Thought–action fusion and its relationship to schizotypy and OCD symptoms

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Abstract

Thought–action fusion (TAF) is a cognitive bias that has been linked to obsessive-compulsive disorder (OCD). Preliminary evidence suggests schizotypal traits may be associated with some types of OCD obsessions but not others. We examined the relationship between each of the two major types of TAF (i.e., likelihood and moral), schizotypal traits, and OCD symptoms in 969 nonclinical undergraduate students. We hypothesized that likelihood TAF would be associated with schizotypal traits; whereas moral TAF would not. Consistent with prediction, schizotypal–magical thinking was significantly associated with likelihood TAF even after controlling for the effects of OCD symptoms, general anxiety, and depression. Moreover, the relationship between likelihood TAF and OCD symptoms was significantly attenuated after controlling for schizotypal traits. In contrast, moral TAF demonstrated negligible association with OCD symptoms, depression, or schizotypal traits. These findings provide preliminary support for the linkage between likelihood TAF and schizotypal traits.
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1. Introduction

Patients with obsessive-compulsive disorder (OCD) often manifest magical or superstitious qualities in their compulsive behavior. For instance, some OCD patients repeat meaningless numbers or phrases or engage in senseless overt acts with the belief that these will prevent some threatening outcome such as the death of a family member. Although compulsions are defined as either excessive or not connected in a realistic way with what they are designed to neutralize

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or prevent (DSM-IV, APA, 1994), some compulsions appear to be connected with their neutral-izing targets in more magical ways than do other compulsions. For instance, repeating a mean-ingless phrase backward and forward 50 times to undo recurrent blasphemous thoughts appears to be more magical and superstitious when compared to checking a lock repeatedly to ensure the door is not unlocked. These magical or superstitious behaviors may be linked to certain cog-nitive biases.

Thought–action fusion (TAF) refers to a set of cognitive biases involving faulty causal rela-tionships between one's own thoughts and external reality, thereby increasing the sense of per-sonal responsibility (Shafran, Thordarson, & Rachman, 1996). Two different types of TAF have been identified: (a) *moral TAF* is the belief that having unacceptable thoughts, images, or impulses are as bad as actually carrying them out, and (b) *likelihood TAF* is the belief that hav-ing an unacceptable or disturbing thought will increase the likelihood that the thought will occur in reality (Shafran et al., 1996). Several studies have demonstrated a significant relation-ship between TAF and OCD symptoms (Amir, Freshman, Ramsey, Neary, & Brigidi, 2001; Coles, Mennin, & Heimberg, 2001; Rassin, Diepstraten, Merckelbach, & Muris, 2001; Shafran et al., 1996).

It is possible that likelihood TAF is an extreme cognitive bias associated with magical think-ing and schizotypal traits; whereas moral TAF is common among those adhering to a strict moral code, and therefore less associated with OCD symptoms and extreme magical thinking. To date, several findings appear to provide indirect support for this hypothesis. First, elevated moral TAF is frequently observed among nonclinical populations, whereas likelihood TAF is not (Shafran et al., 1996). Second, nonclinical subjects and OCD patients do not differ with respect to moral TAF but OCD patients score significantly higher than nonclinical subjects on likelihood TAF (Rassin, Merckelbach, Muris, & Schmidt, 2001; Shafran et al., 1996). Third, likelihood TAF is more strongly associated with OCD symptoms relative to moral TAF (Amir, Freshman et al., 2001; Coles et al., 2001; Rassin, Diepstraten et al., 2001; Rassin, Merckelbach et al., 2001; Shafran et al., 1996). Finally, unlike moral TAF, likelihood TAF is positively asso-ciated with indices of anxiety and worry (Hazlett-Stevens, Zucker, & Craske, 2002; Muris, Meesters, Rassin, Merckelbach, & Campbell, 2001).

Despite evidence suggesting that OCD and schizophrenia are distinguishable (see Turner & Beidel, 1988), there is a line of research suggesting a possible linkage between OCD and schizo-typy. About half of OCD patients exhibit mild to severe levels of schizotypal traits, which has led to the speculation that there may exist a schizotypy subtype of OCD (Sobin et al., 2000). Interestingly, OCD patients appear to be indistinguishable from schizophrenic patients and bipolar patients with respect to schizotypy, although all three groups score higher than unipolar depressive patients (Rossi & Daneluzzo, 2002). There has been some suggestion that OCD and the schizophrenic spectrum may be indirectly linked along a dimension of schizotypy (Pallanti, 2000). However, it should be noted that this line of investigation is at its infancy.

