Death Anxiety and Its Relationship With Obsessive-Compulsive Disorder

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The studies presented in this article explored the relevance of death fears to Obsessive Compulsive Disorder (OCD). In Study 1, the relationships between death anxiety and a variety of markers of psychopathology were examined in 171 treatment-seeking participants with OCD. Moderate to large correlations between Collett-Lester Fear of Death scale scores, taken at initial assessment, and clinical ratings of OCD severity, number of hospitalizations, number of medications, and total number of lifetime anxiety-related diagnoses identified in structured diagnostic interviews were obtained. Study 2 used the mortality salience (MS) paradigm to examine whether experimentally manipulated death cognitions exacerbate compulsive cleaning behaviors among OCD washers. Treatment-seeking participants with OCD (66 washers and 66 nonwashers) were randomly allocated to either a MS or dental pain priming condition. Following priming, participants completed a series of distraction tasks involving skin conductance recording, before being offered an opportunity to wash conductive gel off their hands. As hypothesized, washers went to greater efforts in cleaning (as measured by washing duration and soap and paper towel use) than nonwashers. Similarly, participants in the MS condition showed greater cleaning than those in the dental pain salience condition. However, these main effects were qualified by significant interactions for both washing duration and soap use. As expected, simple effect contrasts revealed that the effect of MS on cleaning behaviors was significant for washers but not for nonwashers. Clinical implications and directions for future research are discussed.

General Scientific Summary

These studies suggest that death anxiety is positively associated with severity of symptoms and distress among individuals with obsessive-compulsive disorder, and that thoughts of death may increase cleaning behaviors among compulsive washers.

Keywords: obsessive-compulsive disorder, mortality salience, death anxiety, terror management theory, washing

The fear of death has appeared throughout recorded human history, frequently serving as the subject of literature, art, and cultural and religious practices (Becker, 1973). The conscious awareness of our own mortality, arguably a capacity unique to humans, was famously described by William James as “the worm at the core” of our existence (James, 1985/1902, p. 119). Yalom (2008, p. 1) proposes the fear of death to be central to the struggles of many individuals, stating that humans are “forever shadowed by the knowledge that we will grow, blossom, and inevitably, diminish and die.” Notably, while death anxiety may be associated with the emergence of positive coping mechanisms (e.g., pursuing meaningful achievements or extending the self through personal relationships), it can also lead to the development of crippling terror and maladaptive coping strategies (e.g., Menzies, 2012; Mikulincer, Florian, & Hirschberger, 2003; Stolorow, 1979). Iverach, Menzies, and Menzies (2014) have recently proposed that the dread of death should be viewed as a transdiagnostic construct with the potential to underpin a range of mental disorders. For example, fear of death appears to lie at the heart of the somatoform disorders, with body scanning, palpating of lymph nodes, and requests for repeated medical tests featured heavily (Iverach et al.). Similarly, those with panic disorder frequently attend emergency services and request repeated consultations with cardiologists due to stated fears of sudden cardiac arrest (Fleet & Beitman, 1998). Many adults with a related disorder, agoraphobia, report that avoidance of unfamiliar places and refusal to travel without security figures (e.g., a partner or a close friend) is intended to prevent death from sudden misadventure or collapse (Foa, Steketee, & Young, 1984). Further, Marks (1987) notes that the majority, if not all, of the specific phobias are associated with objects or situations that could result in death (e.g., heights, snakes, spiders, blood, water). Even the anxiety disorders of the young appear to involve fears of death. For instance, separation anxiety disorder involves persistent worry about losing major attachment figures, including loss through death (APA, 2013). In addition, social anxiety disorder, although lacking any obvious connection with concerns about mortality, may potentially be similarly driven by death anxiety. For example, individuals with high levels of social anxiety have been found to demonstrate significantly higher
levels of social avoidance when reminded of their own death (Strachan et al., 2007). However, unique features of social anxiety disorder that seem devoid of any clear connections with death preclude us from making any strong theoretical claim about the role of death anxiety in this specific disorder.

Along similar lines, Menzies, Menzies, and Iverach (2015) have argued that death anxiety plays a central role in many presentations of Obsessive Compulsive Disorder (OCD), the most prevalent forms of which are dominated by washing and checking behaviors, respectively (Krochmalik & Menzies, 2003). Many compulsive washers explicitly associate their behavioral responses with anxiety about fatal diseases, toxins, poisons, and bodily fluids, stating that these may cause contamination and death (St. Clare, Menzies, & Jones, 2008; Jones & Krochmalik, 2003). Disgust sensitivity, which is associated with contamination-based symptoms of OCD (Berle & Phillips, 2006), also appears to be associated with fear of death (Haidt, McCauley, & Rozin, 1994). Similarly, compulsive checkers may repeatedly inspect electrical outlets, cooktops, heaters, and door and window locks in a reported attempt to prevent potentially fatal fire, electrocution, or home invasions (Vaccaro, Jones, Menzies, & St. Clare, 2010). Some patients appear to fear that their intrusive death thoughts by themselves could magically cause the death of loved ones. Such individuals may use any means, including superstitious tapping, blinking, or counting rituals, to prevent death (Einstein & Menzies, 2003). Even among OCD sufferers with pure obsessions, in which behavioral manifestations are largely absent, themes of death are common. For example, some individuals with aggressive obsessions fear that they may inadvertently, in an altered state of awareness, take their own life or the life of a loved one (Einstein & Menzies).

