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Suppressing the White Bears interacts with Anxiety Sensitivity in the prediction of Mood and Anxiety Symptoms

Meghan E. Keough^{1,*}, Kiara R. Timpano², Christina J. Riccardi¹, and Norman B. Schmidt¹

¹ Florida State University

² Massachusetts General Hospital, Florida State University

Abstract

Suppression is a commonly used strategy to manage unwanted thoughts by attempting to actively remove them from awareness. However, research has shown that this cognitive strategy often results in the paradoxical effect of increasing the frequency of unwanted thoughts. While the association between thought suppression and mood and anxiety symptoms has been repeatedly demonstrated, relations between this cognitive strategy and other anxiety risk factors such as anxiety sensitivity (AS) are unexplored. Using a nonclinical sample of young adults ($N = 414$), the current investigation sought to more thoroughly investigate the association between AS and thought suppression as well as explore their synergistic effect on anxiety symptomatology. As hypothesized, thought suppression and AS were positively associated. Moreover, AS and thought suppression interacted to predict elevated levels of panic and obsessive compulsive symptomatology.

Keywords

Anxiety Sensitivity; Thought Suppression; Anxiety; Panic; Obsessive Compulsive

Introduction

A common cognitive strategy for dealing with distressing thoughts is to attempt to suppress the unwanted and intrusive thoughts from one's mind (Wegner & Zanakos, 1994). Early work on the concept of thought suppression included the classic white bear experiments by Wegner and colleagues (1987) in which participants were instructed not to think about a white bear. Although most individuals perceive thought suppression as an intuitive technique for providing relief from distressing cognitions, the white bear studies were the first to demonstrate that this strategy often results in the opposite of its desired effect. That is, thought suppression paradoxically tends to increase the frequency of the suppressed thought. This effect has been repeatedly demonstrated across various research paradigms and utilizing different types of thoughts, including nonpersonally relevant thoughts (e.g., a white bear) and intrusive or unwanted thoughts identified by the participant (for a review see Abramowitz, Tolin, & Street, 2001).

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* Correspondence should be addressed to keough@psy.fsu.edu, Fax: 850-644-7739. .

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In an effort to assess thought suppression, Wegner and Zanakos (1994) constructed the White Bear Suppression Inventory (WBSI). Elevated scores on this measure have been associated with numerous and varied negative outcomes including increased suicidal ideation and difficulty with smoking cessation (Pettit et al., 2009; Toll, Sobell, Wagner, & Sobell, 2001). In addition, the utilization of thought suppression has been robustly associated with increased mood and anxiety symptoms (Erskine, Kvavilashvili, & Kornbrot, 2007; Hoping & de Jong-Meyer, 2003; Muris, Merckelbach, & Horselenberg, 1996) as well as mood and anxiety disorders (Rassin & Diepstraten, 2003; Rassin, Diepstraten, Merckelbach, & Muris, 2001; Rude & McCarthy, 2003).

While the association between thought suppression and anxiety symptoms is well established, there is a dearth of research focused on the link between this cognitive strategy and other anxiety risk factors such as anxiety sensitivity (AS). The original WBSI validation study was the only investigation to date that examined the link between thought suppression and AS (Wegner & Zanakos, 1994). AS refers to an individual's sensitivity toward and interpretation of anxiety related sensations (Reiss, 1991; Reiss & McNally, 1985), and is among the best established cognitive risk factors for anxiety psychopathology (Zvolensky, Schmidt, Bernstein, & Keough, 2006). Individuals low in AS do not interpret physical sensations related to anxiety as harmful, whereas those high in AS interpret these sensations as an indication of impending illness, embarrassment, loss of cognitive control or other dire consequence (Stewart, Peterson, & Pihl, 1995). Individuals with panic disorder as well as other anxiety disorders report higher levels of AS than the general population (Olatunji & Wolitzky-Taylor, 2009). Among nonclinical samples, prospective studies indicate that AS predicts future occurrences of anxiety symptoms, spontaneous panic attacks and anxiety disorders, with some specificity for panic disorder (Hayward, Killen, Kraemer, & Taylor, 2000; Schmidt, Lerew, & Jackson, 1999; Schmidt, Zvolensky, & Maner, 2006). Examination of AS among individuals with major depression indicates that they too evidence increased levels of AS compared to the general population (Taylor, Koch, Woody, & McLean, 1996).

