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Obsessive Compulsive Symptom Dimensions and Suicide: The Moderating Role of Anxiety Sensitivity Cognitive Concerns

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Abstract Extant work on the relationship between obsessive–compulsive disorder (OCD) and suicide is scarce. Moreover no research has examined potential moderators that may increase risk for suicide among those with OCD. The current study examined the moderating role of anxiety sensitivity (AS) cognitive concerns. The cognitive concerns subscale of AS, which reflects fears of cognitive dyscontrol, has been found to be associated with the obsessions dimension of OCD and increased suicidality in a number of populations. The sample included 80 patients (3.8 % with a primary OCD diagnosis) recruited from the community to participate in a larger clinical trial investigating the effects of an AS intervention on suicide. Results indicated the obsessive dimension of OCD was associated with increased suicidality. Additionally, AS cognitive concerns moderated the relationship between these variables. Future research should examine the relationships between these constructs prospectively. Results of this investigation highlight the importance of assessing suicidal risk as part of a comprehensive OCD assessment.

Keywords Comorbidity · Obsessive–compulsive and related disorders · Suicidal behavior · Cognitive vulnerability factors

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Introduction

Suicide is currently the 10th leading cause of death in the United States (CDC 2013). According to the National Comorbidity Survey, approximately 70 % of individuals with a lifetime history of suicide attempt met criteria for at least one anxiety disorder (Sareen et al. 2005). In addition, more recent research has found significant effects for anxiety disorders on suicide, even after controlling for other relevant diagnoses. For example, Cougle et al. (2009), found a significant relationship between anxiety disorders and suicide after adjusting for the effects of borderline personality disorder and anti-social personality disorder. Nepon et al. (2010) extended these findings by including every Axis I and Axis II diagnosis as a covariate. Even after adjusting for the effects of these diagnoses, anxiety disorders remained significantly associated with increased suicide attempts.

The anxiety disorders most consistently linked with suicidality are post-traumatic stress disorder (PTSD) and panic disorder (PD). A recent study found that PTSD was one of only four diagnoses that contributed significant risk to suicide attempts (Bolton and Robinson 2010). In addition, Nock et al. (2009) found that PTSD predicted which suicide ideators go on to make an attempt. However, findings regarding the relationship between PD and suicide are somewhat mixed. The first large-scale evaluation of this relationship found individuals diagnosed with PD, compared to other diagnoses, had significantly greater rates of suicidal ideation and more previous suicide attempts even after controlling for co-occurring mood and drug pathology (Weissman et al. 1989). Since this initial investigation, a number of studies have demonstrated a relationship between PD and suicide (Cooper-Patrick et al. 1994; Cox et al. 1994; Friedman et al. 1992), whereas others have not (Beck et al. 1991; Rudd et al. 1993).

Despite the substantial literature examining the associations between PTSD, PD, and suicide, extant work on the relationship between other anxiety disorders, namely obsessive compulsive disorder (OCD),[1] and suicide is scarce. However, recent investigations have found high rates of suicidal behavior among individuals with OCD. For example, several studies have suggested that between 10 and 27 % of those suffering from OCD will attempt suicide at least once in their lifetime (Kamath et al. 2007; Torres et al. 2007). When examining various aspects of suicidality in a large sample of primary OCD patients (N = 582), Torres and colleagues found that 36 % of the sample reported a lifetime history of suicidal thoughts, 20 % had made suicidal plans, 11 % had attempted suicide at least once, and 10 % had current suicidal ideation. Interestingly, it appears that the obsessions dimension of OCD is particularly relevant to suicidality whereas the compulsions dimension is not (Kamath et al. 2007; Torres et al. 2011).

The obsession dimension of OCD is characterized by recurrent and persistent thoughts and/or images that are experienced as intrusive and unwanted causing subsequent distress and impairment (American Psychiatric Association 2013). Existing models of obsessional symptoms associate misappraisals of naturally occurring intrusive thoughts as highly meaningful leading to increased behaviors aimed at controlling or suppressing the thoughts (Purdon 2008). Similar to Baumeister's escape theory of suicide (Baumeister 1990), it has been suggested that these distressing thoughts coupled with high levels of negative affect may lead one to consider suicide as a possible solution to escape from the escalating pain and suffering (Balci and Sevincok 2010). Despite these suggested associations, no research has examined potential mechanisms that may account for the apparent associations among obsessions and suicidality.

