attempted to minimize this issue by covarying for negative affect, which is associated with both mood and anxiety disorder diagnoses (Clark & Watson, 1991). Sixth, recent work has found that AS may have a categorical-dimensional structure (Bernstein et al., 2007). However, due to the hypothesized relationship between AS physical concerns and acquired capability as well as the hypothesized relationship between AS cognitive concerns and the positive feedback model of suicidality, we felt using the traditional (Zinbarg et al., 1997) AS subfactors was most appropriate. However, future research in this area should examine the relationship between the AS taxon and suicide related outcomes.

The current investigation also had a number of strengths. Primarily, it was the first examination of the relationship between AS and suicide in a Russian population. Not only does Russia have one of the highest rates of suicide worldwide, but the extant work elucidating risk factors for suicide among Russians has focused primarily on targets that may be difficult to change given Russia's social and political environment (e.g. heavy alcohol use, poor economy). AS has proven to be readily malleable with proper intervention, so it may be an ideal choice as an initial intervention target for clinicians. Further, this cross-cultural examination provides further evidence that the AS-suicide connection is global, not specific to people living in the United States. Second, this was the first study in the AS-suicide literature to assess suicidality via both an item about previous suicide attempt and a

full, psychometrically validated scale of suicidality (BSS). Further, this is the first assessment of suicidality using the BSS in the AS-suicide literature. Inclusion of the BSS into this area is vital, given its standing as one of the most widely used measures of suicidality (Brown, 2000). The present report provides more evidence that AS cognitive concerns and AS physical concerns play a significant role in increased suicidality. However, future research is needed to examine this relationship prospectively, as well as whether targeting AS physical or AS cognitive concerns reduces suicide related outcomes or death by suicide.

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Figure 1.

Interaction of ASI cognitive score and ASI physical score predicting current suicidality among an epidemiological sample of Russian citizens. This analysis controlled for negative affectivity and AUDIT total. ASI = Anxiety Sensitivity Index. AUDIT = Alcohol Use disorders identification test. BSS = Beck Suicide Scale.

Figure 2.

Interaction of ASI cognitive score and ASI physical score predicting suicide attempt history among an epidemiological sample of Russian citizens. This analysis controlled for negative affectivity and AUDIT total. ASI = Anxiety Sensitivity Index. AUDIT = Alcohol Use disorders identification test. BSS = Beck Suicide Scale.

Table 1

Means, Standard Deviations and Intercorrelations for Included Measures

Measure	M	SD	1	2	3	4	5	6	7
1. AUDIT	3.88	5.47	-						
2. ASI - Global	17.34	11.29	.09	-					
3. ASI - Physical	8.30	6.74	.07	.91**	-				
4. ASI - Cognitive	2.83	3.30	.21**	.79**	.61**	-			
5. ASI - Social	6.21	3.54	-.05	.70**	.44**	.43**	-		
6. BSS	.56	2.83	.30**	.16**	.09	.27**	.08	-	
7. PANAS NA	6.41	6.89	.26**	.52	.48**	.64**	.13*	.23**	-
8. Previous Attempt	.02	.14	.22**	.06	.01	.12*	.06	.54**	.16**

**
p < .001.

*
p < .05.

AUDIT = Alcohol use disorders identification test. ASI = Anxiety sensitivity index. BSS = Beck suicide scale. PANAS NA = Negative affect scale.