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## The impact of coronavirus on individuals with problematic hoarding behaviours

Leonardo F. Fontenelle<sup>a,b,\*</sup>, Julia E. Muhlbauer<sup>b</sup>, Lucy Albertella<sup>a</sup>, Jan Eppingstall<sup>a</sup>

<sup>a</sup> Turner Institute for Brain and Mental Health, Monash University, 770 Blackburn Road, Clayton, Victoria, 3168, Australia

<sup>b</sup> Obsessive, Compulsive, and Anxiety Spectrum Research Program. Institute of Psychiatry, Federal University of Rio de Janeiro (UFRJ) & D'Or Institute for Research and Education (IDOR), Rio de Janeiro, Brazil

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### ABSTRACT

We aimed at investigating the impact of the coronavirus pandemic on individuals with problematic hoarding behaviors. One hundred seventeen subjects with hoarding problems responded to the Coronavirus Stressful and Traumatic Rating Scale (COROTRAS), an instrument that quantified the number of coronavirus-related events, whether they were experienced as stressful, and the range of emotions resulting from them. The research subjects also answered self-report tools to evaluate the severity of hoarding, hoarding beliefs/motivations, social support, self-efficacy, internalized stigma, and other psychopathological symptoms. The number of stressful coronavirus-related events was predicted by lower age at onset of hoarding, decreased social support, greater severity of obsessive-compulsive symptoms, and lower intensity of concerns over memory as drivers of hoarding. Two emotional states experienced in the aftermath of trauma, namely greater helplessness and lower sadness, and higher depression, anxiety and distress, predicted greater severity of hoarding. In conclusion, we were able to find significant associations between hoarding disorder phenotypes and covid-19 related stressful events.

### 1. Introduction

Hoarding disorder is a complex psychiatric disorder characterized by difficult discarding, clutter and, in the majority of cases, excessive acquisition (APA, 2013). It is a common condition, affecting up to 2.5% of the general population (Postlethwaite et al., 2019). Hoarding disorder is listed as an obsessive-compulsive and related disorder (OCRD) in DSM-5 (APA, 2013). Twin studies have confirmed a significant role of genetic factors in hoarding, although they also demonstrated a role for non-shared environmental factors, which include traumatic and stressful life events [SLEs] (Iervolino et al., 2009). Studies on clinical samples also demonstrate a high prevalence of these events (e.g. (Landau et al., 2011)), although it is not completely clear whether they function as precipitators, maintainers, or consequences of hoarding.

The COVID-19 pandemic has resulted in unprecedented levels of stress and fear in the general population (Xiong et al., 2020). Further, although many authors have anticipated a significant impact of the COVID-19 on people with existing OCRDs, only few studies have assessed this possibility systematically, particularly in obsessive-compulsive disorder (OCD) (Benatti et al., 2020). Yet, there is still no data on the impact of COVID-19 on other OCRDs, including

hoarding disorder (Banerjee, 2020). Increasingly though, as the COVID-19 pandemic progresses, the population has witnessed reports in the press of people stockpiling toilet paper, disinfectants, masks, and food among other items (Sim et al., 2020). However, whether these behaviors represent healthy reactions under unparalleled stress, sub-clinical hoarding tendencies, or clinical hoarding symptoms, is still unclear.

Worry and perception of threat were the most frequent reasons for stock piling during the pandemic according to different studies (Garbe et al., 2020; Micalizzi et al., 2020; Oosterhoff and Palmer, 2020). For instance, the perception of COVID-19 severity among adolescents was associated with greater hoarding behaviors but also more social distancing, disinfecting, and news monitoring (Oosterhoff and Palmer, 2020). Covid-related stock piling was also seen in different cultures. For instance, in one study, movement restrictions - whether announced by domestic or foreign governments - generated substantial consumer panic/panic buying across 54 countries (Keane and Neal, 2020). Stockpiling was also associated with the view that the government should be doing more to stop the coronavirus epidemic (Dammeyer, 2020) and with a conservative political orientation (Micalizzi et al., 2020).

