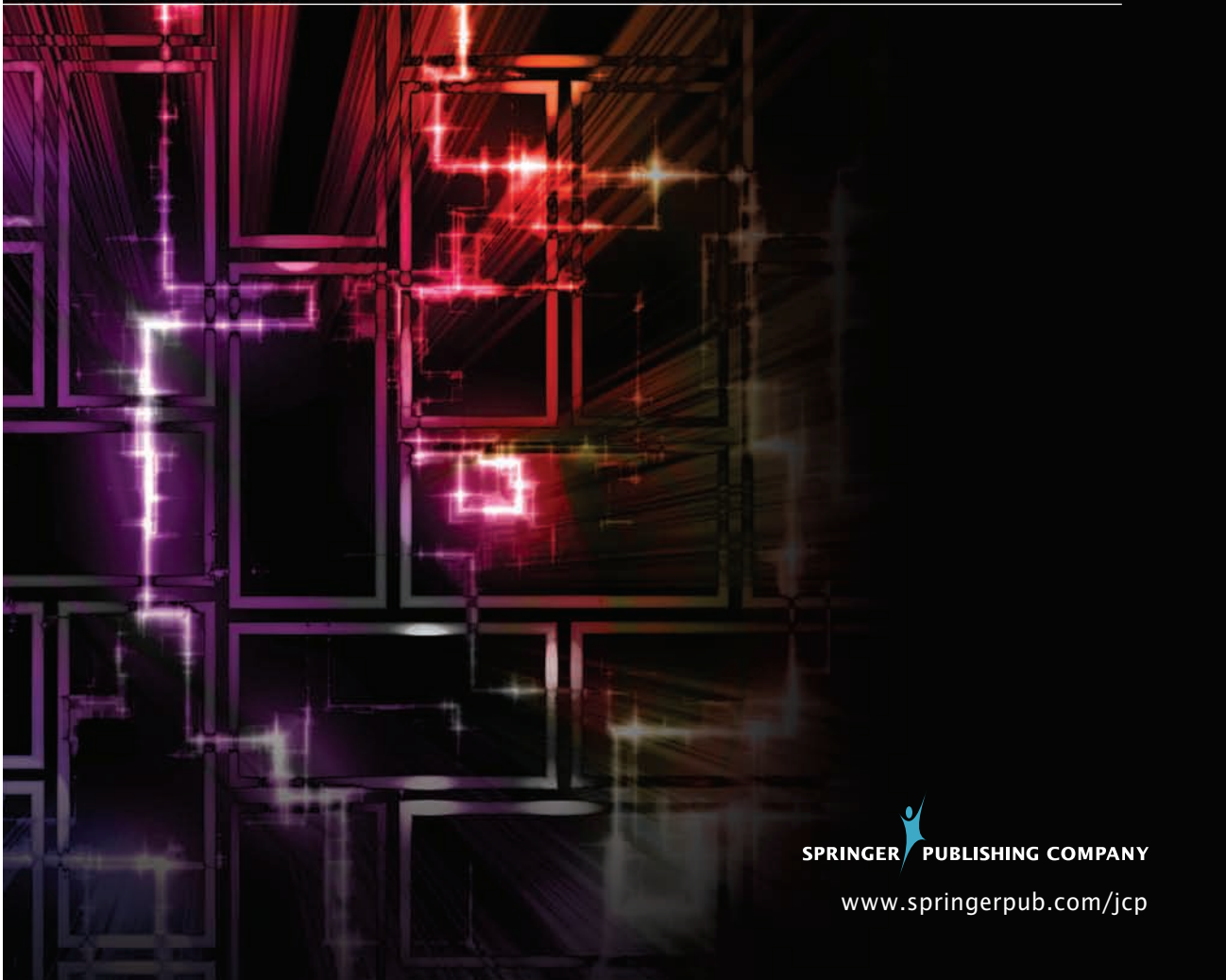


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Evaluation of an In Vivo Measure of Thought–Action Fusion

