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Intolerance of uncertainty in hoarding disorder

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Abstract

Background: Intolerance of uncertainty (IU) has been proposed as a transdiagnostic risk and maintenance factor underlying various forms of psychopathology. Few studies, however, have examined IU in hoarding disorder (HD)—a condition characterized by excessive urges to acquire and difficulties discarding possessions—core symptoms that may be fueled by inflated IU. We examined cross-sectional relationships between IU and different symptom facets of HD, controlling for anxiety and depression severity, and explored whether pre-treatment levels of IU predicted response to exposure-based treatment for HD.

Method: Fifty-seven individuals seeking treatment for HD completed baseline measures of hoarding symptoms, IU, anxiety and depression. Participants then completed 26 sessions of group exposure-based treatment for HD with or without compensatory cognitive training. Hoarding symptoms were assessed following the final treatment session to index treatment response.

Results: IU was positively and significantly associated with greater urges to acquire and greater difficulties discarding possessions, beyond shared variance accounted for by anxiety and depression. IU was not significantly related to clutter symptom severity. Higher pre-treatment IU predicted increased odds of treatment non-response.

Conclusions: Elevated IU is associated with specific hoarding symptom clusters and may be an important target for HD treatment.

Keywords

Hoarding disorder; Intolerance of uncertainty; Aging

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Declarations of interest

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1. Introduction

Compulsive hoarding behavior was historically viewed as a subset of obsessive compulsive disorder (OCD), however, a large body of research has demonstrated that hoarding behavior is diagnostically distinct from OCD (Pertusa et al., 2010, for review), and thus, hoarding disorder (HD) was named an independent disorder in the DSM-5 (American Psychiatric Association, 2013). Furthermore, comorbidity analyses have provided evidence that HD may be associated with other anxiety and depression related disorders as frequently as OCD (Frost, Steketee, & Tolin, 2011), suggesting that hoarding disorder may share underlying features common to many of these disorders. Given the novelty of the hoarding disorder diagnosis and classification, as well as the breadth of comorbid disorders, further research is necessary to more accurately characterize the symptoms of hoarding disorder and the associated causal pathways.

Cognitive-behavioral models of HD posit that hoarding related symptoms develop due to cognitive misappraisals regarding the value and potential future utility of possessions (e.g., Frost & Hartl, 1996; Steketee & Frost, 2003). Due to these misappraisals, individuals experience urges to acquire and save, as well as great distress associated with discarding possessions. This internal distress is believed to influence patterns of cognitive and behavioral avoidance, and preliminary investigations have evidenced an association between these strongly held distorted beliefs and hoarding symptoms (Coles, Frost, Heimberg, & Steketee, 2003; Frost, Steketee, & Grisham, 2004; Luchian, McNally, & Hooley, 2007; Steketee, Frost, & Kyrios, 2003). Decision-making processes are often challenging for individuals high on compulsive hoarding (Frost & Shows, 1993), due to distorted beliefs regarding the probability of making a mistake when choosing to discard (Frost & Gross, 1993).

The explanatory elements of the cognitive-behavioral model of HD closely

follow prevailing cognitive-behavioral models of anxiety and obsessive-compulsive spectrum

disorders, which have increasingly included the construct of intolerance of uncertainty (IU) as a critical factor in the development and maintenance of pathology (Carleton, 2012, for review).

Intolerance of uncertainty is defined as the tendency for an individual to consider the possibility of a negative event occurring as unacceptable and threatening, irrespective of the probability of its occurrence (Carleton, Sharpe, & Asmundson, 2007). This definition specifies that IU includes prospective (cognitive) and inhibitory (behavioral) components that reflect an underlying fear of the unknown, and that individuals high in IU engage in uncertainty-driven avoidance behaviors as a means of coping with ambiguous situations (Suárez, Bennet, Goldstein, & Barlow, 2009). Additionally, measures of IU differentiate between two sub-factors: Factor 1, “Uncertainty has negative behavioral and self-referent implications,” and Factor 2, “Uncertainty is unfair and spoils everything.” Factor 1 has been found to be more closely related to anxiety (Sexton & Dugas, 2009), most likely due to the emphasis on negative self-judgements.