\* Corresponding author. Turner Institute for Brain and Mental Health, Monash University, 770 Blackburn Road, Clayton, Victoria, 3168, Australia.  
E-mail address: [lfontenelle@gmail.com](mailto:lfontenelle@gmail.com) (L.F. Fontenelle).

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In one study (Micalizzi et al., 2020), participants stockpiled, on average, six items, including toilet papers (63.21%), canned goods (59.18%), rice (57.41%), bottled water (56.96%), pasta (56.19%), bread (53%), medicine (52.7%), cash (45.89%), alcohol (37.7%), gasoline (35.96%), firewood (25.8%), guns and other weapons (24.52%), and gold or other precious metals (20.25%). A predisposition towards emotionality predicted the perceived threat of COVID-19 and affected stockpiling behavior indirectly (Garbe et al., 2020). Stockpiling was associated with high scores on extraversion and neuroticism, and low scores on openness to experience (Dammeyer, 2020). Data on conscientiousness is conflicting (Dammeyer, 2020; Garbe et al., 2020). Likewise, individuals with higher pessimism were more willing to “justify” (or support) hoarding behaviors during the COVID-19 pandemic (Sheetal et al., 2020).

Based on research showing that those with pre-existing mental health problems experience greater distress and negative psychological consequences as a result of COVID-19 (Xiong et al., 2020), we made two broad predictions. Firstly, we hypothesized that individuals who reported more severe hoarding symptoms and their most commonly associated psychopathology (i.e. depression, anxiety, OCD symptoms, and attention deficits) (Frost et al., 2011) and people showing lower “psychosocial strengths” [such as lower self-efficacy (Petzold et al., 2020), less social support (Saleem et al., 2020) and greater stigma (Sahoo et al., 2020)] will be more vulnerable to coronavirus-related situations and report experiencing a greater number of coronavirus-related stressful events. Secondly, we predicted that the number of stressful coronavirus-related events and the resulting fear would predict a greater severity of hoarding symptoms during the pandemic over and above specific hoarding subdimensions/cognitions, comorbid symptoms (i.e. depression, anxiety, OCD symptoms, and attention deficits) (Reid et al., 2011) and the subject’s “psychosocial strength” (Archer et al., 2019; Chasson et al., 2018; Timpano and Schmidt, 2013).

## 2. Methods

### 2.1. Subjects

The recruitment process used for the present sample has been described in more detail elsewhere (Fontenelle et al., 2020). Individuals with hoarding problems were selected through advertisements in social media (i.e. Facebook, Instagram and Reddit), forums, and support groups for hoarding. A snowball sampling method was adopted. Inclusion criteria comprised 1) Hoarding behaviors as problem for the participant or significant others, as latter confirmed by Saving Inventory-Revised (SI-R) total score  $>$  or  $=$  39 (Kellman-McFarlane et al., 2019), 2) age above 18 years old and 3) being able to read and fill out forms. The Monash University Human Research Ethics Committee (MUHREC) approved the research protocol. Volunteers consented to take part in the study after reading the explanatory statement. Out of 223 research subjects who consented, 117 were included in the present analyses. The remaining subjects were excluded for not completing the protocol or failing to meet inclusion criteria.

### 2.2. Assessment

The present study employed Qualtrics for data collection. The whole assessment took approximately 45 min to complete but participants were allowed to save responses and finalize their forms later if needed. The assessment battery included a sociodemographic questionnaire, a newly devised instrument to assess for the history of SLEs related to the COVID-19 pandemic, and self-report tools to evaluate the severity of hoarding (the Saving Inventory-Revised [SI-R] (Frost et al., 2004)), hoarding beliefs/motivations (the Saving Cognition Inventory [SCI] (Steketee et al., 2003)), social support (the Multidimensional Scale of Perceived Social Support [MSPSS] (Zimet et al., 1990)), self-efficacy

(the General Self-Efficacy Scale [GSES] (Schwarzer and Jerusalem, 1995)), internalized stigma (the Internalized Stigma of Mental Illness Inventory-10 [ISMI-10] (Boyd et al., 2014)), obsessive-compulsive symptoms (the Dimensional Obsessive Compulsive Scale [DOCS] (Abramowitz et al., 2010)), depression, anxiety, and stress [the Depression Anxiety Stress 21 (DASS 21) (Abramowitz et al., 2010)], and attentional deficits (the Adult ADHD Self-Report Scale [ASRS] (Kessler et al., 2007)).

