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ABSTRACT

Studies indicate high levels of thought-action fusion (TAF) in OCD. The current study aimed to determine if people with OCD evaluate others' thoughts the same way as their own, as existing measures do not test for this distinction. Forty-two non-anxious, 40 OCD, and 41 socially anxious participants completed self-report and behavioral measures of thought-action fusion. Findings indicated that self-report measures of TAF, but not behavioral ones, indicate that people with SAD as well as those with OCD evaluate their own thoughts as more significant/dangerous than they do others' thoughts. Moreover, although the SAD and OCD groups had similarly elevated scores on the total self-report TAF Scale, analyses of subscales indicated that relative to the other groups, OCD participants had higher scores on the likelihood subscales of the measure. These results were partially supported by the behavioral measure of TAF as well. These findings have important implications for our understanding of the TAF bias in both OCD and other disorders.

1. Introduction

Early cognitive models of obsessive-compulsive disorder (OCD) posited that distorted evaluation of one's thoughts contributes to both the onset and the maintenance of the disorder. Specifically, Salkovskis (1985) and Rachman (1997, 1998) observed that patients with OCD seem to overemphasize the dangerousness of their thoughts and the subsequent need to control them. Whereas most people dismiss the occasional intrusive thought as inconsequential, individuals with OCD tend to believe that such thoughts have significant moral and practical implications. This cognitive distortion, known as thought-action fusion (TAF), denotes the belief that merely thinking about doing something bad (e.g., killing someone) is just as immoral as doing it ("moral TAF") or the belief that thinking about a negative outcome makes it more likely to happen ("likelihood TAF"; Rachman, 1993; Shafraan, Thordarson, & Rachman, 1996; Rachman & Shafraan, 1999). Measures of TAF have consistently shown that this bias is present in individuals with the disorder (Hezel & McNally, 2016; Shafraan & Rachman, 2004; Shafraan et al., 1996). Accordingly, TAF has featured prominently not only in the cognitive model of OCD, but also in the metacognitive model of the disorder. The latter holds that dysfunctional appraisals of one's thoughts (e.g., "thoughts are dangerous" or "thoughts must be

controlled") contribute to the repetitive nature of obsessions, the development of compulsions, and other dysfunctional thinking commonly associated with OCD (Fisher, 2009; Myers, Fisher, & Wells, 2009). Indeed, research suggests that TAF may influence the development of other cognitive biases, such as inflated responsibility for preventing harm (Amir, Freshman, Ramsey, Neary, & Brigidi, 2001).

The Thought-Action Fusion Scale (TAF Scale; Shafraan et al., 1996) is one of the most widely used self-report measures of the TAF bias (Berle & Starcevic, 2005). The scale consists of three groups of questions that assess participants' beliefs about the moral implications of certain thoughts (TAF moral) and how likely thoughts are to influence the occurrence of negative events for others (TAF likelihood-other) and oneself (TAF likelihood-self). Studies using the TAF Scale suggest that the total score and each of the three subscales are correlated with the presence and severity of OCD symptoms as assessed by several measures, with the strongest association between OCD symptoms and the likelihood component of TAF (Berle & Starcevic, 2005; Shafraan & Rachman, 2004). Interestingly, TAF seems to extend to positive outcomes, such that people with elevated OCD symptoms are also more likely than others to believe that their thoughts can prevent harm from befalling other people (Amir et al., 2001).

Several researchers have used behavioral paradigms to induce the

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TAF bias in non-clinical samples. [Rachman, Shafraan, Mitchell, Trant, and Teachman \(1996\)](#) developed a task where participants first write a sentence about wishing that harm befall a loved one (e.g., “I hope that ___ will be in a car accident”). Participants then rate their anxiety and urge to neutralize the thought, the immorality of writing the sentence, and the likelihood of the event occurring. Subsequent studies confirm that this task causes people to experience increased anxiety and an urge to neutralize ([Berman, Abramowitz, Wheaton, Pardue, & Fabricant, 2011](#); [Marcks & Woods, 2007](#); [Rassin, 2001](#); [van den Hout, van Pol, & Peters, 2001](#)). [Berman et al. \(2011\)](#) showed that performance on this task correlates with scores on the TAF Scale and thus may qualify as a behavioral assessment of TAF. Indeed, researchers have used sentence paradigm TAF induction to investigate the association of different responses (e.g., neutralizing, thought suppression, and acceptance) following distressing thoughts with obsessive-compulsive experiences, such as anxiety, urge to neutralize, and negative thoughts ([Marcks & Woods, 2007](#); [van den Hout et al., 2001](#)).

One study using a different TAF induction approach demonstrates how this cognitive bias may contribute to OCD pathology. [Rassin, Merckelbach, Muris, and Spaan \(1999\)](#) explained to participants that an EEG machine could accurately detect their thoughts of certain words. Half of the sample was told that every time they thought of the word “apple,” a person in another room would receive a non-life threatening, but painful shock. This group was also told that in the event that they did think about an apple, they could prevent the shock by pressing a button within a couple of seconds of having the thought. The other half of the sample was simply instructed not to think of an apple. Results indicated that relative to those in the latter condition, participants who believed their thoughts would cause others harm experienced more unwanted thoughts of the word apple, felt more distress, and made a greater effort to avoid thinking about the object. These individuals also reported feeling responsible for and guilt about others’ receiving shocks; in fact, they attempted to prevent the shock from occurring approximately 50% of the time after thinking of the word apple. This study provides a model for how activating TAF beliefs can lead to intrusive thoughts and ritualized behaviors akin to those reported in people with OCD.

Further evidence for the role of TAF in the pathology of OCD comes from a study in which patients’ scores on the TAF Scale decreased as OCD symptoms improved pre- to post-treatment ([Rassin, Diepstraten, Merckelbach, & Muris, 2001](#)). Interestingly, the authors found that individuals with anxiety disorders (i.e., panic disorder, social anxiety disorder, and PTSD) had similarly elevated scores on the TAF Scale at both pre- and post-treatment, suggesting that the bias is not specific to OCD. A number of other studies have likewise indicated the presence of heightened TAF in a range of other disorders, such as generalized anxiety disorder, eating disorders, and depression ([Berle & Starcevic, 2005](#); [Shafraan & Rachman, 2004](#); [Thompson-Hollands, Farchione, & Barlow, 2013](#)). After examining TAF in people with anxiety disorders, OCD, and depression, [Abramowitz, Whiteside, Lynam, and Kalsy \(2003\)](#) found that elevated TAF may be more strongly related to negative affect (anxiety and depression) than to specific OCD symptoms.

The present study aimed to clarify the specific nature of thought-action fusion. The cognitive model of OCD holds that people with the disorder tend to make “catastrophic misinterpretations” (p. 794) of their thoughts, and deem them consequential and potentially dangerous ([Rachman, 1997](#)). As described above, people suffering from OCD endorse a number of dysfunctional thoughts in addition to TAF, including feeling a heightened sense of responsibility for their own and others’ safety ([Salkovskis, 1985](#)), and research indicates that they also experience higher levels of guilt than do people without the disorder ([Hezel, Riemann, & McNally, 2012](#)). In view of these cognitive distortions, it seems plausible that people with OCD would regard their own thoughts as more dangerous than those of other people. Therefore, we investigated whether people with OCD evaluate other people’s thoughts in the same way as they evaluate their own thoughts, given that existing

measures of TAF do not test for this distinction. Determining the specificity or generalizability of the TAF bias may be useful in conceptualizing and treating a range of psychopathology. Specifically, this distinction may reveal if participants’ TAF bias reflects underlying distorted beliefs about themselves (e.g., “I am unique, only my thoughts are dangerous”) or thoughts in general (e.g., “everyone’s thoughts have the potential to do harm”). Accordingly, we revised the Thought-Action Fusion Scale to include both indirect and direct evaluations of one’s own versus others’ thoughts. Additionally, participants completed the Obsessive-Compulsive Beliefs Questionnaire, which yields a subscale score related to the TAF bias (i.e., “Importance of and Need to Control Thoughts”), and the sentence task described above ([Rachman et al., 1996](#); [van den Hout et al., 2001](#); [van den Hout, Kindt, Weiland, & Peters, 2002](#)). We hypothesized that individuals with OCD would evaluate their own thoughts as more immoral and potentially dangerous than others’ thoughts on both self-report and behavioral measures. We predicted that non-anxious participants would not show this same bias. We also included a clinical comparison group of individuals who meet criteria for social anxiety disorder to examine whether any group differences are specific to OCD or are generalizable to those with anxiety disorders. We chose social anxiety disorder because it shares some clinical features with OCD (e.g., heightened anxiety, irrational fears about the occurrence of negative outcomes). However, we expected that the socially anxious group would not differ in their evaluation of their own versus others’ thoughts given the ego-syntonic nature of the disorder (whereas those with OCD commonly view their thoughts as intrusive, repulsive, and dystonic) and the fact that intrusive thoughts are a hallmark of OCD, but not SAD.