Both clinical observations and empirical investigations have conceptualized schizotypy as a multifactorial personality liability factor for schizophrenia falling along a continuum of severity (Lenzenweger, 1999; Lenzenweger & Korfine, 1995; Rossi & Daneluzzo, 2002). Factor analyses of the Schizotypal Personality Scale (STA; Claridge & Broks, 1984) point to three primary fac-tors: (a) magical thinking, (b) paranoid ideation, and (c) unusual perceptual experiences. The magical thinking dimension may be particularly relevant to the magical thinking often observed

in certain subtypes of OCD patients such as those displaying sexual, aggressive, or blasphemous obsessions (Lee, Kwon, Kwon, & Telch, submitted for publication). How are schizotypal traits related to OCD-relevant cognitive biases such as TAF? There has been a report that TAF is positively associated with various aspects of schizotypy (Muris & Merckelbach, 2003). However, to date research directly examining the relationship between TAF, schizotypy, and OCD symptoms is very scarce.

The aim of the present study was to investigate the possible connection between the two types of TAF, schizotypy traits, and OCD symptoms using a nonclinical student sample. We justify the use of a nonclinical sample based on previous research demonstrating that their obsessions, compulsions, and beliefs about intrusions are similar to those observed in clinical populations of OCD patients (see Gibbs, 1996, for a review). We hypothesized that likelihood TAF will be more strongly associated with schizotypal traits, especially magical thinking, and that the relationship between likelihood TAF and OCD symptom severity will in part be explained by the association between likelihood TAF and schizotypal traits.

2. Method

2.1. Participants

Nine hundred and sixty-eight undergraduate students (659 women and 309 men) enrolled in introductory psychology classes at the University of Texas at Austin participated in the study. Participants ranged in age from 16 to 47 (M = 19.07, SD = 2.13) and were ethnically diverse. The sample consisted of Caucasus (62.1%), Asian/Pacific Islander (17.0%), Hispanic (14.0%), African American (3.4%), and other (3.4%). Participants received partial course credit for their participation.

2.2. Measures

2.2.1. The Thought–Action Fusion Scale-Revised (TAFS; Shafran et al.,1996)
The TAFS is a 19-item self-report measure that assesses the tendency to fuse thoughts and actions. Each item is rated on a 5-point scale ranging from 0 (disagree strongly) to 4 (agree strongly). Twelve items assess moral TAF (e.g., "Having a blasphemous thought is almost as sinful to me as a blasphemous action."); four items assess likelihood TAF pertaining to others (e.g., "If I think of a relative/friend losing their job, this increases the risk that they will lose their job."); and three items assess likelihood TAF pertaining to oneself (e.g., "If I think of myself being in a car accident, this increases the risk that I will have a car accident."). Psychometric data on the TAFS have been quite favorable (Cronbach's alpha = 0.85–0.96) and a principal components analysis has supported a two-factor solution, i.e., moral and likelihood TAF (Shafran et al., 1996).

2.2.2. Schizotypal Personality Scale (Claridge & Broks, 1984)
The STA is a widely used 37-item self-report measure of schizotypal personality traits developed by Claridge and Broks (1984) and based on DSM-III diagnostic criteria for schizotypal personality disorder (APA, 1980). Each item is presented in a yes/no format. Total scores

range from 0 to 37 with higher scores indicating greater proneness to psychosis. The STA was designed to identify a general psychosis–proneness (i.e., schizotypy) by addressing multidimensional sets of schizotypal traits. In accordance with the current multidimensional conceptualization of schizotypy (Joseph & Peters, 1995; Lenzenweger, 1999; Rossi & Daneluzzo, 2002), the STA assesses three robust factors (Hewitt & Claridge, 1989): (a) *magical thinking*, particularly belief in psychic phenomena (e.g., "Have you ever felt that you were communicating with another person telepathically?"); (b) *unusual perceptual experiences* (e.g., "Have you ever had the sensation of your body or part of it changing shape?"); and (c) *paranoid ideation* (e.g., "Do you often feel that other people have it in for you?"). This three-factor solution has received considerable empirical support (Joseph & Peters, 1995; Wolfradt & Straube, 1998). In addition to its three-factor solution, the STA has good construct and discriminant validity (Rawlings, Claridge, & Freeman, 2001) and evidence suggests that individuals who score high on the STA resemble schizophrenics with respect to their performance on a number of experimental tasks, e.g., negative priming paradigm (Beech, Baylis, Smithson, & Claridge, 1989; Beech, McManus, Baylis, Tipper, & Agar, 1991; Joseph & Peters, 1995).

