

Scrupulosity and obsessive-compulsive symptoms: Confirmatory factor analysis and validity of the Penn Inventory of Scrupulosity

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Abstract

The current study examined scrupulosity in 352 unselected college students as measured by the 19-item Penn Inventory of Scrupulosity (PIOS). Confirmatory factor analysis yielded support for a two-factor model of the 19-item PIOS. However, item-level analyses provided preliminary support for the validity of a 15-item PIOS (PIOS-R) secondary to the removal of items 2, 6, 15, and 10. The two domains of scrupulosity identified on the PIOS-R consisted of the Fear of Sin and the Fear of God. Both domains and total scrupulosity scores were strongly related to obsessive-compulsive symptoms. Scrupulosity also showed significant, but more modest correlations with a broad range of other measures of psychopathology symptoms (i.e., state anxiety, trait anxiety, negative affect, disgust sensitivity, specific fears). However, only obsessive-compulsive symptoms and trait anxiety contributed unique variance to the prediction of scrupulosity. Examination of specific obsessive-compulsive symptom dimensions revealed that only obsessions contributed unique positive variance to the prediction of Fear of God. However, OCD obsessions, washing, and hoarding symptoms contributed unique positive variance to the prediction of Fear of Sin. These findings are interpreted in the context of future research elucidating the relationship between scrupulosity and obsessive-compulsive symptom dimensions.

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Obsessive-compulsive disorder (OCD) is an anxiety disorder characterized by unwanted anxiety-evoking thoughts, ideas, and images (i.e., obsessions) that are subjectively resisted, and by urges to reduce the anxiety via some form of ritualistic behavior (compulsions). Research and clinical observations reveal that the themes of obsessive-compulsive symptoms vary widely (e.g., contamination, harm, symmetry; McKay et al., 2004), with one oft-observed focus being religion (i.e., *scrupulosity*; Abramowitz, 2001; Foa & Kozak, 1995; Greenberg, Witzum, & Pisante, 1987; Rachman, 1997). Common religious obsessions include the fear that one has or will commit sin (when in fact religious authorities would deem the person as inculpable), intrusive mental images of a blasphemous nature, and fears of punishment by God (Abramowitz, Huppert, Cohen, Tolin, & Cahill, 2002). Associated compulsions involve excessive repeating of religious practices (i.e., excessive praying) and asking for reassurances from clergy. Religious OCD symptoms usually extend beyond the common requirements of religious law and are focused on less central aspects of religion to the point of excluding other more important areas (Greenberg, 1984; Greenberg & Shefler, 2002). To illustrate, a Catholic man obsessively feared being punished by God if his parents did not attend church each Sunday, but thought nothing of lying and swearing to his parents (breaches of the fifth Commandment to honor thy father and mother) in his attempts to coerce them into attending.

Several studies suggest that scrupulosity is a common presentation of OCD. For example, Foa & Kozak (1995) found religion to be the fifth most common theme among 425 individuals with OCD (5.9% of patients endorsed it as their primary obsession). Antony, Downie, and Swinson (1998) also found that 24.2% of a sample of 182 adults and adolescents with OCD reported obsessions having to do with religion. Factor analytic studies have shown that religious obsessions load on a factor with sexual and aggressive obsessions (e.g., Mataix-Cols, Rosario-Campos, & Leckman, 2005; McKay et al., 2004). These factor analytic findings suggest that scrupulosity may represent more of an obsessional rather than compulsive OCD symptom cluster and treatments have been applied accordingly (Greenberg, 1987; Greenberg & Witzum, 2001).

The association between scrupulosity and sexual and aggressive obsessions suggests that an overly stringent moral code may be the link (i.e., sex and aggression is immoral) between the obsessional themes. Indeed, highly devout participants have been shown to report higher levels of scrupulosity (Abramowitz et al., 2002) and studies have shown that strength of religiosity significantly influences OCD symptoms (Abramowitz, Deacon, Woods, & Tolin, 2004; Khanna & Channabasavanna, 1988; Sica, Novara, & Sanavio, 2002). Despite evidence in support of scrupulosity as a unique OCD subtype, there remains a paucity of research examining its characteristic features and clinical correlates. Preliminary studies examining affective correlates suggest that degree of religious devotion in OCD is significantly related to feelings of guilt about committing sinful acts (Steketee, Quay, & White, 1991). There is also some evidence that feelings of disgust towards stimuli with moral implications (i.e., death, unusual sexual practices) are significantly related to scrupulosity (Olatunji, Tolin, Huppert, & Lohr, 2005).

A handful of studies has examined relationships between scrupulosity and OCD-related cognitive variables. For example, Tolin, Abramowitz, Kozak, and Foa (2001) found that in comparison with patients with contamination or symmetry-related obsessions, those with religious obsessions were more likely to show increased perceptual aberration and magical ideation, and decreased insight into the irrationality of obsessional fears. Individuals with intense religious scruples, relative to those with less religiosity, also evidence higher scores on measures of obsessiveness, and on dysfunctional beliefs about the overimportance of thoughts, the need to control unwanted intrusive thoughts, perfectionism, and responsibility (Abramowitz et al., 2004; Sica et al., 2002; Tek & Ulug, 2001). Similarly, Nelson, Abramowitz, Whiteside,

and Deacon (2006) recently found that scrupulosity was correlated with obsessional symptoms and beliefs about the importance of, and need to control intrusive thoughts, and an inflated sense of responsibility among individuals with OCD. Consistent findings also suggest that “moral thought action fusion” – the belief that thoughts (e.g., about unacceptable sex acts) are the moral equivalent of actions (e.g., engaging in such acts) – accounts for the relation between scrupulosity and OCD symptoms (i.e., Nelson et al., 2006; Rassin & Koster, 2003; Shafran, Thordarson, & Rachman, 1996). This is in line with cognitive-behavioral theoretical models that implicate specific cognitive biases in the development of OCD (e.g., Rachman, 1998; Salkovskis, 1999).