Laboratory studies on compulsive washing are consistent with the aforementioned verbal reports of OCD sufferers. In one study (Jones & Menzies, 1997a), OCD washers placed their hands into a compound mixture of soil, food scraps, raw meat, and animal hair, submerging them for as long as possible, up to a maximum of 5 min. At 1-min intervals during the hand immersion task, participants were asked to assess the severity of any potential illness, ranging from “no noticeable symptoms” to “death certain” (p. 846). Compared to non-OCD controls, participants with OCD perceived increased severity. Moreover, the severity of illness rating was strongly associated with various aspects of OCD symptomatology (e.g., urge to wash ratings, and time spent washing after the task). That is, consistent with other models of OCD symptomatology (e.g., Tolin, Worhunsky, & Maltby, 2006), participants’ avoidance of perceived contamination was congruent with their overestimation of the likelihood of contracting a severe illness. Most notably, when scores on the single item severity of illness or death certainty scale were held constant, no other predictor, including perfectionism, inflated perceived responsibility, and self-efficacy, remained significantly associated with any OCD measure.

The last three decades have seen much attention directed toward better understanding the implications of existential anxiety among nonclinical populations. Terror Management Theory (TMT) is the central theoretical approach guiding this research (see Greenberg, 2012, for a review). TMT broadly argues that self-preservation instincts, coupled with the knowledge that one’s demise is certain, have the power to produce crippling fear of death (Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989). The theory, which has garnered support from hundreds of studies to date (e.g., Arndt, Greenberg, Solomon, Pyszczynski, & Simon 1997; Dar-Nimrod, 2012; Greenberg et al., 1992), proposes that divergent outcomes arise from conscious and nonconscious death cognitions. According to the dual process model (Pyszczynski, Greenberg, & Solomon, 1999), conscious thoughts of death trigger proximal defense mechanisms, involving suppression of death-related thoughts and denial of one’s vulnerability. In contrast, when fears of death are unconscious, distal defenses are activated to mitigate such fears, including bolstering of self-esteem or defense of cultural worldviews. Thus, the effects of death anxiety may differ depending on whether or not thoughts of death are the focus of current attention.

Given that TMT posits that nonconscious death thoughts give rise to paralyzing fear, Strachan et al. (2007) argued that individuals who employ ineffective strategies to manage anxiety will increase the manifestation of such strategies following reminders of their own mortality. To test this assertion, Strachan et al. used the mortality salience (MS) paradigm (e.g., Arndt et al., 1997; Rosenblatt et al., 1989), a manipulation designed to activate death cognitions, to explore the impact of priming participants with reminders of their death on cleaning behaviors among students with varying sensitivity to contamination. Specifically, the study included 23 students with high contamination sensitivity [termed high washer (HW) group] and 23 students with low contamination sensitivity [termed low washer (LW) group] on the measure. These participants were randomly allocated to a MS condition or a social exclusion salience condition. Following the manipulation and the necessary distractor task (Pyszczynski et al., 1999), the experimenter explained that they would then be connected to a physiograph machine. They were told that the purpose was to provide initial testing of some new laboratory equipment. After two minutes of apparent monitoring of the incoming data, the experimenter removed the sensors and gave them access to a basin, a liquid soap dispenser, and paper towels to wash off the conductive gel. In addition to main effects for washer-status and salience conditions, MS increased the duration of hand washing only among the HW participants. No effects were found for supplementary analyses on paper towel or soap usage, though trends in the expected direction were observed.

Thus, Strachan et al. (2007) found that people who are worried about contamination engaged in exaggerated cleaning when death is nonconsciously activated. However, it may be premature to draw inferences from this study to clinical populations for a number of reasons. First, the sample in that study was taken from a normative, student population rather than a clinical one, limiting our ability to draw conclusions about individuals with actual anxiety-related disorders. Second, a control condition with similar levels of anxiety or with other compulsive tendencies was not employed, limiting the ability to establish whether it was washing tendencies or general obsessional tendencies of the experimental group that made participants vulnerable to the MS effect. Third, with 23 participants per condition, the study may have been underpowered; in order to detect a medium-sized main effect ($d = 0.5$), 132 participants would have been required to obtain power to the level of 0.8. The failure to obtain effects on paper towel and soap usage may reflect the relatively modest power of that study.
Overview of Current Studies

Despite theoretical accounts (Iverach et al., 2014; Menzies et al., 2015), to the best of our knowledge, no research has empirically examined the relationship between fear of death and symptoms of anxiety-related disorders in clinical populations to date. Thus, given suggestive evidence of the role of death-related fears in OCD (e.g., Jones & Menzies, 1997a; Strachan et al., 2007), as well as the aforementioned verbal reports of individuals diagnosed with OCD, we conducted two studies to address this important area of research in relation to this disorder. In the first study, we explored the relationship between fear of death and multiple manifestations of OCD severity and mental health history. In the second study, we manipulated distal death cognitions to examine actual experimental effects among OCD patients.

Study 1

In Study 1, the relationship between subscale scores on the Collett-Lester Fear of Death Scale and OCD severity was examined. It was hypothesized that (a) OCD severity would be positively correlated with all fear of death subscales. In addition, a first test was conducted of Iverach et al.’s (2014) proposition that individuals with a complex (i.e., different diagnoses at different times) and severe mental health history may simply be displaying chronic, high-level fear of death that is attaching to relevant stimuli across the life span. Consistent with this proposal, it was hypothesized that (b) fear of death scale scores would be positively related to the total number of anxiety and mood-related psychiatric diagnoses across the lifetime, number of prior hospitalizations, number of medications used, and clinician ratings of overall clinical impairment.

Method

Participants. At a large group psychology practice in Sydney, Australia, 183 patients identified with OCD at their first interview were offered inclusion in the study by assessing clinicians; 175 agreed to participate. These individuals completed the Anxiety and Related Disorders Interview Schedule for DSM–5, Lifetime Version (ADIS-5L; Brown & Barlow, 2014), and a battery of additional measures (see below). Four individuals failed to satisfy criteria for a current diagnosis of OCD on the ADIS-5L, leaving 171 participants (76 female). The study was approved by the University of Sydney Human Research Ethics Committee.