One potential mechanism that could be influencing the virtually unexplored association between these two variables (i.e., OC obsessions and suicide) is anxiety sensitivity (AS). AS, otherwise known as a "fear of fear", refers to one's fear of anxiety and anxiety-related sensations arising from the belief that these sensations will have negative physical, psychological, and/or social consequences (Reiss and McNally 1985). AS, as measured by the Anxiety Sensitivity Index-3, comprises three subfactors including physical, cognitive and social concerns (Taylor et al. 2007). The cognitive concerns subscale of AS, which reflects fears of cognitive dyscontrol (e.g., "When my thoughts seem to

speed up, I worry that I might be going crazy"), has frequently been associated with pathological worry (Rector et al. 2007). More recently, research has demonstrated (Raines et al. 2014; Wheaton et al. 2012) that the cognitive dyscontrol subscale uniquely predicts difficulties with unacceptable thoughts (i.e., obsessions). It is possible that the recurrent and intrusive nature of obsessive thoughts leads one to conclude that they have lost control over their cognitive capacities. Indeed, when examining attributions for thought suppression, Tolin et al. (2002) found that OCD patients reported a greater belief in internal, negative attributions of their suppression failure (e.g., mental weakness) than did non-anxious controls.

A parallel line of research has also uniquely connected the cognitive concerns dimension of AS to suicide. For example, Schmidt et al. (2001) found that the cognitive dimension of AS was significantly associated with suicidal ideation in a group of patients with PD. Likewise, more recently Capron and colleagues found that AS cognitive concerns were associated with suicidal ideation in a number of populations with elevated suicide rates including HIV patients, outpatients with elevated PTSD symptomatology, cigarette smokers, and Russian citizens (Capron et al. 2012a, b, d, e). Within several of these investigations, AS cognitive concerns operated as a moderator between specific risk factors and suicide (Capron et al. 2012b, d, e). Given the extant literature demonstrating a relationship between fears of cognitive dyscontrol and the obsessions dimension of OCD, as well as the mounting evidence demonstrating a relationship between fears of cognitive dyscontrol and increased suicidal ideation, it stands to reason that the cognitive concerns subfactor of AS may be an important moderator of the association between OC obsessions and suicidality.

Based on these findings, the current study sought to examine the specific nature of the relationship between OCD symptom dimensions and suicide. Participants included 80 individuals recruited from the local community to participate in a larger clinical trial investigating the effects of an AS intervention on suicide. In an effort to replicate previous research, we hypothesized that the obsession dimension of OCD would be most associated with increased suicidality even after controlling for potentially confounding suicidal risk factors such as general levels of depression and anxiety, trauma symptoms, and alcohol use. Next, we hypothesized that the cognitive concerns dimension of AS would be a significant predictor of suicidality, even after accounting for the effects of the aforementioned covariates. Finally, it was hypothesized that there would be a significant AS cognitive concerns by OCD obsession interaction, such that individuals with increased obsessions who also demonstrated elevated levels of AS cognitive concerns would be at even greater risk

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[1] It should be noted that due to changes in the DSM-5, OCD is no longer diagnosed as an anxiety disorder. However, OCD has a long history of being considered in the context of these disorders.

for suicidality compared to those individuals with lower levels of AS cognitive concerns.

Method

Participants

The current sample consisted of 80 individuals recruited from the community to participate in a larger randomized clinical trial investigating the effects of a computerized treatment targeting specific risk factors, namely AS, associated with PTSD, substance use, anxiety, and suicide. To be eligible for inclusion, participants had to be 18 years of age or older, English speakers, and report elevated levels of AS cognitive concerns. Participants were excluded if they were suffering from psychotic and/or bipolar-spectrum disorders, were not stabilized on medication, or were at imminent risk to themselves or others. The ages of participants ranged from 18 to 68 ($M = 39.76$, $SD = 16.07$). The sample was primarily female (58.7 %). 51.3 % were single, 15 % married, 5 % separated, 1.3 % cohabitating, and 27.4 % were divorced or widowed. The race/ethnicity was distributed as such: 66.3 % White, 21.3 % Black, 3.8 % Hispanic, 1.3 % Asian, and 7.3 % Other (e.g., biracial). With regard to diagnoses, 43.9 % of the sample had a primary anxiety diagnosis, 21.3 % had a primary trauma and stressor-related diagnosis, 20.1 % had a primary mood diagnosis, 5.1 % had a primary obsessive–compulsive and related disorder diagnosis (e.g., 3.8 % OCD and 1.3 % Hoarding), 3.8 % had a primary substance-related diagnosis, and 5.8 % had another current diagnosis (e.g., Anorexia Nervosa).