2. Method

2.1. Participants

Participants included 123 adults (63 female, 51%) with a mean age of 31.6 years ($SD = 13.8$) and with no history of psychosis. After completing a phone prescreening and in-person semi-structured standardized clinical interview, individuals were categorized into one of three groups: those who meet diagnostic criteria for OCD (with or without anxiety disorders), those who meet criteria for social anxiety disorder (SAD) but not OCD, and those with no history of OCD or anxiety disorders. The OCD group comprised 41 participants (26 female, 63%) with a mean age of 26.1 years ($SD = 8.4$), the SAD group comprised 40 participants (22 female, 55% and one transgender woman) with a mean age of 31.0 years ($SD = 13.8$), and the non-anxious comparison group comprised 42 participants (15 female, 36%) with a mean age of 37.6 years ($SD = 16.1$). Individuals were recruited via an online posting on a study pool website, which includes students at a local university as well as community members who live in the greater Boston area. In addition, ads were posted on other local university job boards, at the university health center, and in public notice areas in the community. All study postings indicated that people with OCD, SAD, or non-anxious individuals were welcome to participate; postings in the university health clinic made specific reference to social anxiety and obsessive-compulsive symptoms. In addition, participants with OCD were recruited from a research study pool at a Boston OCD outpatient clinic, and 17 participants were recruited from the Rogers Memorial Hospital intensive outpatient, partial hospitalization, and intensive residential treatment programs in Oconomowoc, Wisconsin. They were invited specifically to participate in a study examining cognitive factors in OCD. All participants received either study pool credit or compensation of \$10/hour for their participation.

3. Materials and procedures

After completing a phone prescreening, all eligible participants came into the lab to complete the study. Participants recruited from

Rogers Memorial Hospital were tested on site in a private room at the hospital. The first author conducted a semi-structured clinical interview with the MINI International Neuropsychiatric Interview (Sheehan et al., 1998) and confirmed diagnoses of OCD and SAD with the relevant subscales of the Structured Interview for DSM-5 (First, Williams, & Spitzer, 2015). As part of a larger study, all participants completed a number of measures that broadly examine different aspects of dysfunctional thinking commonly associated with OCD. For the current study, we analyzed data from the following measures. Study participation took approximately one and a half to two hours.

The Yale-Brown Obsessive-Compulsive Scale (YBOCS) and symptom checklist (Goodman, Price, Rasmussen, Mazure, & Fleischmann, 1989) assesses OCD severity, and was thus only administered to participants with OCD. The scale is a clinician-rated, 10-item scale, with each item rated from 0 (no symptoms) to 4 (extreme symptoms). The scale includes five questions about the amount of time the patients spend on obsessions, how much impairment or distress they experience, and how much resistance and control they have over these thoughts. Five similar questions are asked about compulsions (i.e., time spent, interference, etc.). Scores range from zero to 40, with higher scores indicating more severe OCD symptoms. Used widely in both clinical and research settings, the YBOCS has good psychometric properties (Goodman, Price, Rasmussen, Mazure, & Fleischmann, 1989; Goodman, Price, Rasmussen, Mazure, Delgado et al., 1989). The OC Checklist asks patients to specify the content of their obsessions and compulsions (e.g. contamination, aggressive thoughts, etc.). In addition, we asked participants to identify their most distressing obsession and most time-consuming compulsion.

The Obsessional Beliefs Questionnaire, or OBQ-44 (OCCWG, 2001, 2003, 2005), is a self-report measure that assesses dysfunctional beliefs associated with OCD, including heightened responsibility and threat estimation, perfectionism and intolerance of uncertainty, and importance of and need to control thoughts. Individuals are asked to indicate on a seven-point Likert Scale the degree to which they agree or disagree with statements like, “I often think things around me are unsafe” or “If I’m not absolutely sure of something, I’m bound to make a mistake.” Prior studies indicate that the OBQ-44 reliably and validly measures dysfunctional thinking in non-clinical and clinical samples (OCCWG, 2005). Internal consistency in this study was excellent for the total scale (total sample: $\alpha = .97$; all groups: all $\alpha s \geq .93$) and each of the subscales (total sample: all $\alpha s \geq .91$; all groups: all $\alpha s \geq .84$).

The Liebowitz Social Anxiety Scale-Self Report (LSAS) assesses a person's fear and avoidance of 24 different situations (e.g., going to a party, working while being observed, etc.) to identify the presence and severity of social anxiety disorder (Liebowitz, 1987). The LSAS has strong internal consistency and convergent and divergent validity (Fresco et al., 2001). A score of 30 (out of a possible score of zero to 144) is the suggested clinical cutoff for SAD and 60 is the suggested clinical cutoff for generalized social anxiety (Mennin et al., 2002; Rytwinski et al., 2009). All participants in the present study completed the LSAS, which had very strong internal consistency of $\alpha = .98$ for the total sample and all $\alpha s \geq .93$ for each of the groups.

The Center for Epidemiologic Studies Depression Scale, Revised (Eaton, Smith, Ybarra, Muntaner, & Tien, 2004) is a 20-item scale that measures depressive symptoms, including mood, motor functioning, interactions with others, and somatic symptoms (Eaton et al., 2004). Scores range from zero to 60, with higher scores indicating more severe depression. A score of 16 has been identified as a clinical cutoff for depression. The CESD has high internal consistency, acceptable test-retest reliability, and good discriminant and convergent validity (Radloff, 1977). The internal consistency in our sample was excellent at $\alpha = .95$ for the total sample and $\alpha s \geq .90$ for each of the three groups.

In order to determine how people with OCD self-reportedly evaluate their own and others' thoughts, we created three blocks of questions that ask participants to rate the degree to which they agree or disagree with statements about the importance and implications of different

thoughts. All items were based on those of the Revised TAF Scale. All responses were recorded on a Likert scale of one to four instead of the original measure's scale of zero to four (“neutral” was omitted as a response option from the latter due to experimenter error). In block one, some items were taken directly from the TAF Scale, whereas others were reworded slightly to specify that the question is asking about one's own thoughts, not thoughts in general. For example, the statement “Thinking of making an extremely critical remark to a friend is almost as unacceptable to me as actually saying it” was changed to “*When I think of making an extremely critical remark to a friend, it is almost as unacceptable to me as actually saying it*” (italics indicate text that was added to the original item). Block two consists of the same statements reworded to indicate another person's thoughts (e.g., “When my friend thinks of making an extremely critical remark to someone, it is almost as unacceptable as his actually saying it.”). Block three requires that the participant make a direct comparison between his/her own thoughts and those of others (e.g., “When I think of making an extremely critical remark to a friend, it is less acceptable than if my friend thinks of making an extremely critical remark to his friend.”). Participants were asked to rate each item on a scale of one (“strongly disagree”) to four (“strongly agree”). High scores indicate greater emphasis on one's own thoughts. In the current sample, all three blocks of this measure had excellent internal reliability (total sample: all $\alpha s \geq .94$; all groups: $\alpha s \geq .88$).

Participants were then asked to complete a revised TAF sentence paradigm of that described above (Berman et al., 2011). As was done in prior studies, participants were asked to think of a close living relative other than a spouse or romantic partner (we excluded spouses and romantic partners so that we could adequately assess inappropriate sexual thoughts about incest specifically). After telling the experimenter the name of the person they were imagining, participants were asked to write the following sentence on a blank index card, inserting the loved one's name where the blank appears: “I hope ___ is in a car accident today.” This sentence tests the belief that one's negative thoughts make it more likely that harm will befall others (i.e., TAF-likelihood other). Participants were then asked to close their eyes and imagine the situation for 30 s before using visual analogue scales (from 1 to 100) to answer the following questions (Rachman et al., 1996):

(1) How much anxiety do you feel right now? (2) What is the likelihood of the event occurring in the next 24 h? (3) How morally wrong was it to write out the sentence? (4) How strong is your urge to reduce or cancel the effects of writing the sentence? (p. 891).