Procedure. At an initial testing session, all participants completed the following measures:

The ADIS-5L (Brown & Barlow, 2014). This structured clinical interview is designed to establish current and lifetime diagnoses for anxiety, mood, obsessive-compulsive, and related disorders. It uses the criteria of The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM–5; APA, 2013). Previous editions of the ADIS have been shown to have good interrater agreement and reliability for the majority of DSM–IV disorders (Brown, Di Nardo, Lehman, & Campbell, 2001).

The Vancouver Obsessive Compulsive Inventory (VOCI; Thordarson et al., 2004). This widely used self-report instrument measures obsessive-compulsive behavior using six subscales: Contamination (12 items), Checking (6 items), Obsessions (12 items), Hoarding (7 items), Just Right (12 items), and Indecisiveness (6 items), and each item is rated on a 5-point response scale. The VOCI has shown good psychometric properties (Thor- darson et al.).

The Collett-Lester Fear of Death Scale (CLFD; Collett & Lester, 1969). A 36-item measure with four subscales: Death of Self (9 items), Death of Others (10 items), Dying of Self (6 items), and Dying of Others (11 items). Items are rated on 6-point response scales. The CLFD subscales have shown good psychometric properties (Rigdon & Epting, 1985).

The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965). The RSES was administered to participants, but was not included in analyses for the present study.

Big Five Inventory (BFI; John & Srivastava, 1999). A 44-item self-report measure of personality, the BFI has shown good psychometric properties (Denissen, Geen, van Aken, Gosling, & Potter, 2008; John & Srivastava, 1999), and includes eight items assessing the personality domain of neuroticism. This measure was completed at a later time point, by a subsample of participants from the present sample who met criteria to participate in Study 2 (see further below).

Results

Characteristics of the sample are reported in Table 1. The participants, on average, had experienced extensive mental health difficulties across the lifetime, with an average of three diagnoses on the ADIS-5L, high levels of medication use, and an average OCD duration of 13 years.

As hypothesized, positive correlations were found between all four CLFD subscales and ratings of overall OCD severity, as measured by the VOCI and the ADIS-5L OCD severity score (see Table 2). Further, as hypothesized, all CLFD subscale scores were positively correlated with both objective (e.g., the number of prior hospitalizations) and subjective (the clinician’s ADIS-5L rating of overall distress and impairment) measures of lifetime pathology. Many of these correlations were quite substantial (over 70% of them eclipsed $r = .40$).

In addition, to assess whether these results could be explained by a third variable, neuroticism, analyses were conducted in a
subsample of 130 participants, using data made available through Study 2 (see further below). Regression analyses revealed that CLFD scores significantly predicted all of the aforementioned markers of severity above and beyond the effects of neuroticism (all $\Delta R^2$s > .163, $p$'s < .0001).

### Discussion

Consistent with the first hypothesis, moderate to large positive correlations were found between OCD severity and CLFD scores. That is, greater fear of death was associated with more severe manifestations of OCD, whether measured by self-report or clinician ratings. Further, all subscales of the CLFD were positively related to OCD severity. This is consistent with clinical observations that many OCD sufferers fear causing harm to others as much as death to themselves (Salkovskis, 1985). Finally, as expected, each CLFD subscale was also positively associated with (a) total number of lifetime ADIS-5L diagnoses, (b) total number of hospitalizations, (c) total number of medications used, and (d) clinician ratings of ADIS-5L overall distress and impairment, supporting Iverach et al.'s (2014) suggestion that greater fears of death and dying are associated with more severe and complex lifetime mental health problems.

A significant limitation of a correlational design is the ability to draw causal inferences. It is possible, for example, that developing OCD may later increase fear of death as individuals seek out more information over time about possible threats in the environment. Alternatively, a third variable may be the central driver of both death fears and the mental health problems of the participants. As such, fear of death may in fact be a surface-level symptom for some individuals, rather than the true underlying cause of other mental health difficulties. In order to explore the causal effects of death cognitions in OCD, Study 2 utilized an experimental design.

### Study 2

Study 2 was an extension of the work of Strachan et al. (2007), addressing the methodological and generalizability issues raised and extending its scope. It is the first study to incorporate the MS paradigm with a community sample of OCD patients. It was hypothesized that: (a) OCD washers would expend greater efforts in cleaning after contamination than OCD nonwashers, (b) partic-

### Method

#### Participants

From the 171 participants who completed Study 1, equal groups of OCD washers and nonwashers were sought. For inclusion in the washer group, a twofold decision rule was used. First, on the ADIS-5L participants had to receive a 6 (i.e., “frequently”) or higher on the 8-point clinician rating scale for the “current washing” item. Second, as the VOCI has been shown to discriminate between washer and nonwasher groups (Thordarson et al., 2004), participants had to score a minimum of 14 on the contamination scale (one standard deviation below the mean identified for “washer-cleaners”: Thordarson et al.). For inclusion in the nonwasher group, participants had to receive a score of 2 (i.e., “rarely”) or lower on the ADIS-5L’s “current washing” rating scale as well as score 11 or lower on the contamination scale of the VOCI. Applying these inclusion criteria led to 39 participants being excluded, leaving 132 participants (56 female) in the final sample. The study was approved by the University of Sydney Human Research Ethics Committee.

