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An initial investigation of the relationships between hoarding and smoking

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Abstract

Cigarette smokers have increased rates of mood and anxiety-related conditions. Hoarding is another anxiety-related condition that has yet to be examined in relation to smoking behavior. The current investigation sought to examine smoking rates among a sample of individuals with hoarding disorder and individuals with non-hoarding obsessive-compulsive disorder (OCD). Additionally, we examined the relationship between hoarding symptoms and reasons for smoking. Participants in study 1 consisted of 57 individuals with non-hoarding OCD or hoarding disorder. Participants in study 2 consisted of 661 adult daily smokers. Results revealed that a significantly greater proportion of individuals diagnosed with hoarding were current smokers compared to the non-hoarding OCD group. Additionally, hoarding severity was associated with negative affect reduction expectancies. These results provide important information regarding smoking behaviors within hoarding disorder. Given the poor treatment outcomes and negative health risks associated with hoarding, this information could inform future research and treatment programs.

Keywords

Anxiety disorders; Hoarding; Obsessive-compulsive disorder; Reasons for smoking; Smoking expectancies

1. Introduction

Although the positive association between smoking and several of the anxiety disorders is firmly established (Amering et al., 1999; Hapke et al., 2005; Johnson et al., 2000; Sonntag et al., 2000), the relationship between tobacco use and obsessive-compulsive disorder (OCD) seems to represent an opposite end of the tobacco addiction spectrum. Unlike many anxiety-related disorders¹, research suggests that individuals with OCD have comparable or even

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lower rates of tobacco use than other psychiatric populations and the general population. For example, one study found that only 9% of obsessive-compulsive (OC) patients smoked cigarettes, compared to 42% of those with mood or other anxiety disorders (Himle et al., 1988). Similarly, McCabe and colleagues (2004) found that 22.4% of their OCD group were current smokers, compared to 40.4% of their panic disorder group. Additionally, Bejerot and Humble (1999) found that the general population had almost twice the smoking rate of those with OCD (25% compared to 14%), and that those with a non-OC anxiety disorder had nearly three times the smoking rate of those with OCD (42% compared to 25%).

Notably, hoarding has yet to be examined in relation to smoking behavior. Hoarding is defined as the accumulation of and failure to discard large quantities of objects that appear to be useless or limited in value (Frost and Hartl, 1996). In recent years, hoarding has emerged as a considerable public health burden that is linked to substantial impairment in social, occupational, and family domains (Tolin et al., 2008a; Tolin et al., 2008b). Whereas hoarding has been observed in a number of psychiatric conditions including social phobia, schizophrenia, and anorexia, it has most commonly been assumed to be variant of OCD (Frankenburg, 1984; Frost et al., 2000b; Luchins et al., 1992). However, more recent research has demonstrated that a large percentage of individuals who hoard display no other OCD symptoms (Pertusa et al., 2010; Samuels et al., 2008). In addition, it appears that hoarding is more commonly associated with symptoms of depression rather than OCD (Frost et al., 2011), suggesting that hoarding may be a distinct clinical syndrome. Taken together, these and other findings led the American Psychiatric Association to include hoarding disorder as a discrete diagnostic entity within DSM-5 (American Psychiatric Association, 2013).

Despite the lack of information regarding tobacco use in hoarding populations, it is theoretically plausible that hoarding may be linked to increased smoking status. Specifically, hoarders may be inclined to smoke because of the wide range of behavioral effects nicotine has on cognitive functioning. Research has demonstrated that nicotine improves attention, working memory, and other information processing domains (Foulds et al., 1996; Levin and Rezvani, 2002). Given the extant literature demonstrating that hoarding is associated with numerous information processing deficits in the areas of memory, attention, decision making, and categorization (Frost and Shows, 1993; Grisham et al., 2010; Hartl et al., 2005; Hartl et al., 2004) it seems plausible that hoarders could benefit from the information processing enhancement that nicotine has on the brain.