Although preliminary studies have begun to identify the clinical correlates of scrupulosity, there remains a relative paucity of research examining scrupulosity in patients with OCD; and even fewer studies have examined scrupulosity in non-clinical samples. Attempts to replicate and extend the extant research literature are therefore needed. One explanation for the lack of research is that psychometrically sound measures of scrupulosity are lacking. Recently, however, Abramowitz et al. (2002) developed the Penn Inventory of Scrupulosity (PIOS). In an initial study, Abramowitz et al. reported that the 19-item PIOS showed good internal consistency ($\alpha = 0.93$) with good evidence of convergent (correlated with OCD symptoms) and discriminant (not correlated with anger) validity in a sample of undergraduate students. Based on exploratory factor analysis, Abramowitz et al. (2002) reported that the PIOS consists of two factors assessing (a) the Fear of God ($\alpha = 0.88$), and (b) Fear of Sin ($\alpha = 0.90$). However, these findings regarding the psychometric properties and factor structure of the PIOS have yet to be replicated in the literature.

The PIOS appears to be a reliable measure for building on current knowledge on the clinical correlates of scrupulosity. The literature is consistent with regards to the finding that individuals who report high levels of scrupulosity also report high levels of OCD symptoms (Tek & Ulug, 2001). The literature also suggests that OCD is a rather heterogeneous condition, consisting of multiple symptom dimensions (McKay et al., 2004). Indeed, recent research has advanced the notion that different symptom dimensions may manifest as a function of different etiological mechanisms (Taylor et al., 2006). However, it is not yet clear which OCD symptom dimensions relate to scrupulosity and which do not. Abramowitz et al. (2002) did find that scrupulosity (as measured by the PIOS total score) demonstrated mild to moderate significant correlations with washing ($r = 0.22$), checking ($r = 0.28$), doubting ($r = 0.34$), and slowness ($r = 0.20$) OCD symptom dimensions in a non-clinical sample. However, Nelson et al. (2006) found that scrupulosity (PIOS total score) was only significantly correlated with obsessional symptoms in a sample of OCD patients ($r = 0.40$). These findings raise the question of which OCD symptom dimensions are specifically related with scrupulosity.

Emerging research on the role of religiosity in specific manifestations of OCD highlights the importance of a reliable and valid measure of scrupulosity. We therefore had four goals in the present study. First, we examined the factor structure and psychometric properties of the PIOS in a large non-clinical sample. Specifically, we used confirmatory factor analysis (CFA) to examine the goodness of fit of competing factor models and to identify potential areas of item refinement. Second, we examined the convergent and divergent validity of the PIOS with respect to existing measures of psychopathology symptoms. Consistent with previous work, we predicted that the PIOS would (a) best fit a two-factor model including the Fear of God and the Fear of Sin, and (b) demonstrate a pattern of theoretically consistent relationships with measures of psychopathology. Third, we attempted to identify potential areas of item refinement on the newly developed PIOS.

A substantial body of empirical research supports theoretical propositions that clinical obsessive-compulsive symptoms have their origins in normally occurring phenomena (e.g., Salkovskis, 1999) and that such symptoms occur on a continuum, with many individuals in the general population reporting subclinical obsessions and compulsions (e.g., Gibbs, 1996). Studies of non-clinical samples have therefore been of much value in understanding the development and maintenance of OCD (cf. Gibbs, 1996). Our fourth study aim was therefore to examine the relation between scrupulosity and OC-related phenomena in this study sample. We predicted that scrupulosity would be strongly related to obsessive-compulsive symptoms, independent of its relation to a broad range of psychopathology symptoms. Building on prior research, we also examined the relationship between scrupulosity and the specific obsessive-compulsive symptom dimensions. Based on prior research, we predicted that scrupulosity would be most strongly related to obsessions, with only modest correlations with other obsessive-compulsive symptom dimensions.

1. Method

1.1. Participants

Three hundred and fifty-two participants (209 females and 143 males) were recruited from undergraduate courses at a large university in the mid-southern United States in exchange for research credit. Participants ranged in age from 18 to 50 years ($M = 21.34$, $S.D. = 6.38$) and were primarily Caucasian (90.1%). On average, participants had completed 2.52 years of college education ($S.D. = 1.11$).

1.2. Measures

The *Penn Inventory of Scrupulosity* (PIOS; Abramowitz et al., 2002) is a 19-item self-report measure developed to assess scrupulosity in the context of OCD. Items are scored on a 5-point scale ranging from 0 (never) to 4 (constantly). The PIOS consists of two subscales: one measuring fears of having committed a religious sin (*fear of sin*; e.g., I am afraid of having sexual thoughts), and the other measuring the fears of punishment from God (*fear of God*; e.g., I worry that God is upset with me). The PIOS has adequate psychometric properties in non-clinical samples (Abramowitz et al., 2002).

The *Obsessive-Compulsive Inventory-Revised* (OCI-R; Foa et al., 2002) is an 18-item questionnaire based on the earlier OCI (Foa, Kozak, Salkovskis, Coles, & Amir, 1998). Participants rate the degree to which they are bothered or distressed by OCD symptoms in the past month on a 5-point scale from 0 (not at all) to 4 (extremely). The OCI-R assesses six types of obsessive-compulsive symptoms that correspond to symptom dimensions found in previous factor analytic research: *Washing concerns*, *Checking/Doubting*, *Obsessing*, *Neutralizing*, *Ordering*, and *Hoarding*. Hajcak, Huppert, Simons, and Foa (2004) provide evidence that the OCI-R is a psychometrically sound measure of obsessive-compulsive symptoms with non-clinical, college samples.

The *State-Trait Anxiety Inventory* (STAI; Spielberger, Gorsuch, Lushene, Vog, & Jacobs, 1983) is a widely used measure that consists of two measures that assess the state (form Y1) and trait (form Y2) experience of various anxiety-related symptoms. The *State Anxiety* subscale (STAI-S) is a 20-item well validated measure that assesses the current experience of anxiety (i.e., “How do you feel right now, at this moment?”). The *Trait Anxiety* subscale

(STAI-T) is a face valid 20-item scale that measures the enduring or chronic experience of anxiety.