### 2.3. The Coronavirus Traumatic and Stressful Life Events Scale (COROTRAS)

The COROTRAS is a self-report inventory that lists 16 potential life events related to the COVID-19 pandemic (e.g. “have you lost your job or had a reduction in your salary as a consequence of the COVID-19 pandemic?”) (See appendix for the scale). Through the COROTRAS, the respondent can indicate whether he or she has experienced these events as stressful and rate the intensity of a spectrum of emotions that he or she might have experienced as a consequence of the exposure to the event they found most stressful. Thus, the COROTRAS generates (1) the total number of life changes related to coronavirus, (2) the total number of SLEs related to coronavirus and (3) the intensity of each emotion (fear, helplessness, anger, sadness, guilt, shame and disgust) experienced as a result of the most stressful coronavirus event, ranging from 0 (absent) to 4 (extreme). Intraclass correlation coefficient of the COROTRAS in the present sample was considered excellent (Cronbach’s  $\alpha = .917$ ). Inspection of the correlations between the COROTRAS subscores and DASS 21 revealed the scale to have acceptable convergent validity (see appendix for matrix of correlations).

### 2.4. Saving Inventory-Revised (SI-R)

The SI-R is a self-report instrument used to measure severity of hoarding (Frost et al., 2004). It has 23 items and generates three different subscores, namely difficult discarding, clutter and excessive acquisition. The original SI-R scale has demonstrated good psychometric properties (including good internal consistency, test-retest reliability, and convergent and divergent validity) (Frost et al., 2004; Tolin et al., 2010). Total scores vary from 0 to 92. Recently, a score of 39 was proposed as the optimal cut-off to differentiate people with a hoarding problem from people without a hoarding problem (Kellman-McFarlane et al., 2019).

### 2.5. Saving Cognition Inventory (SCI)

The SCI is a self-report tool used to assess the beliefs/motivations underlying hoarding symptoms (Steketee et al., 2003). It has 24 items and generates four different subscores, i.e. emotional attachment (e.g., “This possession provides me with emotional comfort”), concerns about memory (e.g., “Saving this means I don’t have to rely on my memory”), control over possessions (e.g., “I like to maintain sole control over my things”), and responsibility towards possessions (e.g., “I am responsible for finding a use for this possession”). The SCI has demonstrated good psychometric properties, including internal consistency and convergent and discriminant validities (Steketee et al., 2003).

### 2.6. Multidimensional Scale of Perceived Social Support (MSPSS)

The MSPSS is a self-report scale that measures the amount of social support an individual receives from three different sources, i.e. friends (“I can count on my friends when things go wrong”), family (“My family really tries to help me”) and significant others/special people (“There is a special person who is around when I am in need”). The MSPSS has 12 items. Each of source of support is associated with a specific subscore (Zimet et al., 1990) but, for the purposes of the present study, we used the total scores. The original version of the MSPSS has high internal

consistency, stability and divergent validity (Zimet et al., 1990).

### 2.7. General Self-Efficacy Scale (GSES)

The GSES is a self-report instrument that measures the general sense of perceived self-efficacy with the aim of predicting how the respondent copes with daily hassles and adapts to all kinds of stressful life events (e. g. “I can always manage to solve difficult problems if I try hard enough”) (Schwarzer and Jerusalem, 1995). The original version of the GSES is unidimensional and generates one single total score (Schwarzer and Jerusalem, 1995). The GSES has 10 items. Its total scores ranges from 10 to 40 (Schwarzer and Jerusalem, 1995).