#### Design

OCD washer ($n = 66$) and OCD nonwasher ($n = 66$) participants were randomly allocated to either the MS ($n = 66$) or dental pain salience ($n = 66$) conditions, yielding a 2 (OCD type: washer vs. nonwasher) $\times$ 2 (Salience condition: mortality vs. dental pain) factorial design. The dependent variables were time spent washing, number of paper towels used, and the amount of soap used.

#### Materials

##### Salience questionnaire

Participants in the MS condition were asked two open-ended questions extensively used in TMT research to prime death thoughts: (a) “Please briefly describe the emotions that the thought of your own death arouses in you,” and (b) “Jot down, as specifically as you can, what you think will happen to you as you physically die and once you are physically dead” (e.g., Arndt, Greenberg, Simon, Pyszczynski, & Solomon, 1998, p. 1218). In the second condition, which employed commonly used control stimuli, participants were asked two similar questions about dental pain (e.g., Long & Greenwood, 2013). The dental pain questions mirrored the aversive nature of the MS questions, while not being inherently death-related.

##### Big Five Inventory (BFI; John & Srivastava, 1999)

A 44-item, self-report measure of personality, the BFI was primarily used in Study 2 as a filler measure to disguise the importance of the salience questionnaire by making it part of a larger package.

##### Positive and Negative Affect Scales—Expanded Form (PANAS-X; Watson & Clark, 1994)

A 60-item, self-report measure that assesses the individual’s current positive and negative affect, the PANAS-X was included to assess the effect of the participants following the experimental salience manipulations. This ensured that any effect on time spent washing could be attributed to the MS induction, and not to a differential change in mood between the two conditions.

##### Comfort and cleanliness scales

Adapted from Strachan et al. (2007), two final questions were administered to participants: (a)
“How comfortable did you feel being connected to the physiological machine?” and (b) “How clean did you find the experimental room and sink area to be?” Both questions were rated on 9-point response scales, with higher ratings reflecting more positive responses. These were included to ensure that potential differences between the groups could not be explained by varying perceptions of comfort or cleanliness in the laboratory or during the procedure.

**Procedure.** At the initial assessment, as detailed in Study 1, all participants completed a number of self-report measures. Individuals who met the inclusion criteria for the washer and non-washer groups took part in Study 2 two to three weeks after the initial assessment.

After providing consent, participants learned that the experiment involved two phases. The experimenter explained that the first phase consisted of a series of personality questionnaires, whereas the second phase involved the effects of a performance task on arousal among individuals with OCD. Participants were informed that during the second phase their physical arousal would be measured with a galvanic skin response (GSR) sensor, as they completed a word search performance task. The word search task was included to allow sufficient time for any effects of the MS induction to be outside of conscious awareness in line with the theoretical foundation and experimental practices of TMT (e.g., Norenzayan, Dar-Nimrod, Hansen, & Proulx, 2009).

Participants were then instructed to work through the packet of questionnaires in order, and the experimenter left the room to allow privacy. The questionnaires came in a set order: (a) Salience questionnaire pack (i.e., with MS or dental pain salience included) in a sealed envelope prior to each testing session, based on a stratified random block (for OCD type: washers vs. nonwashers) random allocation table. Thus, the experimenter was blind to both OCD group membership (i.e., washer and nonwasher) and salience group membership (i.e., MS and dental pain conditions). The participants were instructed to put the questionnaires back into the envelope once they were completed, and to alert the experimenter in the attached room that they were ready for the second phase of the study.

Once these were completed, participants were introduced to the GSR machine. The setup included a mobile sensor to measure the participant’s GSR during the experimental session. Two electrodes on the fingertips were connected to an iPad Air 2, supported with a Native Union Gripster stand in full view of the participant, which displayed the data using the eSense Skin Response application. The experimenter rubbed a small amount of conductive gel on the index and middle fingertips of the participant’s nondominant hand before attaching the two electrodes. The experimenter explained that this gel would help to increase the accuracy and sensitivity of the electrodes, and the recorded physiological data. In actuality, the entire GSR component was used in order to give participants a reason to wash the gel off their hands at the end of the protocol.

Participants were instructed that they had five minutes in which to work on the word search task, and that they must call out each word as it was found to enable audio recording of their performance. They were told that the recording was to allow GSR levels to be charted for each word identified. The actual purpose of the audio recording was to allow a precise, covert recording of the washing duration that was to follow. The data displayed on the iPad was left facing the participants for 10 s to enhance believability that the study was about physiological reactions to performance conditions. After this time, the screen was turned away to minimize any confounding differences between conditions.

After five minutes, the experimenter terminated the GSR testing session, disconnected the sensors, and informed participants that the gel would be washed off in the neighboring room. The sink area was washed and wiped clean between experimental sessions. One full roll of disposable paper towels sat beside the sink and an open plastic bin stood next to the sink with three used paper towels in view. The soap dispenser was nontransparent, and always filled with between 235 and 245 ml of clear, unscented liquid soap. It had been weighed prior to each participant so that the amount of soap used could be calculated after each individual was tested. The experimenter then left the room to allow the participant privacy to clean his or her hands.

The time spent washing was recorded from the moment the tap was turned on until it was turned off. The number of paper towels and amount of soap used were recorded also. After hand washing was completed, each participant was given the cleanliness and comfort measures to assess comfort during the GSR task and perceived cleanliness of the experimental room. All participants were then probed as to the aim of the study, in order to exclude any participant who identified the dependent variables of interest (i.e., cleaning behaviors). None of the participants showed any suspicion regarding the death manipulation or the cleanliness measures. Finally, participants were fully debriefed and thanked.