The *Positive and Negative Affect Scale* (PANAS; Watson, Clark, & Tellegen, 1988) is well validated 20-item measure of positive and negative affect. Participants are asked to indicate of a 5-point scale (1 = “very slightly or not at all”, 5 = extremely) the extent to which they generally experience each of 10 positive affects (i.e., interested, excited, strong) and each of 10 negative affects (i.e., distressed, upset, nervous).

The *Disgust Emotion Scale* (DES; Kleinknecht, Kleinknecht, & Thorndike, 1997) is a 30-item scale measuring five domains of potential disgust elicitors: Animals, Injections and Blood Draws, Mutilation and Death, Rotting Foods, and Odors. Participants are asked to rate their degree of disgust or repugnance if they were to be exposed to each item, using a 5-point Likert scale, ranging from 0 = “No disgust or repugnance at all” to 4 = “Extreme disgust or repugnance”. A total score for the propensity to experience disgust emotions may be calculated by summing responses to the 30 items. Olatunji, Sawchuk, de Jong, and Lohr (in press) provide evidence for the psychometric properties of the DES with non-clinical participants.

The *Spider Phobia Questionnaire* (SPQ; Klorman, Hastings, Weerts, Melamed, & Lang, 1974) is a 31-item true/false measure of spider related fears, preoccupation, and vigilance.

The *Multidimensional Blood/Injury Phobia Inventory* (MBP; Wenzel & Holt, 2003) is a 40-item self report measure of a broad range of feared stimuli (e.g., injections, hospitals, blood, injury) and phobic reactions (e.g., fear, avoidance, worry, fainting) associated with BII fears and phobia. Participants rate the degree to which statements apply to them on a 5-point scale from 0 (very slightly or not at all) to 4 (extremely). This MBP consists of six subscales including: injections, hospitals, fainting, blood-self focus, injury, and blood/injury-other focus. A total MBP score is calculated by summing responses to the 40 items and serves as an overall index of BII fears. Wenzel and Holt (2003) provide evidence for the psychometric properties of this measure in a non-clinical, college sample.

1.3. Procedure

Participants completed a questionnaire packet containing the above measures and received course credit for their participation. Consent forms were signed prior to data collection, and all participants were informed that their responses would be kept completely confidential and that they were free to withdraw from the study at any time.

2. Results

2.1. Preliminary analyses

The mean PIOS total score was 18.81 (S.D. = 14.05) and is consistent with the non-clinical sample on which the scale was validated ($M = 18.98$, S.D. = 11.66; Abramowitz et al., 2002). As shown in Table 1, each of the 19 PIOS items evidenced acceptable corrected item-total correlations based on the criterion of 0.30 recommended by Nunnally and Bernstein (1994). The PIOS was also found to have strong internal consistency in the current sample ($\alpha = 0.95$). PIOS total scores were weakly correlated with age ($r = -0.16$, $p < 0.01$) and no significant differences were found between men ($M = 20.33$, S.D. = 14.91) and women ($M = 17.76$, S.D. = 13.26), $t(350) = 1.68$, $p > 0.05$.

Table 1

Means, standard deviations and corrected item-total correlations of the 19 PIOS items.

PIOS item		<i>M</i>	S.D.	C-ITR
1.	I worry that I might have dishonest thoughts	1.02	0.95	0.55
2.	I fear that I might be an evil person	0.63	0.84	0.56
3.	I fear I will act immorally	0.96	0.94	0.71
4.	I feel urges to confess sins over and over again	0.84	1.04	0.69
5.	I worry about heaven and hell	1.30	1.15	0.64
6.	I worry I must act morally at all times or I will be punished	1.10	1.08	0.62
7.	Feeling guilty interferes with my ability to enjoy things I would like to enjoy	0.97	0.99	0.62
8.	Immoral thoughts come into my head and I cannot get rid of them	0.75	0.87	0.65
9.	I am afraid my behavior is unacceptable to God	1.42	1.12	0.77
10.	I fear I have acted inappropriately without realizing it	1.14	1.02	0.61
11.	I must try hard to avoid having certain immoral thoughts	0.82	1.01	0.75
12.	I am very worried that things I did may have been dishonest	0.88	0.93	0.70
13.	I am afraid I will disobey God's rules/laws	1.34	1.13	0.75
14.	I am afraid of having sexual thoughts	0.66	0.94	0.64
15.	I worry I will never have a good relationship with God	0.95	1.06	0.59
16.	I feel guilty about immoral thoughts I have had	0.99	1.06	0.80
17.	I worry that God is upset with me	1.01	1.12	0.74
18.	I am afraid of having immoral thoughts	0.77	0.97	0.79
19.	I am afraid my thoughts are unacceptable to God	1.21	1.17	0.77

Note: $n = 352$; C-ITR, corrected item-total correlation.

2.2. Confirmatory factor analysis and comparison of a one-factor versus two-factor model of the PIOS

A CFA was conducted on the 19 items of the PIOS using LISREL Version 8.54 (Jöreskog & Sörbom, 2003) and two competing models of interest were estimated. In the unidimensional model, all 19 PIOS items were loaded onto a latent PIOS variable, whereas in the two-factor model, PIOS items were a priori loaded onto either a Fear of God or a Fear of Sin latent factor based on the exploratory factor analytic results of Abramowitz et al. (2002). These two models involved the same 19 manifest indicators. Consistent with the work of Byrne (1989), the variance of each latent variable was fixed at 1.00 to set a metric for the latent constructs and to identify the measurement model. Model fit was examined via several common indices: χ^2 Index; Non-Normed Fit Index (NNFI; Bentler & Bonett, 1980), Comparative Fit Index (CFI; Bentler, 1989), the Root Mean Square Error of Approximation and its 90% confidence interval (RMSEA; Browne & Cudeck, 1993; Steiger, 1990) and the Standardized Root Mean Square Residual (SRMR; Bentler, 1995). Acceptable model fit is indicated if the following criteria are met: RMSEA and SRMR < 0.08; NNFI and CFI > 0.90 (see Brown, 2004 for a review).