The IU construct was initially developed as part of an explanatory model for excessive worry within generalized anxiety disorder (GAD); however, neither IU nor worry are exclusive to GAD (Clark & Beck, 2010; Suárez et al., 2009). Intolerance of uncertainty, worry, and other forms of repetitive negative thinking are postulated to represent transdiagnostic constructs that may relate to the development of many forms of pathology (Harvey, Watkins, Mansell, & Shafran, 2004; McEvoy, Mahoney, & Moulds, 2010). Recent studies have found that rates of IU are comparable among individuals meeting criteria for GAD and/or OCD, particularly among individuals with OCD and checking behaviors (Holaway, Heimberg, & Coles, 2006; Tolin, Abramowitz, Brigidi, & Foa, 2003). One study found that IU was most closely linked to OCD, followed by social anxiety and GAD (Boelen & Reijntjes, 2009). However, another study found that while IU was most closely linked to GAD and panic disorder, rates of IU did not differ significantly based on diagnosis and were high across all anxiety and depressive disorders (Boswell, Thompson-Hollands, Farchione, & Barlow, 2013), suggesting that IU may represent a common factor across many emotional disorders.

Given the high rate of comorbidity between HD and other anxiety disorders, particularly GAD and OCD (Frost et al., 2011), there is a high likelihood that IU is an underlying vulnerability factor for HD as well. The theoretical models of HD outlined above posit that maladaptive hoarding behaviors are driven by the fear of making a mistake and potentially discarding something of value (Frost & Gross, 1993). Therefore, it is highly possible that the urge to both acquire and save is driven by the desire to avoid the uncertainty associated with making the decision to save or discard a potentially valuable item.

Additionally, numerous studies have found that transdiagnostic cognitive behavioral treatments for anxiety and related disorders impact IU, such that rates of IU significantly decreased from pre to post-treatment. This decrease in IU predicted improvement in clinical presentation, regardless of primary diagnosis (e.g. Boswell et al., 2013; Talkovsky & Norton, 2016). Additional studies have found that higher levels of IU at pre-treatment predict higher levels of anxiety and worry at post-treatment (e.g. Keefer, Kreiser, & Singh, 2017), suggesting that IU may be an important transdiagnostic variable in anxiety and mood disorders, as well as an important target in cognitive behavioral treatments.

To date, there has been only one study that has directly investigated the relationship between hoarding severity and IU. Oglesby et al. (2013) found that in an analogue sample of undergraduate students, IU was robustly associated with hoarding severity, even after controlling for general levels of worry, depression, and non-hoarding related obsessive-compulsive symptoms. Consistent with previous anxiety research, the authors also found that Factor 1 was associated with hoarding severity whereas Factor 2 was not. This preliminary study provided early support for the hypothesized relationship between IU and hoarding severity. However, while this study demonstrated an association between IU and hoarding severity, it was limited by the fact that it relied on a subclinical undergraduate population. Participants' hoarding behaviors were only measured via self-report. Due to the nature of the sample, the age of the participants was also relatively young (17–24), given that research has shown that hoarding severity tends to increase with each decade of life (Ayers, Saxena, Golshan, & Wetherell, 2010).

To ensure validity, these findings should be replicated in a clinical sample of treatment-seeking individuals who have been diagnosed with HD and represent a broader age-range. Additionally, given that participants were not treatment seeking, this study is unable to provide information on the role of IU in treatment response. Thus, future study of the role of IU in a clinical sample would help determine whether IU functions similarly in HD as in anxiety disorders, such that reduction of IU has been shown to predict treatment success in mixed anxiety disorders (e.g. Boswell et al., 2013; Talkovsky & Norton, 2016).