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Thought–action fusion (TAF) refers to maladaptive beliefs about the relationship between mental events and behaviors, and is associated with obsessional problems. Currently, the self-report Thought–Action Fusion Scale (TAFS) is the most widely used measure of TAF, but a single assessment modality limits research that can be conducted on this phenomenon. This study evaluated the validity of an in vivo paradigm that assesses both Moral TAF (the belief that thoughts are the moral equivalent of actions) and Likelihood TAF (the belief that thinking about a negative event increases the probability of the event itself). In this paradigm, participants were asked to contemplate two negative events involving a beloved relative: (a) I hope (relative) is in a car accident today and (b) I hope I have sex with (relative). Participants then provided in vivo ratings of anxiety, estimates of likelihood, and moral wrongness related to the negative thoughts. Results provided evidence for the convergent validity of the in vivo ratings for both sentences. These findings are discussed in terms of clinical care, the assessment of TAF, and the implications for future research on this theoretically important construct.

Keywords: thought–action fusion; cognitive bias; obsessive-compulsive disorder; in vivo

Thought–action fusion (TAF; Shafran, Thordarson, & Rachman, 1996) is a set of cognitive distortions that have been studied at length with regard to obsessional problems (i.e., obsessive-compulsive disorder [OCD]; Berle & Starcevic, 2005). These distortions entail erroneous and maladaptive beliefs about the relationship between mental events and behaviors. Specifically, *Moral* TAF is the belief that thinking unacceptable thoughts is the moral equivalent of performing unacceptable behaviors (e.g., “Thinking about harming someone is as bad as actually harming them”). *Likelihood* TAF is the belief that thinking about an event increases the chances that the event will occur (e.g., “Thinking about a friend getting sick increases the likelihood that she will get sick”). TAF has been implicated in cognitive behavioral models of obsessions. Rachman (1998), for instance, argued that interpreting a harmless unwanted thought (e.g., stealing from the grocery store) as morally unacceptable (e.g., equivalent to stealing) or as likely to lead to the feared outcome (e.g., shoplifting) may result in increased anxiety and an obsessional preoccupation with the thought, as well as attempts to dismiss the thought or

reduce the level of anxiety (e.g., compulsive rituals). A strong relationship between TAF and OCD symptoms has been consistently reported (for a review, see Berle & Starcevic).

The most widely used approach to measuring TAF is the Thought–Action Fusion Scale (TAFS) developed by Shafran et al. (1996). The TAFS is a 19-item self-report questionnaire that contains three factor-analytically derived subscales: Moral, Likelihood-other (the effect of one’s negative thoughts on *other people*), and Likelihood-self (the effect of one’s negative thoughts on *himself or herself*). The scale’s items ask respondents to consider how much they agree with beliefs as exemplified in scenarios about the effects of thinking more or less specific sorts of thoughts (e.g., “If I think about making an obscene gesture to someone else, it is almost as bad as doing it”). The TAFS is considered a reliable and valid measure because of its good psychometric properties (Shafran et al.). It is also positively correlated with obsessional symptoms (Rassin, Merckelbach, Muris, & Schmidt, 2001), and therefore extensively used in research on OCD (e.g., Abramowitz, Whiteside, Lynam, & Kalsy, 2003).

The TAFS is an important instrument; yet to adequately study a psychological construct, it is optimal to have multiple measures or assessment modalities (Kazdin, 2002). Thus, the scope of research that can be conducted on this theoretically important variable is currently limited. Moreover, items on the TAFS assess hypothetical agreement with TAF beliefs, but not actual behavioral indicators of these beliefs. That is, participants’ beliefs, feelings, and behaviors are not actually assessed while engaging in a task that activates TAF. Additionally, when completing the TAFS, respondents have the opportunity to consider the logic of each item, which may expose the irrational nature of such beliefs and translate to an underreporting of TAF (Berle & Starcevic, 2005). Thus, to better understand TAF and how this variable operates under different conditions, the validity of semi-idiographic and methodologically varied measurements of this construct, such as an *in vivo* behaviorally based assessment, should be evaluated.