First, we tested a unidimensional (i.e., one-factor) model of the PIOS. Goodness of fit indices indicated that the fit of this model was relatively poor, $\chi^2(152) = 741.56$, $p < 0.001$; RMSEA = 0.11 (90% CI = 0.10, 0.12); CFI = 0.90; NNFI = 0.88; SRMR = 0.07. All PIOS items had significant loadings on the PIOS latent variable, with standardized parameter estimates that ranged from 0.60 to 0.88. The fit of this model suggests that a unidimensional model may oversimplify the true measurement properties of the PIOS. Next, we tested the two-factor model that was based on the EFA findings of Abramowitz et al. (2002) in the initial psychometric evaluation of the PIOS. Specifically, 12 PIOS items (1, 3, 4, 6, 7, 8, 10, 11, 12, 14, 16, 18) were loaded onto a

Fear of Sin latent factor and 7 PIOS items (2, 5, 9, 13, 15, 17, 19) items were loaded onto a Fear of God latent factor. Goodness of fit indices indicated that the two-factor model provided a good fit to the data, $\chi^2(151) = 479.48, p < 0.001$; RMSEA = 0.08 (90% CI = 0.071, 0.087); CFI = 0.95; NNFI = 0.95; SRMR = 0.06. The two-factor model provided a significantly better fit to the data than the unidimensional model as indicated by improvements in all fit indices, as well as an improvement of 260.08 on the Akaike (1987) Information Criterion (AIC)—a modification of the standard goodness-of-fit χ^2 statistic can be used to compare models that are not hierarchically related (i.e., non-nested).

Analysis of localized areas of strain did provide strong evidence for adding a dual loading from PIOS item 2 (“I fear that I might be an evil person”) to both the Fear of God and Fear of Sin latent factors (modification index $\chi^2 = 156.5$). Thus the measurement model was respecified with the addition of a path from PIOS item 2 to the Fear of Sin latent factor. This respecification significantly improved the overall fit of the two-factor model (CSDT (1) = 35.77, $p < 0.001$); however, when this dual loading was allowed to be estimated the previously positive path ($\beta = 0.54$) from item 2 to the Fear of God latent factor became negative ($\beta = -0.36$). As presented in Fig. 1, a two-factor model specifying that item 2 load only on the Fear of Sin latent factor was evaluated and results

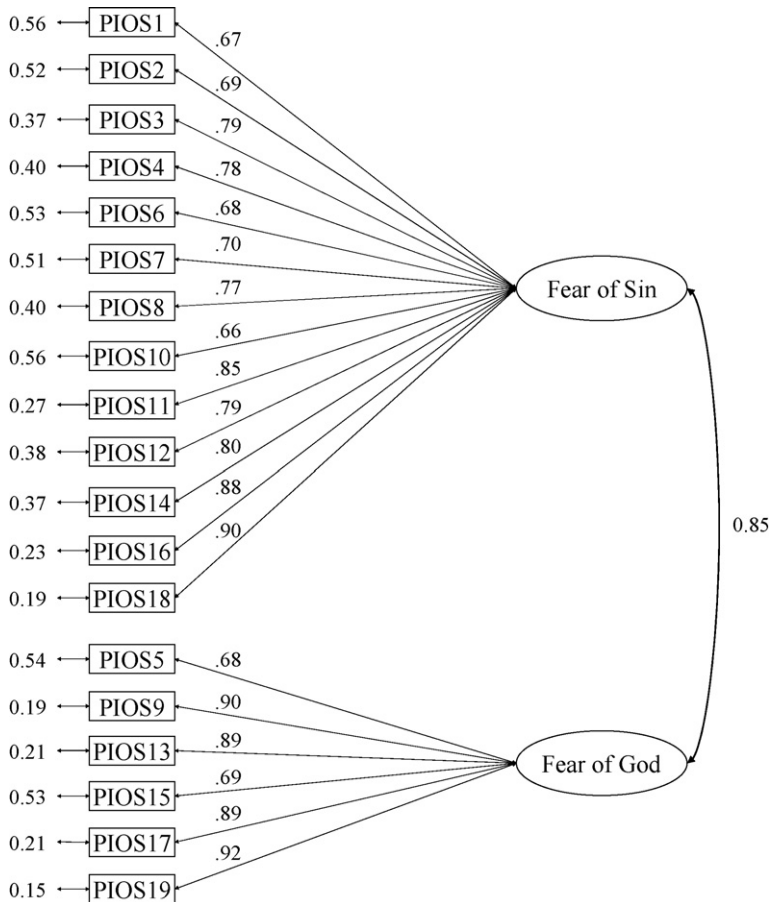


Fig. 1. Two factor measurement model.

indicated that this model fit the data well (e.g., $\chi^2 (151) = 441.56$; RMSEA = 0.074 (90% CI = 0.066, 0.081); CFI = 0.96; NNFI = 0.95; SRMR = 0.057) and that losing the path between item 2 and Fear of God did not result in a significant decrement in model fit (CSDT (1) = 2.15, $p = ns$). Modification indices provided no evidence of additional paths that should be added between the PIOS items and the two latent variables, and all item loadings were strong and significant on their respective factors (i.e., Fear of Sin had standardized loadings that ranged from 0.67 to 0.90; Fear of God had standardized loadings that ranged from 0.68 to 0.92). Further, Fear of Sin and Fear of God appear to represent correlated but conceptually distinct domains of religious scrupulosity (i.e., these factors share 72.25% of the variance in religious scrupulosity). Thus, the results of this CFA support the two-factor model of PIOS religious obsessive-compulsive symptoms obtained by Abramowitz et al. (2002) via EFA with one exception: item 2 appears to be a better indicator of Fear of Sin than Fear of God. Both the 13-item Fear of Sin ($\alpha = 0.92$) and the 6-item Fear of God ($\alpha = 0.90$) subscales demonstrated excellent internal consistency.