Thus, the goal of the current investigation was to examine the relationship between IU and hoarding severity in mid to late-life individuals seeking treatment for a diagnosis of HD. Specifically, we aimed to evaluate the relationship between IU and hoarding severity, after controlling for general levels of anxiety and depression. We hypothesized that IU would be uniquely associated with hoarding severity within individuals diagnosed with HD, above and beyond general symptoms of anxiety and depression. We further aimed to understand this relationship by examining how IU relates to each sub-factor of hoarding severity (e.g. acquiring, difficulty discarding, and clutter), and hypothesized that IU would be uniquely associated with acquiring and difficulty discarding. Finally, we aimed to examine how IU is related to treatment response. Given previous findings that reduction in IU is predictive of treatment outcome (e.g. Boswell et al., 2013; Talkovsky & Norton, 2016) and that baseline IU predicts symptom level at post-treatment (e.g. Keefer et al., 2017), we hypothesized that the degree of IU present at baseline would predict response to treatment.

2. Methods

2.1. Participants

This paper represents a secondary data analyses of a recently published investigation of group treatment for hoarding disorder (citation removed to keep authorship confidential). The study protocol was approved by the Institutional Review Board of (institution name removed to keep authorship confidential) and all participants provided written informed consent. Participants were recruited through clinician referrals and flyers posted around the community. All participants were required to meet DSM-5 criteria for HD, determined using a clinical interview in conjunction with scores on the UCLA Hoarding Severity Scale (UHSS; Saxena, Ayers, Dozier, & Maidment, 2015), a 10-items clinician-administered assessment, and on the Savings Inventory- Revised (SI-R; Frost et al., 2004), a 23-item self-report measure. Final HD diagnosis was determined by the PI of the parent study after review of assessment results during weekly supervision with study assessors.

Further details of the inclusion criteria have been published else-where (citation removed to keep authorship confidential). Of the 60 individuals included in the parent study, baseline data on intolerance of uncertainty was available for only 57 people. The baseline and post-treatment scores for these 57 individuals was utilized for the current investigation.

Participants in the current investigation were from two studies of group treatment for hoarding disorder (citation removed to keep authorship confidential). Twenty-five participants received exposure therapy combined with a brief compensatory cognitive training (CCT) module (26 sessions total) and 32 participants received 26 sessions of

exposure-therapy only. Four groups were run for each treatment condition. During the exposure sessions, participants were exposed to the distress associated with making decisions about their possessions. Participants brought boxes of items from their homes and spent the majority of the session sorting items into “keep” and “discard” piles and recording their subjective level of distress (SUDs) every five minutes. Participants were also asked to sort daily at home in between group sessions. For further details about the procedures of both group treatments for hoarding, please refer to the original treatment outcomes study (citation removed to keep authorship confidential).

2.2. Measures

Hoarding severity was assessed using two well-validated self-report scales, the Saving Inventory-Revised (SI-R; Frost et al., 2004) and the Clutter Image Rating (CIR; Frost, Steketee, Tolin, & Renaud, 2008). The SI-R is a 23-item assessment of the core HD symptoms and has three subscales: difficulty discarding, urges to acquire, and impairment due to clutter. Internal consistency of the SI-R in the current sample was adequate for the total score ($\alpha = 0.90$) and all subscales (difficulty discarding: $\alpha = 0.82$; acquiring: $\alpha = 0.83$; clutter: $\alpha = 0.93$).

The CIR is a three-item pictorial measure of household clutter level. The CIR has been validated for use in older HD samples (Dozier & Ayers, 2015), and has excellent inter-rater reliability between patient and clinician (Dozier & Ayers, 2015; Frost et al., 2004). Internal consistency of the CIR in the current sample was adequate ($\alpha = 0.78$). The CIR can be administered as a self-report or as a clinician-reported measure. The CIR was administered as a self-report measure in the current investigation.

Psychiatric symptom severity was assessed using the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983), a 14-item self-report measure with anxiety and depression subscales. Internal consistency of both subscales was adequate in the current sample (Anxiety: $\alpha = 0.81$; Depression: $\alpha = 0.86$).

