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Abstract

Hoarding is associated with functional impairment and impacts quality of life. One process that has been theorized to explain how hoarding develops and leads to impairment is psychological inflexibility, in which behavior is rigidly controlled by a perceived need to regulate internal experiences, at the expense of more effective, valued actions. The present study aimed to test the mediational role of psychological inflexibility in the development of hoarding and its impact on life satisfaction with a sample of 489 college students completing an online survey. Results indicated that multiple measures of psychological inflexibility (overall inflexibility, inattention, and values obstruction) mediated the relationship between distress and hoarding. Other measures of psychological inflexibility (overall inflexibility, cognitive fusion, and lack of values progress) mediated the link between hoarding severity and life satisfaction. These findings suggest that how one responds to distress and hoarding symptoms can influence symptom severity and life satisfaction, and that psychological flexibility may promote more adaptive outcomes. Thus, current interventions for problematic hoarding may be strengthened by targeting psychological inflexibility and related processes.

Keywords: acceptance, cognitive fusion, hoarding, mindfulness, psychological inflexibility, values

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Hoarding disorder (HD) is a *Diagnostic and Statistical Manual of Mental Disorders,*

Fifth Edition (DSM-5) diagnosis characterized by (1) difficulty discarding possessions due to

distress associated with discarding, (2) excessive clutter that affects the ability to use living

spaces as intended, and (4) clinically significant distress and/or impairment (American

Psychiatric Association [APA], 2013). Excessive acquisition is a common symptom of HD

(Timpano, Exner, et al., 2011), and is included as a specifier in the DSM-5 (APA, 2013). HD has

an estimated prevalence of 1.5% (Nordsletten et al., 2013), and is associated with functional

impairment and low quality of life (Saxena et al., 2011). Hoarding can impact work and home

life (Drury, Ajmi, Fernández de la Cruz, Nordsletten, & Mataix-Cols, 2014) as well as contribute

to medical issues and eviction (Tolin, Frost, Steketee, Gray, & Fitch, 2008). As such, it

represents a significant public health concern and effective treatment is essential.

A cognitive-behavioral model of hoarding posits three central mechanisms in the

development and maintenance of hoarding: 1) deficits in information processing, 2) beliefs about

and emotional attachment to belongings, and 3) distress and avoidance when discarding or not

acquiring items (Frost & Hartl, 1996; Steketee & Frost, 2003). Expanding upon this model,

recent studies indicate that deficits in emotion regulation may also contribute to the emotional

distress and avoidance exhibited in HD. For example, hoarding symptoms are associated with

heightened emotional reactivity (Shaw, Timpano, Steketee, Tolin, & Frost, 2015; Timpano,

Shaw, Cougle, & Fitch, 2014), lower emotional clarity (Fernández de la Cruz et al., 2013), and

lower distress tolerance (Timpano, Keough, Traeger, & Schmidt, 2011; Timpano et al., 2014).

Thus, individuals may choose to save or acquire to control aversive internal experiences, and in

turn, saving and acquiring are maintained through the removal or reduction of aversive emotions. Given that individuals with HD report heightened levels of distress as well as difficulty tolerating distress, it is possible that distress associated with discarding attempts is perceived as particularly aversive in this population and especially difficult to cope with or regulate (Frost, Ong, Steketee, & Tolin, 2016).

These findings have led researchers to hypothesize that psychological inflexibility may play a role in the development of hoarding symptoms (Ayers, Castriotta, Dozier, Espejo, & Porter, 2014; Wheaton, Abramowitz, Franklin, Berman, & Fabricant, 2011). Psychological inflexibility is a transdiagnostic psychopathological process in which behavior is rigidly controlled by a perceived need to change internal experiences (e.g., thoughts, emotions, sensations), limiting the ability to engage in behavior consistent with personal values (Bond et al., 2011; Levin et al., 2014). Psychological inflexibility is related to difficulties in emotion regulation as it involves an unwillingness to experience certain thoughts, feelings or sensations, leading to ineffective attempts to control or change those internal experiences (a component of inflexibility called experiential avoidance).