Another potential rationale for the use of tobacco among individuals who hoard is related to nicotine's effects on the central nervous system. Smoking is associated with lower perceived stress, reduced negative affect, and enhanced positive affect among nicotine users (Brown et al., 2001; Copeland et al., 1995). From a neuropsychological perspective, research has indicated that nicotine exerts its reinforcing effects by activating dopamine neurons along the mesolimbic dopamine pathway, which enhances the positive reinforcement properties of nicotine including increased energy, reduced stress, and mild euphoria (Watkins et al.,

¹It 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.

2000). Given the high rates of depression seen among individuals diagnosed with hoarding , particularly compared to individuals with OCD (Frost et al., 2011; Frost et al., 2000b), it is reasonable to assume that smoking may be one mechanism by which hoarders attempt to reduce negative affect and induce positive emotional states.

Finally, hoarders may engage in tobacco use because of their increased levels of impulsivity. Hoarding is related to increased impulsivity, particularly under conditions of intense negative affect (Timpano et al., 2012), and these symptoms are not better accounted for by comorbid OCD or depression (Grisham et al., 2007). In addition, research has indicated a distinct association between impulse control disorders (e.g., compulsive buying and gambling) and hoarding symptoms (Frost and Gross, 1993; Frost et al., 1998; Frost et al., 2001). Impulsivity is a significant predictor of smoking initiation, perceived reward from smoking, and of greater relapse upon smoking cessation (Doran et al., 2004; Granö et al., 2004). Moreover, current models of drug addiction highlight the role of impulsivity in the development of drug abuse (Bari and Robbins, 2013). Thus, elevated impulsivity among hoarders may contribute to smoking initiation and sustained tobacco use.

Despite these suggested associations, to our knowledge no empirical research has examined the relationships between hoarding symptoms and smoking status. Thus, the primary aim of the current study (Study 1) was to examine smoking rates utilizing a sample of hoarding disorder patients and patients with non-hoarding OCD. An OCD sample was used as a comparison group for a number of reasons. First, there is increasing empirical evidence suggesting that the prevalence of cigarette smoking is even greater in psychiatric populations than the general population (Kalman et al., 2005). Thus, we were interested in comparing rates of smoking among hoarders to those of another psychiatric population. Second, hoarding has a long-standing history of being considered within the context of OCD. Considering recent changes to DSM-5 regarding the nosology of hoarding disorder, further information regarding distinctions between these two conditions seems warranted. Based on the aforementioned indications that individuals who hoard may be at greater risk for nicotine use, we expected elevated rates of smoking among hoarders compared to a non-hoarding OCD sample. The second aim of the current investigation (Study 2) was to examine the relationship between hoarding symptoms and potential reasons and expectancies for smoking in a large sample of adult daily smokers. Based on the limited empirical work available, we expected to find a relationship between negative affect reduction expectancies and motives, as well as positive reinforcement expectancies and pleasure/relaxation motives.

2. Study 1

2.1. Study 1 methods

2.1.1. Participants—The sample consisted of 57 individuals who presented to an outpatient clinic to participate in various research and/or treatment options. Eligible individuals had to have a primary diagnosis of OCD, as determined by the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID; First et. al., 1996) or hoarding disorder, as determined by the Structured Interview for Hoarding Disorder (SIHD; Pertusa and Mataix-Cols, unpublished). Participants were excluded if criteria were met for both

disorders. The OCD group consisted of 28 participants (64.3% female) and the hoarding group consisted of 29 participants (82.8% female). Ages ranged from 18 to 65 ($M = 28.61$, $SD = 12.61$) for the OCD group and 18 to 76 ($M = 45$, $SD = 14.86$) for the hoarding group. Eighty-two percent of the OCD participants were Caucasian, 3.6% African American, and 14.4% Other (e.g., bi-racial). 58.6% of the hoarding group were Caucasian, 37.9% African American, and 3.4% Other.

2.1.2. Measures

2.1.2.1. Clinician administered

2.1.2.1.1. Obsessive-compulsive disorder: OCD was assessed using the SCID for DSM-IV Axis I Disorders (First et al., 1996). The SCID was administered by advanced doctoral students who had received extensive training in SCID administration. This training included reviewing SCID training tapes, observing live SCID administrations, and conducting SCID interviews with a trained interviewer. Trainees received feedback throughout the process until they demonstrated high reliability. Additionally, each SCID they completed was presented and reviewed by a licensed psychologist to ensure accurate diagnosis. The rate of agreement between clinical interviewers within our laboratory has been found to be over 80% with a kappa value of 0.77 (Timpano and Schmidt, 2012).