Procedure

Participants were recruited from the community through various media outlets including newspaper advertisements and flyers. Interested participants, who were deemed potentially eligible after an initial screening process, were scheduled for a baseline appointment during which they completed a battery of self-report questionnaires and a semi-structured diagnostic interview for the DSM-IV-TR (First et al. 1996). After the baseline assessment, participants were randomly assigned to either a cognitive anxiety sensitivity treatment or a health information control condition. Following the treatment phase, participants were followed up 1 month post-treatment. The current report utilizes data collected during the baseline appointment, which took place prior to randomization and the onset of treatment. Informed consent was obtained from all participants after the nature of the procedures was fully

explained. The procedures were approved by the university's institutional review board.

Measures

Clinician Administered

Structured Clinical Interview for DSM-IV Axis I Disorders The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First et al. 1996) is a widely administered and well-validated semi-structured interview intended to assess DSM-IV Axis I diagnoses. The SCID was administered by highly trained, advanced doctoral students. Training included reviewing SCID training tapes, observing live SCID administrations, and conducting SCID interviews with a trained interviewer. Feedback was provided throughout the training process until the students demonstrated high reliability. In addition, all SCIDs were presented to and reviewed by a licensed clinical psychologist. The rate of agreement between clinical interviewers within our laboratory has been found to be over 80 % with a kappa value of .77 (Timpano and Schmidt 2012).

Self-report

Anxiety Sensitivity Index-3 (ASI-3) The ASI-3 is an 18-item self-report questionnaire designed to measure fears of physiological arousal (Taylor et al. 2007). The multi-dimensional scale assesses common subfactors of anxiety sensitivity, namely physical, cognitive, and social concerns. Respondents were asked to rate the degree to which they agreed with statements (e.g. "It scares me when my heart beats rapidly", "When I cannot keep my mind on a task, I worry that I might be going crazy" and "I worry that other people will notice my anxiety") using a 5-point Likert-type scale ranging from 0 (*Very little*) to 4 (*Very much*). Higher scores are representative of increased fear of anxiety symptoms. Previous research has demonstrated that the ASI-3 is a reliable and valid measure of anxiety sensitivity (Taylor et al. 2007). Internal consistency in the present sample was excellent for the cognitive concerns subscale ($\alpha = .92$). In addition, the physical and social concerns subscales demonstrated good internal consistency (α's = .86 and .85, respectively).

Alcohol Use Disorders Identification Test (AUDIT) The AUDIT is a 10-item self-report questionnaire developed by the World Health Organization to identify individuals with alcohol-related problems (Babor et al. 2001). Individuals are asked to read various questions regarding the quantity and frequency of alcohol behaviors and alcohol-related problems (e.g., blackouts, injuries). There is a significant body of research attesting to the psychometric properties of the

AUDIT (Saunders et al. 1993). The AUDIT demonstrated good internal consistency in the present sample (α = .89).

Beck Anxiety Inventory (BAI) The BAI is a 21-item self-report questionnaire designed to measure general anxiety symptomatology (Beck et al. 1988). Respondents were asked to rate the degree to which they have been bothered by each symptom over the past week. Previous research has demonstrated that the BAI is both valid and reliable in clinical and non-clinical samples (Beck et al. 1988). The BAI demonstrated excellent internal consistency in the present investigation (α = .93).

Beck Depression Inventory-II (BDI-II) The BDI-II is a 21-item self-report measure of depressive symptoms. Respondents were asked to read a group of statements and select the statement that best describes how they have felt over the past 2 weeks. The BDI-II is scored using a 4-point Likert-type scale ranging from 0 to 3, with higher scores reflecting more severe depressive symptoms. The BDI-II has demonstrated strong internal consistency and good test–retest reliability (Beck et al. 1988). Internal consistency in the present sample was good (α = .88).