Psychological inflexibility has been linked to a wide range of psychological disorders (e.g., Levin et al., 2014) including anxiety disorders and obsessive-compulsive and related disorders (Bluett, Homan, Morrison, Levin, & Twohig, 2014). It is the primary treatment target of acceptance and commitment therapy (ACT; Hayes, Strosahl, & Wilson, 1999) and research has consistently found that reductions in psychological inflexibility mediate ACT treatment effects (Twohig & Levin, 2017), supporting the importance of this mechanism of change. A recent review found modest support for the use of ACT for OCD and related disorders such as trichotillomania (Bluett et al., 2014), which suggests that targeting psychological inflexibility

may also be beneficial in hoarding given that it is both theoretically similar (Steketee & Frost, 2003) and often comorbid with OCD (Wheaton, Timpano, Lasalle-Ricci, & Murphy, 2008). Examining specific connections between psychological inflexibility, hoarding symptoms, and life satisfaction might further clarify how this transdiagnostic process and related treatment apply to hoarding.

Several studies have found significant positive correlations between hoarding symptoms and psychological inflexibility (Ayers et al., 2014; Wheaton et al., 2011) measured with the Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011), although another study found no significant association when controlling for mental health symptoms (Wheaton, Fabricant, Berman, & Abramowitz, 2013). These initial findings suggest that psychological inflexibility may be linked to hoarding; however, further research is needed to clarify the nature of this relationship. One method to better understand how psychological inflexibility is connected to hoarding is to investigate specific components of psychological inflexibility.

Psychological inflexibility includes multiple components, including experiential avoidance, cognitive fusion (behavior overly controlled by cognitions), lack of mindful awareness (inattention to the present moment), and deficits in valued action (patterns of behavior that are inconsistent with personal values). These components are theoretically interrelated (e.g., fusion with thoughts about the intolerability of negative emotions may contribute to experiential avoidance) yet have distinct effects (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Examining both psychological inflexibility and its component processes in relation to hoarding may help clarify how maladaptive responses to internal experiences contribute to hoarding.

Psychological inflexibility processes could also explain how distress leads to hoarding. For example, acquiring and saving might result from experiential avoidance in that they are

inflexible, perhaps automatic attempts to control distress. This hypothesis is consistent with past research showing that hoarding symptoms function as a maladaptive emotion regulation strategy (Timpano et al., 2014). Additional components of psychological inflexibility, such as cognitive fusion, may further contribute to hoarding. If individuals are fused with thoughts about their possessions such as "I cannot get rid of this," they may establish a narrowed repertoire in terms of choices about saving or acquiring.

Past research has also indicated a positive link between inattention and hoarding (Burton et al., 2016; Fullana et al., 2013; Hall, Tolin, Frost, & Steketee, 2013), which suggests that hoarding is connected to difficulties in maintaining present moment awareness. In addition, although no study has specifically examined values in relation to hoarding, motivational interviewing has been added to CBT for HD in response to clinical observations regarding the need to address low motivation in treatment (Steketee, Frost, Tolin, Rasmussen, & Brown, 2010), indicating that disconnection from values is a common barrier to behavioral change in hoarding.

In addition, a psychological inflexibility model suggests that how individuals relate to their hoarding symptoms may also impact overall life satisfaction. Inflexible responses to symptoms of excessive acquisition, difficulty discarding, and/or clutter could lead to disengagement with values when one is unwilling to experience the discomfort related to those symptoms, resulting in decreased life satisfaction. For example, if individuals experience shame regarding the clutter in their home, they might attempt to ignore the clutter or ruminate on how it has developed (i.e., reduced present moment awareness), or avoid inviting visitors over (i.e., disengagement with valued activities) in order to control the shame.