### 2.8. Internalized stigma of Mental Illness Inventory-10 (ISMI-10)

The Internalized Stigma of Mental Illness-10 (ISMI-10) is 10-item version of the original 29 items ISMI-29 (Boyd et al., 2014). Like its predecessor, the ISMI-10 measures the subjective perception of devaluation, marginalization, secrecy, shame, and withdrawal presented by people with psychiatric disorders (Boyd et al., 2014). It does, however, demonstrate a unidimensional factor structure and good psychometric properties (Boyd et al., 2014). The total scores of the ISMI-10 range from 10 to 40, the higher scores indicating greater internalized stigma.

### 2.9. Dimensional Obsessive Compulsive Scale (DOCS)

The DOCS is a self-report scale that assesses the four OCD dimensions most regularly reported in previous factor analytic studies, specifically concerns about germs and contamination; concerns about being responsible for harm, injury or bad luck; unacceptable thoughts, and concerns about symmetry, completeness and need for things to be “just right” (Abramowitz et al., 2010). Each dimension is evaluated in terms of time spent, avoidance, distress, interference, and control. The scale has a total of 20 items, each rated from 0 to 4. The DOCS has shown adequate psychometric properties (Abramowitz et al., 2010). For the purposes of the present study, we used the DOCS total score.

### 2.10. Depression Anxiety Stress 21 (DASS 21)

The DASS 21 is a 21-item self-report tool based on the tripartite model proposed by Clark and Watson (Henry and Crawford, 2005). The DASS 21 generates three specific subscores, i.e. depression (e.g. sadness, anhedonia, lack of initiative, low self-esteem, among others); anxiety (e. g. worrying, panic, fear, and somatic symptoms); and stress (e.g. irritability, impatience, tension, and other symptoms consistent with persistent arousal) (Lovibond and Lovibond, 1996). The DASS 21 has shown good psychometric features across different settings (Henry and Crawford, 2005). Its scores range from 0 to 63 (0–21 for each subscale). For the purposes of this study, we used the total DASS 21 score.

### 2.11. Adult ADHD self-report scale (ASRS)

The ASRS-v1.1 Symptom Checklist is an 18-item self-report instrument that assesses the ADHD symptoms in adults. Part A is a screener with six items, previously validated by Kessler et al. (2007). Part B contains 12 items that serve as further probes into the subjects’ symptoms. The 18 items that comprise the ASRS-v1.1 are based on the 18 DSM-IV ADHD symptoms. The ASRS has shown good psychometric characteristics. Since we aimed at determining the ADHD symptom burden rather than subtypes, the total ASRS scores were calculated by summing the number of points across all 18 items (Adler et al., 2019).

### 2.12. Data analysis plan

To test the first research hypothesis, we performed a Poisson regression, as the dependent variable (the number of coronavirus-

related stressful events) was expected to follow a Poisson distribution. Independent variables included age, age at onset of hoarding, number of stressful life events before and after the onset of hoarding, SI-R subscores, SCI subscores, and DOCS, DASS 21, ASRS, MSPSS, GSES, ISMI-10 and total scores.

Conversely, a linear regression was used to test the second hypothesis, as we expected the dependent variable (SI-R total scores) to be normally distributed. The later model included, as independent variables, the number of coronavirus-related life events, the number of coronavirus-related stressful events, the intensity of each emotion experienced in their aftermath of the stressful event, SCI subscores, and DOCS, DASS 21, ASRS, MSPSS, GSES, ISMI-10 and total scores.