2.1.2.1.2. Hoarding: Hoarding was assessed using the SIHD. The SIHD is a brief structured interview based on the DSM-5 diagnostic criteria for Hoarding Disorder (Pertusa and Mataix-Cols, unpublished). The interview consists of detailed questions and specifiers regarding each of the 6 DSM-5 criteria. The SIHD was used in the current study to assess for potential Hoarding Disorder.

2.1.2.2. Self-report

2.1.2.2.1. Smoking behaviors: Smoking status was assessed using a series of self-report questions. Reviews of assessment of smoking behaviors indicate that self-report is highly accurate (Patrick et al., 1994; Velicer et al., 1992). Current tobacco use was defined based on previous research examining cigarette smoking and anxiety disorders (Bejerot et al., 2000). A *current smoker* was defined as someone who consumes at least one cigarette per day for at least the last six months. A *non-smoker* was defined as someone who has not consumed during the past six months. Number of years as a smoker was also measured using a self-report question, with participants asked to indicate for how many years they had smoked daily. Additionally, number of cigarettes smoked daily was assessed using a 5-point Likert scale with answers ranging from 0 (*None*) to 4 (*30 or more*).

2.1.3. Procedure—Participants were individuals from the general community who presented to an anxiety clinic to take part in various treatment and/or research studies. Upon arrival, informed consent was obtained. Next participants were instructed to complete a battery of self-report questionnaires that took approximately 30 minutes to complete. The questionnaire battery included questions related to smoking status, as well as additional measures used for other ongoing projects. After the completion of self-report measures, participants completed a diagnostic interview. Finally, participants were debriefed and dismissed. This study was approved by the university's institutional review board (IRB).

2.2. Study 1 results

2.2.1. Sample characteristics—Chi-square analyses indicated no significant differences between the diagnostic groups with respect to gender $\chi^2(1, N = 57) = 0.21, p = 0.20, \phi = 0.21$. However, an independent t-test indicated that there was a significant difference across the two diagnostic groups with respect to age. Specifically, the hoarding group ($M = 45, SD, 14.86$) was significantly older than the OCD group ($M = 28.61, SD = 12.6; t(55) = 4.50, p < 0.001$) and the magnitude of this difference (mean difference = 16.39, 95% *CI*: 9.09 to 23.70) was very large (eta square = 0.27).

2.2.2. Primary analyses—Chi-square analyses were used to evaluate differences in past and present smoking status (i.e., respondents indicated either “yes” or “no” to whether they were past or present smokers). Results indicated that there was not a significant difference between the two diagnostic groups with regard to past smoking status. Specifically, results indicated that 10% of the hoarding group were past smokers compared to 14% of the non-hoarding OCD group, $\chi^2(1, N = 57) = 0.00, p = 0.96, \phi = -0.06$. However, a significantly greater proportion of the hoarding group (52%) were current smokers compared to the non-hoarding OCD group (18%), $\chi^2(1, N = 57) = 5.76, p = 0.02, \phi = 0.36$.

Next, a series of negative binomial regressions were performed to assess the relationships between diagnostic group and smoking severity (i.e., number of cigarettes smoked daily and number of years as a smoker), after controlling for the participant’s age. The likelihood ratio chi-square test in the first regression was significant indicating that the overall model was a better fit than a model with no predictors at all ($p = .007$). When examining the regression coefficients for the covariate, results indicated that age was not a significant predictor of number of cigarettes smoked ($\beta = 0.01, \text{Wald } \chi^2 = 1.08, p = .30$). Consistent with initial prediction however, results indicated that there was a significant association between diagnostic group and number of cigarettes smoked such that individuals in the OCD group smoked significantly fewer cigarettes per day than the hoarding disorder group ($\beta = -1.09, \text{Wald } \chi^2 = 4.83, p = .03$). In the second regression, the likelihood ratio chi-square test was once again significant indicating that the overall model was a better fit than a model with no predictors at all ($p = .006$). When examining the regression coefficients for the covariate, results indicated that age was significantly associated with number of years as a smoker ($\beta = 0.07, \text{Wald } \chi^2 = 6.63, p = .01$). However, there was not a significant association between diagnostic group and number of years as a smoker ($\beta = -0.66, \text{Wald } \chi^2 = 0.70, p = .40$).