To date, no research has investigated the link between the component processes of psychological inflexibility and hoarding, or the mediational role of psychological inflexibility in the context of hoarding. Understanding these relationships may provide a clearer conceptualization of the cognitive-behavioral model of hoarding and pathways through which aversive internal experiences contribute to hoarding. For example, it is unclear whether experiential avoidance is the primary contributor to hoarding problems or if a broader range of inflexibility components may be relevant such as cognitive fusion, lack of mindful awareness, and values deficits. This information could be used to modify current interventions in theoretically and empirically coherent ways, particularly given that various modern cognitive behavioral therapies (CBTs) emphasize targeting different aspects of psychological inflexibility, including mindful awareness, acceptance, and valued action (Hayes, Villatte, Levin, & Hildebrandt, 2011). Such findings may support the utility of adjunctive treatment options to standard CBT for HD, such as the mindfulness and values modules, or the use of other modern CBTs that directly target these processes (e.g., acceptance and commitment therapy).

The objectives of the current study were to determine if: 1) psychological inflexibility and its component processes are consistently associated with hoarding symptoms, 2) psychological inflexibility and its component processes mediate the relationship between distress and hoarding symptoms, and 3) psychological inflexibility and its component processes mediate the relationship between hoarding symptoms and life satisfaction.

Method

Participants

Four hundred and eighty-nine participants were recruited from undergraduate psychology courses through SONA, an online university research recruitment system, and on-campus fliers.

Eligibility criteria included age of at least 18 years and English fluency. The mean age of the sample was 20.47 years (SD = 4.38, range = 18 to 54). Seventy percent of participants identified as female, 90.4% identified as White (2.7% as Hispanic or Latino, 1.8% as bi/multiracial, 1.6% as Asian American, 0.8% as African American/Black, 0.8% as Native Hawaiian or Other Pacific Islander, 0.4 % as Native American, and 1.4% as Other), and 86.5% were single.

Procedure

Participants were directed to complete an online survey on Qualtrics, a secure online survey platform, via SONA. Informed consent was obtained prior to the start of the survey. Measures included on the survey are described below. Participants received course credit for their participation in the study, as determined by their instructor. All study procedures were approved by the institutional review board at the university.

Measures

Saving Inventory – Revised (SI-R; Frost, Steketee, & Grisham, 2004). The SI-R is a 23-item hoarding severity measure comprising three subscales: difficulty discarding, clutter, and excessive acquisition. Items on the SI-R are scored between 0 and 4, with higher scores indicating greater hoarding severity. Internal consistency, test-retest reliability, and convergent and divergent validity have been established for the scale (Frost et al., 2004). In the present sample, αs for the full scale and subscales ranged from .79 to .91.

Acceptance and Action Questionnaire – II (AAQ-II; Bond et al., 2011). The AAQ-II is a seven-item measure of overall psychological inflexibility. Items are rated from 1 (never true) to 7 (always true), with higher scores indicating greater psychological inflexibility. The AAQ-II has shown satisfactory internal consistency, test-retest reliability, convergent validity, and discriminant validity (Bond et al., 2011), and has been associated with a range of outcomes tied

to wellbeing (Kashdan & Rottenberg, 2010). Internal reliability was excellent in the current sample (α = .93).

Philadelphia Mindfulness Scale (PHLMS; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008). The PHLMS is a 20-item measure assessing the frequency of two relatively independent aspects of mindfulness, awareness and acceptance, over the past week. Only the acceptance (experiential avoidance) subscale was used in the present study. Items are rated from 1 (never) to 5 (very often). All subscale items are reverse scored such that lower scores represent higher levels of experiential avoidance. The PHLMS has shown good internal consistency, convergent validity, and divergent validity (Cardaciotto et al., 2008). Internal reliability for the acceptance subscale was excellent in our sample (α = .93).

Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014). The CFQ is a seven-item measure of cognitive fusion. Items are scored between 1 (never true) and 7 (always true), and higher scores indicate greater cognitive fusion. The CFQ has shown excellent internal reliability, good temporal stability, convergent validity, and divergent validity (Gillanders et al., 2014). In the current sample, Cronbach's α was .94, indicating excellent internal consistency.

Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). The MAAS is a 15-item scale that measures attention to and awareness of what is occurring in the present moment. Items are rated from 1 (almost always) to 6 (almost never); lower scores indicate higher levels of inattention. The MAAS has shown good internal consistency, high test-retest reliability, discriminant validity, convergent validity, and criterion validity (Brown & Ryan, 2003). Internal consistency in the present sample was excellent (α = .92)

Valuing Questionnaire (VQ; Smout, Davies, Burns, & Christie, 2014). The VQ is a 10-item measure of valued living comprising two domains: progress and obstruction. Progress

refers to behavioral consistency with one's values, whereas obstruction reflects distraction from and avoidance of valued activities due to difficult internal experiences. Items are rated from 0 (not at all true) to 6 (completely true). Higher scores indicate greater progress in and disruption of valued living, respectively. The VQ has shown good internal consistency, good convergent validity, and incremental validity over related measures (e.g., AAQ-II; Smout et al., 2014). In the current study, internal reliabilities for the subscales were good (α = .81 for progress; α = .83 for obstruction).

Depression Anxiety Stress Scales (DASS-21; Henry & Crawford, 2005). The DASS-21 is a 21-item measure of overall psychological distress, as well as of the dimensions of depression, anxiety, and stress experienced over the past week. Each item is rated from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time), with higher scores representing higher levels of distress. The DASS-21 has demonstrated good to excellent internal reliability, as well as good convergent and divergent reliability (Henry & Crawford, 2005). Internal consistency for the DASS-21 was good to excellent in the current sample (αs ranged from .82 to .93). Given that the DASS-21 total score has been shown to assess overall psychological distress (Henry & Crawford, 2005), we used the DASS-21 total score as a composite measure of distress.

Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). The SWLS is a five-item scale assessing global life satisfaction. Items are scored from 1 (strongly disagree) to 7 (strongly agree); higher scores indicate higher life satisfaction. The SWLS has demonstrated high internal reliability, test-retest reliability, and convergent validity (Diener et al., 1985). Cronbach's α in the present sample was .90.

Statistical Analyses

Preliminary descriptive analyses were used to examine variable distributions for normality as well as to calculate means and standard deviations. Bivariate correlation coefficients were calculated to determine the relationships among study variables.

To test the relative strength of psychological inflexibility processes as mediators, multiple mediator models were used to contrast specific indirect effects (i.e., the unique contribution of each mediator in explaining the effect of the independent variable on the dependent variable; Preacher & Hayes, 2008). We were interested in determining the incremental contribution of individual psychological inflexibility processes over the variance explained by a general psychological inflexibility construct (AAQ-II). Whereas psychological inflexibility has been linked to various psychopathological processes (Kashdan & Rottenberg, 2010), understanding how specific components of the psychological inflexibility model influence hoarding – beyond a global deficit in psychologically flexible responding – may facilitate development of more targeted interventions.

The advantage of multiple mediator models over single mediator models is that they allow for a comparison of the relative strengths of mediators, controlling for other mediators in the model. The product-of-coefficients approach was used to determine the statistical significance of indirect effects. An SPSS macro developed by Preacher and Hayes (2008) was used to estimate path coefficients as well as bootstrap 95% confidence intervals for the total and specific indirect effects of the independent variable on the dependent variable in each our multiple mediator models.

In addition, we examined the paths of c, a, b, and c' in the mediational models using regression analysis, based on guidelines provided by Baron and Kenny (1986). Path c reflects the association between the independent variable (X) and dependent variable (Y), or the overall

effect that may be mediated by a third variable (M). Path *a* represents the relationship between X and M, whereas path *b* represents the relationship between M and Y, controlling for X. Finally, path *c'* is the effect of X on Y, controlling for M. If the proposed mediator mediates the relationship between X and Y, then path *c'* should be no longer significant or zero (full mediation; Baron & Kenny, 1986). We also calculated proportion of the mediated effect (or percent mediated) for individual mediators using the formula, $\frac{ab}{c}$, where *ab* represents the specific indirect effect. This was only calculated when $|c| \geq 0.2$, as recommended by Kenny (2018).