Obsessive–Compulsive Inventory-Revised (OCI-R) The OCI-R is an 18-item self-report questionnaire used to assess common symptom dimensions of obsessive compulsive disorder. Respondents were asked to read various statements (e.g., "I check things more often than necessary", "I feel I have to repeat certain numbers", and "I wash my hands more often and longer than necessary") and rate their associated distress in each situation on a 5-point Likert-type scale ranging from 0 (*Not at all*) to 4 (*Extremely*). In addition to a total score, the measure yields six subscale scores including washing, checking, ordering, obsessing, hoarding, and neutralizing. Research has demonstrated that the OCI-R has good internal consistency, convergent validity, and reliability (Foa et al. 2002). In the current sample, the OCI-R total score demonstrated excellent internal consistency (α = .91). In addition, the washing (α = .85), checking, (α = .86), ordering (α = .91), obsessing (α = .84), hoarding (α = .82), and neutralizing (α = .86) subscales demonstrated good to excellent internal consistency.

Posttraumatic Stress Disorder Checklist-Civilian Version (PCL-C) The PCL-C is a 17-item questionnaire that assesses various symptoms of PTSD (Weathers et al. 1994). Respondents were asked to read a list of problems and complaints that individuals sometimes have in response to stressful life experiences and rate the degree to which they have been bothered by the problem in the past month on 5-point Likert-type scale ranging from 1 (*Not at all*) to 5 (*Extremely*). The PCL-C has demonstrated good

psychometric properties in previous samples (Wilkins et al. 2011). Additionally, in the current study the PCL-C showed great internal consistency (α = .92).

Suicidal Behaviors Questionnaire-Revised (SBQ-R) The SBQ-R is a 4-item self-report questionnaire targeting lifetime prevalence of suicidal thoughts and behaviors, past 12 months suicidal ideation, threat of suicidal behavior, and future suicidal risk. Respondents were asked to answer questions such as "Have you ever thought about or attempted to kill yourself?" and "How likely is it that you will attempt suicide someday?" Scores for each item are totaled, with higher scores indicating more severe suicidality. The SBQ-R has acceptable (α = .76) to good (α = .88) reliability (Osman et al. 2001). Internal consistency in the current sample was acceptable (α = .70).

Statistical Analyses

Analyses were conducted using SPSS 19.0 statistical software (SPSS 2010). First, means, standard deviations, and zero order correlations for all variables were examined. Second, data screening was performed. Preliminary analyses for all regression equations indicated that there were no threats or violations of normality, multicollinearity, or homoscedasticity. Next, a series of hierarchical regression equations were computed to test our hypotheses that (1) obsessions (as measured by the OCI-R obsessing subscale) would be most associated with suicidal risk (as measured by the SBQ-R), and (2) obsessions would interact with AS cognitive concerns (as measured by the ASI-3 cognitive concerns subscale) to predict suicidal risk. Finally, in an effort to demonstrate specificity regarding the role of AS cognitive concerns, we tested whether the noncriterion AS factors (physical or social concerns) interacted with obsessions to predict suicide risk. To ensure that the relationships between obsessions, AS cognitive concerns, and suicidality were not better accounted for by known suicidal risk factors (Beck et al. 1989; Cougle et al. 2009), step one of each model included the covariates of general levels of depression and anxiety (as measured by the BDI-II and BAI), trauma symptoms (as measured by the PCL-C), and alcohol use (as measured by the AUDIT). Step 2 included the relevant main effects (i.e., obsessions and/or AS cognitive concerns). Step 3 included the relevant interaction term. SBQ-R served as the dependent variable in all analyses.

Results

Sample Descriptives

The means, standard deviations, ranges, and zero-order correlations for all variables used in the current analyses

Table 1 Means, standard deviations, and ranges for all self-report measures

Variable	Mean	SD	Range
1. AUDIT	5.64	6.75	0–27
2. PCL-C	49.16	14.51	18–18
3. BDI-II	27.46	11.46	6–55
4. BAI	25.24	13.08	1–54
5. OCI-R washing	3.03	3.44	0–12
6. OCI-R checking	4.16	3.65	0–12
7. OCI-R ordering	5.72	3.99	0–12
8. OCI-R hoarding	4.94	3.38	0–12
9. OCI-R neutralizing	2.57	3.26	0–12
10. OCI-R obsessions	5.72	3.45	0–12
11. OCI-R total	25.94	15.32	1–62
12. ASI-3 physical	10.28	6.23	0–24
13. ASI-3 social	12.76	5.87	0–23
14. ASI-3 cognitive	12.63	6.61	0–24
15. SBQ-R	6.31	2.98	3–15