The above procedure was repeated with two additional sentences, including “I hope I have sex with [family member's name]” and “I hope I fall down the stairs today” (Berman et al., 2011). The first sentence tests the belief that thinking about something is just as immoral as doing it (i.e., TAF moral) whereas the second sentence tests whether people believe their own thoughts have negative consequences for themselves (i.e., TAF likelihood-self). In the present study, participants were randomly assigned to one of two groups to examine if ratings differed based on who wrote the sentence. The first group was asked to complete the three TAF sentence paradigms as described above. The second group did not write the sentence themselves, but after providing the name of a loved one, watched while the experimenter wrote the sentences down on a blank index card. Both groups were then asked to visualize the scenario and answer the same questions as listed above (ratings of anxiety, likelihood of event occurring, moral wrongness, and urge to neutralize). After providing their ratings, all participants were given the opportunity to do anything they would like to the index card in order to “neutralize the thought or make the thought go away.” We recorded if a person did do something to the card, including flipping it over, tearing it up, writing other words or phrases on the card, etc.

Table 1
Group characteristics.

	OCD <i>M (SD)</i>	SAD <i>M (SD)</i>	Non-Anxious <i>M (SD)</i>	<i>F(2,122)</i>	<i>p</i>	Effect Size <i>r</i>
OBQ-44 Total Score	177.46 (53.29)	181.10 (37.20)	121.83 (43.15)	22.50	< .001*	.52
OBQ: Respon/Threat Est	63.71 (21.49)	66.50 (14.89)	45.05 (17.96)	16.76	< .001*	.47
OBQ: Import of Thoughts	41.95 (16.98)	38.78 (12.05)	26.57 (10.79)	14.97	< .001*	.45
OBQ: IU/Perfectionism	71.80 (21.98)	75.83 (18.73)	50.21 (18.99)	19.71	< .001*	.50
LSAS (anxiety severity)	61.95 (31.92)	71.18 (25.71)	19.95 (15.74)	48.23	< .001*	.67
CESD (depression severity)	21.59 (13.26)	22.28 (14.22)	4.62 (6.12)	30.26	< .001*	.58

Note.

* = $p \leq .05$ criteria; OBQ = Obsessive Beliefs Questionnaire; Import of Thoughts = Importance of and Need to Control Thoughts; TAF = Thought-Action Fusion; IU = Intolerance of Uncertainty; LSAS = Liebowitz Social Anxiety Scale; CESD = Center for Epidemiologic Studies Depression Scale.

4. Results

4.1. Preliminary analyses

The OCD group had a mean YBOCS score of 21.00 ($SD = 5.45$), which indicates moderately severe OCD symptoms (Goodman, Price, Rasmussen, Mazure, & Fleischmann, 1989). Relative to non-anxious comparison participants, those with OCD and SAD had higher levels of social anxiety, depression, and obsessive thinking (as measured by the OBQ-44); however, OCD and SAD participants' scores did not differ on any of these measures (Table 1). The mean age of OCD participants was significantly lower than that of the non-anxious group ($p < .001$), but did not differ from the mean age of the SAD group ($p = .29$); there was a trend toward a significant age difference between non-anxious and SAD participants ($p = .08$). Twenty-four individuals in the OCD group also met diagnostic criteria for social anxiety disorder, and both the OCD and SAD groups had average LSAS scores above 60, which indicates clinical severity of generalized social anxiety (Rytwinski et al., 2009). Thirty-six of the 41 OCD participants, 34 of the 40 SAD participants, and nine of the 42 non-anxious participants met diagnostic criteria (current or past episode) for another disorder as assessed by the MINI (Table 2).

4.2. Self-reported TAF

4.2.1. Indirect comparison of TAF own and others' thoughts (Block 1 vs. Block 2)

First, we analyzed the data to determine whether people with OCD evaluate their own thoughts differently from others' thoughts when making an indirect comparison of the two (as measured by the total TAF Scale, blocks 1 and 2, respectively). Findings from a 3 (group: non-anxious, OCD, SAD) \times 2 (actor: self vs. other) repeated measures ANOVA with follow-up analyses showed a main effect of group ($F(2,120) = 7.68, p = .001, r = .36, 90\% \text{ CI} [.18, .44]$) such that participants with OCD and SAD had higher scores on the TAF Scale than did non-anxious participants. There was also a main effect of actor (F

Table 2
DSM-5 diagnoses.

Diagnosis	OCD <i>n (%)</i>	SAD <i>n (%)</i>	Non-Anxious <i>n (%)</i>
Obsessive Compulsive Disorder	41 (100%)	0	0
Social Anxiety Disorder	24 (59%)	40 (100%)	0
Major Depressive Disorder	26 (63%)	25 (62.5%)	6 (14%)
Bipolar Disorder (I & II)	6 (15%)	4 (10%)	1 (2%)
Generalized Anxiety Disorder	19 (46%)	16 (40%)	0
Panic Disorder (with & without Agoraphobia)	6 (15%)	5 (12.5%)	0
Agoraphobia (without Panic Disorder)	1 (2%)	2 (5%)	0
PTSD	1 (2%)	1 (2.5%)	0
Substance Use Disorders	6 (15%)	4 (10%)	4 (9.5%)

(1,120) = 17.93, $p < .001, r = .36, 90\% \text{ CI} [.22, .47]$), such that participants rated their own thoughts as more significant than others' thoughts. Pairwise comparisons showed that there were no significant differences between SAD and OCD groups in how they scored on either block one or two of the TAF Scale ($ps > .29$). The ANOVA revealed an interaction between group and actor ($F(2,120) = 4.85, p = .009, r = .27, 90\% \text{ CI} [.10, .39]$). Follow-up analyses (with a Bonferroni adjusted p threshold of .02) indicated that participants with OCD ($t(40) = 2.98, p = .005, r = .43, 90\% \text{ CI} [.19, .59]$) and participants with SAD ($t(39) = 4.16, p < .001, r = .55, 90\% \text{ CI} [.34, .68]$) had higher scores on block one of the TAF Scale than they did on block two. That is, OCD and SAD participants rated their thoughts as more immoral and more likely do to harm than they did others' thoughts. Conversely, non-anxious participants did not differ in how they evaluated their own and others' thoughts (i.e., there were no significant differences between their scores on blocks one and two of the TAF Scale, $t(41) = .42, p = .68$; see Fig. 1).

Next, we performed the same analysis on the subscales of the TAF Scale to determine if groups differed in how they evaluated specific aspects (moral, likelihood-other, likelihood-self) of thought-action fusion. For the moral subscale of TAF, a 3 (group) \times 2 (actor) ANOVA showed the same pattern of results as above (see Fig. 2). Specifically, there was a main effect of group ($F(2,120) = 5.91, p = .004, r = .30, 90\% \text{ CI} [.14, .41]$) and actor (self vs. other; $F(1,120) = 21.87, p < .001, r = .40, 90\% \text{ CI} [.26, .50]$) and an interaction between the two ($F(2,120) = 5.62, p = .005, r = .29, 90\% \text{ CI} [.13, .40]$). Follow-up analyses with Bonferroni corrections revealed that relative to the non-anxious group, both OCD and SAD groups had higher scores on the TAF moral subscale overall ($ps \leq .03$) and rated the moral wrongness of their own thoughts as more severe than they did others' thoughts ($ps \leq .001$). Non-anxious participants did not differ in how they rated the moral wrongness of their own versus others' thoughts, $t(41) = .30, p = .77$.

A different pattern of findings emerged for the likelihood subscales

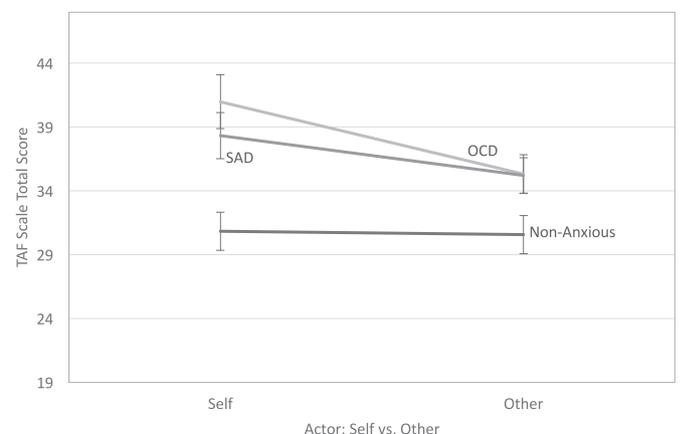


Fig. 1. Performance on self-report TAF scale: total.