Given how anxiogenic catastrophic thoughts associated with AS can be (e.g., My heart beating fast means I am going to have a heart attack; Difficulty concentrating indicates I am losing my mind.), it stands to reason that individuals who are high in AS would be motivated to rid themselves of these distressing thoughts and may be likely to employ thought suppression. In their original WBSI investigation, Wegner and Zanakos (1994) found that increased AS was associated with the tendency to use thought suppression. However, the brief methodological description provided by the authors limits the conclusions that can be drawn from these results. Other than noting when the study data were collected and the number of participants, Wegner and Zanakos (1994) did not delineate the methodology or sample characteristics of this investigation. There was also no inclusion of third variables known to be associated with both AS and thought suppression such as depression and general levels of anxiety when examining the association between AS and the WBSI. Therefore, although the Wegner study was an important first step in understanding the relationship between thought suppression and AS, there is an obvious need for further work to clarify the association between these two constructs.

The aims of the current investigation are in large part exploratory and are intended to further the literature on the association between AS and thought suppression, particularly with regard to how these factors might be related to anxiety pathology. First, we sought to replicate the reported association between AS and thought suppression identified by Wegner and Zanakos (1994) in order to more definitively establish this link. The current research builds on their findings by including a larger sample and describing the sample and methodology in further detail. The correlation between AS and the WBSI will also be

examined in light of third variables known to be associated with both, including general anxiety and depressive symptomatology.

Additionally, we sought to gain a better understanding of how AS and thought suppression might interact to predict the symptoms of two distinct types of anxiety pathology that have been reliably associated with AS and thought suppression: panic and obsessive compulsive disorder (OCD). While the AS literature has clearly established that AS is a risk factor for panic (e.g., Hayward, et al., 2000; Schmidt, et al., 2006), the link between panic and thought suppression has yet to be thoroughly investigated. Individuals who experience catastrophic misinterpretations regarding their bodily sensations associated with panic may attempt to eliminate these thoughts through suppression. The paradoxical increase in these thoughts could then result in increased distress, greater attention toward the feared sensations and ultimately panic attack symptomatology (see Figure 3). OCD has been associated with AS (Olatunji & Wolitzky-Taylor, 2009) as well as the use of thought suppression to deal with intrusive thoughts (Altin & Gencoz, 2007; Smári & Hólmsteinsson, 2001). It has been postulated that intrusive thoughts may be particularly distressing for individuals with OCD because of their tendency to overvalue both the consequences and significance of these thoughts (Rassin, et al., 2001). Among those with OCD, an elevation in AS would amplify the anxiety and distress associated with these overvalued and distressing thoughts while the use of thought suppression could have the unintended effect of increasing their frequency. This chain of events could ultimately lead to a greater risk for OCD symptomatology and distress. Thus, we hypothesized that individuals who experience catastrophic AS type thoughts and employ thought suppression would demonstrate a greater risk for experiencing elevations in panic and OC symptomatology.

Finally, there has been some debate within the thought suppression literature regarding whether or not the WBSI taps a unitary construct (Blumberg, 2000; Hoping & de Jong-Meyer, 2003; Palm & Strong, 2007; Rassin, 2003). Some research suggests that a two factor solution, with one factor assessing the tendency to experience intrusive thoughts and the second assessing the tendency to suppress thoughts may provide a better index of this construct (Rassin, 2003). Thus, to ensure that we were assessing the relationship between thought suppression and not simply the intrusion of thoughts, we also examined the WBSI suppression and intrusion subscales.

Methods

Participants

Participants were recruited from a pool of introductory level psychology undergraduates and received class credit for their participation. A total of 414 individuals participated in the study. Participants were 18 years old or older ($M = 18.83$, $SD = 2.40$) and primarily female (71%). The racial and ethnic representation of the study participants is as follows, Caucasian (69.3%), Hispanic/Latino (12.6%), African American (11.8%), Asian (4.3%) and other (1.9%).

Procedure

Participants signed up for a testing session through the department's confidential electronic research sign-up database. Upon arrival, participants read and signed a consent form. The study was completed in a group setting of approximately 10-30 individuals. After completing the battery of self-report measures, participants were debriefed and thanked for their time. The Institutional Review Board at Florida State University approved the study prior to data collection.

Measures

Anxiety Sensitivity Index (ASI)—The ASI is a 16-item questionnaire that measures respondents' fear of consequences resulting from anxiety-related bodily sensations, anxiety sensitivity (Reiss, Peterson, Gursky, & McNally, 1986). Each item is rated on a five-point Likert scale with the summation of all items resulting in the final score.