2.2.3. State-Trait Anxiety Inventory—Trait version (STAI; Speilberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983)

The STAI is a 40-item self-report measure of state and trait anxiety. This study employed only the trait version, which consists of 20 items assessing trait anxiety or how the respondent feels generally. The STAI has demonstrated sound reliability and validity (Speilberger et al., 1983).

2.2.4. Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996)

This is a 21-item self-report measure widely used to assess depressive symptoms. The reliability and stability of the BDI have been comprehensively validated and reviewed (Beck & Steer, 1984; Beck, Steer et al., 1996), and its psychometric properties have been established cross-culturally (Kammer, 1983). BDI-II is the latest version of the measure designed to make its symptom content consonant with the diagnostic criteria for major depressive disorders (MDD) in the DSM-IV.

2.2.5. Obsessive-Compulsive Inventory-Revised (OCI-R; Foa et al., 2002)

The OCI is a self-report measure of OCD designed for use with both clinical and nonclinical samples. The revised OCI, relative to its 42-item original version, eliminates the redundant frequency scale, simplifies the scoring of the subscales, and reduces overlap across subscales. The OCI-R consists of 18 items forming six subscales (i.e., checking, hoarding, neutralizing, obsessing, ordering, and washing) and has demonstrated excellent psychometric properties. Moreover, the OCI-R and its subscales successfully discriminate individuals with and without OCD (Foa et al., 2002).

2.2.6. Procedure

The participants were administered a computerized version of the questionnaire battery, which took approximately 30–40 min to complete.

2.2.7. Statistical analyses

Correlation and the multiple hierarchical regression analyses were conducted to test the hypothesized relationships between TAF, schizotypal personality features (the STA), OCD symptoms, general anxiety (the STAI-T), and depression (the BDI).

3. Results

Means and standard deviations of study measures are presented in Table 1. The zero-order correlations among the measures, and their partial correlations after controlling for depression and anxiety are presented in Table 2. Consistent with prediction, likelihood TAF was more strongly associated with schizotypal traits, depression, general anxiety, and OCD symptoms, relative to moral TAF ($p < 0.001$ for all of these correlation coefficient comparisons using Fisher Z-transformation). The association between moral TAF and the three subscales of the STA were negligible, whereas likelihood TAF was moderately associated with the three sub-scales of the STA (see Table 2).

Likelihood-other TAF and likelihood-self TAF did not differ significantly as to the pattern of their association with the other measures, so both subscales were collapsed into a likelihood TAF scale throughout the study.

3.1. Relationship between schizotypal traits and TAF

A series of hierarchical regression analyses were conducted to examine the hypothesized relationship between schizotypal traits and the likelihood and moral types of TAF. In step 1,

Table 1
Means and standard deviations of study measures

	Males ($n = 309$)		Females ($n = 659$)		Total ($n = 968$)	
	Mean	SD	Mean	SD	Mean	SD
TAF-M	17.21	10.44	20.53	9.84	19.47	10.15
TAF-L	2.80	3.35	3.02	3.08	5.85	5.54
TAF-LO	2.70	2.78	2.99	2.76	2.95	3.17
TAF-LS	5.50	5.63	6.01	5.50	2.90	2.77
OCI	15.43	10.29	15.64	10.42	15.57	10.38
STAI-T	35.77	10.09	39.04	11.12	38.00	10.90
BDI	6.57	6.21	9.43	8.19	8.52	7.73
STA	11.04	7.27	12.67	7.21	12.15	7.26
STA-M	2.68	1.94	2.94	1.97	2.86	1.96
STA-U	2.00	1.87	2.19	1.89	2.13	1.89
STA-P	2.02	1.93	2.19	1.91	2.14	1.92

TAF-M, moral thought–action fusion; TAF-L, likelihood thought–action fusion; TAF-LO, likelihood thought–action fusion—others; TAF-LS, likelihood thought–action fusion—self; STA, schizotypal personality questionnaire (total score); STA-M, magical thinking subscale of the STA; STA-U, unusual perceptual experience subscale of the STA; STA-P, paranoid ideation subscale of the STA; OCI, obsessive-compulsive inventory (total score); STAI-T, state-trait anxiety inventory (trait subscale); BDI, beck depression inventory.