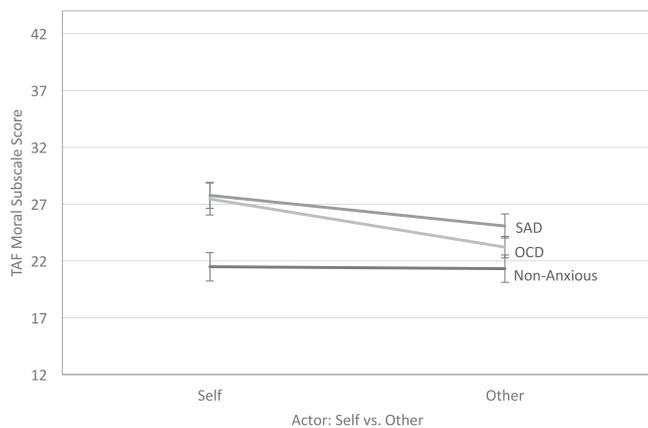


Fig. 2. Performance on self-report TAF scale: moral subscale scores.

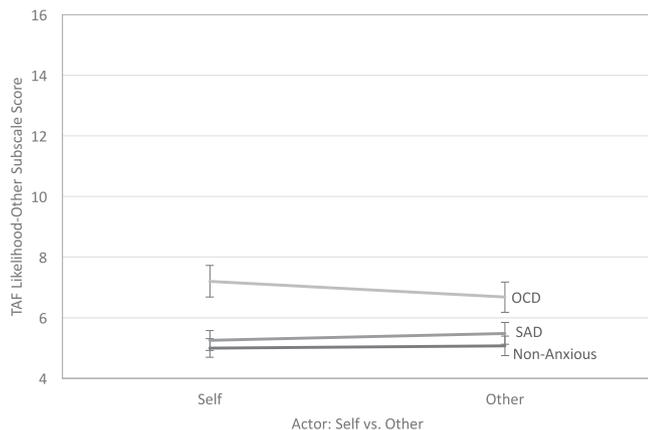


Fig. 3. Performance on self-report TAF scale: likelihood-other subscale scores.

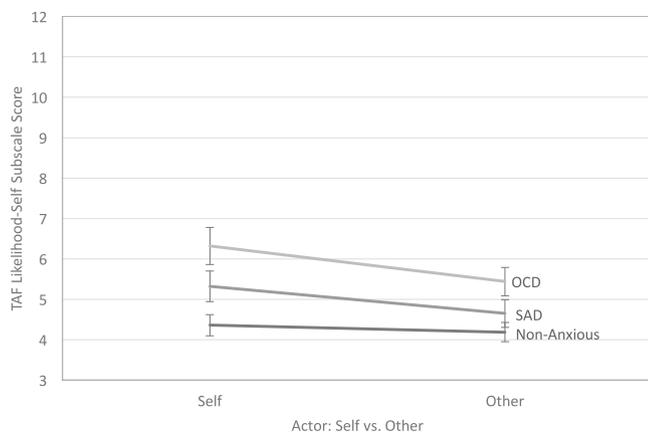


Fig. 4. Performance on self-report TAF scale: likelihood-self subscale scores.

of the TAF Scale (see Fig. 3). Results indicated a main effect of group ($F(2,120) = 7.87, p = .001, r = .34, 90\% \text{ CI} [.18, .45]$), such that OCD participants rated the likelihood that thoughts would negatively impact other people (i.e., TAF-likelihood-other) to be higher than did either the SAD or non-anxious group, regardless of the person (self vs. other) having the thought. There was neither a main effect of actor (self vs. other; $F(1,120) = .12, p = .70$), nor an interaction between group and actor, $F(2,120) = 1.41, p = .25$. Additionally, socially anxious participants' and non-anxious participants' ratings of likelihood-harm to other were indistinguishable ($p = 1.00$). Finally, when examining the likelihood-harm to self subscale of the TAF Scale across blocks (with corrections for multiple comparisons), we found a significant main effect of group ($F(2,120) = 6.67, p = .002, r = .32, 90\% \text{ CI} [.16, .43]$)

such that people with OCD had higher scores overall on the subscale than did the non-anxious group ($p = .001$), whereas the socially anxious group did not significantly differ from the non-anxious group ($p = .33$) or the OCD group ($p = .14$; see Fig. 4). There was also a main effect of actor ($F(1,120) = 11.57, p = .001, r = .30, 90\% \text{ CI} [.15, .42]$), but no interaction ($F(2,120) = 1.60, p = .21$). In other words, all groups believed that if they had thoughts about something bad happening to themselves, a negative outcome was more probable than if someone else had a thought about something bad happening to him/her (i.e., the belief that “my thoughts are more likely to hurt me than other people's thoughts are to hurt them”).

4.2.2. Direct comparison of TAF own and others' thoughts (Block 3)

Next, we conducted a one-way ANOVA on block three of the TAF Scale to determine if the same pattern of results emerged when participants were asked to make a *direct* comparison of their own versus others' thoughts. Results from the ANOVA and planned contrasts showed that this was the case. Specifically, there was a main effect of group $F(2,120) = 12.96, p < .001, r = .42, 90\% \text{ CI} [.30, .55]$, such that participants with OCD and SAD had higher scores on the TAF Scale than did non-anxious controls ($t(120) = 4.85, p < .001, r = .40, 90\% \text{ CI} [.27, .51]$ and $t(120) = 3.73, p < .001, r = .32, 90\% \text{ CI} [.18, .44]$, respectively). There were no significant differences between OCD and SAD groups on overall score, $t(120) = 1.08, p = .28$. As was the case with the indirect comparison of TAF, we found a similar pattern of performance on the subscales of block 3. That is, a multivariate analysis of variance with follow-up analyses (all Bonferroni corrected p values are reported) showed that though the OCD and SAD groups had identically elevated scores on the moral subscale of the measure ($p = 1.00$), the OCD group had higher scores than did the other groups on the likelihood-harm to other ($ps \leq .001$) and likelihood-harm to self subscales ($ps < .04$) of the measure. These results indicate that OCD participants think their thoughts are more likely than other people's thoughts to cause negative consequences.

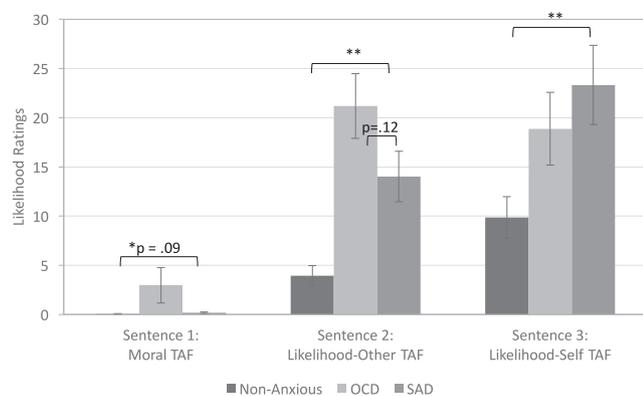
Finally, we conducted a correlational analysis to examine if performance on the three blocks of the revised TAF Scale were related. All correlations were significant, with the largest association between blocks one (evaluation of one's own thoughts) and three (direct comparison of self vs. others' thoughts), $r = .82, p < .001$. Blocks one and two were correlated at $r = .71 (p < .001)$ and blocks two and three were correlated at $r = .54 (p < .001)$.

4.3. Behavioral measure of TAF

In order to examine if participants' ratings of their own and others' thoughts differed on a behavioral measure of TAF, we analyzed the ratings (i.e., anxiety, likelihood of event occurring, moral wrongness of writing the sentence, and urge to neutralize) given by participants after writing or observing someone else write each of the three TAF sentences. We performed separate multivariate analysis of variance (MANOVAs) for the three sentences. Results indicated that across all three sentences, there was a significant main effect of group, but there was no main effect of who wrote the sentence (actor: participant or experimenter) and no significant interactions between group and actor.

Distinct patterns of group differences emerged based on the specific scenario (see Fig. 5). Specifically, for the moral TAF sentence¹ (“I hope I have sex with [family member]”), participants with OCD and SAD had similarly elevated ratings of anxiety ($F(2,114) = 22.03, p < .001, r = .53, 90\% \text{ CI} [.40, .61]$), moral wrongness ($F(2,114) = 4.15, p = .02, r = .26, 90\% \text{ CI} [.08, .38]$), and urge to neutralize ($F(2,114) = 11.41, p < .001, r = .41, 90\% \text{ CI} [.26, .51]$) relative to the non-anxious group.

¹ We omitted the responses to this sentence from three non-anxious participants, who stated they did not have a family member with whom they were close. For the likelihood-other sentence, they used the name of a close friend.



* = trending toward significance
 ** = significant at $p < .05$

Fig. 5. Performance on behavioral measure of TAF: likelihood ratings for all three sentences.