## 3. Results

### 3.1. Description of the sample

The general characteristics of the present sample have been already described elsewhere (Fontenelle et al., 2020). Most volunteers were based at the US (n = 60; 53.1%), Australia (n = 25; 22.3%) or the UK (n = 17; 16.2%). The sample’s mean age was 48.38 (12.74) years, and the majority of subjects (i.e. 90.5%) identified as females. Individuals were mostly married or cohabiting (n = 48; 41.4%), single (n = 45; 38.8%) or divorced/separated (n = 21; 18.1%). From the educational point-of-view, at least 89 individuals had at least secondary/high school degree (76.06% of the cases). In terms of age at onset, hoarding initiated around 20.25 (14.16) years, whereas age at onset of clinically significant hoarding was 30.19 (15.72) years. Individuals who sought treatment for their hoarding (n = 47) did so at 41.76 (15.74) years. The sample’s mean score on the SI-R was 76.54 (14.17). Only a fraction of the sample was undergoing pharmacotherapy (36.8%) or psychotherapy (20%). Pharmacotherapy included selective serotonin reuptake inhibitors (SSRIs) or selective serotonin and noradrenaline reuptake inhibitors (SNRIs) in 24.8%, psychostimulants in 8.5%, and antipsychotics in 3.4% of the sample. For a summary of the volunteers’ clinical features, see Table 1.

### 3.2. Coronavirus related events

The median number of life events related to coronavirus, which were not necessarily stressful, was 2 [minimum 0 and maximum 10], whereas the median number of stressful events related to coronavirus pandemic was 1 [minimum 0 and maximum 10]. The number of SLEs related to coronavirus pandemic differed between people with hoarding problems from the US (Mdn number of SLEs = 2; range = 0–10), the UK (Mdn number of SLEs = 0; range = 0–6), Australia (Mdn number of SLEs = 0; range = 0–3); and other parts of the world (Mdn number of SLEs = 2; range = 0–4) (Kruskal-Wallis  $H = 13.272$ ;  $df = 3$ ;  $p = .004$ ). As seen in Table 2, the planned Poisson regression found that lower age at onset of hoarding ( $B = -0.031$ ,  $SE = 0.008$ ,  $p < .001$ ), lower intensity of concerns over memory as a driver of hoarding ( $B = -0.041$ ,  $SE = 0.018$ ,  $p = .027$ ), greater severity of obsessive-compulsive symptoms ( $B = 0.019$ ,  $SE = 0.009$ ,  $p = .027$ ), and lower social support ( $B = -0.017$ ,  $SE = 0.008$ ,  $p = .038$ ) were associated with a greater number of covid-related stressful events. Finally, the multiple linear regression performed to identify the predictors of greater severity of hoarding (Table 3) found that greater covid-related helplessness ( $B = 5.257$ ,  $SE = 1.66$ ,  $p = .002$ ), greater DASS 21 scores ( $B = 0.377$ ,  $SE = 0.147$ ,  $p = .013$ ), and lower covid-related sadness ( $B = -2.630$ ,  $SE = 1.27$ ,  $p = .042$ ) were associated greater hoarding symptoms (Table 2) [Adjusted  $R^2 = 0.359$ ;  $F(19,79) = 3.88$ ;  $p = 0.00001$ ].

## 4. Discussion

In this online study, we investigated the relationship between the coronavirus pandemic (as demonstrated by the number, the stress, and the emotions resulting from coronavirus-related events) and the

**Table 1**  
Summary of participants clinical features.

	Mean (SD)	Cut-off scores (Reference)	% of individuals in the clinical level
<b>Symptoms' severity</b>			
<i>Saving Inventory-Revised</i>	76.55 (14.17)	≥39 (Kellman-McFarlane et al., 2019)	100%
Clutter	31.77 (6.45)	≥17 (Kellman-McFarlane et al., 2019)	99.1%
Difficult discarding	23.87 (5.11)	≥13 (Kellman-McFarlane et al., 2019)	100%
Excessive Acquisition	20.90 (5.37)	≥11 (Kellman-McFarlane et al., 2019)	99.1%
<i>Depression Anxiety Stress Scale-21</i>	42.78 (11.34)		
Depression	33.78 (16.03)	>9 (Lovibond and Lovibond, 1996)	96.0%
Anxiety	15.27 (5.15)	>7 (Lovibond and Lovibond, 1996)	99.0%
Stress	21.46 (8.80)	>14 (Lovibond and Lovibond, 1996)	62.4%
<i>Dimensional Obsessive-Compulsive Scale</i>	35.23 (14.26)	>18 (Abramowitz et al., 2010)	92.1%
<i>Adult ADHD Self-Report Scale</i>	55.53 (18.05)	≥8 (Kessler et al., 2007)	94.1%
<b>Other constructs</b>			
<i>Saving Cognitions Inventory</i>			
Emotional Attachment	33.78 (16.03)	–	–
Control	15.27 (5.15)	–	–
Responsibility	21.46 (8.80)	–	–
Memory	17.51 (8.23)	–	–
<i>General Self-Efficacy Scale</i>	28.57 (5.32)	–	–
<i>Multidimensional Scale of Perceived Social Support</i>	18.26 (7.52)	–	–
<i>Internalized Stigma of Mental Illness Inventory-10</i>	23.40 (4.20)	–	–