Table 2
Zero-order correlations between the measures and partial correlations after controlling for depression and anxiety

	TAF-M	TAF-L	TAF-LS	TAF-LO	STA	STA-M	STA-U	STA-P	OCI	STAI-T
TAF-L	0.27**									
	(0.26**)[a]									
TAF-LS	0.26**	0.92**								
	(0.25**)	(0.92**)								
TAF-LO	0.24**	0.94**	0.74**							
	(0.22**)	(0.94**)	(0.72**)							
STA	0.07	0.35**	0.34**	0.32**						
	(0.05)	(0.26**)	(0.25**)	(0.23**)						
STA-M	0.08**	0.37**	0.36**	0.34**	0.80**					
	(0.07*)	(0.32**)	(0.31**)	(0.29**)	(0.79**)					
STA-U	0.05	0.26**	0.25**	0.23**	0.83**	0.58**				
	(0.03)	(0.18**)	(0.17**)	(0.17**)	(0.80**)	(0.54**)				
STA-P	0.07*	0.24**	0.23**	0.22**	0.76**	0.42**	0.53**			
	(0.04)	(0.10**)	(0.09**)	(0.10**)	(0.68**)	(0.35**)	(0.43**)			
OCI	0.14**	0.31**	0.27**	0.30**	0.46**	0.31**	0.38**	0.39**		
	(0.12**)	(0.22**)	(0.18**)	(0.23**)	(0.33**)	(0.23**)	(0.28**)	(0.23**)		
STAI-T	0.07	0.30**	0.30**	0.27**	0.43**	0.23**	0.29**	0.48**	0.36**	
BDI	0.05	0.22**	0.23**	0.19**	0.45**	0.24**	0.36**	0.48**	0.37**	0.64**

TAF-M, moral thought–action fusion; TAF-L, likelihood thought–action fusion; TAF-LO, likelihood thought–action fusion—others; TAF-LS, likelihood thought–action fusion—self; STA, schizotypal personality questionnaire (total score); STA-M, magical thinking subscale of the STA; STA-U, unusual perceptual experience subscale of the STA; STA-P, paranoid ideation subscale of the STA; OCI, obsessive-compulsive inventory (total score); STAI-T, state-trait anxiety inventory (trait subscale); BDI, beck depression inventory.

* $p < 0.05$.

** $p < 0.01$.

[a] Partial correlations after controlling for the BDI and STAI-T are presented in parentheses.

scores from the STAI-T, OCI, and BDI were entered into the model. The three subscales of the STA (i.e., magical thinking, unusual perceptual experience, and paranoid ideation) were then entered in step 2. This analysis was performed separately for likelihood TAF and moral TAF.

3.1.1. Relationship between schizotypal traits and likelihood TAF

In step 1, the BDI, the STAI-T, and the OCI accounted for 13.8% of variance in likelihood TAF ($R^2 = 0.138$, $F = 51.39$, $p < 0.001$). In step 2, the three schizotypal subscales explained an additional 7.2% of the variance in likelihood TAF ($R^2 = 0.072$, $F = 29.29$, $p < 0.001$). Among the three STA indices, magical thinking emerged as the only significant predictor of likelihood TAF ($\beta = 0.30$, $t = 8.45$, $p < 0.001$).

3.1.2. Relationship between schizotypal traits and moral TAF

A quite different pattern of findings emerged for the prediction of moral TAF. In step 1, the BDI, the STAI, and the OCI explained only 2% of the variance in moral TAF ($R^2 = 0.020$, $F = 6.69$, $p < 0.001$). At step 2, the three subscales of the STA explained only an additional 0.3% of the variance in moral TAF ($R^2 = 0.003$, $F = 0.85$, $p = 0.468$). In sum, none of the STA indices significantly predicted moral TAF (see Table 3).