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can be found in Tables 1 and 2. The mean SBQ-R total score was slightly higher than that found in another report utilizing a clinical sample, but lower than that found in an inpatient suicidal sample (Osman et al. 2001). Comparing the current study mean (M = 6.31) to the SBQ-R clinical cutoff (i.e., 8) established by Osman et al. (2001) indicates this sample had meaningful levels of suicidality, although on average it did not quite reach clinical levels. The mean ASI-3 cognitive concerns subscale score was higher than that found in other reports utilizing clinical populations (Medley et al. 2013). Likewise, the mean PCL-C total score was slightly higher than that found in reports utilizing individuals with a trauma history (Fetzner et al. 2013). The mean AUDIT total score was comparable to that found in other reports utilizing community samples (McLeish et al. 2007) but slightly lower than that found in reports utilizing trauma-exposed participants (Medina et al. 2011). The mean BAI total score was in the moderate range and comparable to that found in other anxiety disorder populations (Beck et al. 1988). With regard to overall OC symptoms, the mean OCI-R total score was above the clinical cut score set forth by Foa et al. (2002) and consistent with that found in other OCD populations (Huppert et al. 2007), suggesting that the current sample was above average with regard to OC symptoms. Finally, the mean OCI-R obsessions subscale score was comparable to that found in another report utilizing a mixed clinical anxiety disorders group (Abramowitz and Deacon 2006).

Consistent with initial predictions, all correlations between the ASI-3 cognitive concerns subscale, OCI-R obsessions subscale, and SBQ-R total score were significant.

Primary Analyses

A hierarchical regression equation was performed to assess the relationships between obsessive–compulsive symptom dimensions (as measured by the OCI-R) and suicidal risk (as measured by the SBQ-R), after controlling for general levels of depression and anxiety (as measured by the BDI-II and BAI), trauma symptoms (as measured by the PCL-C), and alcohol use (as measured by the AUDIT). BDI-II, BAI, PCL-C, and AUDIT scores were entered into the first step of the model accounting for 17 % of the variance in suicidal risk (F (4, 73) = 3.74, p = .01). In the second step of the model, all six OCI-R subscales were added accounting for an additional 13 % of the variance in suicidal risk (F Change = 2.06, p = .07). Consistent with initial predictions, the obsessions dimension of the OCI-R was significantly associated with increased suicidal risk (β = .37, t = 2.80, p = .01, sr^2 = .08), whereas the washing (β = .07, t = .49, p = .62, sr^2 = .00), checking (β = −.16, t = −1.02, p = .31, sr^2 = .01), ordering (β = .02, t = .17, p = .87, sr^2 = .00), neutralizing (β = .15, t = .92, p = .36, sr^2 = .01), and hoarding (β = −.13, t = −.92, p = .36, sr^2 = .01) subscales were not.

A second hierarchical regression equation was computed to test the hypothesis that elevated levels of obsessions (as measured by the OCI-R), as well as elevated levels of AS cognitive concerns (as measured by the ASI-3) would be associated with increased suicidal risk (as measured by the SBQ-R), even after controlling for general levels of depression and anxiety (as measured by the BDI-II and BAI), trauma symptoms (as measured by the PCL-C), and alcohol use (as measured by the AUDIT). All four covariates were entered into step one of the model accounting for 17 % of the variance in suicidal risk (F (4, 74) = 3.79, p = .01). In the second step of the model, the two predictor variables of OCI-R obsessions and AS cognitive concerns were added accounting for an additional 11 % of the variance in suicidal risk (F change = 5.57, p = .01). In line with initial predictions, OCI-R obsessions significantly predicted increased suicidality (β = .31, t = 2.25, p = .03, sr^2 = .05). However, inconsistent with initial predictions elevated levels of AS cognitive concerns were not associated with increased suicidal risk (β = .17, t = 1.31, p = .20, sr^2 = .02). In the final step of the model, the centered two-way interaction term was added. OCI-R obsessions by AS cognitive concerns significantly predicted increased suicidality (β = .23, t = 2.05, p = .04, sr^2 = .04).