Recognizing the need to expand how TAF is induced and assessed in the laboratory, authors have developed paradigms for experimentally manipulating TAF. In a study by Rachman, Shafran, Mitchell, Trant, and Teachman (1996), participants were asked to think of a beloved relative and then write a sentence indicating that they hoped the relative would be in a car accident. Some participants were then given the opportunity to engage in immediate neutralization, defined as a behavior aimed at canceling the negative effects of the thought (e.g., crossing out the sentence). Results indicated that after participants contemplated this negative event, they reported increased levels of distress, feelings of responsibility, guilt, and urges to neutralize (i.e., cancel the effects of thinking the thought). Moreover, the most common neutralizing behaviors were altering the sentence to make it positive or destroying the sentence. Bocci and Gordon (2007) similarly examined participants’ response to thinking about a relative being in a car accident (i.e., Likelihood TAF) and monitored their neutralizing behavior. Bocci and Gordon followed Freeston and Ladouceur’s (1997) classification scheme to code neutralizing behaviors, such that the behaviors (a) must not follow the laws of normal causation and (b) cannot be seen as a normal coping strategy. Participants reported an increase in anxiety after writing the sentence, and 75% of participants engaged in a neutralizing behavior following the TAF induction. Bocci and Gordon concluded that neutralization was a frequent behavior in response to the activation of likelihood TAF beliefs. Several other researchers have also experimentally induced TAF in a nonclinical sample using Rachman et al.’s (1996) paradigm, finding elevated ratings of anxiety, likelihood, and urges to neutralize following the induction (Marcks & Woods, 2007; Rassin, 2001; van den Hout, Kindt, Weiland, & Peters, 2002; van den Hout, van Pol, & Peters, 2001; Zucker, Craske, Barrios, & Holguin, 2002).

Rassin, Merckelbach, Muris, and Spaan (1999) also evaluated the effects of TAF by designing a novel experimental induction in which high school students were connected to electroencephalography (EEG) electrodes that could purportedly “detect thoughts.” Participants were instructed that if they thought about the word “apple,” then another participant in the experiment (who was actually a confederate) would be given an electric shock. Results indicated that participants who were informed of this threat (which was akin to TAF) experienced more intrusive thoughts,

discomfort, and an increased resistance to thinking about an “apple” as compared to participants who were not told about this threat.

Although previous researchers' in vivo paradigms for activating TAF are highly innovative, these authors did not report the extent to which their methods possessed convergent or discriminant validity. Therefore, the aim of this study was to evaluate the validity of a paradigm for measuring both cognitive biases of TAF. Specifically, we derived our paradigm from Rachman et al.'s (1996) study; however, we instructed participants to write down and contemplate *two* personally relevant negative thoughts, each designed to assess a different form of TAF: “I hope (relative) is in a car accident today” was used to activate TAF-likelihood beliefs, and “I hope I have sex with (relative)” was used to activate TAF-moral beliefs. A car accident scenario was used to activate the Likelihood TAF bias because car accidents are everyday occurrences and participants are likely to have relatives that would be driving, and therefore are at risk. An incest scenario was chosen to activate the Moral TAF bias because most people consider incest a taboo (immoral) subject. Moreover, because incest is unlikely to occur among our sample (university students, most of whom do not live with their relatives), this subject would not provide a good test of Likelihood TAF. After writing down and thinking about each thought (one at a time), participants were asked to rate their degree of anxiety, perceived moral wrongness of thinking the thought, and perceived likelihood of the corresponding event and were given the opportunity to neutralize the thought with some overt behavior (e.g., tearing up the piece of paper on which they had written the sentence).

We hypothesized that in vivo ratings of anxiety and likelihood, as well as engagement in neutralizing behavior, while writing down and contemplating the thought of a loved one having a car accident, would be positively associated with the TAFS Likelihood-other, but not with Moral subscale. Similarly, we hypothesized that in vivo ratings of anxiety and moral wrongness, as well as engagement in neutralizing behavior, while writing down and contemplating the thought of having sex with a relative (i.e., committing incest), would be positively associated with the TAFS-Moral, but not with the Likelihood, subscale. Support for these hypotheses would represent evidence for the convergent validity of these in vivo ratings as measures of TAF. With regard to the discriminant validity of the in vivo ratings, we hypothesized that ratings for each sentence would not be associated with self-report measures of general distress or anxiety sensitivity (which refers to a cognitive bias present in several anxiety disorders and not specific to OCD; e.g., Taylor, 1999). Finally, we also predicted that for each scenario (car accident and incest), the in vivo ratings would be positively associated with engagement in neutralizing behavior, supporting the notion that neutralizing behaviors are performed in response to distress about unwanted thoughts (e.g., Rachman, 1998).