3.2. Relationship between likelihood/moral TAF and OCD symptoms

Simple regression analyses revealed that likelihood TAF accounted for 9.6% of the variance in OCD symptoms ($\beta = 0.31$, $t = 10.12$, $p < 0.001$). In order to examine the relationship between TAF and OCD symptoms after controlling for anxiety and depression, a hierarchical regression analysis was conducted to predict OCD symptoms with the BDI and STAI-T entered in step 1 and with either likelihood or moral TAF entered in step 2. Analyses were conducted

Table 3
Prediction of likelihood/moral TAF using hierarchical regression analyses

Step	Predictors[a]	Predicting likelihood TAF				Predicting moral TAF			
		ΔR^2	F[b]	β [c]	t [d]	ΔR^2	F	β	t
1	STAI-T			0.21	5.29***			0.03	0.65
	BDI			−0.02	5.19***			−0.02	−0.40
	OCI			0.17	−0.50			0.13	3.52***
	Overall model	0.14	51.39***			0.02	6.69***		
2	STA-M			0.30	8.45***			0.06	1.50
	STA-U			−0.02	−0.46			−0.04	−0.95
	STA-P			−0.04	−0.94			−0.01	0.31
	Overall model	0.07	29.29***			0.003	0.85		

[a] STA-M, magical thinking subscale of the STA; STA-U, unusual perceptual experience subscale of the STA; STA-P, paranoid ideation subscale of the STA; OCI, obsessive-compulsive inventory (total score); STAI-T, state-trait anxiety inventory (trait subscale); BDI, beck depression inventory.

[b] *F*-test on R^2 change.

[c] Standardized regression coefficients at step 2.

[d] *t*-Tests on unstandardized regression coefficients.

*** $p < 0.001$.

separately for likelihood and moral TAF. At step 1, the BDI and STAI-T accounted for 16% of the variance in OCD symptoms ($R^2 = 0.160$, $F = 91.82$, $p < 0.001$). At step 2, likelihood TAF explained an additional 4.2% of the variance in OCD symptoms ($R^2 = 0.042$, $F = 50.55$, $p < 0.001$, $\beta = 0.22$, $t = 7.11$, $p < 0.001$). This same analytic procedure was carried out for moral TAF. Results revealed that moral TAF alone explained only 2.0% of the variance in OCD symptoms ($R^2 = 0.020$, $F = 19.43$, $p < 0.001$, $\beta = 0.14$, $t = 4.41$, $p < 0.001$). After controlling for anxiety and depression, moral TAF explained an additional 1.3%—a statistically reliable but clinically insignificant proportion of variance in OCD symptoms ($R^2 = 0.013$, $F = 15.02$, $p < 0.001$, $\beta = 0.11$, $t = 3.88$, $p < 0.001$).

3.2.1. Relationship between likelihood/moral TAF and OCD symptoms after controlling for schizotypal traits

To determine whether likelihood and moral TAF would predict OCD symptoms after controlling for schizotypal traits, we repeated the analyses described above but entered the three subscales of the STA in step 2 after entering the BDI and STAI in step 1. These analyses revealed that likelihood TAF accounted for an additional 2.1% of the variance in OCD symptoms ($R^2 = 0.021$, $F = 26.91$, $p < 0.001$, $\beta = 0.16$, $t = 5.19$, $p < 0.001$). Moral TAF accounted for an additional 1% of the variance in OCD symptoms ($R^2 = 0.01$, $F = 12.39$, $p < 0.001$, $\beta = 0.10$, $t = 3.52$, $p < 0.001$ (see Table 4)).

3.3. Relationship between schizotypal traits and OCD symptoms

In order to examine how schizotypal traits contribute to OCD symptoms, we conducted similar hierarchical regression analyses. The BDI and the STAI-T were entered into step 1; the three schizotypal subscales were entered into step 2. At step 1, both the BDI and the STAI-T predicted OCD symptoms and together accounted for 16% of the variance in OCD symptoms ($R^2 = 0.160$, $F = 91.82$, $p < 0.001$). At step 2, each of the three schizotypal subscales significantly predicted OCD symptoms and together explained an additional 8.3% of the variance in OCD symptoms ($R^2 = 0.083$, $F = 35.32$, $p < 0.001$).

3.3.1. Relationship between schizotypal traits and OCD symptoms after controlling for likelihood TAF

To determine whether schizotypal traits would predict OCD symptoms after controlling for likelihood TAF, we repeated the analyses described above but entered the three schizotypal subscales in step 3 after entering likelihood TAF in step 2. The three schizotypal subscales accounted for an additional 6.2% of the variance in OCD symptoms ($R^2 = 0.062$, $F = 27.03$, $p < 0.001$) after controlling for depression, anxiety, and likelihood TAF. However, the magical thinking subscale of the STA was no longer significant in predicting OCD symptoms after likelihood TAF was entered into the model ($\beta = 0.04$, $t = 1.12$, $p < 0.27$), whereas unusual perceptual experience and paranoid ideation were still significant predictors ($\beta = 0.17$, $t = 4.58$, $p < 0.001$; $\beta = 0.14$, $t = 3.71$, $p < 0.001$ (see Table 5)).