The first multiple mediator model tested the role of psychological inflexibility processes (AAQ-II, PHLMS-acceptance, CFQ, MAAS, VQ-obstruction) in the relationship between distress and hoarding severity. The second model examined the effects of psychological inflexibility variables (AAQ-II, PHLMS-acceptance, CFQ, MAAS, VQ-progress) on the association between hoarding severity and life satisfaction. The obstruction subscale of the VQ – but not the progress subscale – was included in the first model of distress and hoarding severity because it assesses an avoidant interaction pattern with one's internal experiences. The progress subscale, on the other hand, measures overt behaviors consistent with valued living, and so was included in the second mediation model of hoarding severity and life satisfaction.

Results

Descriptive Statistics

All study variables were normally distributed (i.e., skewness and kurtosis absolute values were < 1). Thus, no transformations were applied prior to subsequent analyses. Psychological inflexibility and its component processes were all significantly associated with hoarding severity and life satisfaction in the predicted directions. Correlation coefficients for the associations

between distress and hoarding severity, as well as between hoarding severity and life satisfaction were .35 and -.24, respectively ($ps < .001$). Zero-order bivariate correlation coefficients and descriptive statistics for all study variables are presented in Table 1.

Mediators of the Relationship between Distress and Hoarding Severity

In the first multiple mediator model, psychological inflexibility, inattention, and values obstruction significantly mediated the relationship between distress and hoarding severity ($ps < .05$), while experiential avoidance and fusion were not significant mediators. Psychological inflexibility accounted for 55.0% of the overall mediated effect, values obstruction explained 36.6%, inattention explained 15.8%, experiential avoidance explained 8.0%, whereas fusion accounted for 0.9%. The total proportion of variance in hoarding severity explained by the model was 24.9% (total indirect effect = 0.40, 95% CI [0.30. 0.52]). In addition, the regression coefficient for the effect of distress on hoarding severity decreased from 0.35 ($p < .001$; path *c*; total effect) to -0.06 ($p = .362$; path *c'*; direct effect) when the mediators were controlled for, reflecting full mediation. Table 2 displays results from normal theory tests and bias-corrected 95% confidence intervals.

Mediators of the Relationship between Hoarding Severity and Life Satisfaction

In the second multiple mediator model, psychological inflexibility, cognitive fusion, and lack of values progress significantly mediated the association between hoarding severity and life satisfaction ($ps < .05$), whereas experiential avoidance and inattention were non-significant mediators. Percent mediated was not calculated for this model because the absolute value of the standardized total effect (path *c*) was less than 0.2 (Kenny, 2018). The total proportion of variance explained by the mediator model was 42.1% (total indirect effect = -0.14, 95% CI [-0.18. -0.10]). The regression coefficient for the effect of hoarding severity on life satisfaction

decreased from -0.13 ($p < .001$; path c; total effect) to 0.01 ($p = .739$; path c'; direct effect) when the mediators were controlled for, indicating full mediation. Table 3 shows results from normal theory tests and bias-corrected 95% confidence intervals.

Discussion

Results from the present study indicate that psychological flexibility may play a multifaceted role in the presentation of hoarding. Psychological inflexibility mediated not only the relationship between distress and hoarding severity, but also the relationship between hoarding severity and life satisfaction. This suggests that psychologically inflexible responses to distress and hoarding symptoms, in which such internal experiences have a dominant impact on behavior, can influence symptom severity and life satisfaction, respectively.