To interpret this finding, the interaction term was probed using the recommendations of Aiken and West (see Fig. 1;

Table 2 Zero-order correlations for all self-report measures

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. AUDIT	–													
2. PCL-C	−.03	–												
3. BDI-II	−.02	.45***	–											
4. BAI	.06	.64***	.57***	–										
5. OCI-R washing	−.12	.23*	.13	.22	–									
6. OCI-R checking	.12	.34**	.17	.34**	.56***	–								
7. OCI-R ordering	.04	.49***	.18	.38**	.46***	.57***	–							
8. OCI-R hoarding	.02	.26*	.12	.23*	.34**	.58***	.45***	–						
9. OCI-R neutralizing	.07	.40***	.22	.47***	.58***	.59***	.50***	.54***	–					
10. OCI-R obsessions	−.03	.53***	.44***	.50***	.16	.31**	.30**	.14	.39***	–				
11. OCI-R total	.03	.51***	.30**	.48***	.71***	.86***	.77***	.69***	.81***	.52***	–			
12. ASI-3 physical	−.07	.42***	.40***	.67***	.22	.40***	.22	.20	.39***	.37**	.44***	–		
13. ASI-3 social	.13	.42***	.34**	.54***	.13	.27*	.30**	.07	.33**	.35**	.33**	.49***	–	
14. ASI-3 cognitive	.10	.32**	.45***	.42***	−.003	.24*	.20	.03	.11	.56***	.28*	.41***	.44***	–
15. SBQ-R	.09	.22*	.38**	.16	.07	.02	.09	−.06	.16	.42***	.16	.18	.27*	.38***

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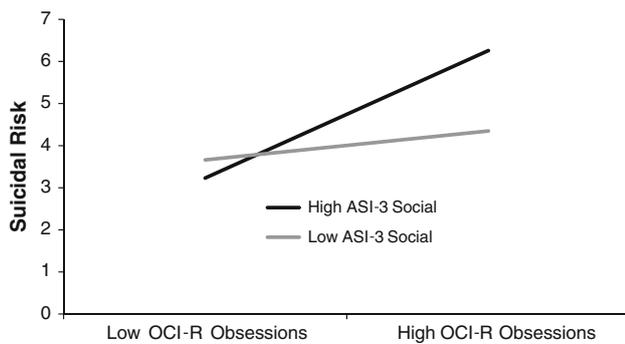
*** $p < .001$; ** $p < .01$; * $p < .05$
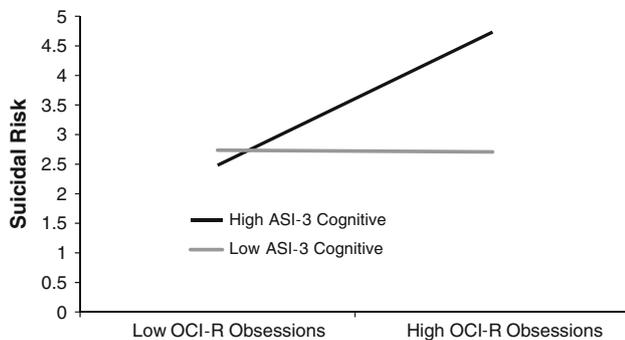
Fig. 1 Interaction of Anxiety Sensitivity Index-3 (ASI-3) cognitive concerns subscale and Obsessive Compulsive Inventory-Revised (OCI-R) obsessions subscale predicting suicidal risk as measured by the Suicide Behaviors Questionnaire-Revised

1991). Specifically, the simple effect of obsessions at high and low levels of AS cognitive concerns (i.e., 1 SD above and below the mean) was assessed. As anticipated, at high levels of AS cognitive concerns the effect of obsessions was significantly associated with increased suicidal risk ($\beta = .4$, $t = 3.00$, $p = .004$, $sr^2 = .09$) whereas at low levels of AS cognitive concerns, obsessions did not significantly predict increased suicidal risk ($\beta = −.04$, $t = −.$ $p = .85$, $sr^2 = .00$).