2.3. Modifications to the two-factor model

A secondary goal of the present study was to utilize SEM procedures to identify potential areas of item refinement on the PIOS. We consider this an important additional area of psychometric examination, particularly given that Abramowitz et al. (2002, p. 828) “had intentionally worded some items very similarly”. Analysis of localized areas of strain indicated that there was strong evidence of correlated residuals between item 2 (“I fear that I might be an evil person”) and item 3 (“I fear I will act immorally”; modification index $\chi^2 = 80.23$) and between item 5 (“I worry about heaven and hell”) and item 6 (“I worry I must act morally at all times or I will be punished”; modification index = 74.3). Consideration of both of these outcomes suggests that the covariance of these items that was unaccounted for by their latent factors is likely due to a method effect stemming from content overlap (e.g., being an evil person and acting immorally for items 2 and 3 and worrying about heaven and hell versus being punished for items 5 and 6). In addition, examination of the inter-item correlations revealed that items 2 and 3 ($r = 0.64$) and items 5 and 6 ($r = 0.58$) shared significant variance. The measurement model was refit to the data freely estimating the error covariances between items 2 and 3 and between items 5 and 6 (i.e., $\chi^2 (149) = 360.30$; $p < 0.001$; RMSEA = 0.064 (90% CI = 0.055, 0.072); CFI = 0.96; NNFI = 0.96; SRMR = 0.054). This respecification resulted in a significant improvement in model fit (CSDT (2) = 81.26, $p < 0.001$).

Review of the modification indices suggested two additional correlated residuals between item 15 (“I worry I will never have a good relationship with God”) and item 17 (“I worry that God is upset with me”) and between item 10 (“I fear that I have acted inappropriately without realizing it”) and item 12 (“I am very worried that things I did may have been dishonest”), modification index $\chi^2 = 71.1$ and 44.5, respectively. Consideration of the correlated residuals between these two pairs of items is likely due to a method effect stemming again from content overlap (e.g., one’s relationship with God on items 15 and 17 and acting inappropriately or dishonestly without realizing it on items 10 and 12). Examination of the inter-item correlations revealed that items 15 and 17 ($r = 0.63$) and items 10 and 12 ($r = 0.59$) shared significant variance. Accordingly, the measurement model was refit to the data freely estimating the error covariances between items 15 and 17 and between items 10 and 12 (i.e., $\chi^2 (147) = 298.36$; $p < 0.001$; RMSEA = 0.054 (90% CI = 0.045, 0.063); CFI = 0.97; NNFI = 0.96; SRMR = 0.052). This respecification also resulted in a significant improvement in model fit (CSDT (2) = 61.94, $p < 0.001$).

Analysis of localized areas of strain suggested another significant error covariance (modification index $\chi^2 = 52.9$) between item 16 (“I feel guilty about immoral thought I have

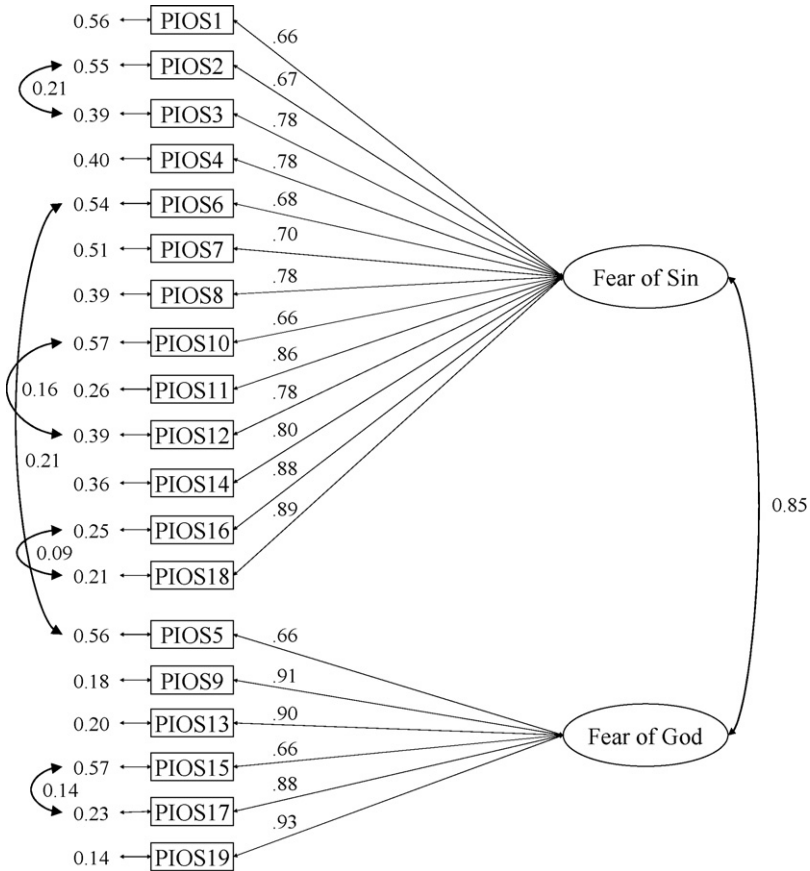


Fig. 2. Modified two-factor measurement model allowing correlated residuals.

had”) and item 18 (“I am afraid of having immoral thoughts”). Consideration of the content of these items indicates that this correlated residual may also be accounted for by overlapping item content (e.g., fearing immoral thoughts versus feeling guilty about such thoughts). Thus, the model was respecified allowing the error covariance between items 16 and 18 to be freely estimated. This respecification also significantly improved the fit of the measurement model (CSDT (1) = 15.11, $p < 0.001$). This model, with five correlated residuals between PIOS items was decided upon as the final measurement model and is presented in Fig. 2. The final measurement model demonstrated a good to excellent fit to the data, χ^2 (146) = 283.25, $p < 0.001$; RMSEA = 0.052 (90% CI = 0.041, 0.06); CFI = 0.98; NNFI = 0.97; SRMR = 0.051.