**Results**

**Primary Analyses.**

**OCD group characteristics.** Table 3 presents severity and washing-related summary data for the two OCD groups, whereas Table 4 presents the distribution of the additional diagnoses of the overall sample. Analyses were conducted in order to confirm that the twofold decision rules for group membership did indeed produce two distinct groups of participants with OCD (i.e., washers and nonwashers). A univariate ANOVA revealed a significant difference between the groups in the VOCI washing subscale scores, $F(1, 130) = 232.65, p < .001, \eta^2 = .642, 90\%$ CI [.56, .70]. Similarly, a significant difference was found in the ADIS-5L “current washing” scores of the washer and nonwasher groups, $F(1, 130) = 1.389.17, p < .001. \eta^2 = .914, 90\%$ CI [.89, .93].

Further analyses were conducted in order to determine if the two OCD groups differed on a potential confound, namely, overall disorder severity. No significant differences (all $p’s > .05$) were found between the two OCD groups for any of the following: ADIS overall distress and impairment, total VOCI score, total OCD ADIS-5L severity, total number of medications, number of hospitalizations, duration of OCD illness, total number of ADIS-5L lifetime diagnoses, and current number of ADIS-5L lifetime diagnoses. Importantly, there were no significant differences between the groups on the CLFD subscales (all $F’s < 0.2, p’s > .65$). Thus, by and large, the two groups appear to be comparable in terms of OCD severity, general dread of death, and clinical levels of impairment.
VOCI washing score 23.29/H11569

Table 3
Summary of Characteristics of the OCD Groups

<table>
<thead>
<tr>
<th>Measure</th>
<th>OCD group</th>
<th>Washers (n = 66)</th>
<th>Non-washers (n = 66)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>VOCI washing score</td>
<td>23.29*</td>
<td>7.40</td>
<td>6.71</td>
</tr>
<tr>
<td>ADIS-5L current washing</td>
<td>6.68*</td>
<td>.75</td>
<td>7.4*</td>
</tr>
<tr>
<td>VOCI total score</td>
<td>74.86</td>
<td>37.00</td>
<td>39.18</td>
</tr>
<tr>
<td>ADIS-5L OCD severity</td>
<td>6.11</td>
<td>1.31</td>
<td>5.95</td>
</tr>
<tr>
<td>ADIS-5L distress/impairment</td>
<td>6.24</td>
<td>1.45</td>
<td>6.23</td>
</tr>
<tr>
<td>Total no. of medications</td>
<td>1.59</td>
<td>1.60</td>
<td>1.91</td>
</tr>
<tr>
<td>No. of hospitalizations</td>
<td>.23</td>
<td>.49</td>
<td>.42</td>
</tr>
<tr>
<td>Total ADIS-5L diagnoses</td>
<td>3.11</td>
<td>1.95</td>
<td>3.05</td>
</tr>
<tr>
<td>Current ADIS-5L diagnoses</td>
<td>2.18</td>
<td>1.19</td>
<td>2.24</td>
</tr>
<tr>
<td>OCD duration (years)</td>
<td>13.27</td>
<td>6.81</td>
<td>13.58</td>
</tr>
<tr>
<td>RSES</td>
<td>25.12</td>
<td>6.06</td>
<td>24.32</td>
</tr>
<tr>
<td>CLFD dying of self</td>
<td>8.44</td>
<td>10.33</td>
<td>7.50</td>
</tr>
<tr>
<td>CLFD death of others</td>
<td>6.82</td>
<td>9.93</td>
<td>7.50</td>
</tr>
<tr>
<td>CLFD dying of self</td>
<td>4.65</td>
<td>6.70</td>
<td>4.91</td>
</tr>
<tr>
<td>CLFD dying of others</td>
<td>-1.12</td>
<td>10.79</td>
<td>-3.30</td>
</tr>
</tbody>
</table>

Note. ADIS-5L = Anxiety and Related Disorders Interview Schedule for DSM-5 – Lifetime Version; CLFD = Collett-Lester Fear of Death Scale; OCD = Obsessive-Compulsive Disorder; RSES = Rosenberg Self-Esteem Scale; VOCI = Vancouver Obsessive Compulsive Inventory. Group means marked with an asterisk (*) were significantly different at p < .01.

Analyses of cleaning behavior. Prior to analysis, the data were examined for outliers. Three data points that had Z-scores greater than 3.29 were considered to be outliers and were removed (in line with recommendations by Tabachnick & Fidell, 2001). The application of this decision rule preceded all analyses.

A two-way MANOVA analyzing cleaning behaviors revealed a significant multivariate main effect for both prime condition, F (1, 125) = 7.3, p < .001, Wilks’ λ = .849, η² = .15, and OCD type, F (1, 125) = 11.63, p < .001, Wilks’ λ = .779, η² = .22, as well as a significant interaction effect, F (1, 125) = 3.96, p = .01, Wilks’ λ = .912, η² = .088. Given the significance of the overall test, the univariate main effects were examined. Three (OCD type) × 2 (salience condition) univariate ANOVAs were performed on time spent washing, the amount of soap used, and the number of paper towels used.

As expected, main effects were found for OCD type, such that, compared to OCD nonwashers, OCD washers spent more time washing their hands, F (1, 127) = 30.52, p < .001, η² = .194, 90% CI [.10, .29], used more soap, F (1, 128) = 28.74, p < .001, η² = .183, 90% CI [.09, .28], and used a greater number of paper towels, F (1, 126) = 18.45, p < .001, η² = .138, 90% CI [.05, .22]. Similarly, main effects of the salience condition were found, such that those in the MS condition had greater washing duration, F (1, 127) = 20.18, p < .001, η² = .137, 90% CI [.06, .23], used more soap, F (1, 128) = 17.69, p < .001, η² = .121, 90% CI [.06, .21], and used more paper towels, F (1, 126) = 14.05, p < .001, η² = .113, 90% CI [.05, .18], than those in the dental pain condition. Lastly, as expected, these effects were qualified by Type x Salience interactions, such that the effects of the MS prime on washing duration, F (1, 125) = 10.79, p = .001, η² = .094, 90% CI [.05, .16], and soap usage, F (1, 128) = 17.69, p < .001, η² = .137, 90% CI [.06, .23], were more pronounced for washers than for nonwashers. However, the Type x Salience interaction failed to reach significance for paper towel usage, F (1, 126) = 11.63, p = .006, η² = .058, 90% CI [.03, .11], and OCD type, F (1, 127) = 14.05, p < .001, η² = .113, 90% CI [.05, .18], than those in the dental pain condition.