3.3.2. Relationship between schizotypal traits and OCD symptoms after controlling for moral TAF

The same analytic procedure was repeated with moral TAF entered at step 2. The three schizotypal subscales accounted for an additional 8.0% of the variance in OCD symptoms after con-

Table 4

Hierarchical regression analyses with likelihood/moral TAF predicting OCD symptoms after controlling for depression, anxiety, and schizotypal traits

Step	Predictors[a]	ΔR^2	F[b]	β[c]	t[d]
1	STAI-T			0.10	2.58***
	BDI			0.13	3.57***
	Overall Model	0.16	91.82***		
2	STA-M			0.04	1.12
	STA-U			0.17	4.58***
	STA-P			0.14	3.71***
	Overall Model	0.08	35.32***		
3	TAF-L			0.16	5.19***
	Overall Model	0.02	26.91***		
1	STAI-T			0.13	3.45***
	BDI			0.14	3.56***
	Overall Model	0.16	91.82***		
2	STA-M			0.08	2.40*
	STA-U			0.17	4.65***
	STA-P			0.13	3.55***
	Overall Model	0.08	35.32***		
3	TAF-M			0.10	3.52***
	Overall Model	0.01	12.39***		

[a] STA-M, magical thinking subscale of the STA; STA-U, unusual perceptual experience subscale of the STA; STA-P, paranoid ideation subscale of the STA; OCI, obsessive-compulsive inventory (total score); STAI-T, state-trait anxiety inventory (trait subscale); BDI, beck depression inventory; TAF-L, moral TAF; TAF-M, likelihood TAF.

[b] F-test on R^2 change.

[c] Standardized regression coefficients at step 3.

[d] t-Tests on unstandardized regression coefficients.

* $p < 0.05$

*** $p < 0.001$.

trolling for depression, anxiety, and moral TAF ($R^2 = 0.080$, $F = 34.35$, $p < 0.001$). Moreover, each of the three schizotypal subscales remained significant predictors of OCD symptoms after controlling for moral TAF (magical thinking, $\beta = 0.08$, $t = 2.40$, $p < 0.05$; unusual perceptual experience, $\beta = 0.17$, $t = 4.65$, $p < 0.001$; paranoid ideation, $\beta = 0.13$, $t = 3.55$, $p < 0.001$ (see Table 5)).

4. Discussion

This study sought to examine the possible linkage between TAF and schizotypal characteristics. Our findings provide preliminary evidence for a positive association between likelihood TAF and schizotypal traits. Because several investigations have shown that likelihood TAF is related to general anxiety (Abramowitz, Whiteside, Lynam, & Kalsy, 2003; Hazlett-Stevens

Table 5

Hierarchical regression analyses with schizotypal traits predicting OCD symptoms after controlling for depression, anxiety, and likelihood/moral TAF

Step	Predictors[a]	ΔR^2	F[b]	β[c]	t[d]
1	STAI-T			0.10	2.58***
	BDI			0.13	3.57***
	Overall model	0.16	91.82***		
2	TAF-L			0.16	5.19***
	Overall model	0.04	50.55***		
3	STA-M			0.04	1.12
	STA-U			0.17	4.58***
	STA-P			0.14	3.71***
	Overall model	0.06	27.03***		
1	STAI-T			0.13	3.45***
	BDI			0.14	3.56***
	Overall model	0.16	91.82***		
2	TAF-M			0.10	3.52***
	Overall model	0.01	15.02***		
3	STA-M			0.08	2.40*
	STA-U			0.17	4.65***
	STA-P			0.13	3.55***
	Overall model	0.08	34.35***		

[a] STA-M, magical thinking subscale of the STA; STA-U, unusual perceptual experience subscale of the STA; STA-P, paranoid ideation subscale of the STA; OCI, obsessive-compulsive inventory (total score); STAI-T, state-trait anxiety inventory (trait subscale); BDI, beck depression inventory; TAF-L, likelihood TAF; TAF-M, moral TAF.

[b] F-test on R^2 change.

[c] Standardized regression coefficients at step 3.

[d] t-Tests on unstandardized regression coefficients.