2.4. Evaluating redundant item content and item omission in the two-factor model

Consistent with the goal of identifying areas for refinement of the PIOS, redundant items were removed rather than relaxing the error covariance between pairs of items. Consistent with Abramowitz et al. (2002) we eliminated items based on the following criteria: (1) modification indices suggested relaxing the error covariance between a pair of items and the respecified model resulted in improved model fit; (2) the items had a high inter-item correlation (e.g., $r > 0.45$,

Rapee, Craske, Brown, & Barlow, 1996); and (3) the items had similar wording or content. When a pair of items met these criteria, the item with the lower item-total correlation coefficient was removed (cf. DeVellis, 1991). This procedure resulted in the removal of 4 items from the PIOS (i.e., items 2, 6, 15, and 10). The two-factor measurement model with 15 PIOS items was then refit to the data and is presented in Fig. 3 (i.e., $\chi^2(89) = 195.08; p < 0.001; RMSEA = 0.058$ (90% CI = 0.047, 0.069); CFI = 0.97; NNFI = 0.97; SRMR = 0.047). The fit of this model was similar to that of the modified measurement model with 5 correlated residuals, and comparisons based on the AIC indicated that the fit of the 15 item PIOS was better than the fit of the 19-item PIOS (i.e., an improvement of 114.17 on the AIC with the omission of 4 items).

The impact of removing the four items on internal consistency estimates for the PIOS was then examined as well as correlations between the original and revised PIOS total score and subscale scores. The overall alpha coefficient for the revised 15-item PIOS ($M = 14.96, S.D. = 11.49$) was an excellent 0.943 with inter-item correlations that ranged from 0.27 to 0.78 ($M = 0.52$). In addition, both the 10-item Fear of Sin ($\alpha = 0.92; M = 8.68, S.D. = 7.38$) and the 5-item Fear of God ($\alpha = 0.906; M = 6.27, S.D. = 4.84$) subscales demonstrated excellent internal consistency. The 15-item PIOS total score was highly correlated with the original PIOS total score ($r = 0.99$). In addition, the revised Fear of Sin subscale was highly correlated with the original Fear of Sin subscale ($r = 0.99$), and the revised Fear of God subscale was highly correlated with the original

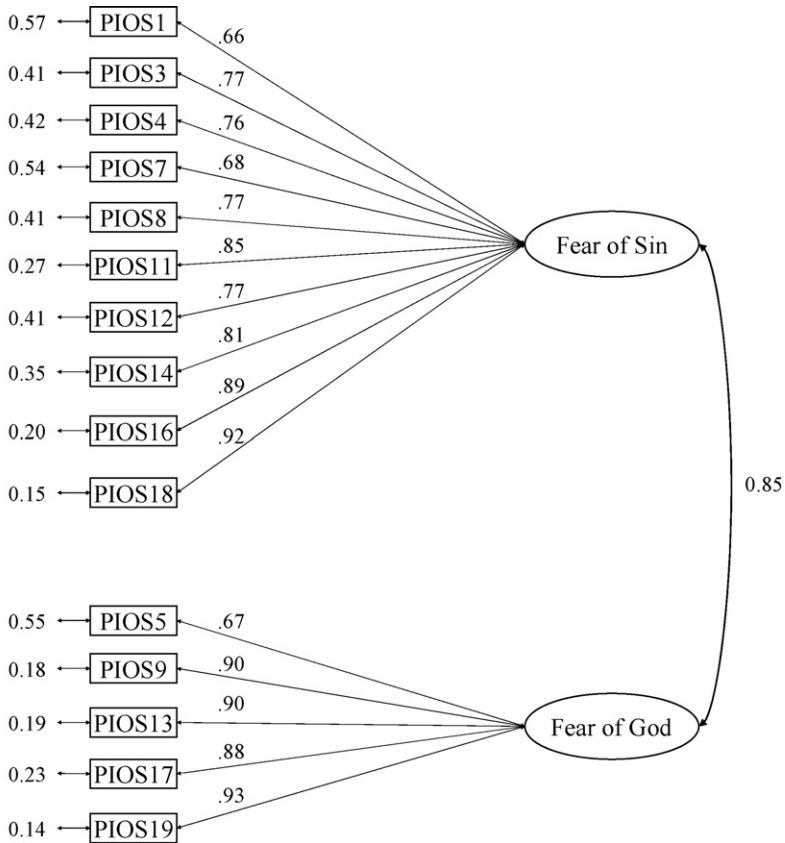


Fig. 3. Revised 15-item PIOS (PIOS-R) two-factor measurement model.

Table 2

Correlations, means, standard deviations (S.D.), and alpha coefficients of measures of scrupulosity and generally psychopathology

Measure	PIOS-R total	FOG	FOS	Mean	S.D.	Alpha coefficient
OCI-R	0.43	0.30	0.47	25.05	24.65	0.96
STAI-S	0.24	0.19	0.25	38.80	9.99	0.89
STAI-T	0.38	0.30	0.40	41.99	8.19	0.81
Positive affect	−0.06	−0.02	−0.08	28.92	9.15	0.92
Negative affect	0.30	0.23	0.31	16.54	6.49	0.90
DES	0.27	0.22	0.27	48.13	20.15	0.94
SPQ	0.15	0.14	0.14	9.88	5.52	0.84
MBPI	0.20	0.13	0.23	62.76	23.67	0.96

Note: r 's ≥ 0.11 , $p < 0.05$. PIOS-R, Penn Inventory of Scrupulosity-Revised; FOG, Fear of God; FOS, Fear of Sin; OCI-R, Obsessive Compulsive Inventory-Revised; STAI-S, State Anxiety; STAI-T, Trait Anxiety; DES, Disgust Emotion Scale; SPQ, Spider Phobia Questionnaire; MBPI, Multidimensional Blood/Injury Phobia Inventory.

Fear of God subscale, $r = 0.99$. Taken together, these results suggest that little information is lost from the removal of four PIOS items. Therefore, subsequent analyses are performed with the 15-item PIOS (PIOS-R) and its subscales.

2.5. Relationship of scrupulosity to obsessive-compulsive symptoms and other domains of psychopathology

As shown in Table 2, the PIOS-R total score and subscales were significantly correlated with obsessive-compulsive symptoms (r 's range 0.30–0.47). The PIOS-R total and subscale scores were also significantly correlated with measures of other domains of psychopathology (state anxiety, trait anxiety, negative affect, disgust sensitivity, and specific fears). The PIOS-R total and subscale scores showed correlations of moderate magnitude with trait anxiety (r 's range 0.30–0.40) and negative affect (r 's range 0.23–0.30). More modest correlations were found between scrupulosity and the STAI-S, DES, SPQ, and MBPI (r 's range 0.13–0.27).