Interestingly, with respect to likelihood ratings, and in a similar pattern to that observed via self-reported TAF, there was a trend toward a significant group difference. Specifically, OCD group estimated the probability of their committing incest higher than did the SAD and non-anxious groups ($F(2,114) = 2.47, p = .09, r = .20, 90\% \text{ CI} [.0, .33]$), though this difference failed to reach statistical significance. Moreover, pairwise comparisons revealed that the likelihood ratings provided by the SAD and non-anxious groups were indistinguishable ($p = 1.00$).

A similar pattern of findings emerged for the likelihood-harm to other TAF sentence (“I hope [family member] is in a car accident today.”). That is, both OCD and SAD participants had higher anxiety ($F(2,117) = 29.16, p < .001, r = .58, 90\% \text{ CI} [.46, .65]$) and a greater urge to neutralize ($F(2,117) = 6.32, p = .002, r = .31, 90\% \text{ CI} [.15, .42]$) after imagining the scenario. There was a trend for significant group difference in moral wrongness of writing the sentence ($F(2,117) = 2.47, p = .09, r = .20, 90\% \text{ CI} [.0, .32]$) such that SAD participants had higher ratings relative to non-anxious, but not to OCD, participants. There was also a significant main effect of group for likelihood ratings ($F(2,117) = 12.91, p < .001, r = .43, 90\% \text{ CI} [.28, .52]$), with subsequent paired comparisons showing that the OCD and SAD groups rated the probability of the outcome higher than did the non-anxious ($ps \leq .01$) group. The OCD group also provided higher likelihood scores than did the SAD group, but this difference failed to reach statistical significance ($p = .12$).

Analysis of the likelihood-harm to self TAF sentence (“I hope I fall down the stairs today”) showed that again, OCD and SAD groups experienced more anxiety than did the non-anxious group, $F(2,117) = 18.54, p < .001, r = .49, 90\% \text{ CI} [.36, .58]$. There was a trend toward significant group differences on the moral wrongness ratings ($F(2,117) = 2.61, p = .08, r = .21, 90\% \text{ CI} [.0, .33]$) with the SAD and OCD groups rating writing the sentence as more morally wrong than did the non-anxious group. Moreover, there was a significant main effect of group on the likelihood ($F(2,117) = 4.39, p = .02, r = .26, 90\% \text{ CI} [.09, .38]$) and urge to neutralize ($F(2,117) = 4.43, p = .01, r = .27, 90\% \text{ CI} [.09, .38]$) ratings. Follow-up analyses showed that the socially anxious group had higher likelihood estimations and urges to neutralize than did non-anxious participants ($ps = .02$); however, group differences were not identified for the SAD versus OCD groups or for the OCD versus non-anxious groups ($ps \geq .13$).

Finally, we examined if participants differed in the frequency with which they neutralized the effects of writing or watching someone else write the three sentences. A chi-square revealed no group differences, $\chi(6) = 7.5, p = .28$, suggesting that people with OCD and SAD were no more likely to engage in visible² ritualistic behavior following the

behavioral TAF task than were non-anxious participants.

4.4. Additional analyses

Given the high rates of comorbid OCD and SAD in our sample, we repeated all analyses using dimensional measures of OCD and social anxiety symptoms. Specifically, we regressed TAF scores on the Yale-Brown Obsessive-Compulsive Scale (OCD severity), the Liebowitz Social Anxiety Scale (social anxiety severity), the Center for Epidemiology Studies – Depression (depression severity), and age in a simultaneous multiple regression. Results from the self-report TAF Scale revealed that social anxiety, but not OCD, severity significantly predicted moral TAF scores ($t(118) = 2.17, p = .03, r = .20, 90\% \text{ CI} [.04, .33]$), whereas the opposite pattern of findings was true for both likelihood scales of the measure. That is, OCD severity significantly predicted TAF likelihood-other scores ($t(118) = 3.64, p < .001, r = .32, 90\% \text{ CI} [.17, .44]$) and self ($t(118) = 2.20, p = .03, r = .20, 90\% \text{ CI} [.04, .33]$), even after accounting for depression and age. Specifically, the more severe people's OCD symptoms, the stronger their belief that their thoughts would negatively impact others and themselves.

Next, we regressed the same variables on the behavioral TAF outcomes of interest. We found that social anxiety severity was significantly associated with participants' level of anxiety following (all $ps < .001$) and urge to neutralize (all $ps \leq .02$) the effects of writing (or watching the investigator write) all three sentences, as well as their evaluation of the “moral wrongness” of the TAF-other-likelihood sentence (car accident; $p = .01$). Though OCD severity was related to none of those same outcomes, it did uniquely predict likelihood ratings following the TAF moral sentence (having sex with a relative), $t(115) = 2.07, p = .04, r = .19, 90\% \text{ CI} [.02, .32]$. Both OCD ($t(118) = 3.06, p = .003, r = .27, 90\% \text{ CI} [.12, .40]$) and social anxiety ($t(118) = 2.35, p = .02, r = .21, 90\% \text{ CI} [.06, .34]$) severity predicted ratings of likelihood following the TAF-likelihood-other sentence, OCD to a greater extent than SAD, whereas no variables were associated with likelihood-self (falling down the stairs) ratings.

5. Discussion

The aim of the present study was to examine if people with OCD evaluate their own thoughts as more significant than they do other people's thoughts. We tested this question three ways: indirectly via self-report (TAF Scale block 1 vs. 2), directly via self-report (TAF Scale Block 3), and via two separate conditions (self writing vs. other writing) on a behavioral measure of TAF. Analysis of both the indirect and direct comparisons showed that the OCD and SAD groups evaluated their thoughts as more morally wrong and more likely to do harm than they did others' thoughts; the non-anxious group did not evaluate their own and others' thoughts differently. These results indicate that TAF may be more related to biased evaluation of one's own thoughts than to thoughts in general. However, the behavioral measure of TAF revealed no differences in how any of the groups evaluated the significance of their own versus others' thoughts on four different dimensions (anxiety, likelihood, moral wrongness, and urge to neutralize the thought). What might account for this inconsistency between self-report and behavioral measures of how people evaluate their own versus others' thoughts? One possibility is that the behavioral measure was more emotionally salient than was the modified TAF Scale. Indeed, the TAF Scale includes neither specific names of friends or relatives, nor does it ask participants to write down a certain thought or to picture an upsetting scenario. Conversely, the sentence paradigm requires participants to imagine and provide the name of a specific loved one, write out or watch someone else write sentences that involve incest or harm to

(footnote continued)

knowing, as participants were not asked to report such covert responses.

² It is possible that participants engaged in mental rituals without the experimenter

oneself or the family member, and imagine the scenario for 30 s. Myriad studies confirm that emotional information affects cognitive processes, such as memory and attention, and that the neural processing of emotional stimuli differs from that of less emotionally salient information (Anderson & Phelps, 2001; Vuilleumier, 2005). The scenarios used in the behavioral TAF paradigm may have been so emotionally arousing that the person who physically wrote them out made little difference in how they were assessed.

Using three different measures of TAF, we found that relative to non-anxious people, obsessive-compulsive and socially anxious individuals have similar beliefs about the significance of and need to control their thoughts. Specifically, the OCD and SAD groups had similar scores on the TAF subscale of the OBQ-44 and on the total score of the modified Thought-Action Fusion Scale. Similarly, SAD and OCD participants had comparably elevated ratings on most subscales of a behavioral measure of TAF. These findings are in line with other studies reporting that people with anxiety disorders possess cognitive biases that are also associated with OCD (Steketee, Frost, & Cohen, 1998). For example, studies by Rassin et al. (2001) and Thompson-Hollands et al. (2013) found that individuals with a range of anxiety disorders scored similarly on the TAF Scale to people with OCD.

Despite their comparable total score on TAF measures, one aspect that seems to distinguish OCD participants from SAD participants is the extent to which they believe that thoughts influence the likelihood of outcomes (i.e., the belief that thinking about something makes it more likely to happen), a belief known as magical thinking. Analyses of the subscales of the modified TAF scale showed that OCD and SAD groups did not differ in how they rated the moral wrongness of different thoughts, but that people with OCD had higher scores than SAD and non-anxious participants on the likelihood-other subscale of the measure and higher scores than non-anxious participants on the likelihood-self subscale. These findings are consistent with prior research, which showed that participants with OCD had higher scores on the likelihood subscales of the TAF Scale than did people with social anxiety disorder (Abramowitz et al., 2003). However, in the same study, the authors found that likelihood scores did not significantly differ between people with OCD and certain other anxiety disorders, such as generalized anxiety disorder and panic disorder. Though it is possible that likelihood scales only distinguish OCD from SAD, but not other anxiety disorders, Abramowitz et al. (2003) examined groups with homogenous diagnoses, whereas our OCD and SAD groups included people who met criteria for comorbid anxiety disorders. It is noteworthy that despite the fact that 59% of our OCD group also met criteria for SAD, the group differences on likelihood scales were still present. Moreover, after repeating analyses using dimensional scores of OCD and SAD, the findings showed that OCD severity predicted both self-reported and behavioral measures of TAF likelihood, whereas SAD severity did not (with the exception of likelihood-other after imagining a car accident).