Finally, in an effort to demonstrate specificity regarding AS cognitive concerns we also examined the relationships between AS physical concerns, AS social concerns, and OC obsessions in predicting increased suicidality. Two

separate regression equations were computed. In the first step of each model all four covariates were entered (i.e., BDI-II, BAI, PCL-C, and AUDIT total scores). In the second step of each model the two predictor variables were added. In line with initial predictions, OCI-R obsessions significantly predicted increased suicidal risk in both models ($\beta = .38$, $t = 3.00$, $p = .004$, $sr^2 = .09$; $\beta = .37$, $t = 2.94$, $p = .004$, $sr^2 = .09$) whereas AS physical concerns ($\beta = .13$, $t = .92$, $p = .36$, $sr^2 = .01$) and AS social concerns ($\beta = .19$, $t = 1.54$, $p = .13$, $sr^2 = .02$) did not. In the final step of each model, the centered two-way interaction terms were added. Consistent with initial predictions, OCI-R obsessions by AS physical concerns ($\beta = −.01$, $t = −.09$, $p = .93$, $sr^2 = .00$) was not significantly associated with increased suicidal risk. Inconsistent with hypotheses however, OCI-R obsessions by AS social concerns ($\beta = .22$, $t = 2.03$, $p = .046$, $sr^2 = .04$) was significantly associated with increased suicidal risk.

To interpret this finding, the interaction term was probed using the recommendations of Aiken and West (see Fig. 2; 1991). Specifically, the simple effect of obsessions at high and low levels of AS social concerns (i.e., 1 SD above and below the mean) was assessed. Results indicated at high levels of AS social concerns the effect of obsessions was significantly associated with increased suicidal risk ($\beta = .51$, $t = 3.62$, $p = .001$, $sr^2 = .12$), whereas at low levels of AS social concerns, obsessions did not significantly predict increased suicidal risk ($\beta = .12$, $t = .67$, $p = .50$, $sr^2 = .00$).

Fig. 2 Interaction of Anxiety Sensitivity Index-3 (ASI-3) social concerns subscale and Obsessive Compulsive Inventory-Revised (OCI-R) obsessions subscale predicting suicidal risk as measured by the Suicide Behaviors Questionnaire-Revised

Discussion

Consistent with initial predictions, the obsessions subscale of the OCI-R was robustly associated with suicidality. This finding is consistent with previous research demonstrating that the obsessive dimension of OCD is associated with both current and lifetime suicidal thoughts and plans, whereas the compulsive dimension is not (Kamath et al. 2007; Torres et al. 2011). Additionally, this finding adds to a growing body of literature demonstrating that the obsessive dimension of OCD is associated with greater levels of distress/impairment and interference than the compulsive dimension (Fullana et al. 2009; Masellis et al. 2003).

Consistent with expectation, AS cognitive concerns moderated the relationship between suicidality and OC obsessions, whereas AS physical concerns did not. This finding supports previous research demonstrating that AS cognitive concerns may act as a moderator between specific risk factors and increased suicidality (Capron et al. 2012e, f). These findings also lend support for existing cognitive models of OCD, which highlight the interplay between obsessive thoughts and the individuals belief system (i.e., one should and can control their thoughts) in the development of mood disturbances (Purdon 2008; Salkovskis 1985). Consistent with these conceptualizations, it is possible that the recurrent and intrusive nature of obsessions coupled with fears of cognitive dyscontrol may lead one to consider suicide as a possible solution to escape the increasing cognitive turmoil.