symptoms expressed by individuals with hoarding symptoms. Two main findings are reported. Firstly, individuals reporting high levels of hoarding behaviors and lower age at onset, greater severity of comorbid obsessive-compulsive symptoms, lower social support, and less concerns over memory as a driver of hoarding were more likely to perceive a greater number of events related to the coronavirus pandemic as stressful. Secondly, greater helplessness and lower sadness as a consequence of the coronavirus pandemic, and greater general distress were associated with increased severity of hoarding during the pandemic.

It is unclear at this stage why an earlier onset of hoarding may predict the experience of a greater number of stressful coronavirus-related events. However, Grisham et al. (Grisham et al., 2006) suggested that early onset hoarding may be a manifestation of long-term information processing deficits and that behaviours endemic to hoarding may form a fundamental part of the identity of the individuals who hoard. We speculate that these lifelong “characterological” features may explain why individuals with early onset hoarding may perceive the threat associated with the coronavirus pandemic as particularly stressful. Though, it must be noted that psychological distress was not predictive of the number of stressful coronavirus events.

Another significant predictor of the number of stressful coronavirus-related events was the severity of comorbid obsessive-compulsive symptoms. Despite gaining the status of an independent illness in

DSM-5 (APA, 2013), hoarding is known to have a significant impact on the OCD phenotype by being associated with an earlier age at onset, higher frequency of the symmetry-ordering symptom dimension, poorer insight and specific pattern of comorbidities, among several other factors [e.g. (Torres et al., 2012)]. However, it is presently unclear if these related factors (such as increased delusionality or greater severity of post-traumatic stress symptoms) are also responsible for the augmented perception of threat of events related coronavirus, a possibility that can only be answered in future studies.

We also found that greater social support was negatively related to the total number of coronavirus related events perceived as stressful. This finding is consistent with the “buffering hypothesis” by Cohen and Willis, which argued that social support is required to ‘buffer’ the pathogenic effects of stress (Cohen and Wills, 1985). Accordingly, Moak and Agrawal (Moak and Agrawal, 2010) found that across different numbers of traumatic experiences, people at the lowest level of social support reported statistically higher rates of mental health problems than those experiencing the same number of traumatic experiences but higher perceived social support. Nevertheless, whether there is something unique about the “hoarding orientation” that makes the pandemic threat particularly stressful in the presence of decreased social support is presently unclear.

Although we had hypothesized that individuals showing greater responsibility over possessions would report more stressful events related to the pandemic, we found those who reported greater concerns over memory as the motivation for their hoarding behaviors reported fewer coronavirus-related stressful events. It is difficult to explain this unanticipated finding, but we speculate that some individuals reporting more severe hoarding symptoms may be preoccupied by memories of the past and are therefore less aware of current events, including the coronavirus pandemic. Alternatively, the stress of an ongoing pandemic could lead to greater allocation of attentional resources to the coronavirus-related events and result in decreased perception of memory problems as reasons for hoarding.

Finally, we were interested in the impact of the coronavirus pandemic on the severity of hoarding symptoms. Even though the number of coronavirus related events and the individuals’ perception of these events as being stressful did not predict greater severity of hoarding, the intensity of the emotions (increased helplessness and decreased sadness) experienced in the aftermath of the stressful event did. Although helplessness is one of the A2 criteria for traumatic events dropped from DSM-5 for being thought to lead to false negatives (i.e. for various reasons, people may not always remember the exact nature of their peritraumatic reactions) (Pivovarova et al., 2016), we demonstrated that this specific emotional state might have a unique ability to predict greater hoarding in the context of an *ongoing* pandemic. Perhaps hoarding-related behaviors are a method of exerting control in a situation where individuals perceive they are devoid of control.