3. Study 2

3.1. Study 2 methods

3.1.1. Participants—The sample consisted of 661 adult smokers recruited from community-based advertisements (e.g., newspaper ads). Eligible participants had to be 18 years of age or older, currently smoking at least 8 cigarettes per day for at least 1 year², and report a motivation to quit smoking. Participants who expressed severe current suicidal ideation, plans, or preparations were excluded. Additionally, psychotic individuals, those

²It should be noted that while the criteria for current smoking status differed between study 1 and study 2, the majority of smokers (21% of 35%) in study 1 smoked 11 or more cigarettes per day.

using another smoking cessation program or tobacco product, and those with a significant medical condition were excluded. Participants were primarily male (51.5% male, 48.5% female) with ages ranging from 18 to 68 ($M = 36.87$, $SD = 13.45$). Eighty-three percent of the participants were Caucasian, 11% African American, 1% Asian, and 5% Other (e.g., biracial).

3.1.2. Measures

3.1.2.1. Hoarding symptoms: Hoarding symptoms were assessed using the *Obsessive Compulsive Inventory-Revised* (OCI-R) hoarding subscale (Foa et al., 2002). The OCI-R is an 18-item self-report questionnaire that assesses the six obsessive-compulsive dimensions including washing, checking, ordering, obsessing, hoarding, and neutralizing. Respondents are asked to rate the degree to which they have been bothered by each symptom on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*very much*). Specifically, the 3 hoarding items were summed to create a measure of hoarding severity. The OCI-R has shown good internal consistency in individuals with OCD and with other anxiety disorders (Abramowitz and Deacon, 2006). Additionally, the OCI-R has shown good test-retest reliability (Foa et al., 2002). In the current study, the OCI-R hoarding items demonstrated acceptable internal consistency ($\alpha = 0.82$).

3.1.2.2. Reasons for smoking: Reasons for smoking were assessed using the *Reasons for Smoking Questionnaire* (RFS; Ikard et al., 1969). The RFS is a 23-item measure that assesses six domains of smoking motives: Addictive (e.g., “Between cigarettes, I get a craving only a cigarette can satisfy”), Habitual (“I’ve found a cigarette in my mouth and didn’t remember putting it there”), Negative Affect Reduction (“When I feel uncomfortable or upset about something, I light up a cigarette”), Pleasurable Relaxation (“I find cigarettes pleasurable”), Stimulation (“I like smoking when I am busy and working hard”), and Sensorimotor (“Part of the enjoyment of smoking a cigarette comes from the steps I take to light it up”). The RFS is scored using a 5-point Likert Scale ($1 = \text{Never}$, $5 = \text{Always}$). The internal consistency, factor structure, and test-retest reliability have all been well established (Shiffman, 1993). Additionally, the RFS demonstrated excellent internal consistency in the present study ($\alpha = 0.91$).

3.1.2.3. Smoking Expectancies: Smoking expectancies were assessed using the *Smoking Consequences Questionnaire* (SCQ; Brandon and Baker, 1991). The SCQ is a 50-item self-report questionnaire that assesses four factors of tobacco use expectancies including negative consequences, positive reinforcement/sensory satisfaction, negative reinforcement/negative affect reduction, and appetite-weight control. The SCQ is scored using a 10-point scale for likelihood of occurrence ($0 = \text{completely unlikely}$, $9 = \text{completely likely}$), with higher scores representing more positive smoking expectancies. The measure and its constituent factors have excellent psychometric properties (Brandon and Baker, 1991; Buckley et al., 2005). The SCQ demonstrated good internal consistency in the present study ($\alpha = 0.94$).