Beck Anxiety Inventory (BAI)—The BAI is a 21-item measure of general anxiety symptomatology (Beck, Epstein, Brown, & Steer, 1988). Respondents rate the extent to which they have been bothered by the 21 anxiety symptoms over the past week. The BAI has been widely used and shown to be both valid and reliable in clinical and nonclinical samples (Beck, et al., 1988; Borden, Peterson, & Jackson, 1991).

Beck Depression Inventory (BDI-II)—The BDI-II is a 21-item measure that assesses severity of depressive symptomatology (Beck, Steer, & Brown, 1996). This measure has been shown to be valid and reliable among college and clinical samples (Dozois, Dobson, & Ahnberg, 1998; Steer & Clark, 1997) and has demonstrated discriminative validity (Riskind, Beck, Brown, & Steer, 1987).

Panic Disorder Self-Report (PDSR)—The PDSR is a 24-item self-report measure designed to assess recent panic disorder symptomatology (Newman, Holmes, Zuellig, Kachin, & Behar, 2006). Respondents indicate whether they have had a panic attack in the past six months and then whether it came out of the blue. If they answer in the affirmative to both of those questions, questions regarding the DSM-IV panic disorder criteria are then completed. Items are totaled to produce one composite score. This measure demonstrates good test-retest reliability as well as convergent and divergent validity (Newman, et al., 2006).

Obsessive Compulsive Inventory-Revised (OCIR)—The OCIR is an 18-item self-report measure designed to assess common OCD symptoms (Foa et al., 2002). Respondents rate the degree to which they have been bothered by each symptom. The OCIR has been found to demonstrate good test-retest reliability, good internal consistency, and to differentiate between patients with and without OCD (Foa, et al., 2002).

White Bear Suppression Inventory (WBSI)—The WBSI is a 15-item measure designed to assess the tendency to suppress unwanted thoughts (Wegner & Zanakos, 1994). Respondents rate the extent to which they agree with each item. The measure has been shown to have good internal consistency, test-retest reliability and convergent validity (Muris, et al., 1996).

Results

As expected, the ASI and WBSI, including its subscales, were positively associated with one another and with the anxiety and depression symptom measures (see Table 1). The correlations between the WBSI and the anxiety and depression measures ranged from .52 to .23 and were all significant at the $p < .001$ level. To determine whether the correlation between the WBSI and ASI was due to their common association with depression and general anxiety, we examined the correlation between the WBSI and ASI controlling for the BAI and BDI-II using linear regression analyses. Despite controlling for both the BAI and BDI-II, the WBSI and ASI remained significantly associated with one another ($\beta = .33$, $t(410) = 6.31$, $p < .001$).

To examine our hypothesis that individuals with elevations on both ASI and thought suppression would be at an increased risk to experience panic and OC symptoms, we constructed hierarchical linear regressions with the PDSR and OCIR serving as dependent variables in separate equations. To assess the main effects of the ASI and WBSI, they were entered into the second step. The ASI and WBSI interaction term was entered into the second step to assess their synergistic effect on both the PDSR and OCIR. The ASI and WBSI scores were centered in order to reduce multicollinearity (Holmbeck, 2002). The simultaneous inclusion of the ASI and WBSI main effects along with the interaction term in the second step of the regression equation ensures that the observed interaction is not attributable to the main effects of these variables (Cohen & Cohen, 1983). Results indicate that the main effects for the ASI and WBSI were significantly associated with the PDSR (ASI, $\beta = .28$, $t(413) = 5.08$, $p < .001$; WBSI $\beta = .12$, $t(413) = 2.22$, $p = .03$) and OCIR (ASI, $\beta = .38$, $t(412) = 7.96$, $p < .001$; WBSI $\beta = .25$, $t(412) = 5.23$, $p < .001$). In addition, these main effects were qualified by a significant interaction with both the PDSR ($\beta = .12$, $t(413) = 2.47$, $p = .01$) and OCIR ($\beta = .11$, $t(412) = 2.56$, $p = .01$). The same pattern of effects was found when gender was entered as a covariate in the above equations.

In order to probe the interactions and employing the same statistical procedure outlined above, we assessed the simple effects of the ASI among low and high levels of the WBSI (i.e. 1 SD above and 1 SD below the WBSI mean) for both dependent measures. Figures 1 and 2 depict the expected values of the PDSR and OCIR at 1 SD above and below the means on the ASI and WBSI. The pattern of results for the PDSR and OCIR mirror one another. Specifically for both the PDSR and OCIR, individuals with high and low scores on the WBSI experienced an increase in their PDSR and OCIR scores as ASI scores increased. The effect for the PDSR among those with high WBSI scores was statistically significant, whereas the effect for those with low WBSI scores approached statistical significance (see Figure 1). Figure 2 demonstrates that the effects for the OCIR were significant at both high and low WBSI levels but the effect was larger for those with high WBSI scores. These results support our hypothesis that individuals who exhibit both a fear of anxiety related bodily sensations and the tendency to use thought suppression are at increased risk for experiencing problems with panic and obsessive-compulsive symptoms.