The presence of decreased sadness and increased psychological distress (depression, anxiety and stress symptoms) as predictors of greater severity of hoarding might seem counterintuitive at first glance. However, together with increased helplessness, decreased sadness and greater psychological distress may be conceptualized as part of an inertia or withdrawal response to the effects of the pandemic, and therefore consistent with increased psychological distress in a broader sense. There is also evidence to suggest individuals with hoarding behaviors may be unwilling to experience a range of negative emotions and inclined to employ maladaptive self-regulation strategies which include the use of possessions and excessive acquiring behaviors to manage emotions (Taylor et al., 2019).

Our results should be taken in context. People with clinically significant hoarding (SI-R scores > or = 39) may not always satisfy criteria for hoarding disorder. Therefore, the implications of our findings for individuals with DSM-5 hoarding are not completely clear. Since no formal diagnostic interview was applied, it is possible that the present strategy resulted in recruiting people with hoarding as a consequence of

**Table 2**  
Results of the Poisson Regression with number of coronavirus related stressful events as dependent variable.

	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	.369	1.2113	-2.005	2.743	.093	1	.761
Age	.005	.0107	-.016	.026	.187	1	.666
<b>Age at onset</b>	<b>-.031</b>	<b>.0083</b>	<b>-.047</b>	<b>-.014</b>	<b>13.705</b>	<b>1</b>	<b>&lt; .001</b>
N stressful events (after)	.021	.0592	-.095	.136	.120	1	.729
N stressful events (before)	.017	.0363	-.054	.088	.215	1	.643
SI-R Clutter	-.017	.0195	-.055	.021	.767	1	.381
SI-R Difficult Discarding	.005	.0327	-.060	.069	.019	1	.890
SI-R Excessive Acquisition	.000	.0304	-.059	.060	.000	1	.989
SCI Emotional Attachment	-.006	.0099	-.026	.013	.424	1	.515
SCI Control	.035	.0248	-.013	.084	2.035	1	.154
SCI Responsibility	.029	.0203	-.011	.069	2.007	1	.157
<b>SCI Memory</b>	<b>-.041</b>	<b>.0183</b>	<b>-.076</b>	<b>-.005</b>	<b>4.895</b>	<b>1</b>	<b>.027</b>
ASRS Total	.003	.0080	-.013	.018	.102	1	.749
DASS 21 Total	-.008	.0129	-.033	.017	.399	1	.528
<b>DOCS Total</b>	<b>.019</b>	<b>.0085</b>	<b>.002</b>	<b>.036</b>	<b>4.911</b>	<b>1</b>	<b>.027</b>
GSES Total	.036	.0229	-.008	.081	2.534	1	.111
ISMI-10 Total	.001	.0264	-.051	.053	.002	1	.966
<b>MSPSS Total</b>	<b>-.017</b>	<b>.0084</b>	<b>-.034</b>	<b>-.001</b>	<b>4.288</b>	<b>1</b>	<b>.038</b>
(Scale)	1a						

Footnote: SI-R=Saving Inventory-Revised; SCI=Saving Cognitions Inventory; DASS -21 = Depression Anxiety Stress Scale-21; DOCS = Dimensional Obsessive-Compulsive Scale; ASRS = Adult ADHD Self-Report Scale; GSES = General Self-Efficacy Scale; MSPSS = Multidimensional Scale of Perceived Social Support; ISMI-10 = Internalized Stigma of Mental Illness Inventory-10.

**Table 3**  
Results of the linear regression with severity of hoarding according to the Saving Inventory –Revised (SI-R) as the dependent variable.