3.1.3. Procedure—Individuals who met the initial requirements during a telephone screen and structured clinical interview were scheduled to come in for a baseline appointment to

complete various demographic, anxiety, substance use, and smoking assessments. Following the baseline appointment, individuals were randomly assigned to a standard smoking cessation program or an anxiety-based management smoking cessation program. Both smoking cessation programs consisted of four 90-minute sessions with a trained therapist. Following treatment, participants were followed up periodically for a 2-year period. The current study utilizes data collected from the baseline appointment which took place prior to randomization and smoking cessation treatment. The study was approved by the university's IRB, and informed consent was obtained from all participants.

3.2. Study 2 results

3.2.1. Sample Descriptives—Table 1 contains the means, standard deviations, and intercorrelations for all variables included in the current analyses. The mean OCI-R hoarding subscale score was comparable to those found in other reports utilizing non-clinical samples (Oglesby et al., 2013; Timpano et al., 2009). Additionally, the mean SCQ and RFS subscale scores were comparable to those found in other reports utilizing samples of adult daily smokers (Brandon and Baker, 1991; Leyro et al., 2008).

3.2.2. Primary Analyses—A multiple regression analysis was performed to assess the relation between hoarding severity (as measured by the OCI-R hoarding subscale) and reasons for smoking (as measured by the RFS). Preliminary analyses indicated that there were no threats or violations of normality, multicollinearity, or homoscedasticity. OCI-R hoarding subscale scores were regressed onto all 6 subscales of the RFS simultaneously. Consistent with initial prediction, results revealed that the negative affect reduction subscale of the RFS was significantly associated with hoarding severity ($\beta = 0.21, t = 3.33, p = 0.001, sr^2 = 0.02$), whereas the stimulation ($\beta = 0.07, t = 1.24, p = 0.22, sr^2 = 0.00$) and sensorimotor ($\beta = 0.08, t = 1.69, p = 0.09, sr^2 = 0.01$) subscales were not. Inconsistent with initial prediction, the pleasure relaxation subscale of the RFS was not significantly associated with greater levels of hoarding severity ($\beta = -0.03, t = -0.58, p = 0.56, sr^2 = 0.00$). However, results revealed that there was a significant positive association between the habitual subscale of the RFS and hoarding severity ($\beta = 0.17, t = 3.23, p = 0.001, sr^2 = 0.02$). In addition, there was a negative significant association between the addictive subscale of the RFS and hoarding severity ($\beta = -0.14, t = -2.13, p = 0.03, sr^2 = 0.01$).

A second multiple regression was computed to assess the relationships between hoarding severity (as measured by the OCI-R hoarding subscale) and outcome expectancies for smoking (as measured by the SCQ). Once again, preliminary analyses revealed no threats or violations of normality, multicollinearity, or homoscedasticity. OCI-R hoarding subscale scores were regressed onto all 4 subscales of the SCQ simultaneously. In line with initial predictions, the negative affect reduction subscale of the SCQ was significantly associated with hoarding severity ($\beta = 0.16, t = 2.60, p = 0.01, sr^2 = 0.01$), whereas the negative consequences ($\beta = 0.03, t = 0.58, p = 0.56, sr^2 = 0.00$) and weight control ($\beta = 0.00, t = 0.00, p = 0.99, sr^2 = 0.00$) subscales were not. Inconsistent with initial prediction however, the positive reinforcement subscale of the SCQ was not significantly associated with hoarding severity ($\beta = 0.06, t = 1.07, p = 0.29, sr^2 = 0.00$).

4. Discussion

Consistent with initial prediction, results indicated that a significantly greater proportion of individuals diagnosed with hoarding were current smokers (52%), compared to individuals diagnosed with non-hoarding OCD (18%). These findings add to a growing body of literature on various safety (e.g., fire, sanitation problems) and health risk problems (e.g., diabetes/high blood sugar, obesity) associated with compulsive hoarding (Frost et al., 2000a; Timpano et al., 2011; Tolin et al., 2008c). Moreover, they support a growing body of research challenging the notion of a specific hoarding-OCD relationship. Specifically, several studies have demonstrated that a considerable number of individuals with hoarding display no other OCD symptoms (Mataix-Cols et al., 2010; Pertusa et al., 2008). Furthermore, compared to OCD patients without hoarding, those with hoarding have an earlier age of onset (Samuels et al., 2002), greater levels of impairment (Lochner et al., 2005), and less insight into the nature and severity of their symptoms (Steketee and Frost, 2003). Similar to these findings, smoking status appears to be another factor that discriminates between OCD and hoarding populations.