METHOD

Participants

Ninety-two undergraduate students at a large university in the southeastern United States completed a screening battery of self-report measures and agreed to be contacted to participate in laboratory experiments for course credit. All participants provided informed consent to participate in this study following a full description of the procedures. The sample included 65 females and 27 males with a mean age of 20.22 years ($SD = 3.41$; range = 17–22). The following racial categories were represented: White (64.9%), African American (21.3%), Asian (7.4%), Latino (3.2%), and other (3.2%).

Procedure

Within 2 weeks of completing a battery of self-report measures administered online (see Measures section), the participants engaged in the behavioral portion of the study, which received institutional review board (IRB) approval at the research institution. Each participant was tested individually at a computer in a laboratory setting by a research assistant who had been trained in

the study's protocol. The protocol was a modified version of Rachman et al.'s (1996) procedure in which a negative thought was induced and neutralizing strategies were assessed. In our study, participants were first asked to indicate their current (baseline) level of anxiety from 0 (*not at all*) to 100 (*extremely anxious*) using a computerized visual analogue scale (VAS).

Next, participants were asked to think of a close, living blood relative, such as a parent or sibling, and write the person's full name on a note card that was provided. The experimenter then placed the note card next to the computer monitor. Participants were then presented with one of two thoughts that were in the form of a sentence displayed on the computer screen (in counterbalanced order) designed to activate TAF beliefs: "I hope I have sex with _____" and "I hope _____ is in a car accident today." Participants were instructed to copy the sentence onto another note card, inserting their close relative's name into the blank.

Immediately after writing each sentence, participants were asked to close their eyes and think about the event occurring. Then, they were asked to use the computerized 0–100 VAS to indicate (a) their current level of anxiety, (b) their perceived likelihood of the event occurring because of thinking and writing down this thought, and (c) the perceived moral wrongness of thinking and writing down the thought.

After completing these three in vivo ratings for each sentence, a prompt appeared on the screen that read, "You may now do anything you wish to reduce or cancel the effects of writing or thinking about the sentence." This prompt was given to provide participants with the opportunity to perform behaviors that would function to neutralize the effects of the negative thought. The experimenter recorded whether or not the participant then performed any such neutralizing behavior (e.g., crossing out the sentence, turning over or tearing the note cards) in response to this prompt.

Once this process was complete for the first thought, it was repeated for the second. After completing the procedure for both thoughts, participants were debriefed about the actual purpose of the study, were thanked for their participation, and were dismissed.

Measures

The following self-report measures were completed as part of the screening battery and were used in this study.

Anxiety Sensitivity Index-3 (ASI-3). The ASI-3 (Taylor et al., 2007) is an 18-item version of the original ASI (Reiss, Peterson, Gursky, & McNally, 1986) that measures beliefs about the feared consequences of symptoms associated with anxious arousal (i.e., anxiety sensitivity [AS]; e.g., "It scares me when I become short of breath"). Respondents indicate their agreement with each item from *very little* (coded as 0) to *very much* (coded as 4). Total scores range from 0 to 72. The measure possesses excellent psychometric properties (Taylor et al.). Given the ASI-3's common use, strong psychometric properties, and its measurement of a construct divergent from TAF, the ASI-3 was included in this study to examine the discriminant validity of the behavioral measure of TAF.

Center for Epidemiological Studies-Depression Scale (CES-D). The CES-D (Radloff, 1977) is a 20-item measure that assesses general psychological distress. Participants are asked to rate how often they have felt (or behaved) in certain ways (e.g., "I felt sad") over the past week. Items are summed to obtain a total score ranging from 0 to 60. The measure possesses good internal consistency in non-clinical samples ($\alpha = .85$; Radloff) and is strongly correlated with the Beck Depression Inventory ($r = .87$; Santor, Zuroff, Ramsay, Cervantes, & Palacios, 1995). Given the CES-D's common use, strong psychometric properties, and its measurement of a construct divergent from TAF, the CES-D was included in this study to examine the discriminant validity of the behavioral measure of TAF.