When significant interactions were identified, analyses of simple effects were conducted using the Bonferroni procedure to control familywise error rate at .05. Analyses showed that the effect of MS on washing duration was significant for OCD wash-

Table 4
Summary of Study 2 Sample Characteristics: Prior and Current Diagnoses Additional to OCD

<table>
<thead>
<tr>
<th>DSM-5 Diagnosis</th>
<th>Currently</th>
<th>Previously</th>
<th>Never</th>
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<tbody>
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<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>Agoraphobia</td>
<td>4 3.0</td>
<td>6 4.5</td>
<td>122 92.4</td>
</tr>
<tr>
<td>Alcohol Use Disorder</td>
<td>7 5.3</td>
<td>6 4.5</td>
<td>119 90.2</td>
</tr>
<tr>
<td>Bipolar Disorder</td>
<td>8 6.1</td>
<td>0 0</td>
<td>124 93.9</td>
</tr>
<tr>
<td>Body Dysmorphia</td>
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<td>1 0</td>
<td>128 97.0</td>
</tr>
<tr>
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<td>0 0</td>
<td>131 99.2</td>
</tr>
<tr>
<td>Generalized Anxiety Disorder</td>
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<td>5 3.8</td>
<td>108 81.8</td>
</tr>
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<td>7 5.3</td>
<td>102 77.3</td>
</tr>
<tr>
<td>Major Depressive Disorder</td>
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<td>8 6.1</td>
<td>95 72.0</td>
</tr>
<tr>
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<td>14 10.6</td>
<td>99 75.0</td>
</tr>
<tr>
<td>Persistent Depressive Disorder</td>
<td>9 6.8</td>
<td>6 4.5</td>
<td>117 88.6</td>
</tr>
<tr>
<td>Posttraumatic Stress Disorder</td>
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<td>1 0</td>
<td>128 97.0</td>
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<td>Separation Anxiety Disorder</td>
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<td>25 18.9</td>
<td>107 81.1</td>
</tr>
<tr>
<td>Social Anxiety Disorder</td>
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<td>5 3.8</td>
<td>110 83.3</td>
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<td>125 94.7</td>
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<td>Substance Use Disorder</td>
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<td>55 41.7</td>
<td>40 30.3</td>
<td>40 30.3</td>
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Note. ADIS-5L = Anxiety and Related Disorders Interview Schedule for DSM-5 — Lifetime Version; DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; OCD = obsessive-compulsive disorder.
ers, $F(1, 127) = 32.05, p < .001$, $\eta^2 = .202$, 90% CI [.11, .30], but not for OCD nonwashers, $F(1, 127) = .45, p = .50$, $\eta^2 = .004$, 90% CI [.00, .04]. Similarly, analyses revealed that MS increased soap usage for washers, $F(1, 128) = 24.64, p < .001$, $\eta^2 = .161$, 90% CI [.07, .26], but not for nonwashers, $F(1, 128) = 7.18, SD = 1.08$, 90% CI [.00, .08], or soap usage, $F(1, 128) = 3.25, p = .07, \eta^2 = .025$, 90% CI [.00, .08], as a function of OCD type.

**Secondary Analyses.**

**Positive and negative affect.** A two-way MANOVA revealed no significant differences in General Negative and Positive Affect for OCD type, $F(1, 128) = .672, p = .513$, Wilks’ $\lambda = .99$, $\eta^2 = .01$. Similarly, no significant differences were found for prime condition, $F(1, 128) = 6.83, p = .007$, Wilks’ $\lambda = .989$, $\eta^2 = .01$, consistent with most TMT studies (e.g., Arndt et al., 1998; Greenberg, Solomon, & Pyszczynski, 1997). Further, no significant Type x Salience interaction was found for General Negative and Positive Affect, $F(1, 128) = .614, p = .543$, Wilks’ $\lambda = .99$, $\eta^2 = .01$.

**Measures of cleanliness and comfort.** Potential differences in perceptions of cleanliness and comfort during the procedure were examined through 2 (OCD type) × 2 (salience condition) univariate ANOVAs on these variables. Consistent with the findings of Strachan et al. (2007), there were no significant differences in cleanliness ratings between washers ($M = 7.18, SD = 1.08$) and nonwashers ($M = 7.18, SD = 1.29$), $F(1, 128) = .000, p = 1.0$, $\eta^2 = .00$, 90% CI [.00, .00], or any significant differences in comfort ratings between washers ($M = 6.59, SD = 1.72$) and nonwashers ($M = 6.42, SD = 1.52$), $F(1, 128) = .351, p = .56$, $\eta^2 = .003$, 90% CI [.00, .04]. Similarly, ratings of cleanliness did not significantly differ between those in the MS condition ($M = 7.18, SD = 1.23$) and those in the dental pain condition ($M = 7.18, SD = 1.15$), $F(1, 128) = .000, p = 1.0$, $\eta^2 = .00$, 90% CI [.00, .00], nor did ratings of comfort differ between the MS condition ($M = 6.67, SD = 1.63$) and the dental pain condition ($M = 6.35,$
SD = 1.60), F (1, 128) = 1.28, p = .26, $\eta^2_p = .01$, 90% CI [.00, .06]. Finally, no interactions were observed for cleanliness, F (1, 128) = 3.12, p = .08, $\eta^2_p = .024$, 90% CI [.00, .08], or comfort ratings, F (1, 128) = 1.53, p = .21, $\eta^2_p = .012$, 90% CI [.00, .06].