Intolerance of uncertainty was assessed using the Intolerance of Uncertainty Scale – Short Form (IUS-12; Buhr & Dugas, 2002; Carleton, Norton, & Asmundson, 2007), a 12-item self-report measure. The shortened version of the IUS has been found to be highly correlated with the original 27-item IUS scale ($r = 0.96$; Carleton et al., 2007). Items are summed to create a total score with higher scores indicating increased levels of uncertainty. Internal consistency of the IUS in the current sample was adequate ($\alpha = 0.92$).

2.3. Data analysis

All analyses were performed using Stata version 13.0 (StataCorp, 2013). Descriptive statistics of all variables and zero-order correlations between all baseline measures were examined. Hierarchical regression analyses were used to examine the unique association of IU and base-line hoarding severity when controlling for symptoms of anxiety and depression. Models were tested separately for each dependent variable (i.e., each SI-R subscale).

Logistic regression was used to determine if baseline IU was predictive of treatment response on the SI-R, which was defined as participants in the parent investigation who achieved sub-clinical levels of hoarding severity (< 41 total score on the SI-R) at post-treatment assessment (citation removed to keep authorship confidential). Participants who dropped out of the study prior to the post-treatment assessment were classified as non-responders. From the sample used in the current analysis ($n = 57$), six participants dropped out of the exposure therapy only study and three participants dropped out of the CCT + exposure therapy study. Two participants (from the exposure therapy only study) completed the study but did not have data available for the SI-R from the post-treatment assessment. These two individuals were not included in the analyses of treatment response.

A power analysis conducted using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009) indicated that using an alpha of 0.05 the study sample size of 57 had 0.80 power to detect a medium to large effect ($f^2 = 0.15$) for the baseline regression analyses and to detect a large effect (odds ratio = 2.43) for the logistic regression analysis.

3. Results

3.1. Descriptive statistics

Participants were mostly female (74%), Caucasian (79%), and unmarried (75%). The average age of participants was 58.28 ($SD = 9.65$, range: 29–77). Forty-four percent of participants were employed either full or part time, 28% of participants were retired, and 28% of participants were unemployed or on disability.

The descriptive statistics and associations among all variables are presented in Table 1. The SI-R Total and Difficulty Discarding and Acquiring subscales were significantly correlated with the IUS-12, as was the HADS Anxiety and Depression subscales (all p s < 0.05). Because the CIR and the SI-R Clutter subscale were not significantly correlated with the IUS-12 (both p s > 0.05), they were not included in subsequent analyses.

3.2. Hierarchical analyses

Hierarchical regressions were performed to assess the unique association of intolerance of uncertainty (IUS-12) with hoarding symptom severity (SI-R Difficulty Discarding and Acquiring) when controlling for symptoms of anxiety and depression (HADS) (see Table 2). The HADS Anxiety and Depression subscales were entered in the first step of all regression analyses and predicted significant variance in the SI-R Difficulty Discarding subscale ($F(2, 54) = 8.95$, $p = 0.0004$), and the SI-R Acquiring subscale ($F(2, 54) = 9.45$, $p = 0.0003$). The IUS-12 accounted for significant additional variance on the SI-R Difficulty Discarding subscale ($R^2 = 0.0852$, $p = 0.012$) and the SI-R Acquiring subscale ($R^2 = 0.1734$, $p < 0.001$).

3.3. Predicting treatment outcomes

A similar percentage of participants who received CCT + exposure therapy and who received exposure therapy only were classified as treatment responders (32% vs. 30%; $\chi^2(1) = 0.03$, $p = 0.873$); thus, treatment type was not included in the subsequent analysis.

Logistic regression was used to determine if baseline IU predicted whether or not participants were categorized as treatment responders. Participants with higher baseline scores on the IUS-12 were significantly less likely to be classified as treatment responders on the SI-R Total (OR = 0.92, $SE = 0.03$, $z = -2.35$, $p = 0.019$).