2.6. The uniqueness of scrupulosity to OCD

To ensure that the relation between scrupulosity and obsessive-compulsive symptoms were not due to symptoms of trait anxiety or negative affect, partial correlations were calculated between scrupulosity and obsessive-compulsive symptoms while controlling for levels of trait anxiety and negative affect. The results showed that the PIOS-R total (partial $r = 0.33$), Fear of God (partial $r = 0.22$), and Fear of Sin (partial $r = 0.38$) subscale was significantly correlated with the OCI-R when controlling for trait anxiety (p 's < 0.01). The PIOS-R total (partial $r = 0.37$), Fear of God (partial $r = 0.25$), and Fear of Sin (partial $r = 0.42$) subscale was also significantly correlated with the OCI-R when controlling for negative affect (p 's < 0.01).

2.7. Predicting scrupulosity from obsessive-compulsive symptoms and measures of general psychopathology

A hierarchical regression predicting scrupulosity (PIOS-R total score) using levels of obsessive-compulsive symptoms (OCI-R total score), and measures of general psychopathology (STAI-S, STAI-T, Negative Affect, DES, SPQ, and MBPI) was conducted to examine the

Table 3

Hierarchical regression analysis for psychopathology measures predicting total levels of scrupulosity (PIOS-R total score)

Measures	<i>B</i>	<i>t</i>	<i>p</i>	Partial <i>r</i>
OCI-R	0.29	5.39	<0.01	0.28
STAI-S	0.00	0.05	0.95	0.00
STAI-T	0.22	3.43	<0.01	0.18
Negative affect	0.06	1.10	0.27	0.05
DES	0.06	1.04	0.29	0.05
SPQ	0.01	0.24	0.80	0.01
MBPI	0.00	0.14	0.88	0.00

Note: $R^2 = 0.25$; PIOS-R, Penn Inventory of Scrupulosity-Revised; OCI, Obsessive Compulsive Inventory-Revised; STAI-S, State Anxiety; STAI-T, Trait Anxiety; DES, Disgust Emotion Scale; SPQ, Spider Phobia Questionnaire; MBPI, Multidimensional Blood/Injury Phobia Inventory.

Table 4

Correlations of scrupulosity with OCD symptom dimensions of the OCI-R

OCD dimensions	PIOS-R total	FOG	FOS
Washing	0.27	0.17	0.31
Checking	0.25	0.19	0.26
Ordering	0.23	0.19	0.24
Obsessions	0.45	0.29	0.51
Hoarding	0.35	0.24	0.39
Neutralizing	0.32	0.23	0.34

Note: All p 's < 0.01. PIOS-R, Penn Inventory of Scrupulosity-Revised; FOG, Fear of God; FOS, Fear of Sin; OCI-R, Obsessive Compulsive Inventory-Revised.

potentially unique relation between scrupulosity and obsessive-compulsive symptoms. Details of this analysis are shown in Table 3. Overall, this model significantly predicted scrupulosity [$F(7, 344) = 16.81, p < 0.001$] accounting for 25% of the variance with only the OCI-R and the STAI-T contributing significant unique variance to the prediction of scrupulosity.

2.8. Specificity of obsessive-compulsive symptom dimensions to scrupulosity

The relationship between scrupulosity and various types of obsessive-compulsive symptoms was then examined. As shown in Table 4, the PIOS-R total score and both subscale scores were significantly correlated with all domains of obsessive-compulsive symptoms. Further, the majority of these correlations were moderate or large in magnitude (r 's range 0.17–0.51, $p < 0.01$). A hierarchical regression was then conducted predicting the Fear of God subscale of the PIOS-R using the obsessive-compulsive symptoms measured by the OCI-R.¹ This model significantly predicted the Fear of God [$F(6, 344) = 6.85, p < 0.001$] accounting for 11% of the variance. However, Table 5 shows that only obsessions contributed significant unique variance to the prediction of Fear of God. Similar analyses were conducted for the Fear of Sin subscale of the

¹ This analysis allowed for the examination of the potentially unique relation between scrupulosity and specific OCD symptom dimensions. We chose to conduct the regressions separately for the Fear of Sin and the Fear of GOD subscales (rather than using the PIOS-R total score) to examine the specificity of the two subscales to specific OCD symptom dimensions.

Table 5
Hierarchical regression analysis for OCD symptom dimensions of the OCI-R predicting scrupulosity

PIOS-R subscale	<i>B</i>	<i>t</i>	<i>p</i>	Partial <i>r</i>
FOG ^a				
Washing	0.01	0.21	0.82	0.01
Checking	−0.01	−0.17	0.85	−0.01
Ordering	0.56	0.32	0.57	0.03
Obsessions	0.20	3.35	<0.01	0.18
Hoarding	0.08	1.18	0.23	0.06
Neutralizing	0.08	1.29	0.19	0.07
FOS ^b				
Washing	0.13	2.27	<0.05	0.12
Checking	−0.10	−1.61	0.10	−0.08
Ordering	−0.03	−0.56	0.57	−0.03
Obsessions	0.41	7.69	<0.01	0.38
Hoarding	0.16	2.73	<0.01	0.14
Neutralizing	0.07	1.28	0.20	0.06

Note: PIOS-R, Penn Inventory of Scrupulosity-Revised; FOG, Fear of God; FOS, Fear of Sin; OCI-R, Obsessive Compulsive Inventory-Revised.

^a $R^2 = 0.11$.

^b $R^2 = 0.31$.

PIOS-R. This model also significantly predicted the Fear of Sin [$F(6, 344) = 25.41, p < 0.001$] accounting for 31% of the variance. As shown in Table 5, obsessions, hoarding, and washing contributed significant unique variance to the prediction of Fear of Sin.