Inconsistent with initial predictions, findings also revealed that AS social concerns moderated the relationship between OC obsessions and increased suicidality. Although somewhat unanticipated, this finding is consistent with previous research demonstrating associations between the obsessions subscale of the OCI-R and AS social concerns (Wheaton et al. 2012). In addition, although most studies have not found a relationship between AS social concerns and suicidal ideation, there are some exceptions (Capron et al. 2012a, c). It is possible that the persistent and unwanted nature of obsessions, coupled with increased social concerns leads one to consider suicide as a possible solution to escape from the escalating distress and embarrassment. Indeed, research has demonstrated that individuals with OCD often attempt to conceal their symptoms from others (Newth and Rachman 2001). Given the intrusive and often repugnant nature of obsessions, as well as the stigma associated with OCD (Stengler-Wenzke et al. 2004), it is reasonable to assume that individuals may fear being judged or evaluated by others. This may contribute to lack of belongingness, a risk factor for suicidal ideation from the Interpersonal-Psychological Theory (Van Orden et al. 2010). Contrary to initial predictions, the current investigation did not find a significant main effect of AS cognitive concerns on increased suicidality. This finding is inconsistent with emerging literature on the relationship between AS cognitive concerns and suicidal ideation across a myriad of populations (Capron et al. 2012c; Schmidt et al. 2001). One potential explanation for this lack of finding is that the OCI-R obsessions subscale contains several items that are potentially related to AS cognitive concerns (e.g., "I find it difficult to control my own thoughts") and thus may have obscured potential relations between AS cognitive concerns and suicidality. Indeed, Pearson product-moment correlation coefficient results indicated that there was a strong, positive correlation between the OCI-R obsessions subscale and AS cognitive concerns (r = .56). This overlap could have affected the individual contribution of AS cognitive concerns. It should be noted however, calculating the coefficient of determination indicated that these two measures share only 31 % of their variance. This suggests while there is some overlap between the two subscales they are tapping into different constructs.

Taken together, the current findings are compatible with recent models of anxiety and suicidality which posit that catastrophic psychological cognitions in response to anxiety represent a specific vulnerability to the development of increased suicidality (Capron et al. 2012f; Katz et al. 2011). In these models, catastrophic psychological cognition is amplified, eventually activating suicidal ideation. Consistent with this notion, our findings indicate that when obsessions are amplified by catastrophic cognitions (i.e., AS cognitive concerns) the resulting psychological distress may eventually lead to increased suicidality. This is compatible with the Interpersonal-Psychological theory of suicide (Joiner et al. 2005), wherein the experience of psychological pain in vulnerable individuals is a risk factor for acquiring the capability for suicide.

Results of the present investigation also highlight the importance of assessing suicidal risk as a part of a comprehensive OCD assessment. Clinicians should inquire about current ideation, plans, preparations, and prior attempts in order to determine if preventative interventions are needed during the course of treatment. Additionally, for individuals high in obsessions, clinicians should assess for elevations in AS cognitive concerns and when appropriate consider utilizing brief AS interventions. These protocols have been shown to be effective at reducing AS and AS subfactors over a 2 years period (Keough and Schmidt 2012; Schmidt et al. 2007) and may be effective at lowering suicidal risk (Capron et al. 2014; Schmidt et al. in press).

The current investigation has a couple of limitations worth noting. First, clear conclusions regarding causality cannot be made due to the cross-sectional nature of the current study. Future investigations should examine these variables prospectively in order to elucidate the temporal relationships among them. Second, although this was a clinical sample, we had relatively few participants with an OCD diagnosis. Even though there is a growing body of literature indicating that both OC symptoms and AS occur on a continuum of severity (Gibbs 1996; Olatunji et al. 2008), it is unclear how these findings would generalize to a clinical OCD sample. Third, to be eligible for inclusion, participants had to report elevated levels of AS cognitive concerns. Whereas more recent research has demonstrated unique associations between AS cognitive concerns and various OC symptom domains (Raines et al. 2014; Wheaton et al. 2012), it is unclear if these findings would apply to the general population of those with OCD. Fourth, the current study used the OCI-R to measure OC symptoms. Compared to newer measures of OCD symptoms, the OCI-R does not adequately capture the heterogeneous and multidimensional severity of OCD including everyday interference, occurrence and duration of symptoms, and avoidance behaviors. Thus, future investigations should attempt to replicate these findings using newer OCD instruments, such as the Dimensional Obsessive Compulsive Scale (Abramowitz et al. 2010). Finally, it is possible that the associations between OC obsessions, AS cognitive concerns and suicidality may not generalize to actual death by suicide. However, suicide attempt is the strongest predictor of death by suicide (Suominen et al. 2004) and has been used in previous research examining suicidality (Sareen et al. 2007; Schmidt et al. 2001).

Despite these limitations, the current study provides important new information regarding the relationship between OC symptoms and suicidality. To our knowledge, this is the first investigation to examine potential mechanisms that may influence the associations between these two variables. Future work with clinically relevant samples is needed to determine the generalizability of these findings. Additionally, it will be important to determine if a reduction in AS is associated with a subsequent reduction in suicidal risk among patients with OCD.

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