Thought–Action Fusion Scale. The TAFS (Shafran et al., 1996) is a 19-item self-report measure of beliefs about the importance of thoughts. It contains three subscales: *Moral* (12 items, e.g., "Having a blasphemous thought is almost as sinful to me as a blasphemous action," $\alpha = .90$); *Likelihood-other* (4 items, e.g., "If I think of a relative/friend losing their job, this increases the risk that they will lose their job," $\alpha = .92$); and *Likelihood-self* (3 items, e.g., "If I think of myself having

an accident, it increases the risk that I will have an accident," $\alpha = .84$). Each item is rated on a scale from 0 (*disagree strongly*) to 4 (*agree strongly*). Items on the TAFS have good face validity and the measure shows good internal consistency (Shafran et al.). It is also correlated with measures of OC symptoms and cognitions (Rassin et al., 2001).

RESULTS

Sample Characteristics

Table 1 presents the sample means for the in vivo TAF ratings and self-report measures, as well as the frequency that participants engaged in a neutralizing behavior. These neutralizing behaviors included crossing out the name or sentence, ripping up the note cards, folding the note card, altering the sentence by inserting words such as "doesn't" or "won't," and turning the note card over. One participant took a picture out of her purse of the relative whose name she had used and held it to her heart. We attempted to categorize these behaviors according to the classification scheme described by Freeston and Ladouceur (1997). However, because most neutralizing fell into their "physical action" category (mental strategies and covert rituals were not assessed), we created a binary variable to represent whether or not a participant had engaged in any overt neutralizing behavior.

As can be seen in Table 1, while thinking about a relative having a car accident, participants experienced moderate levels of anxiety but rated the likelihood of an accident as somewhat low. They also rated the moral wrongness of writing and thinking about this event as somewhat high. More than one-quarter of the participants engaged in an overt neutralizing behavior after writing and thinking about this thought. While thinking about having sex with a relative, participants again experienced a moderate degree of anxiety, yet rated the likelihood of such an event as close to zero. On the other hand, the moral wrongness of writing and thinking about this event was rated as extremely high. Almost one-third of the participants engaged in an overt neutralizing

TABLE 1. SAMPLE MEAN SCORES ON STUDY MEASURES

| Sentence and Variables | Mean | SD | Range |
|--|----------------|-------|-------|
| I hope _____ is in a car accident today. | | | |
| Anxiety | 40.71 | 27.24 | 0–100 |
| Likelihood | 25.10 | 21.50 | 0–100 |
| Moral wrongness | 76.75 | 31.30 | 0–100 |
| Neutralizing behavior | $n = 30$ (28%) | — | — |
| I hope I have sex with _____. | | | |
| Anxiety | 40.69 | 28.65 | 0–100 |
| Likelihood | 0.83 | 5.64 | 0–50 |
| Moral wrongness | 91.53 | 22.53 | 0–100 |
| Neutralizing behavior | $n = 29$ (31%) | — | — |
| Self-report measures | | | |
| TAFS Moral | 26.82 | 11.18 | 12–56 |
| TAFS Likelihood-other | 5.72 | 2.95 | 4–16 |
| TAFS Likelihood-self | 5.35 | 2.83 | 3–12 |
| CES-D | 14.35 | 11.09 | 0–56 |
| ASI-3 | 16.17 | 10.53 | 0–60 |

behavior after writing and thinking about this thought. Mean scores on the self-report measures of general distress and anxiety sensitivity fell within the nonclinical range.