In order to determine whether the pattern of effects differed across the two WBSI subfactors, the regression analyses were repeated replacing the total WBSI score with either the WBSI intrusion or suppression subscale. As can be seen in Table 1, the WBSI intrusion and suppression subscales were highly correlated with the total WBSI scale and therefore shared nearly identical correlations with the other study measures. Based on these correlations, it is not surprising that the results for the intrusion and suppression subscales mirror that of the total WBSI scale. Specifically, the WBSI intrusion scale interacted with the ASI to predict the PDSR ($\beta = .11$, $t(414) = 2.32$, $p = .02$) and OCIR ($\beta = .10$, $t(413) = 2.42$, $p = .02$). Similarly, the WBSI suppression scale interacted with the ASI to predict the PDSR ($\beta = .11$, $t(413) = 2.25$, $p = .03$) and OCIR ($\beta = .10$, $t(412) = 2.24$, $p = .03$).

The same analytic procedures as outlined above for the total scale were used to probe the subscale significant interactions. The pattern of results for the intrusion and suppression subscales are consistent with the full scale WBSI pattern of results and indicate that individuals who experience a fear of anxiety related bodily sensations and both elevations in the tendency to suppress thoughts and/or elevations in intrusive thoughts are most at risk for experiencing greater problems with anxiety and depression (see Table 2).

Discussion

Consistent with the seminal WBSI investigation by Wegner and Zanakos (1994), the results indicate that AS and thought suppression, as measured by the WBSI, were strongly correlated with one another. This relationship was found above and beyond the shared association both AS and thought suppression hold with general anxiety and depression. These findings suggest that individuals who believe anxiety related sensations are an indication of impending harm also show an increased likelihood to attempt to suppress unwanted thoughts.

Our hypotheses about both the potential main and synergistic effects of AS and thought suppression were supported with respect to OCD and panic symptoms. As has been consistently shown in previous investigations, an elevation in AS was associated with OCD and panic symptoms (e.g., Hayward, et al., 2000; Olatunji & Wolitzky-Taylor, 2009; Schmidt, et al., 2006). An individual's tendency to attempt to suppress unwanted thought was also found to be associated with both symptom measures. Above and beyond the main effects of AS and thought suppression, individuals with a dual vulnerability in terms of the tendency to interpret arousal sensations in a maladaptive/catastrophic manner as well as the tendency to suppress unwanted thoughts, show increased levels of OCD and panic symptoms. This suggests that the combination of these two factors work in concert to place an individual at risk for experiencing OCD and panic symptomatology. This pattern of findings is consistent with a growing literature demonstrating that AS may interact synergistically with other factors, including stress (Zvolensky, Kotov, Antipova, Leen-Feldner, & Schmidt, 2005), genetics (Schmidt et al., 2000), and other cognitive risk factors (Schmidt, Richey, Cromer, & Buckner, 2007; Timpano, Buckner, Richey, Murphy, & Schmidt, 2009).

Several avenues of future research emerge from the present findings. First, a more clear delineation of the mechanism accounting for the relationship between AS and thought suppression is warranted. In particular, it is possible that different mechanisms might affect how these constructs impact the specific anxiety disorders we examined, as depicted in Figure 3. For panic symptoms, it is possible that AS first generates the anxiety response to the physical sensations of panic, and that thought suppression is then utilized against the AS-related thoughts as an anxiety-reducing strategy. The use of thought suppression would likely lead to an increase in these thoughts, which would in turn lead to an increase in anxiety and feared sensations. With regard to OCD, it may be that AS amplifies the experience of anxiety produced by a triggering intrusive thought. That is, those individuals with higher levels of AS might perceive the anxiety symptoms they experience as more dangerous, which could in turn increase the urge or desire to perform an anxiolytic response, such as thought suppression. Once again, such responses could lead to an increase in the distressing intrusive thoughts. Thus, it seems likely that although both groups may be utilizing thought suppression as an anxiolytic strategy, the types of thoughts being suppressed and the motivation behind their suppression may be distinct. Future investigations are needed to determine whether suppressed thoughts and motivations to engage in this cognitive strategy vary across the anxiety disorders.