Results also indicated that compared to the non-hoarding OCD group, the hoarding group smoked significantly more cigarettes per day. Thus, not only are hoarders more likely to smoke than non-hoarding OCD patients, they are also more likely to smoke a greater number of cigarettes. It could be that individuals with hoarding have an increased motivation to smoke in order to reduce overall negative affect. Indeed, findings from study 2 indicated that hoarding severity was associated with negative affect reduction motives and expectancies. Thus, it appears that not only are individuals with hoarding disorder motivated to smoke in an effort to reduce negative affect but also expect that smoking will reduce negative affect. These findings are consistent with the self-medication model of smoking which posits that a significant proportion of smokers use nicotine as a form of self-medication to elevate their mood (Dinn et al., 2004). Given the high rates of depression seen among individuals with hoarding (Frost et al., 2011), it seems plausible that increased nicotine use may be one way in which hoarders attempt to increase or regulate their mood.

When examining the relation among past smoking status and diagnostic group, results revealed that there were no significant differences between hoarders and individuals with non-hoarding OCD. These findings (i.e., no significant differences in the average number of past smokers between groups) combined with the increased proportion of current smokers in the hoarding group potentially suggest that hoarders may have a more difficult time quitting smoking. Research has demonstrated that increased psychiatric comorbidity is associated with more difficulty quitting as well as greater relapse rates (Dani and Harris, 2005). Given the extant research demonstrating increased Axis I and II comorbidity among hoarding patients, particularly compared to non-hoarding OCD patients (Frost et al., 2011; Samuels et al., 2002), these findings make sense. However, future research should examine if hoarders do indeed have a more difficult time quitting smoking compared to other psychiatric populations. There were also no significant differences between diagnostic groups with regard to number of years as a smoker, after controlling for age. One potential explanation for this finding is that the hoarding group was significantly older than the non-hoarding OCD group. This significant age difference is consistent with previous research

demonstrating that the mean age of OCD participants is considerably lower than that of hoarding participants (Steketee and Frost, 2003; Steketee et al., 2003). However, it is unclear what differences in number of years as smoker would emerge if the groups were similar in age.

Inconsistent with initial predictions results indicated that hoarding was not significantly associated with positive reinforcement or pleasure motives. These results were consistent across a measure of smoking motives and smoking expectancies. Previous research has suggested that individuals who smoke for positive reinforcement tend to be light or occasional smokers (< 5 cigarettes per day; Shiffman, 2009). Thus, this finding seems expected given our results indicating that hoarders tend to be heavier smokers. Furthermore, findings from study 2 indicated that hoarding severity was significantly and positively associated with the habitual motives subscale and significantly and negatively associated with the addictive motives subscale, suggesting that hoarders may smoke out of habit rather than addiction. Previous research examining relationships among smoking motives and affective vulnerability factors have found that habitual motives are associated with anxious arousal and anxiety sensitivity (AS), whereas addictive motives are not (Gregor et al., 2007). Given the extant literature establishing an association between AS and hoarding (Medley et al., 2013; Timpano et al., 2009), as well as findings from study 2 indicating that hoarding severity is associated with habitual motives and negative affect reduction motives and expectancies, these findings make sense. Perhaps individuals who smoke out of habit rely on smoking as an automatic tool for regulating stress.

Together, the present findings fit within the broader framework of the orbitofrontal/disinhibition model which suggests that decisions to engage in unhealthy behaviors such as smoking may depend upon one's ability to anticipate the long-term deleterious consequences associated with nicotine use (Dinn et al., 2004). Indeed, research has suggested that the orbitofrontal system is central for the processing of various emotional information including reward and punishment (O'Doherty et al., 2001). Given the extant research demonstrating that individuals with hoarding, particularly compared to individuals with OCD (An et al., 2009), experience distinct excessive activity in the lateral orbitofrontal cortex (Tolin et al., 2009; Tolin et al., 2012), it seems plausible that a failure to employ reward and punishment cues could guide smoking behaviors among those with hoarding.