* $p < 0.05$

*** $p < 0.001$.

et al., 2002), we considered the possibility that the observed linkage between likelihood TAF and schizotypal traits was simply a function of elevated anxiety or general distress among those displaying schizotypal traits. Contrary to this explanation, the positive relationship between schizotypal traits and likelihood TAF remained even after controlling for anxiety and depression. Salkovskis (1996) has argued that high schizotypal scores in OCD may be a result of criterion contamination rather than underlying processes shared by OCD and schizophrenia. Thus, we also considered the possibility that the observed association was due to item overlap. Careful inspection revealed that some items in the magical thinking subscale of the STA appear to assess experiences that are similar to items found in likelihood TAF (e.g., mysterious forces causing accidents, a belief that dreams can come true; see Table 6). However, additional analyses excluding these items from the magical thinking subscale did not change the observed relationship between likelihood TAF and schizotypy.

Table 6

Degree of item overlap from the likelihood subscale of the TAFS and the magical thinking subscale of the STA

Likelihood TAF of the TAFS	Magical thinking of the STA
1. If I think of a relative/friend losing their job, this increases the risk that they will lose their job.	1. Do you believe in telepathy?
2. If I think of a relative/friend being in a car accident, this increases the risk that he/she will have a car accident.	2. Are you sometimes sure that other people can tell what you are thinking?
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.	3. Do you ever feel sure that something is about to happen even though there doesn't seem to be any reason for your thinking that?
4. If I think of a relative/friend ill this increases the risk that he/she will fall ill.	4. Do you ever have a sense of vague danger or sudden dread for reasons that you do not understand?
5. If I think of myself being injured in a fall, this increases the risk that I will have a fall and be injured.	5. Do you sometimes feel that your accidents are caused by mysterious forces?
6. If I think of myself being in a car accident, this increases the risk that I will have a car accident.	6. Do you believe that dreams can come true?
7. If I think of myself falling ill, this increases the risk that I will fall ill.	7. Are your thoughts sometimes so strong that you can almost hear them?
	8. Have you ever felt that you were communicating with another person telepathically?

Unlike likelihood TAF, moral TAF showed no relationship with schizotypy and was only weakly associated with OCD symptoms, depression, and anxiety. These findings provide some suggestion that moral TAF may differ greatly from likelihood TAF in its linkage with indicators of psychopathology in general and OCD in particular. These data are consistent with previous work showing that moral TAF did not distinguish between normal controls and clinical OCD patients (Rassin, Diepstraten et al., 2001; Shafran et al., 1996). However, our data are at odds with the suggestion that moral TAF is more directly related to depression or general distress (Abramowitz et al., 2003).

The role of schizotypal traits in OCD deserves further study. In this nonclinical sample, schizotypal traits emerged as a more potent predictor of OCD symptoms relative to depression or general anxiety. These data are consistent with previous findings showing a linkage between OCD and schizotypy (Rossi & Daneluzzo, 2002; Sobin et al., 2000). However, it is not yet clear how schizotypal traits contribute to OCD symptoms. One possibility is that the magical thinking facet of schizotypy may put one at greater risk for displaying the cognitive bias of likelihood TAF, which in turn may increase one's risk for OCD. Several findings from the present study are consistent with this hypothesis. First, a significant positive association was found between the magical thinking subscale of the STA and OCD symptoms. Second, the relationship between magical thinking and likelihood TAF was also significant. Third, and most importantly, the relationship between the magical thinking subscale of the STA and OCD symptoms was no longer significant after controlling for likelihood TAF. This latter finding provides some suggestion for the hypothesized mediational role of likelihood TAF in explaining the relationship between magical thinking and OCD symptoms. Interestingly, neither likelihood nor moral TAF significantly attenuated the relationship between OCD symptoms and the two other schiz-

otypy facets (i.e., unusual perceptual experiences and paranoid ideation), suggesting that schizotypy traits may be linked to OCD symptoms through multiple pathways.

Several study limitations of the current study should be noted. First, the observed linkage between likelihood TAF and schizotypal traits and its relationship to OCD symptoms found in the present study should be interpreted with caution given the nonclinical sample. Second, despite evidence suggesting that the STA is a psychometrically sound instrument for assessing schizotypy, replication based on data derived from structured clinical interviews is needed. Finally, the cross-sectional nature of our data precludes causal inferences regarding schizotypy traits as a risk factor in OCD. Data obtained from both prospective and experimental studies are needed to demonstrate causal connections between schizotypy and TAF or OCD.

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