Interestingly, in response to the likelihood-self sentence (“I hope I fall down the stairs today”), there were no differences in how participants with OCD and those with SAD rated the likelihood of the outcome (and this finding remained consistent in a regression analysis). It is possible that the object of the action – in this case, oneself – influences how different groups assess the likelihood of harm. Unlike the other two sentences, the TAF-likelihood-harm to self scenario does not involve physically harmful consequences for other people, but only for oneself. Indeed, as noted above and in line with the behavioral measure, socially anxious participants scored similarly to OCD participants on the self-report likelihood-harm to self subscale, but not the likelihood-harm to other subscale, of the TAF Scale. These self-report and behavioral findings suggest that socially anxious individuals do not overestimate the likelihood of negative events occurring in general, but rather only when the potential object of harm is themselves. In other words, when the threat is to themselves, their likelihood scores do not differ from those with OCD, but when the threat is to others’ well-being, they perform more like non-anxious participants. One potential explanation

for this finding is socially anxious people’s well-documented tendency to focus attention inward and on self-referent information (Boehme, Miltner, & Straube, 2015). This amplified inward focus causes biased processing of information and increases anxiety, arousal, and negative evaluation of oneself (Boehme et al., 2015; Bogels & Mansell, 2004; Woody & Rodriguez, 2000). Therefore, SAD participants may have processed situations in which they are at risk differently from those in which others are at risk. Moreover, socially anxious participants may have viewed the likelihood-harm to self scenario (i.e., falling down the stairs) as a potentially embarrassing event. Given that SAD entails an intense fear of humiliation, interpreting the sentence as socially threatening could explain why this group deemed it more likely to occur than the other non-socially relevant scenarios.

In our study, estimations of likelihood seem to be the only factor that consistently distinguishes these groups. Perhaps more fixed and generalized beliefs about the probability or likelihood of negative outcomes are unique contributors to OCD pathology versus other disorders. Alternatively, the dominant fear of people with SAD is doing something socially awkward that provokes ridicule from other people, whereas a dominant fear of people with OCD is doing something dangerous that provokes moral condemnation from other people as well from themselves. Hence, in everyday life the focus of fearful preoccupation will differ between these groups. As Tversky and Kahneman (1973) wrote in their article on the *availability heuristic*, “Continued preoccupation with an outcome may increase its availability, and hence its perceived likelihood” (p. 230). Accordingly, this heuristic may explain why OCD participants reported higher likelihood ratings than did SAD participants despite both groups responding similarly on other measures TAF.

5.1. New insights

The current study has important research and clinical implications. First, this study is the first to examine if the TAF bias is specific to one’s own thoughts or if it generalizes to how people with OCD evaluate others’ thoughts. Using a revised version of a widely used measure, we found that in both indirect and direct assessments of this question, people with OCD and those with SAD evaluated their thoughts as more potentially dangerous and more likely to do harm than others’ thoughts. Cognitive therapy for OCD includes exercises to combat dysfunctional thoughts about beliefs. However, this study indicates that it might be more useful to target the distorted belief that “there is something about me or my thoughts that are especially dangerous” as opposed to “thoughts in general are dangerous” as they likely represent different schemas or core beliefs. Indeed, patients would benefit from an understanding that their thoughts are not, in fact, more dangerous and significant than are others’ thoughts, but that cognitive biases such as heightened responsibility and increased guilt contribute to misplaced fear that they are responsible for negative, uncontrollable events. Second, we replicated the finding that the thought-action fusion bias is not specific to OCD, despite the fact that it is has been studied most widely in this disorder (Berle & Starcevic, 2005; Shafran & Rachman, 2004). Therefore, our study supports the theory that some vulnerabilities cross diagnostic boundaries, and that focusing on transdiagnostic factors may be useful in understanding the etiology and improving the treatment of mental illness (Insel et al., 2010). Third, we have replicated and extended the finding that heightened TAF likelihood estimation may distinguish OCD from other psychopathology (Shafran & Rachman, 2004). Not only did we find evidence of this distinction on self-report measures of TAF, but also we found similar patterns of performance on the behavioral sentence paradigm. To our knowledge, this study is the first to have used both measures to assess this construct in a clinical sample. Taken with other studies, these findings suggest that when treating OCD, it may be worthwhile to target TAF likelihood specifically (especially when assessed with a self-report measure such as the TAF Scale), as it may play a unique role in the

maintenance of the disorder. It would be interesting to examine if people at risk for OCD show similar patterns of performance on TAF-likelihood measures than do people with the active disorder. If so, these measures could be used to identify individuals who may be more prone to developing OCD as opposed to a different disorder.

5.2. Challenges faced

Our study has limitations, including a modest sample size in each condition of the behavioral TAF task (e.g., 20 people each). In addition, the first author was responsible for conducting all clinical interviews and diagnoses. Though multiple raters were not explicitly involved in the present study, a number of the participants with OCD were recruited from OCD clinics, where they had already received a diagnosis of the disorder. In addition, the inclusion of dimensional measures of symptom severity (e.g., the Y-BOCS and LSAS) confirmed that the groups differed in ways consistent with this diagnosis.

Although ecologically valid, high rates of comorbidity may be a weakness if the goal is to understand how different symptoms of psychopathology (e.g., social anxiety versus generalized anxiety) are specifically related to TAF. Indeed, deciding how to account for comorbidity is an ongoing challenge when conducting experimental studies. Including comorbid disorders in samples can add complexity to identifying factors that are unique to a given disorder, yet may contribute to a better transdiagnostic understanding of frequently co-occurring disorders. Given the increasing interest in diagnostic systems that do not conceptualize disorders as discrete entities, examining cognitive factors shared by clusters of disorders may enhance our understanding of why some symptoms co-occur more than others do while still allowing us to identify factors that predict certain symptom profiles. Indeed, given that we detected group differences despite the high rates of comorbidity (including social anxiety disorder in the OCD group), the heterogeneity of the sample is unlikely to have diminished the validity of our study. Indeed, we were able to repeat analyses using dimensional measures of psychopathology, which strengthens our findings.

Finally, the current study underscores the importance of using multiple modes of measurement when examining a given construct (Kazdin, 2002). Though there were similarities in how subjects performed on the self-report and behavioral measures of TAF, there were also some notable differences, as delineated above. The majority of studies on TAF have relied on self-report measures, but ours provides evidence that in vivo paradigms may yield results undetected by the former. Further, this study indicates that relying on self-report data may be insufficient to determine how cognitive factors affect everyday behavior.

5.3. Solutions

We used both self-report and behavioral measures of TAF. By making very subtle changes to the standard TAF questionnaire, we identified a significant difference in how individuals with OCD and SAD evaluate their own and others' thoughts. We also included both categorical and dimensional measures of symptoms to clarify the relationship of specific symptoms to TAF. A possible solution to designing more sensitive behavioral measures of cognitive constructs may be to tailor them specifically to participants' symptoms. We neither used idiographic sentences in the behavioral TAF paradigm, nor did we examine the relationship between TAF and specific OCD subtypes or domains (e.g., contamination versus unacceptable thoughts), as we did not have sufficient power to do so. Though it is not customary to use idiographic sentences in the behavioral TAF task, it is possible that doing so would have captured differences not apparent with generic scenarios. Indeed, research on other cognitive processes in OCD, such as attention and memory, demonstrate the importance of self-referent stimuli in testing these constructs (Radomsky & Rachman, 2004). However, despite the

more generalized approach used in the current investigation, important group differences emerged.

In conclusion, the current study provides evidence for the presence of TAF in other disorders, the relative importance of TAF likelihood estimation in distinguishing OCD participants from those with anxiety disorders, and the potential benefit of addressing dysfunctional beliefs about one's individual thoughts (as opposed to thoughts in general) when targeting TAF in OCD and other anxiety disorders.