Correlations Between In Vivo Ratings and TAFS Subscales

Car Accident Sentence. Correlational analyses between participants' in vivo ratings and the TAFS subscales are shown in Table 2. In response to writing and thinking about a relative having a car accident, participants' in vivo ratings of anxiety were moderately correlated with their TAFS Likelihood-other subscale scores and weakly correlated with their Likelihood-self scores. Additionally, participants' in vivo ratings of the likelihood that their relative will have a car accident were weakly correlated with their score on the TAFS Likelihood-other subscale. The point-biserial correlation between in vivo neutralizing behavior and the TAFS Moral subscale was also weak, but significant.

Incest Sentence. In response to writing and thinking about having sex with a relative, participants' in vivo ratings of anxiety were moderately correlated with their TAFS Likelihood-other subscale scores and weakly correlated with their Moral and Likelihood-self scores. Additionally, in vivo ratings of the moral wrongness of writing down and thinking this thought were correlated with TAFS Moral subscale. Finally, the point-biserial correlation between in vivo neutralizing behavior and the TAFS Moral subscale was weak, but significant.

Correlations Between In Vivo Ratings and Discriminative Study Measures

Table 2 also presents correlations between the in vivo ratings for each sentence and the CES-D and ASI-3. As can be seen, for both sentences, no significant relationships were detected. We also computed correlations between the in vivo ratings and the individual ASI-3 subscales (physical concerns, social concerns, and cognitive concerns), yet found no significant relationships. We then used Steiger's equation for comparing the magnitude of correlation coefficients (Cohen & Cohen, 1983) to determine if the correlations between similar constructs (i.e., in vivo measure of TAF and the TAFS subscale scores) were significantly stronger than those between measures of divergent constructs (i.e., in vivo measure of TAF and the CES-D and ASI-3). Results indicated no

TABLE 2. CORRELATIONS BETWEEN PARAMETERS OF IN VIVO TAF AND SELF-REPORT MEASURES

| In Vivo Rating | Self-Report TAFS | | | CES-D | ASI-3 |
|---|------------------|------------------|-----------------|-------|-------|
| | Moral | Likelihood-other | Likelihood-self | | |
| <i>I hope _____ is in a car accident.</i> | | | | | |
| Anxiety | .19 | .37*** | .21* | .12 | .10 |
| Likelihood | .17 | .26** | .11 | .10 | .04 |
| Moral wrongness | .15 | .18 | .07 | .07 | .11 |
| Neutralizing behavior | .23* | -.03 | -.17 | -.01 | -.07 |
| <i>I hope I have sex with _____.</i> | | | | | |
| Anxiety | .23* | .33*** | .23* | .11 | .12 |
| Likelihood | -.10 | -.09 | -.03 | -.02 | -.05 |
| Moral wrongness | .26** | .14 | -.04 | .07 | .05 |
| Neutralizing behavior | .25* | -.06 | -.17 | .04 | -.08 |

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

significant differences in the magnitudes of the convergent and divergent validity correlations ($p > .05$). Thus, although stronger in magnitude, the relationships among divergent measures were not significantly weaker than those between the in vivo measure of TAF and the TAFS.

Correlations Between In Vivo Ratings and Neutralizing Behavior

Table 3 presents the point-biserial correlations between in vivo ratings for each sentence and engagement in a neutralizing behavior. As can be seen, for the car accident sentence, only participants' in vivo rating of moral wrongness was positively and significantly associated with engagement in a neutralizing behavior. For the incest sentence, participants' in vivo ratings of anxiety and moral wrongness were positively and significantly correlated with engagement in a neutralizing behavior. For both sentences, participants' in vivo rating of likelihood was not related to engagement in a neutralizing behavior.

DISCUSSION

TAF involves maladaptive beliefs about the significance, morality, and influence of negative thoughts, and is related to obsessional symptoms (e.g., Berle & Starcevic, 2005; Shafran et al., 1996). The TAFS (Shafran et al.) has shown good psychometric properties and is the most widely used measure of TAF (Rassin et al., 2001; Shafran et al.). In this study, we examined an in vivo method of assessing TAF to broaden the methods available for measuring this theoretically important cognitive variable in future research studies. Participants were presented with negative thoughts about committing incest with a close relative (Moral TAF) and about the relative getting into a car accident (Likelihood TAF). While thinking about and writing down these thoughts, participants provided ratings of anxiety, perceived moral acceptability, and perceived likelihood of the thought coming true. Participants were then provided with an opportunity to perform a neutralizing behavior.