In the first multiple mediator model, psychological inflexibility, inattention, and values obstruction significantly mediated the relationship between distress and hoarding severity, controlling for each of the inflexibility variables. The additional variance explained by inattention and values obstruction, beyond the general construct of psychological inflexibility, indicates that these may be particularly pertinent skills of which a deficit can contribute to or even exacerbate hoarding. In other words, after accounting for global psychologically inflexible responding, an inability to contact the present moment and distraction from valued living by internal states continued to predict hoarding severity. Thus, responding to distress with rumination and/or worrying may be a significant pathway through which distress leads to hoarding. For example, when distress shows up, a rigid focus on future emotional states (e.g., worrying that the distress will last forever) could result in saving possessions in the present. Preoccupation with the past and/or future in response to distress may also lead to lack of contact with present circumstances and a sense of automaticity of action, such that engrained habits (e.g.,

saving, acquiring) are readily maintained in the space of fond memories or imagined

opportunities, making it difficult for individuals to attend to the current consequences of their

behavior. In addition, to the extent that distress distracts individuals from engagement in valued

activities, it controls their behavior. In other words, individuals' behaviors become more about

regulating distress than about doing things that are important to them. This pattern of interacting

with distress could easily lead to hoarding (e.g., saving to avoid sadness associated with

discarding) at the expense of more meaningful activities. Therefore, interventions for hoarding

may benefit from targeting these specific ways of responding to unpleasant thoughts and

feelings. Namely, mindfulness skills to increase present moment awareness may improve the

ability to notice and accept distress, rather than get caught up in concerns about the past or

future. These skills may also allow individuals to refocus their attention on other stimuli in the

presence of distracting internal states, and increase the influence of chosen values on behavior.

The second multiple mediator model showed that psychological inflexibility, cognitive

fusion, and lack of values progress were significant mediators of the relationship between

hoarding severity and life satisfaction, controlling for each inflexibility variable. Just as in the

previous model, psychological inflexibility explained unique variance, illustrating its relevance

to the presentation of hoarding. This time, psychological inflexibility significantly explained the

relationship between hoarding symptoms and life satisfaction, suggesting that how individuals

relate to their symptoms as well as to thoughts and feelings about their symptoms influences life

satisfaction. For instance, avoiding the reality and/or severity of hoarding symptoms – instead of

non-judgmentally acknowledging the role that hoarding plays in one's life – may paradoxically

decrease life satisfaction. The role of cognitive defusion in this association may have had to do

with thoughts related to hoarding that show up, rather than hoarding per se, as the CFQ

specifically asks individuals how they interact with their thoughts. For example, fusing with

thoughts about having poor self-control over behaviors may be one way that problematic

hoarding compromises life satisfaction. Another important way that hoarding impacts life

satisfaction is through moving individuals away from valued activities. In other words, hoarding

in and of itself may not be of concern unless it begins to interfere with the ability to lead a

meaningful life.

It is worth noting that experiential avoidance was not a significant mediator in either of

the tested models. One potential explanation is that the PHLMS Acceptance subscale was highly

correlated with both the AAQ-II and CFQ. Thus, the shared variance could have been explained

by the AAQ-II and CFQ instead. It is also possible that although all processes are relevant (based

on zero-order correlations), certain processes contribute more reliably to hoarding than others.

Perhaps willingness to be open to aversive internal states is less important than the ability to

flexibly attend to various aspects of our experience, to respond to thoughts in a detached manner,

or to select behaviors based on values in terms of contributing to hoarding and poor life

satisfaction.

The current study provides evidence that psychological inflexibility is a relevant

construct in the presentation of hoarding. Being psychologically flexible confers individuals the

ability to respond to internal experiences in various ways, expanding their behavioral repertoire.

Individuals are then free to choose the behaviors that serve their values more effectively. Based

on our findings, targeting the skill of non-judgmentally noticing difficult internal experiences as

they show up in the present moment instead of ruminating on the past (e.g., "This object made

me happy when I bought it") or worrying about the future (e.g., "The distress associated with

getting rid of this item would be intolerable") may be helpful in the treatment of hoarding.