There has been some debate within the WBSI literature as to whether this questionnaire solely measures the tendency to suppress thoughts or whether it also assesses the frequency of intrusive thoughts (Blumberg, 2000; Hoping & de Jong-Meyer, 2003; Palm & Strong, 2007; Rassin, 2003). However, our findings are consistent with a unidimensional model since the subscales are highly intercorrelated as well as being highly correlated with the total scale. Not surprisingly, the intrusion and suppression results reflected the full scale results. These findings provide further support for the notion that the WBSI is best conceptualized

as measuring a unitary construct of thought suppression (Altin & Gencoz, 2007; Palm & Strong, 2007; Wegner & Zanakos, 1994)

This study should be considered in light of its limitations and opportunities for subsequent research. The correlational nature of the current investigation precludes any conclusions about causality. Carefully designed experimental investigations will be needed to tease apart the specific relationships between thought suppression, AS, and anxiety pathology. While our sample was composed of a substantial proportion of individuals who reported significant panic and OCD symptomatology, reliance on a nonclinical sample prohibits us from generalizing our findings to clinical populations of individuals with panic disorder, or OCD. Clinical investigations are called for to determine whether these results generalize to clinical samples.

The current study adds to the literature by suggesting that AS and thought suppression share a robust association and that their interplay predicts anxiety symptomatology. The study results also provide further evidence of the importance of examining multiple risk factors and their interplay in the assessment of anxiety and its disorders. Continued investigation into thought suppression has the potential to provide clearer conceptualization of the cognitive processes at play in anxiety as well as areas for the enhancement of anxiety treatment and prevention.

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Figure 1.

Panic Symptomatology Predicted by the Interaction Between the ASI and WBSI.

Note. ASI = Anxiety Sensitivity Index; WBSI = White Bear Suppression Inventory; PDSR = Panic Disorder Self-Report; ASI_low = 1 SD below the Anxiety Sensitivity Index mean; ASI_high = 1 SD above the Anxiety Sensitivity Index mean.

Figure 2. Obsessive Compulsive Symptomatology Predicted by the Interaction Between the ASI and WBSI.
Note. ASI = Anxiety Sensitivity Index; WBSI = White Bear Suppression Inventory; OCIR = Obsessive Compulsive Inventory-Revised; ASI_low = 1 SD below the Anxiety Sensitivity Index mean; ASI_high = 1 SD above the Anxiety Sensitivity Index mean.

Figure 3. Hypothesized models for the role anxiety sensitivity and thought suppression play in panic and OCD symptomatology.
Note. Red arrows represent the theoretical starting point in each model.

Table 1

Bivariate Correlations, Means, and Standard Deviations for Study Variables.

	Means (SD)	WBSI- Total	WBSI- Int	WBSI- Supp	ASI	BAI	BDI-II	PDSR	OCIR
WBSI-Total	45.28 (11.74)	-							
WBSI-Int	17.69 (5.01)	.93	-						
WBSI-Supp	27.59 (7.32)	.97	.81	-					
ASI	15.92 (10.35)	.52	.48	.50	-				
BAI	8.64 (9.32)	.45	.40	.44	.63	-			
BDI-II	7.70 (7.87)	.51	.46	.50	.49	.58	-		
PDSR	1.86 (4.46)	.26	.23	.26	.34	.47	.34	-	
OCIR	12.81 (11.01)	.45	.41	.44	.51	.47	.52	.22	-

Note. Zero-order correlations between study variables.

All correlations significant at $p < .001$

WBSI-Total = White Bear Suppression Inventory Total Score; WBSI-Int = White Bear Suppression Inventory Intrusion Subscale; WBSI-Supp = White Bear Suppression Inventory Suppression Subscale; ASI = Anxiety Sensitivity Index; BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory; PDSR = Panic Disorder Self-Report; OCIR = Obsessive Compulsive Inventory-Revised.

Table 2

Simple effects of ASI on anxiety symptoms, given either high or low levels on WBSI subscales.

	WBSI-Intrusion			WBSI-Suppression		
	Low		High	Low		High
	β	p	β	β	p	β
PDSR	.17	.03	.36	.14	.07	.33
OCIR	.47	<.001	.29	.27	<.001	.44

Note. Low = 1 SD below the mean; High = 1 SD above the mean; WBSI-Intrusion = White Bear Suppression Inventory Intrusion Subscale; WBSI-Suppression = White Bear Suppression Inventory Suppression Subscale; PDSR = Panic Disorder Self-Report; OCIR = Obsessive Compulsive Inventory-Revised.