Consistent with our first two hypotheses regarding convergent validity, in vivo ratings of anxiety and likelihood while writing down and contemplating the thought of a loved one having a car accident were positively associated with scores on the TAFS Likelihood-other, but not on the Moral subscale. In addition, in vivo ratings of anxiety and moral wrongness, as well as engagement in neutralizing behavior, while writing down and contemplating the thought of having sex with a relative (i.e., committing incest), were positively associated with scores on the TAFS Moral, but not the Likelihood,

TABLE 3. POINT-BISERIAL CORRELATIONS BETWEEN PARAMETERS OF IN VIVO TAF AND NEUTRALIZING BEHAVIOR

| In Vivo Rating | Neutralizing Behavior |
|------------------------------------|-----------------------|
| I hope _____ is in a car accident. | |
| Anxiety | .15 |
| Likelihood | .04 |
| Moral wrongness | .20* |
| I hope I have sex with _____. | |
| Anxiety | .25** |
| Likelihood | -.09 |
| Moral wrongness | .21* |

* $p < .05$. ** $p < .01$.

subscale. These findings provide evidence for the convergent validity of the in vivo ratings and suggest that such ratings can be conceptualized as a suitable measure of likelihood (other) and moral TAF. In contrast, performing overt neutralizing behaviors in response to the car accident thought was not associated with scores on the TAFS Likelihood-other subscale, which indicates that more strongly believing that one's thoughts can affect the likelihood of events occurring in the external environment may not be related to a greater frequency of engagement in overt neutralizing behaviors.

Partially consistent with our third hypothesis, the in vivo ratings for each sentence were not significantly associated with the self-report measures of general distress or anxiety sensitivity. However, the magnitude of the correlations between the in vivo TAF measure and our divergent constructs was not significantly less than the magnitude of the correlations with the convergent measure (i.e., the TAFS). This result was not surprising given the somewhat weak strength of the convergent correlations, which might have resulted from method variance: The in vivo TAF measure was a behavioral response, whereas all other study measures were self-report instruments.

Our fourth hypothesis received partial support. For both sentences, in vivo ratings of moral wrongness, but not ratings of likelihood, were associated with neutralizing behaviors. In vivo ratings of anxiety were only associated with neutralizing for the incest sentence. These findings have implications for understanding the relationship between overt neutralizing behaviors and TAF beliefs. Specifically, they suggest that overt neutralizing may be especially related to beliefs about the moral wrongness of thoughts (i.e., moral TAF) and less strongly associated with the belief that thinking about a negative event increases its likelihood (i.e., likelihood TAF). This bias-specific neutralizing behavior may be caused by the perceived effectiveness of neutralizing in response to strong feelings of immorality. The neutralizing of thoughts that are perceived as morally wrong might generate an immediate reduction in distress, because the degree of immorality perceived is entirely subjective. Moreover, relative to an event perceived to be likely, the individual can more easily decide when an "immoral thought" has been neutralized. Future studies might more closely address the relationship between neutralizing and specific types of TAF-related beliefs, and consider assessing the role of mental neutralization (e.g., imagining the car accident occurring without the relative being harmed or rationalizing the thought).

Our findings are generally consistent with those reported in previous studies in which TAF was experimentally manipulated (Bocci & Gordon, 2007; Marcks & Woods, 2007; Rachman et al., 1996; Rassin, 2001; Rassin et al., 1999; van den Hout et al., 2001, 2002; Zucker et al., 2002). In those studies, as well as in this investigation, participants contemplated a negative event and subsequently reported elevated levels of distress, likelihood, and moral wrongness, and at times engaged in neutralizing behaviors. Given that our laboratory paradigm activated TAF beliefs in a similar manner to previous experimental manipulations, and evidence was found to support the convergent validity for measures of the two TAF-related cognitive biases, this study provides initial support for this paradigm as a methodologically varied assessment of TAF.