Hence, rather than attempt to avoid distress through saving or acquiring, clients could practice acknowledging these internal experiences using mindfulness techniques. In addition, training cognitive defusion or the ability to notice thoughts as they are may improve life satisfaction without the need to get rid of difficult thoughts. The ability to defuse from thoughts means that individuals can choose to engage in valued activities in the presence of thoughts that say otherwise. Because values processes were significant, unique mediators in both models, encouraging clients to attend to behavioral consistency with values in the presence of unpleasant internal experiences, and to engage in values-driven behaviors rather than emotion-driven behaviors may be helpful. In fact, using a values module in current interventions has been found to improve outcomes (Villatte et al., 2016). Furthermore, motivational interviewing – which serves a similar function as values work of increasing motivation and empowerment – has been identified as a useful component in the treatment of hoarding disorder (Muroff et al., 2009; Steketee et al., 2010). Nonetheless, although training psychological flexibility has been found to be an effective intervention across a range of disorders, including anxiety and depression (A-Tjak et al., 2015; Ost, 2014), whether psychological flexibility would be helpful for reducing problematic hoarding is an empirical question that needs to be examined.

It is worth noting that our sample was comprised of college students, and not a clinical population. This limits generalizability of study findings to clinical populations being treated for HD, particularly given that hoarding often worsens over time and is treated in older populations (Tolin, Meunier, Frost, & Steketee, 2010). However, one unique benefit of focusing on a younger, non-clinical population is that it may provide a perspective on processes relevant to the development of clinically significant hoarding, such as how inflexible responding to distress may contribute to hoarding symptoms. In other words, the skill of psychologically flexible responding

may be one way to prevent a trajectory of increasing, habitual use of unhelpful emotion

regulation strategies, which could lead to a variety of problem behaviors, including excessive

hoarding. Further research is needed to clarify if these mediational processes would be replicated

in a clinical sample.

This study has other limitations that should be considered when interpreting findings.

First, its cross-sectional design precludes causal inference regarding the explanatory power of

psychological inflexibility and related processes. As such, we cannot conclude that improving

psychological flexibility would necessarily lead to a change in hoarding severity or life

satisfaction. Second, we did not control for other processes related to hoarding severity, such as

distress tolerance (Timpano, Buckner, Richey, Murphy, & Schmidt, 2009) or intolerance of

uncertainty (Wheaton, Abramowitz, Jacoby, Zwerling, & Rodriguez, 2016). As such, we could

not ascertain the incremental validity of psychological inflexibility, beyond these relevant

processes. Third, much of the variance in hoarding severity remained unexplained by our

multiple mediator model, which suggests that other processes not included in the model may also

be contributing to hoarding symptoms. Including other process measures could provide a more

comprehensive model for the relationship between distress and hoarding. Fourth, the study was

conducted in a relatively homogeneous college sample (e.g., 90% of participants identified as

White), making generalization of our results more difficult. However, given that hoarding and

psychological flexibility processes have both been observed across cultures (e.g., Cederberg,

Cernvall, Dahl, von Essen, & Ljungman, 2016; Timpano et al., 2015), and that psychological

flexibility appears to be a core aspect of human functioning (Kashdan & Rottenberg, 2010), it is

plausible that similar mechanisms underlie the presentation of hoarding even in demographically

different samples. Empirical research is needed to test this prediction.

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Table 1

Bivariate Correlations, Means, and Standard Deviations (SDs) for Measures Used in Mediation Analyses

	1	2	3	4	5	6	7	8	9
1. SI-R									
2. DASS-total	.35								
3. AAQ-II	.46	.67							
4. PHLMS-acceptance	-.39	-.57	-.71						
5. CFQ	.42	.68	.81	-.74					
6. MAAS	-.34	-.46	-.42	.43	-.45				
7. VQ-progress	-.19	-.34	-.30	.19	-.26	.23			
8. VQ-obstruction	.43	.67	.65	-.55	.67	-.50	-.36		
9. SWLS	-.24	-.46	-.49	.34	-.45	.24	.57	-.46	
Mean	21.27	16.53	20.48	28.76	24.00	57.41	19.44	10.64	24.83
SD	11.76	12.09	9.61	9.07	9.93	14.65	5.62	6.14	6.60
Range	2-61	0-63	7-48	10-50	7-49	15-90	0-30	0-29	5-35

Note. All correlations were significant (*p*s < .001) and in the expected direction (between higher hoarding, distress and inflexibility).