4. Discussion

The current study investigated the relationship between IU and hoarding symptom severity, controlling for symptoms of anxiety and depression, in a sample of 57 adults seeking treatment for HD. The results supported our primary hypothesis that elevated IU is associated with increased hoarding severity, and that this relationship is over and above the relationship between IU and symptoms of anxiety and depression. These results are consistent with a previous study that examined the association between IU and HD in a subclinical sample (Oglesby et al., 2012), as well as a large body of literature supporting IU as a critical factor in the development of various anxiety and mood disorders (see Carleton, 2012 for review). This study represents the first examination of the relationship between IU and HD in a clinical sample.

Results indicated that elevations in IU are associated with higher rates of acquiring behaviors as well as increased difficulty discarding items. These findings correspond with the cognitive behavioral model of HD, which views these symptom clusters as avoidance behaviors aimed at reducing the distress associated with negative cognitions. These negative cognitions frequently relate to making a mistake regarding the potential future utility of an item (Steketee & Frost, 2003) and individuals with HD often display difficulty making decisions due to the fear of making an error (Frost & Gross, 1993). Thus, the current findings may indicate that choosing to avoid making the decision to save or discard an item reduces the distress related to uncertainty regarding the future utility of the item and uncertainty regarding the probability of making an error. Additionally, and consistent with our hypotheses, IU was only related to the acquiring and difficulty discarding symptoms of HD and not the clutter symptom. This finding is consistent with previous research indicating that acquiring and difficulty discarding are related to experiential avoidance (avoidance of distressing internal experiences), whereas clutter is not related, and is likely a consequence of the other two sub-factors (Ayers, Castrionta, Dozier, Espejo, & Porter, 2014).

Finally, the results support our second hypothesis, that baseline levels of IU predict treatment outcome, such that individuals with higher levels of baseline IU experienced fewer gains in treatment than those with lower levels of IU. These findings are consistent with previous research that has found that baseline IU predicts residual symptoms of anxiety and worry following treatment for anxiety disorders (Keefer et al., 2017) and that reductions in IU throughout treatment predict level of overall improvement (e.g. Boswell et al., 2013; Talkovsky & Norton, 2016). This initial study of the impact of IU on HD treatment outcome provides further evidence that IU functions similarly in HD as in anxiety disorders, and that IU may represent a common vulnerability factor across disorders.

4.1. Clinical implications

The result that higher levels of baseline IU predict poorer performance in treatment indicates that IU should be a target of HD treatment. This finding compliments previous studies that have found that IU decreases following CBT (e.g. Boswell et al., 2013; Talkovsky & Norton, 2016), and is one of the first studies that demonstrates that baseline IU may be an important variable in predicting treatment response and/or which individuals will respond positively to treatment. At clinical assessment, the presence and severity of IU should be determined through clinical observation or self-report as it will aide in the understanding of severity of HD symptoms. Longitudinal studies examining IU and various anxiety disorders, particularly GAD and social anxiety disorder (SAD), have shown that reductions in IU predict reductions in associated psychopathology (Mahoney & McEvoy, 2012). Thus, IU should be a focus of HD treatments, similar to GAD and SAD. Additionally, as hoarding behaviors relate to both IU and experiential avoidance, it is possible that specific hoarding behaviors serve as a means of avoiding uncertainty. Increasing comfort with uncertainty may reduce behaviors such as saving and difficulty discarding.

4.2. Limitations and future directions

While the strengths of this investigation include a large sample of treatment-seeking individuals and a wide age range, there are several limitations. This study relied on self-report measures of hoarding symptom severity and IU, which may be more subject to bias than clinician administered measures. Because this study represents a secondary data analysis of previously published treatment outcomes, we retained the original study's operationalization of treatment response, in which participants with post-treatment SI-R Total scores > 40 or who did not complete treatment were categorized as non-responders (see citation removed to keep authorship confidential). Because IU was significantly correlated with baseline hoarding severity, it is likely that the definition of treatment response used in this study influenced the observed association between treatment response and IU.