A noteworthy inconsistency between the results of this study and Bocci and Gordon's (2007) findings was the number of participants that engaged in neutralizing behaviors. In response to both sentences, participants in this investigation neutralized approximately one-quarter of the time, compared to three-quarters of the time in Bocci and Gordon's study. This difference may be attributed to study procedures and the coding of neutralization behaviors. In Bocci and Gordon's protocol, participants were asked to visualize the scene (i.e., car accident) for 30 seconds and were then given a 2-minute period in which they were told "that they did not have to do anything during that time, but if they did wish to do something, it could be anything, and could involve the sheet of paper" (Bocci & Gordon, p. 1827). Additionally, Bocci and Gordon assessed for covert neutralizing behaviors (e.g., imagine the relative being "Okay," or rationalization). In this investigation, on the other hand, participants were only asked to visualize the scenario for 5 seconds, and once they had contemplated the sentence and responded to in vivo ratings, they were given instructions about neutralization ("You may now do anything you wish to reduce or cancel the

effects of writing or thinking about the sentence.”). If participants did not engage in a neutralizing behavior, then the experimenter continued the protocol and did not wait for 2 minutes. It may be that (a) the amount of time Bocci and Gordon allotted for participants to visualize the car accident and potentially engage in a neutralizing behavior, (b) referencing an object to which a neutralizing behavior could be performed upon (e.g., sheet of paper), and (c) including covert neutralizing behaviors in their coding scheme may have led to their higher count of neutralizing behaviors. Failure to code covert neutralizing was a limitation of this study.

Although the behavioral paradigm we studied has certain advantages, such as methodological variation and its semi-idiographic nature, this protocol has practical limitations that should be considered. Our use of this paradigm with research participants underwent more scrutiny during ethical review from our Office of Human Research Ethics (i.e., IRB) than is typical. Indeed, board members found our TAF induction potentially harmful, and therefore required documentation of its previous use as well as education on the construct of TAF. Because of these difficulties, it may be necessary for some researchers to rely only on a self-report measure of TAF (e.g., TAFS).

Additional limitations of this study should be considered in the interpretation of these results. First, the correlations between our in vivo ratings and the TAFS were somewhat weaker than expected. However, because of the relatively small sample size, these results are likely not caused by Type 1 error. Instead, the somewhat weak relationships between the in vivo ratings and the subscales of the TAFS may be an artifact of methodological differences across these two measures of TAF. Although participants respond to hypothetical TAF situations on the self-report TAFS, the in vivo ratings involve writing down and contemplating a personally relevant negative thought and providing ratings. A second limitation is that we used an undergraduate sample in this study. Although TAF has been shown to exist in both clinical and nonclinical samples (Berle & Starcevic, 2005), replication of our findings using a clinical sample is an important next step. Patients with OCD, in particular, would be a meaningful group to study, given the role that TAF beliefs play in this condition (Rachman, 2003). It would be interesting to see whether neutralizing behavior is more strongly associated with both Likelihood and Moral TAF in a clinical sample.

Additional research directions involve modifying the present laboratory paradigm. Currently, TAF is assessed by instructing participants to imagine a *beloved* relative experiencing a negative event. However, it is unknown whether similar effects would be observed if the referenced individual was a stranger. To better understand the parameters of how and when TAF beliefs are activated, it is important to discern the role of familiarity in this phenomenon. In addition, although the current paradigm assesses likelihood-*other* TAF, it does not measure likelihood-*self* TAF—the belief that thinking about harm befalling oneself increases the likelihood of such harm. Thus, a modified paradigm including negative scenarios that reference the participant (e.g., “I hope I fall down a flight of stairs today”) would be useful to develop.

To the extent that the present findings with non-treatment-seeking participants can be generalized to clinical populations, this research has implications for psychological treatment of OCD. First, the behavioral paradigm can be used within the context of cognitive behavioral therapy. For instance, clinicians could use this protocol as a psychoeducational tool to illustrate the cognitive behavioral model of OCD for patients (e.g., how cognitive distortions can lead to rituals). In addition, this paradigm could be used as a behavioral measure of change in TAF throughout the course of therapy. To this end, future research might examine how sensitive ratings from this paradigm are to the effects of treatment (e.g., treatment sensitivity).

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