3. Discussion

The current study examined scrupulosity in a college sample. We first evaluated the factor structure of the 19-item PIOS. Here, CFA provided support for the two-factor model of the PIOS previously reported by Abramowitz et al. (2002). CFA also revealed that the two-factor model of the PIOS significantly fit the data better than a one-factor model. However, analysis of localized areas of strain of the two-factor model did indicate that the two-factor model did require some modification. In their initial exploratory factor analysis of the PIOS, Abramowitz et al. (2002) reported that Item 2 (“I fear that I might be an evil person”) loaded on the Fear of God factor. However, in the present study, CFA indicated that item 2 was more related to the Fear of Sin factor. Furthermore, respecification that item 2 loaded on the Fear of Sin factor significantly improved the overall fit of the two-factor model. CFA also identified potential areas of item refinement of the PIOS. Specifically, item analysis revealed four pairs of items (items 2 and 3; 5 and 6; 10 and 12; 15 and 17) that were identified as conceptually redundant. Removal of the item with the lower item-total correlation coefficient in the pair resulted in a two-factor (Fear of God and Fear of Sin) 15-item PIOS (PIOS-R). Importantly, the PIOS-R and its two factors yielded a better fit than the 19-item PIOS. The PIOS-R and its two factors also yielded excellent reliability and the PIOS-R was highly correlated with the original PIOS total score.

Although we found strong correlations between the Fear of God and the Fear of Sin subscales of the PIOS-R, the two the scales were not identical. The present study also revealed satisfactory convergent and divergent validity for the PIOS-R total score and the two factors. These findings offer preliminary evidence for the reliability and validity of the PIOS-R. Specifically, the total

score and the two factors were moderately to strongly associated with theoretically relevant constructs (e.g., anxiety symptoms, negative affect) and weakly related to constructs that may be considered theoretically distinct from scrupulosity (e.g., positive affect). Scrupulosity was also found to be mildly associated with age with older college studies endorsing less scrupulosity and no significant differences were found between men and women in degree of scrupulosity. Taken together, these results support the psychometric properties and validity of the PIOS-R among non-clinical individuals.

An important goal of the present study was to examine the relation between scrupulosity and obsessive-compulsive symptoms in a non-clinical sample. Consistent with our hypotheses, scrupulosity was strongly correlated with obsessive-compulsive symptoms. However, scrupulosity was also significantly associated with negative affect and anxiety in this college sample. Thus, even if the scrupulous concerns reported in the present study are not above clinical threshold, increases in scrupulosity appears to be related to increases in self-reported anxiety and negative affect. Subsequent analyses did show that the relationship between scrupulosity and obsessive-compulsive symptoms remained significant when controlling for trait anxiety and negative affect. This finding supports the notion that the scrupulosity–OCD relationship is unique and is not necessarily attributable to general distress.

Scrupulosity was also significantly correlated with measures of a broad range of symptoms of psychopathology including state anxiety, disgust sensitivity, and specific fears. However, in our multiple regression model, only obsessive-compulsive symptoms and trait anxiety contributed unique variance to the prediction of scrupulosity. Accordingly, trait anxiety as a stable or enduring feature of personality may represent a risk factor for scrupulosity particularly in the context of obsessive thoughts regarding negative religious consequences (e.g., punishment from God) of having morally offensive intrusive thoughts (e.g., sexual). Examination of the relationship between scrupulosity and specific obsessive-compulsive symptom dimensions revealed that only obsessions contributed unique positive variance to the Fear of God. However, obsessions, washing, and hoarding contributed unique positive variance to the Fear of Sin. These findings correspond well with emerging research suggesting that OCD is a heterogeneous condition with different subtypes that potentially have different etiological mechanisms (McKay et al., 2004; Taylor et al., 2006).

In concert with recent research (Nelson et al., 2006), the findings from our regression analyses suggest that scrupulosity is most strongly associated with obsessional symptoms, as opposed to washing, checking, hoarding, or ordering/arranging rituals. This is also consistent with various studies suggesting that religious obsessions load together with violent and sexual obsessions, which may or may not present with overt compulsive behaviors (McKay et al., 2004). The specific association between scrupulosity and obsessional symptoms may be understood in the context of cognitive-behavioral models of OCD predicting that individuals with scrupulosity, who are hypervigilant for sin, might also be exquisitely sensitive to occasional unwanted, yet normally occurring, unpleasant intrusive thoughts with religious themes (e.g., doubts about one's devotion, sacrilegious thoughts). According to cognitive-behavioral theoretical models, such innocent intrusions evolve into clinical obsessions if the intrusions are misinterpreted as highly significant or meaningful (e.g., "one who has immoral thoughts is an immoral person").

Obsessive-compulsive washing and hoarding symptoms contributed unique positive variance to the prediction of Fear of Sin but not the Fear of God. This finding suggests that preoccupation with sin may operate as a vulnerability factor for a wider range of obsessive-compulsive symptom themes than preoccupation with God in a non-clinical sample. Indeed, the Fear of Sin

may be related to washing symptoms given that cleanliness is often regarded as a sign of moral purity (e.g., Greenberg & Witzum, 1994). The relation between preoccupation with sin and hoarding also compliments prior research. For example, Fullana et al. (2004) found that hoarding symptoms was positively correlated with sensitivity to punishment in a sample of OCD patients. These findings could point to a problem in hoarding marked by behavioral inhibition in situations involving the possibility of aversive consequences or the threat of punishment (i.e., going to hell).

The present study adds to the growing literature on the relationship between scrupulosity and obsessive-compulsive symptoms. However, the interpretations drawn from the present findings should be considered in light of the limitations of the study. First, scrupulosity appears to vary according to the individual's religious affiliation and level of devoutness (Abramowitz et al., 2002, 2004). Thus, the lack of assessment of religious affiliation and devotion limits the inferences that can be drawn from the present findings. Second, the reliance exclusively on self-report measures might have inflated the magnitude of observed relationships between variables. Future studies using multitrait-multimethod approaches to assessment are warranted. Lastly, although a growing literature supports the notion that obsessive-compulsive symptoms occur on a continuum of severity and have their origin in largely normal human processes (Gibbs, 1996), it is unclear how well our results with this non-clinical sample can be generalized to individuals at the clinical end of the obsessive-compulsive continuum.

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