**Neuroticism.** Regression analyses were performed in order to explore the potential role of neuroticism in moderating the effect of the prime on cleaning behaviors, using participants’ responses on the BFI. Neuroticism was not found to significantly predict washing duration, $b = .042, t (126) = .166, p = .87$, soap, $b = .22, t (127) = .869, p = .39$, or paper towels, $b = .211, t (125) = .812, p = .42$. Further, neuroticism also did not appear to significantly interact with the prime to predict washing duration, $b = .055, t (126) = .216, p = .83$, soap, $b = -.2, t (127) = -.772, p = .44$, or paper towels, $b = -.176, t (125) = -.675, p = .50$. Importantly, mean neuroticism did not significantly differ as a function of the prime, $F (1, 126) = 1.31, p = .25, \eta^2_p = .01$, or OCD type, $F (1, 126) = 1.14, p = .29, \eta^2_p = .009$, suggesting minimal (if any) effect of the prime on neuroticism.

**Fear of death.** In addition, regression analyses were performed to assess whether conscious fears of death affected the effects of the prime on cleaning behaviors. The Dying of Self subscale of the CLFD explained a significant proportion of variance in washing duration, $\Delta R^2 = .053, F (4, 123) = 10.86, p < .001$, and significantly predicted washing duration above and beyond salience condition and OCD type, $b = 1.57, t (123) = 2.3, p = .023$. However, it did not significantly predict soap or paper towel use, nor did it moderate the effects of OCD type or salience condition on washing duration in one of the two-way or three-way interactions (all $p’s > .068$). Scores on the remaining three CLFD subscales did not significantly predict washing duration, soap, or paper towel usage, above and beyond the effects of OCD type and salience condition, nor did they significantly interact with these variables to predict cleaning behavior (all $\Delta R^2’s < .054, p’s > .062$).

**General Discussion**

Studies 1 and 2 collectively aimed to explore the relationship between fears of death and severity of clinical symptoms, using correlational and experimental designs, respectively. In Study 2, as in Study 1, support was found for each of the hypotheses. First, OCD washers expended greater efforts in cleaning after contact with an inert conductive gel than OCD nonwashers. Second, participants in the MS condition showed greater washing behavior than those in the dental pain salience condition. Third, interactions between salience condition and OCD group were apparent for hand washing duration and soap use. As with Strachan et al. (2007), no significant interaction was observed for paper towel use. However, a trend in the expected direction was apparent on this measure. This may suggest that the effect of MS priming on hand towel use is a small one, and therefore difficult to detect with the present sample size. Alternatively, hand towel use may be a poorer indicator of contamination fears than the other behavioral variables in the study; to note, lengthy hand washing and excessive soap use are highlighted in the major chapters and manuals exploring contamination fears (Jones & Krochmalik, 2003; St. Clare, Menzies, & Jones, 2008), whereas excessive hand towel use is generally not.

Analyses of simple effects further clarified the nature of the obtained interactions. Compared to dental pain priming, MS priming was associated with greater washing duration and soap use among OCD washers, but not among nonwashers. That is, as expected, reminders of mortality selectively increased cleaning behaviors among OCD washers. This effect is unlikely to be due to differences in severity or disability between the two obsessional groups; analyses showed no differences in baseline severity or fear of death, or positive and negative affect during the experimental session. Finally, the selective exacerbation of MS priming among washers does not appear to be due to differences between groups in comfort with the GSR recording or in their general perceptions of cleanliness, as no differences between OCD washers and nonwashers on these measures were detected.

The findings therefore support the notion that the behavioral response of individuals with OCD to reminders of mortality depends on their own particular pattern of patterns. The present procedure provided an opportunity for washing behaviors to be activated, and these behaviors may simply have been irrelevant to OCD nonwashers. An alternative hypothesis is that MS priming is limited to the wash subtype in OCD. Further research is needed to explore whether the alternative compulsions of individuals with different types of OCD can be similarly exacerbated, given that the generality of the MS effect in OCD remains to be seen.

Some comment should be made about the size of the MS priming effect on OCD washers. Not only did MS priming lead to a statistically significant increase in cleaning among washers, it also appears to have produced a clinically meaningful change in behavior. Whereas OCD washers primed with dental pain averaged a washing duration of less than 10 s, when primed with MS this average more than doubled, representing an increase in washing duration of more than two standard deviations. The magnitude of this change is particularly notable given that the participants were exposed to an inert conductive gel, rather than a typical contaminant. The similar comfort with the procedure among the two groups, along with no increase in PANAS-X General Negative Affect scores and no differences in perceptions of the sink area’s cleanliness, suggests that washers did not consciously perceive a greater threat in the experimental procedure. The data therefore present a challenge to expectancy models of anxiety-based disorders. These disorders, and anxiety more generally, have been broadly regarded as being mediated by expectancies of proximal threats (Beck & Emery, 1985). Such expectancy accounts are based largely on the observation in first-order fear conditioning that individuals display anxiety and avoidance on the first trial in which they can articulate the association between the conditioned stimulus and unconditioned stimulus (Chan & Lovibond, 1996). However, in the present study, OCD washers primed with MS appeared to display avoidance or escape behaviors without any apparent evidence of increased threat perception, in line with TMT theorectical focus on nonconscious processes rather than expectancies (e.g., Pyszczynski et al., 1999).