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Appendix A

Revised Thought-Action Fusion (TAF) Scale (Shafran, 1996)

Original scale followed by:

- a = block 1 (self)
- b = block 2 (other)
- c = block 3 (direct comparison)

TAF-Moral

1. Thinking of making an extremely critical remark to a friend is almost as unacceptable to me as actually saying it.
 - a. When I think of making an extremely critical remark to a friend, it is almost as unacceptable to me as actually saying it.
 - b. When my friend thinks of making an extremely critical remark to someone, it is almost as unacceptable as his actually saying it.
 - c. When I think of making an extremely critical remark to a friend, it is more unacceptable than if my friend thinks of making an extremely critical remark to his friend.
2. Having a blasphemous thought is almost as sinful to me as a blasphemous action.
 - a. When I have a blasphemous thought, it is almost as sinful to me as taking a blasphemous action.
 - b. When my friend has a blasphemous thought, it is almost as sinful as if he took a blasphemous action.
 - c. When I have a blasphemous thought, it is more sinful than when my friend has a blasphemous thought.
3. Thinking about swearing at someone else is almost as unacceptable to me as actually swearing.
 - a. When I think about swearing at someone else, it is almost as unacceptable to me as actually swearing at them.
 - b. When my friend thinks of swearing at someone else, it is almost as unacceptable as his actually swearing at them.
 - c. When I think about swearing at someone else, it is more unacceptable than if my friend thinks of swearing at someone.
4. When I have a nasty thought about someone else, it is almost as bad as carrying out a nasty action.
 - a. When I have a nasty thought about someone else, it is almost as bad as if I carried out a nasty action.
 - b. When my friend has a nasty thought about someone else, it is almost as bad as if she carried out a nasty action.
 - c. When I have a nasty thought about someone else, it is worse than if my friend has a nasty thought about someone else.
5. Having violent thoughts is almost as unacceptable to me as violent acts.

- a. If I have violent thoughts, it is almost as unacceptable to me as committing a violent act.
- b. If my friend has violent thoughts, it is almost as unacceptable as if he committed a violent act.
- c. If I have violent thoughts, it is more unacceptable than if my friend has violent thoughts.
6. When I think about making an obscene remark or gesture in church, it is almost as sinful as actually doing it.
 - a. When I think about making an obscene remark or gesture in church, it is almost as sinful as if I actually do make an obscene remark or gesture in church.
 - b. When my friend thinks about making an obscene remark or gesture in church, it is almost as sinful as if he actually does make an obscene remark or gesture in church.
 - c. When I think about making an obscene remark or gesture in church, it is worse than if my friend thinks about making an obscene remark or gesture in church.
7. If I wish harm on someone, it is almost as bad as doing harm.
 - a. If I wish harm on someone, it is almost as bad as my doing harm to that person.
 - b. If my friend wishes harm on someone, it is almost as bad as his doing harm to another person.
 - c. If I wish harm on someone, it is worse than if my friend wishes harm on someone.
8. If I think about making an obscene gesture to someone else, it is almost as bad as doing it.
 - a. If I think about making an obscene gesture to someone else, it is almost as bad as my doing it.
 - b. If my friend thinks about making an obscene gesture to someone else, it is almost as bad as her doing it.
 - c. If I think about making an obscene gesture to someone, it is worse than if my friend thinks about making an obscene gesture to someone.
9. When I think unkindly about a friend, it is almost as disloyal as doing an unkind act.
 - a. When I think unkindly about a friend, it is almost as disloyal of me as doing an unkind act.
 - b. When my friend thinks unkindly about her friend, it is almost as disloyal of her as doing an unkind act.
 - c. When I think unkindly about a friend, it is worse than if my friend thinks unkindly about her friend.
10. If I have a jealous thought, it is almost the same as making a jealous remark.
 - a. If I have a jealous thought, it is almost the same as if I made a jealous remark.
 - b. If my friend has a jealous thought, it is almost the same as if she made a jealous remark.
 - c. If I have a jealous thought, it is worse than if my friend has a jealous thought.
11. Thinking of cheating in a personal relationship is almost as immoral to me as actually cheating.
 - a. If I think of cheating in a personal relationship, it is almost as immoral as if I actually cheated.
 - b. If my friend thinks of cheating in his personal relationship, it is almost as immoral as if he actually cheated.
 - c. If I think of cheating in a personal relationship, it is more immoral than if my friend thinks of cheating in a personal relationship.
12. Having obscene thoughts in a church is unacceptable to me.
 - a. If I have obscene thoughts in church, it is unacceptable.
 - b. If my friend has obscene thoughts in church, it is unacceptable.
 - c. If I have obscene thoughts in church, it is more unacceptable than if my friend has obscene thoughts in church.

TAF-Likelihood-Other

1. If I think of a relative/friend losing their job, this increases the risk that they will lose their job.
 - a. No change.
 - b. If my friend thinks of his relative/friend losing her job, this increases the risk that his friend/relative will lose her job.
 - c. If I think of my friend losing her job, this increases the risk that she will lose it more than if her other friend has the same thought.
2. If I think of a relative/friend being in a car accident, this increases the risk he/she will have a car accident.
 - a. No change.
 - b. If my friend thinks of a relative/friend being in a car accident, this increases the risk that his friend/relative will be in a car accident.
 - c. If I think of a friend being in a car accident, this increases the risk that he will have a car accident more than if his other friend has the same thought.
3. If I think of a friend/relative being injured in a fall, this increases the risk that he/she will have a fall and be injured.
 - a. No change.
 - b. If my friend thinks of a friend/relative being injured in a fall, this increases the risk that her friend/relative will fall and be injured.
 - c. If I think of a friend being injured in a fall, this increases the risk that she will fall and be injured more than if her other friend has the same thought.
4. If I think of a relative/friend falling ill, this increases the risk that he/she will fall ill.
 - a. No change.
 - b. If my friend thinks of a relative/friend falling ill, this increases the risk that her relative/friend will fall ill.
 - c. If I think of a friend falling ill, this increases the risk that he will fall ill more so than if his other friend has the same thought.

TAF-Likelihood-Self

1. If I think of myself being injured in a fall, this increases the risk that I will have a fall and be injured.
 - a. No change.
 - b. If my friend thinks of being injured in a fall, this increases the risk that she will have a fall and be injured.
 - c. If I think about myself being injured in a fall and my friend thinks about himself being injured in a fall, I am more likely than he to fall and be injured.
2. If I think of myself being in a car accident, this increases the risk that I will have a car accident.
 - a. No change.
 - b. If my friend thinks of being in a car accident, this increases the risk that he will have a car accident.
 - c. If I think of being in a car accident and my friend thinks about herself being in a car accident, I am more likely than she to be in a car accident.
3. If I think of myself falling ill, this increases the risk that I will fall ill.
 - a. No change.
 - b. If my friend thinks of himself falling ill, this increases the risk he will fall ill.
 - c. If I think of myself falling ill and my friend thinks of herself falling ill, I am more likely than she is to fall ill.

References

- Abramowitz, J. S., Whiteside, S., Lynam, D., & Kalsy, S. (2003). Is thought-action fusion specific to obsessive-compulsive disorder?: A mediating role of negative affect. *Behaviour Research and Therapy*, *41*, 1069–1079.
- Amir, N., Freshman, M., Ramsey, B., Neary, E., & Brigidi, B. (2001). Thought-action fusion in individuals with OCD symptoms. *Behaviour Research and Therapy*, *39*, 765–776 (doi: S0005-7967(00)00056-5)(pii).