The present investigation has a few limitations worth noting. First, due to the cross-sectional design of the current study, we cannot speak to the exact nature of the associations between smoking behaviors and hoarding disorder. Prospective studies are needed to further elucidate the temporal relationships between these two constructs. Specifically, it will be important to determine if hoarding is a vulnerability factor for smoking initiation or rather a maintaining factor for smoking behaviors. Second, it is possible that reporting biases in smoking behaviors may have influenced the results of this study. Therefore, future research should utilize validated timeline follow-back procedures as a next step in evaluating smoking behaviors within hoarding samples. Third, the current study lacked an additional comparison group. Future research should compare rates of smoking among hoarders to other known smoking psychiatric populations (e.g., panic disorder patients; Zvolensky and Schmidt, 2003) to determine if hoarders are indeed prone to smoking. Finally, the second

study in the present investigation used the 3-item hoarding subscale of the OCI-R as a measure of hoarding symptoms. Prospective studies on the relationship between smoking motives and hoarding could benefit from using a more comprehensive hoarding measure.

In summary, the current study provides important new information regarding smoking behaviors within hoarding disorder. To our knowledge, this investigation is the first to examine the relationships among these two constructs. Considering the paucity of research regarding hoarding, as well as the negative health risks associated with smoking, these findings add considerably to a growing body of literature on hoarding, and on smoking within various anxiety-related conditions. Moreover, these findings support a growing body of literature highlighting distinct differences between hoarding and OCD (Mataix-Cols et al., 2010; Pertusa et al., 2008).

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Table 1

Zero-order correlations, means, standard deviations, and ranges.

	1	2	3	4	5	6	7	8	9	10	11	Mean	SD
1. OCIR-H	-											2.58	2.60
2. RFS-H	0.24	***	-									2.33	0.73
3. RFS-A	0.15	**	0.52	***	-							3.29	0.77
4. RFS-NAR	0.25	***	0.44	***	0.68	***	-					3.45	0.81
5. RFS-PR	0.04	0.04	0.35	***	0.31	***	-					3.76	0.81
6. RFS-St	0.21	***	0.40	***	0.49	***	0.55	***	-			2.68	0.94
7. RFS-Se	0.18	***	0.31	***	0.39	***	0.38	***	0.43	***	-	2.51	1.00
8. SCQ-NC	0.10	*	0.22	***	0.30	***	0.31	***	-0.02	0.15	**	6.54	1.30
9. SCQ-PR	0.16	***	0.18	***	0.43	***	0.42	***	0.57	***	0.33	5.66	1.53
10. SCQ-NR	0.20	***	0.20	***	0.48	***	0.70	***	0.30	***	0.48	5.63	1.82
11. SCQ-WC	0.09	*	0.22	***	0.29	***	0.35	***	0.16	***	0.36	4.15	2.37
											0.22	0.44	0.44
											0.32	0.44	0.44
											0.26	0.44	0.44
											0.28	0.44	0.44
											0.49	0.44	0.44
											0.29	0.44	0.44
											0.38	0.44	0.44
											0.59	0.44	0.44

p < 0.001,

**
p < 0.01,

*
p < 0.05.

OCIR-H, OCI-R Hoarding Subscale;; RFS-H = Reasons For Smoking – Habitual Subscale; RFS-A, Reasons For Smoking – Addictive Subscale; RFS-NAR = Reasons For Smoking – Negative Affect Reduction Subscale; RFS-PR = Reasons For Smoking – Pleasure/Relaxation Subscale; RFS-St, Reasons For Smoking – Stimulation Subscale; RFS-Se, Reasons For Smoking – Sensorimotor Subscale; SCQ-NC, Smoking Consequences Questionnaire – Negative Consequences Subscale; SCQ-PR, Smoking Consequences Questionnaire – Positive Reinforcement Subscale; SCQ-NR, Smoking Consequences Questionnaire Negative Reinforcement/Negative Affect Reduction Subscale; SCQ-WC = Smoking Consequences Questionnaire – Weight Control/Appetite Subscale.