Further supporting TMT’s focus on nonconscious processes, the current sample reported significantly high levels of death anxiety, with mean scores on the various CLFD subscales being more than double those obtained in community samples using this instrument (e.g., Dickstein, 1978; Vargo, 1980). However, the lack of evidence for moderation suggests that a high level of conscious death anxiety was not the reason why reminders of mortality directly
increased cleaning behavior. That is, the salience condition did not appear to have a differential effect for those with varying levels of conscious fears of death. Despite this, the high CLFD scores in the current clinical sample should be considered, and the results from nonclinical samples with lower death anxiety may differ.

Limitations of the current studies should be considered. First, diagnostic interviews used to classify groups and determine symptom severity were conducted by a single clinical psychologist. As such, no indication of diagnostic reliability is available. However, all participants were interviewed by the same clinician, whose judgment of both their overall distress and OCD severity was significantly correlated with the self-report severity ratings of participants. Second, given that participants in Study 2 completed the BFI immediately after the salience induction, it is plausible that the results regarding neuroticism were affected by the prime. Importantly, however, there were no significant differences in neuroticism between participants in the mortality salience and control conditions. Third, cognitive features significantly associated with OCD (e.g., perfectionism, inflated perceived responsibility), were not assessed. Future research may benefit from exploring the potential role of such features as moderators of the effect of death fears on both symptom severity and behavior. Finally, given the high levels of death fears found in the present sample, future research may benefit from utilizing more recent measures, such as the Death Attitudes Profile-Revised (Wong, Reker, & Gesser, 1994), which may provide a more detailed picture of the precise concerns related to mortality found among clinical populations.

Taken together, the results of the two studies offer some support for Iverach et al.’s (2014) call for innovative approaches to treating the dread of death. Cognitive behavioral therapy (CBT) for OCD may address elements of death anxiety through existing techniques including imaginal exposure, such as by encouraging clients to imagine dying as a result of failing to perform a ritual (Williams, Powers, & Foa, 2012). Similar exposure-based interventions appear in implosive therapy (Stampfl & Lewis, 1967), in which clients with fears of injury may be instructed to imagine scenes of bodily mutilation and death. In addition, recent CBT treatment approaches to illness anxiety disorder have featured in vivo exposure to death-related material (e.g., newspaper obituaries) and cognitive reappraisal of unrealistic beliefs about death (Furer & Walker, 2008). However, Iverach et al. argue that contemporary CBT typically focuses on reducing expectancies of proximal threats, but may do little to address long-term existential issues. For example, exposure for phobias, behavioral experiments for panic, and psychoeducation programs about disease and illness (e.g., the DIRT program of Jones & Menzies, 1997b), frequently seek to demonstrate that the individual’s current threat expectancies are erroneous (Menzies et al., 2015). These CBT techniques produce rapid improvements in functioning and have become the gold standard in psychotherapy (Öst, Havnen, Hansen, & Kvale, 2015). However, Iverach et al. have argued that such programs, in failing to address core fears of death, will not stop the “revolving door” of mental health problems (p. 590). That is, it is not rare for children and adolescents to be treated successfully for one anxiety-based condition, only to return with another in adulthood (Menzies et al.). Consistent with this, Simon et al. (2007) found that rates of comorbid anxiety-related lifetime diagnoses were around double those of current comorbid disorders, and other studies have reported similarly higher rates of lifetime disorders compared with the individual’s current diagnosis (e.g., Brown, Campbell, Lehman, Grisham, & Mancill, 2001).

Iverach et al. (2014) suggested that it may be necessary to directly address death anxiety to stop a lifetime of mental health difficulties among individuals with excessive death fears. In this regard, they recommend exploring components of transdiagnostic treatments such as Existential Psychotherapy, Acceptance and Commitment Therapy (ACT), Dignity Therapy, and Meaning-Centered Therapy (Barrera & Spiegel, 2014). ACT, for instance, employs tasks such as writing one’s own tombstone inscription or eulogy (e.g., Hayes & Smith, 2005), which may prove beneficial in addressing pervasive existential fear (Menzies et al., 2015). Of course, these claims are speculative, and the importance of the present data in the growing call for existential treatments should not be overstated. Controlled studies are needed in order to determine the efficacy of procedures targeting death anxiety, and whether they improve the long-term outcomes of sufferers when offered as an adjunct to established CBT programs.

Concluding Comments

Despite the vast body of research investigating the dread of death through the MS experimental paradigm, few studies have targeted clinical participants. The present research included the first report to target a treatment-seeking community sample of individuals with OCD using a mortality activation design. In fact, to the best of the authors’ knowledge, Study 2 is the first MS priming study to use any treatment-seeking sample of diagnosed psychiatric patients. Under tight experimental conditions, MS priming was found to selectively produce a clinically significant increase in cleaning behavior among OCD washers, despite no increase in fear or apparent perception of threat. In addition, in Study 1, moderate to large positive correlations have been reported between death anxiety, OCD severity, and lifelong markers of mental health. Thus, the present research not only contributes to the existing TMT literature, but also to broader discussions about the role of death fears in psychopathology. These two studies have provided an important step forward in highlighting the potential role of death fears in a crippling and disabling mental health disorder. Future research is needed to (a) explore the extent to which intruding death cognitions are involved in cleaning behavior among OCD washers outside of the laboratory, (b) establish whether MS priming influences the behavior of individuals with other OCD subtypes, (c) assess the specificity of MS priming in relation to its effect on other psychiatric conditions, and (d) identify potentially effective ways in which to reduce fears of death through innovative therapies.

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