Our sample was largely Caucasian and female, and thus the results may not generalize to other cultural groups or males. This study did not include a healthy control group, and thus a comparison cannot be made regarding the role of IU in individuals with hoarding disorder versus those without. Furthermore, these results may only be indicative of treatment seeking HD patients, and not those unmotivated for treatment or with limited insight. However, a previous study (Oglesby et al., 2012) found similar results in a subclinical, non-treatment seeking sample, suggesting that the relationship between HD and IU is present across a spectrum of severity levels.

Future studies should assess whether level of IU decreases throughout a typical course of HD treatment and whether reductions in IU predict treatment outcome. Given that IU is not currently a direct target of HD treatment, studies should develop interventions directly aimed at reducing IU within HD and investigate the utility of adding such interventions to standard HD treatments. Additionally, if IU represents a possible transdiagnostic vulnerability factor for HD and other emotional disorders, future studies should examine whether a common

treatment for IU would be effective at reducing symptoms of both HD and other emotional disorders, such as anxiety disorders.

4.3. Conclusion

The current study validates a previous finding that elevated IU is uniquely associated with hoarding severity and provides the first examination of the relationship between IU and hoarding symptoms in a clinical sample of adults seeking treatment for HD. Results further indicate that baseline levels of IU predict treatment response, suggesting that IU may be an important target for HD treatment.

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Table 1

Descriptive statistics and zero-order correlations of baseline study variables and age in 57 adults with hoarding disorder.

SI-R	SI-R			CIR	HADS		Mean	SD
	Total	Clutter	Difficulty Discarding		Acquiring	Anxiety		
SI-R	Total	–					58.28	12.50
	Clutter	0.78 ^{***}	–				23.63	7.46
	Difficulty Discarding	0.73 ^{***}	0.28 [*]	–			19.14	4.02
	Acquiring	0.74 ^{***}	0.25	0.61 ^{***}	–		15.51	5.00
CIR		0.57 ^{***}	0.57 ^{***}	0.29 [*]	–		4.02	1.56
HADS	Anxiety	0.44 ^{***}	0.35 ^{**}	0.33 [*]	0.06	–	9.65	4.67
	Depression	0.62 ^{***}	0.44 ^{***}	0.50 ^{***}	0.34 ^{**}	0.70 ^{***}	8.11	4.88
IUS-12		0.59 ^{***}	0.26	0.55 ^{***}	0.19	0.42 ^{**}	32.79	11.25

SI-R: Saving Inventory-Revised; CIR: Clutter Image Rating; HADS: Hospital Anxiety and Depression Scale; IUS-12: Intolerance of Uncertainty Scale – 12 item version.

^{***} $p < 0.001$.

^{**} $p < 0.01$.

^{*} $p < 0.05$.

Hierarchical regression analyses evaluating intolerance of uncertainty as a predictor of hoarding severity.

Table 2

Outcome Variable	Predictor Variable	R ²	B	SE B	β	t	p
SI-R Difficulty Discarding	Step 1 - Psychiatric Symptoms	0.2490					
	HADS Anxiety		-0.02	0.14	-0.03	-0.16	0.875
	HADS Depression		0.43	0.14	0.52	3.15	0.003
	Step 2 – IUS-12	0.0852	0.14	0.05	0.39	2.60	0.012
SI-R Acquiring	Step 1 - Psychiatric Symptoms	0.2592					
	HADS Anxiety		-0.07	0.17	0.06	-0.07	0.676
	HADS Depression		0.57	0.17	0.55	3.40	0.001
	Step 2 – IUS-12	0.1734	0.25	0.06	0.56	4.02	< 0.001

Note: Coefficient data reported are those from the step at which the variable was entered into the equation.

SI-R: Saving Inventory-Revised; CIR: Clutter Image Rating; HADS: Hospital Anxiety and Depression Scale; IUS-12: Intolerance of Uncertainty Scale – 12 item version.