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error			
(Constant)	38.919	14.303		2.721	.008
COROTRAS Number of events	-.737	1.734	-.081	-.425	.672
COROTRAS Number of stresses	.964	1.840	.106	.524	.602
COROTRAS Fear	-.074	1.383	-.008	-.053	.958
<b>COROTRAS Helplessness</b>	<b>5.257</b>	<b>1.658</b>	<b>.634</b>	<b>3.170</b>	<b>.002</b>
COROTRAS Disgust	-1.628	1.524	-.161	-1.068	.289
COROTRAS Anger	-.174	1.311	-.019	-.132	.895
COROTRAS Guilt	-1.268	1.653	-.138	-.767	.445
COROTRAS Shame	-.367	1.483	-.042	-.248	.805
<b>COROTRAS Sadness</b>	<b>-2.630</b>	<b>1.270</b>	<b>-.333</b>	<b>-2.071</b>	<b>.042</b>
SCI Emotional Attachment	.094	.119	.100	.787	.434
SCI Control	.052	.273	.019	.190	.850
SCI Responsibility	.432	.235	.256	1.838	.070
SCI Memory	-.022	.202	-.013	-.109	.913
ASRS Total	.077	.082	.094	.935	.353
<b>DASS 21 Total</b>	<b>.377</b>	<b>.147</b>	<b>.302</b>	<b>2.556</b>	<b>.013</b>
DOCS Total	-.080	.108	-.080	-.742	.460
GSES Total	.052	.274	.020	.191	.849
ISMI-10 Total	.395	.372	.116	1.063	.291
MSPSS Total	-.071	.091	-.079	-.778	.439

Footnote: SI-R=Saving Inventory-Revised; COROTRAS= Coronavirus Traumatic and Stressful Life Events Scale; SCI=Saving Cognitions Inventory; MSPSS = Multidimensional Scale of Perceived Social Support; GSES = General Self-Efficacy Scale; DASS -21 = Depression Anxiety Stress Scale-21.

depression, substance abuse, “incipient” cognitive disorders, or even OCD. Despite this, we believe our findings provide an initial attempt to clarify the impact of COVID-19 in individuals with clinically significant hoarding. Our findings are also aligned with a trans-diagnostic perspective of maladaptive behaviors, regardless of their specific causes, and are acceptable under present pandemic conditions which limits the opportunity for face-to-face clinical assessments.

Other limitations of our study include a small and severe sample, high rates of attrition, and a cross-sectional assessment that lacked important sociodemographic (e.g., home and/or family sizes) and pre-COVID 19 clinical information. Thus, it is not possible to establish the generalizability of our findings or direction of causality with certainty. It is equally conceivable, for instance, that people with increased severity of hoarding experience greater helplessness as a consequence of the pandemic (rather than the other way around). Therefore, longitudinal studies using the COROTRAS to assess for future COVID-19 “waves” in

conjunction with SI-R are still needed to confirm the findings of the present study. These investigations should assess whether “baseline” helplessness reactions to the COVID-19 are actually able to predict symptom deterioration on the long-term.

As the present study did not include a comparison group, it would be important to compare the emotional reactions of individuals with high severity of hoarding behaviors to those of people with other mental disorders (including other OCRDs) or healthy controls to check whether the pandemic leads to “transdiagnostic” symptoms’ worsening. Finally, it seems essential to investigate the impact of different types of treatment (including cognitive-behavior therapy and/or other forms of pharmacotherapy) in the experience of stress associated with the pandemic. As OCRDs’ symptoms seem to be particularly sensitive to the threats posed by COVID-19 (Fontenelle et al., 2021), future studies should pursue strategies aimed at increasing the resilience of individuals with hoarding behaviors and other type of conditions related to OCRDs

during increased infection rates and/or lockdown policies.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jpsychores.2021.10.042>.

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## Authorship contribution statement

All authors were responsible for the study conception/design and the interpretation of findings; JM and JE were directly responsible for data acquisition; LF and LA performed analysis; LF drafted the first version of the paper, which was revised for intellectual content by JM, LA and JE; All authors approved the final version of the manuscript and agree to be accountable for all aspects of the work.

## Declaration of competing interests

The authors have no conflict of competing interest to report.

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