SI-R = Saving Inventory – Revised; DASS = Depression Anxiety Stress Scales; AAQ-II = Acceptance and Action Questionnaire – II;

PHLMS = Philadelphia Mindfulness Scale; CFQ = Cognitive Fusion Questionnaire; MAAS = Mindful Attention Awareness Scale;

VQ = Valuing Questionnaire; SWLS = Satisfaction with Life Scale.

Table 2

Results from Mediation Analyses with Distress (DASS) as the Predictor and Hoarding Severity (SI-R) as the Outcome Measure

Mediator	Normal theory tests				Bootstrap results for indirect effects	
	a path		*b* path			
	Coefficient (SE)	t	Coefficient (SE)	t	Point estimate (SE)	95% CI
AAQ-II	0.538*** (0.028)	19.229	0.355*** (0.095)	3.723	0.190 (0.057)	0.083, 0.306
PHLMS-acceptance	-0.437*** (0.029)	-15.080	-0.064 (0.086)	-.735	0.029 (0.035)	-0.039, 0.096
CFQ	0.562*** (0.028)	20.030	0.006 (0.100)	.058	0.003 (0.059)	-0.109, 0.123
MAAS	-0.562*** (0.050)	-11.178	-0.097* (0.041)	-2.371	0.057 (0.027)	0.008, 0.113
VQ-obstruction	0.342*** (0.018)	18.967	0.373** (0.121)	3.094	0.125 (0.043)	0.050, 0.222
Total effect of IV (*c* path)	0.347 (0.044)	7.963***				

Direct effect of IV (*c'* path)	-0.057 (0.062)	-0.913

*** *p* < .001. ** *p* < .01. * *p* < .05.

Note. Number of bootstrap resamples = 5000. DASS = Depression Anxiety Stress Scales; SI-R = Saving Inventory – Revised; SE = standard error; CI = confidence interval; AAQ-II = Acceptance and Action Questionnaire – II; PHLMS = Philadelphia Mindfulness Scale; CFQ = Cognitive Fusion Questionnaire; MAAS = Mindful Attention Awareness Scale; VQ = Valuing Questionnaire; IV = independent variable.

Table 3

Results from Mediation Analyses with Hoarding Severity (SI-R) as the Predictor and Life Satisfaction (SWLS) as the Outcome Measure

Mediator	Normal theory tests				Bootstrap results for indirect effects	
	a path		*b* path			
	Coefficient (SE)	t	Coefficient (SE)	t	Point estimate (SE)	95% CI
AAQ-II	0.374*** (0.034)	10.994	-0.185*** (0.046)	-4.026	-0.070 (0.018)	-.1073, -.0346
PHLMS-acceptance	-0.300*** (0.033)	-8.988	-0.016 (0.041)	-0.389	0.005 (0.013)	-.0188, .0305
CFQ	0.344*** (0.036)	9.653	-0.094* (0.046)	-2.054	-0.033 (0.016)	-.0652, -.0009
MAAS	-0.420*** (0.055)	-7.669	0.015 (0.019)	-0.791	0.006 (0.008)	-.0082, .0222
VQ-progress	-0.092*** (0.022)	-4.286	0.544*** (0.045)	12.028	-0.050 (0.012)	-.0763, -.0278
Total effect of IV (*c* path)	-0.133*** (0.025)	-5.244				

Direct effect of	0.008 (0.023)	0.333
IV (*c'* path)		

*** *p* < .001. * *p* < .05.

Note. Number of bootstrap resamples = 5000. SI-R = Saving Inventory – Revised; SWLS = Satisfaction with Life Scale; SE = standard error; CI = confidence interval; AAQ-II = Acceptance and Action Questionnaire – II; PHLMS = Philadelphia Mindfulness Scale; CFQ = Cognitive Fusion Questionnaire; MAAS = Mindful Attention Awareness Scale; VQ = Valuing Questionnaire; IV = independent variable.