- Anderson, A. K., & Phelps, E. A. (2001). Lesions of the human amygdala impair enhanced perception of emotionally salient events. *Nature*, *411*, 305–309. <http://dx.doi.org/10.1038/35077083>.
- Berle, D., & Starcevic, V. (2005). Thought-action fusion: Review of the literature and future directions. *Clinical Psychology Review*, *25*, 263–284. <http://dx.doi.org/10.1016/j.cpr.2004.12.001>.
- Berman, N. C., Abramowitz, J. S., Wheaton, M. G., Pardue, C. M., & Fabricant, L. (2011). Evaluation of an in vivo measure of thought–action fusion. *Journal of Cognitive Psychotherapy*, *25*, 155–164.
- Boehme, S., Miltner, W. H., & Straube, T. (2015). Neural correlates of self-focused attention in social anxiety. *Social and Cognitive Affective Neuroscience*, *10*, 856–862. <http://dx.doi.org/10.1093/scan/nsu128>.
- Bogels, S. M., & Mansell, W. (2004). Attention processes in the maintenance and treatment of social phobia: Hypervigilance, avoidance and self-focused attention. *Clinical Psychology Review*, *24*, 827–856. <http://dx.doi.org/10.1016/j.cpr.2004.06.005>.
- Eaton, W. W., Smith, C., Ybarra, M., Muntaner, C., & Tien, A. (2004). Center for Epidemiologic Studies Depression Scale: Review and Revision (CESD and CESD-R). In M. E. Maruish (Ed.). *The Use of Psychological Testing for Treatment Planning and Outcomes Assessment, Instruments for Adults* (pp. 363–377). (3 ed.). Mahwah, NJ: Lawrence Erlbaum.
- First, M. B., Williams, J. B., & Spitzer, R. L. (2015). *Structured Clinical Interview for DSM-5-Research Version*. Arlington, VA: American Psychiatric Association.
- Fisher, P. L. (2009). Obsessive compulsive disorder: A comparison of CBT and the metacognitive approach. *International Journal of Cognitive Therapy*, *2*, 107–122.
- Fresco, D. M., Coles, M. E., Heimberg, R. G., Liebowitz, M. R., Hami, S., Stein, M. B., & Goetz, D. (2001). The Liebowitz Social Anxiety Scale: A comparison of the psychometric properties of self-report and clinician-administered formats. *Psychological Medicine*, *31*, 1025–1035.
- Goodman, W. K., Price, L. H., Rasmussen, S. A., Mazure, C., Delgado, P., Heninger, G. R., & Charney, D. S. (1989). The Yale-brown obsessive compulsive scale. II. Validity. *Archives of General Psychiatry*, *46*, 1012–1016.
- Goodman, W. K., Price, L. H., Rasmussen, S. A., Mazure, C., Fleischmann, R. L., Hill, C. L., & Charney, D. S. (1989). The Yale-brown obsessive compulsive scale. I. Development, use, and reliability. *Archives of General Psychiatry*, *46*, 1006–1011.
- Hezel, D. M., & McNally, R. J. (2016). A Theoretical review of cognitive biases and deficits in obsessive-compulsive disorder. *Biological Psychology*, *121*, 221–232. <http://dx.doi.org/10.1016/j.biopsycho.2015.10.012>.
- Hezel, D. M., Riemann, B. C., & McNally, R. J. (2012). Emotional distress and pain tolerance in obsessive-compulsive disorder. *Journal of Behavior Therapy and Experimental Psychiatry*, *43*, 981–987.
- Insel, T., Cuthbert, B., Garvey, M., Heinssen, R., Pine, D. S., Quinn, K., & Wang, P. (2010). Research domain criteria (RDoC): Toward a new classification framework for research on mental disorders. *American Journal of Psychiatry*, *167*, 748–751. <http://dx.doi.org/10.1176/appi.ajp.2010.09091379>.
- Kazdin, A. E. (2002). *Research design in clinical psychology* (4 ed.). Boston: Allyn and Bacon.
- Liebowitz, M. R. (1987). Social phobia. *Modern Problems of Pharmacopsychiatry*, *22*, 141–173.
- Marcks, B. A., & Woods, D. W. (2007). Role of thought-related beliefs and coping strategies in the escalation of intrusive thoughts: An analog to obsessive-compulsive disorder. *Behaviour Research and Therapy*, *45*, 2640–2651. <http://dx.doi.org/10.1016/j.brat.2007.06.012>.
- Mennin, D. S., Fresco, D. M., Heimberg, R. G., Schneier, F. R., Davies, S. O., & Liebowitz, M. R. (2002). Screening for social anxiety disorder in the clinical setting: Using the Liebowitz Social Anxiety Scale. *Journal of Anxiety Disorders*, *16*, 661–673.
- Myers, S. G., Fisher, P. L., & Wells, A. (2009). Metacognition and cognition as predictors of obsessive-compulsive symptoms: A prospective study. *International Journal of Cognitive Therapy*, *2*, 132–142.
- OCCWG (2001). Development and initial validation of the obsessive beliefs questionnaire and the interpretation of intrusions inventory. *Behaviour Research and Therapy*, *39*, 987–1006.
- OCCWG (2003). Psychometric validation of the obsessive beliefs questionnaire and the interpretation of intrusions inventory: Part I. *Behaviour Research and Therapy*, *41*, 863–878.
- OCCWG (2005). Psychometric validation of the obsessive belief questionnaire and interpretation of intrusions inventory—Part 2: Factor analyses and testing of a brief version. *Behaviour Research and Therapy*, *43*, 1527–1542.
- Rachman, S. (1993). Obsessions, responsibility and guilt. *Behaviour Research and Therapy*, *31*, 149–154 (doi: 0005-7967(93)90066-4)(pii).
- Rachman, S. (1997). A cognitive theory of obsessions. *Behaviour Research and Therapy*, *35*, 793–802 (doi: S0005-7967(97)00040-5)(pii).
- Rachman, S. (1998). A cognitive theory of obsessions: Elaborations. *Behaviour Research and Therapy*, *36*, 385–401 (doi: S0005-7967(97)10041-9)(pii).
- Rachman, S., & Shafran, R. (1999). Cognitive distortions: Thought-action fusion. *Clinical Psychology and Psychotherapy*, *6*, 80–85.
- Rachman, S., Shafran, R., Mitchell, D., Trant, J., & Teachman, B. (1996). How to remain neutral: An experimental analysis of neutralization. *Behaviour Research and Therapy*, *34*, 889–898.
- Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, *1*, 385–401.
- Radomsky, A. S., & Rachman, S. (2004). The importance of importance in OCD memory research. *Journal of Behavior Therapy and Experimental Psychiatry*, *35*, 137–151. <http://dx.doi.org/10.1016/j.jbtep.2004.04.005>.
- Rassin, E. (2001). The contribution of thought-action fusion and thought suppression in the development of obsession-like intrusions in normal participants. *Behaviour Research and Therapy*, *39*, 1023–1032.
- Rassin, E., Diepstraten, P., Merckelbach, H., & Muris, P. (2001). Thought-action fusion and thought suppression in obsessive-compulsive disorder. *Behaviour Research and Therapy*, *39*, 757–764.
- Rassin, E., Merckelbach, H., Muris, P., & Spaan, V. (1999). Thought-action fusion as a causal factor in the development of intrusions. *Behaviour Research and Therapy*, *37*, 231–237.
- Rytwinski, N. K., Fresco, D. M., Heimberg, R. G., Coles, M. E., Liebowitz, M. R., Cissell, S., & Hofmann, S. G. (2009). Screening for social anxiety disorder with the self-report version of the Liebowitz Social Anxiety Scale. *Depression and Anxiety*, *26*, 34–38. <http://dx.doi.org/10.1002/da.20503>.
- Salkovskis, P. M. (1985). Obsessional-compulsive problems: A cognitive-behavioural analysis. *Behaviour Research and Therapy*, *23*, 571–583 (doi: 0005-7967(85)90105-6)(pii).
- Shafran, R., & Rachman, S. (2004). Thought-action fusion: A review. *Journal of Behavior Therapy and Experimental Psychiatry*, *35*, 87–107.
- Shafran, R., Thordarson, D. S., & Rachman, S. (1996). Thought-action fusion in obsessive compulsive disorder. *Journal of Anxiety Disorders*, *10*, 379–391.
- Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., & Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry*, *59*(Suppl 20), 22–33.
- Steketee, G., Frost, R. O., & Cohen, I. (1998). Beliefs in obsessive-compulsive disorder. *Journal of Anxiety Disorders*, *12*, 525–537.
- Thompson-Hollands, J., Farchione, T. J., & Barlow, D. H. (2013). Thought-action fusion across anxiety disorder diagnoses: Specificity and treatment effects. *Journal of Nervous and Mental Disease*, *201*, 407–413. <http://dx.doi.org/10.1097/NMD.0b013e31828e102c>.
- Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, *5*, 207–232. [http://dx.doi.org/10.1016/0010-0285\(73\)90033-9](http://dx.doi.org/10.1016/0010-0285(73)90033-9).
- van den Hout, M., Kindt, M., Weiland, T., & Peters, M. (2002). Instructed neutralization, spontaneous neutralization and prevented neutralization after an obsession-like thought. *Journal of Behavior Therapy and Experimental Psychiatry*, *33*, 177–189 (doi: S0005791602000484)(pii).
- van den Hout, M., van Pol, M., & Peters, M. (2001). On becoming neutral: Effects of experimental neutralizing reconsidered. *Behaviour Research and Therapy*, *39*, 1439–1448.
- Vuilleumier, P. (2005). How brains beware: Neural mechanisms of emotional attention. *Trends in Cognitive Sciences*, *9*, 585–594. <http://dx.doi.org/10.1016/j.tics.2005.10.011>.
- Woody, S. R., & Rodriguez, B. F. (2000). Self-focused attention and social anxiety in social phobics and normal controls. *Cognitive Therapy and Research*, *24*, 473–488.