



# The Obsessive-Compulsive Inventory-Revised (OCI-R): Psychometric properties of the Korean version and the order, gender, and cultural effects

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## ABSTRACT

In this study, the psychometric properties of the Korean version of the OCI-R and the effects of order, gender, and culture on the inventory were examined in a nonclinical and in a clinical sample comprised of 702 college students and 91 patients with OCD. As a result, the original six-factor model is supported by the confirmatory factor analysis. The internal consistency, test-retest reliability, and the convergent and divergent validity of the OCI-R total and its subscales were good. Additionally, the receiver operating characteristic analyses showed that the OCI-R is an effective screening tool for OCD. For the negative results, the internal consistency of the neutralizing subscale was poor, and the hoarding and ordering subscale failed to distinguish patients with OCD from college students. Further, the divergent validity of the obsessing subscale appeared to be poor. A minor order effect on the OCI-R total score was observed—the decrease of the score when administered after another OCD symptom measure. No gender effects were found, whereas the cultural differences were found in some of the subscales.

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## 1. Introduction

Although obsessive-compulsive disorder (OCD) is a single diagnostic entity in the DSM-IV-TR (American Psychiatric Association, 2000), it has started to be recognized that the disorder consists of several symptom dimensions (Mataix-Cols, Rosario-Campos, & Leckman, 2005). The heterogeneity of OCD is an important issue because it could lead to inconsistencies in the findings of various studies. To date, the majority of studies investigating the heterogeneity of OCD have been based on data concerning the overt symptoms of OCD, and many researchers have suggested that OCD symptoms could be divided into four to seven subtypes, including contamination, hoarding, ordering, checking, obsession and so on (McKay et al., 2004).

In the past decade, several questionnaires that reflect the recent findings on the symptom dimensions of OCD have been developed (e.g., the Vancouver Obsessional Compulsive Inventory [VOCI]; Thordarson et al., 2004, and Schedule of Compulsions, Obsessions, and Pathological Impulses [SCOPI]; Watson & Wu, 2005). Among them, the Obsessive-Compulsive Inventory-Revised (OCI-R; Foa et al., 2002) is a frequently used instrument in both research and clinical settings and is translated into the most languages.

The OCI-R is a revised version of the OCI, which consists of 42 items and 7 subscales and is designed to report the frequency of and distress caused by each symptom (Foa, Kozak, Salkovskis, Coles, & Amir, 1998). Although the OCI was psychometrically sound, it has some disadvantages in terms of length and redundancy. To address these problems and easily assess the primary symptoms of an individual with OCD and its severity, Foa et al. (2002) developed the Revised OCI, which consists of 18 items and 6 subscales, by means of selecting 3 items having the highest factor loading per subscale and eliminating one factor.

Several studies examining the psychometric properties of the OCI-R consistently showed that the OCI-R has a 6-factor structure and that the reliability and convergent validity of the OCI-R are excellent (Abramowitz & Deacon, 2006; Foa et al., 2002). Moreover, the discriminant validity of its subscales is good, and the OCI-R is sensitive to treatment effects (Abramowitz, Tolin, & Diefenbach, 2005; Huppert et al., 2007). However, the OCI-R total and its subscales showed moderate to high correlations with measures of depression and trait anxiety (Abramowitz & Deacon, 2006; Foa et al., 2002), indicating that the divergent validity of the OCI-R is poor. Foa et al. (2002) suggested that the high correlation may result from the high levels of depression among patients with OCD, and Abramowitz and Deacon (2006) suggested that the weak divergent validity might be a common characteristic of the measures of OCD severity.

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In addition, Hajcak, Huppert, Simons, and Foa (2004) found a significant order effect on the OCI-R in two studies conducted with U.S. college students; the OCI-R score significantly decreased when it was presented after another questionnaire of OCD. They suggested that the order effect might be specific to nonclinical populations and presented some possible reasons for the effect, such as fatigue, habituation, and increased understanding of OCD symptoms (Hajcak et al., 2004). However, in a study on the Spanish version of the OCI-R, Fullana et al. (2005) could not find the order effect. Therefore, the order effect needs further examination.

The gender effects on scores of the OCI-R subscales have been also found. However, the effects vary with different cultural contexts. In a Spanish study, men showed significantly higher scores on the hoarding and checking subscales than women (Fullana et al., 2005); in Iceland, women scored significantly higher than men on the checking and ordering subscales (Smári, Ólason, Eypórsdóttir, & Frólunde, 2007); in Italy, men scored significantly higher than women on the washing, checking, and obsessing subscales (Sica et al., 2009). Hence, the gender effects on the OCI-R call for further examinations in other cultural contexts.

The cultural effects on the OCI-R total and its subscales also have been found. For instance, a French college sample scored lower on the OCI-R total and its subscales than did a U.S. college sample (Zermatten, Van der Linden, Jermann, & Ceschi, 2006), and a German sample with OCD patients showed a higher checking subscale score and lower obsessing and hoarding subscale scores than U.S. patient samples (Gönner, Leonhart, & Ecker, 2008). In particular, the cultural effect needs to be seriously considered because it could affect cutoff scores for the diagnostic decision in each culture. However, to date, there have been no studies examining the cultural effect with Asian samples.

Finally, the characteristics of some subscales also need to be examined more thoroughly. For instance, some researchers suggested that the obsessing subscale is a global measure of obsession because the obsessing subscale scores were elevated in patients with all OCD subtypes (Huppert et al., 2007). In addition, Foa et al. (2002) found that the obsessing subscale score could effectively discriminate OCD patients from control groups (Foa et al., 2002). However, it was also suggested that the obsessing subscale highly overlaps other psychopathology, such as depression and anxiety (Gönner et al., 2008). Further, some studies reported that the internal consistency of the neutralizing subscale is low and suggested that the subscale needs some modification (Fullana et al., 2005; Gönner et al., 2008; Huppert et al., 2007). Moreover, the relationships between the hoarding subscale and the other subscales need to be examined because hoarding symptom has been recently suggested as being a distinct syndrome from OCD (Grisham, Brown, Liverant, & Campbell-Sills, 2005; Wu & Watson, 2005).

Therefore, in the present study, we primarily examined the psychometric properties and factor structure of the Korean version of the OCI-R with a college student sample and an OCD patient sample. We also examined the order and gender effects that had not been clearly ascertained in previous studies. Finally, we investigated the cultural effects on mean and cutoff scores of the OCI-R total and its subscales.

## 2. Method

### 2.1. Participants

#### 2.1.1. College student sample

The college student sample consisted of 702 undergraduate students (392 males, 310 females) who were recruited from introductory psychology classes at Seoul National University. The

age range of the participants was between 18 and 30 years ( $M = 21.33$ ,  $SD = 2.40$ ). For males, the mean age was 22.02 ( $SD = 2.66$ ), and for females, 20.47 ( $SD = 1.67$ ). Notably, a significant age difference between the gender groups was found,  $t(664) = 9.43$ ,  $p < .001$ . All of the participants were Korean.

#### 2.1.2. OCD patient sample

The patients were recruited from the OCD outpatient clinic at Seoul National University Hospital. We collected data from 104 psychiatric patients who met DSM-IV criteria for OCD as their principal diagnosis. Because the OCI-R has been validated only in adult samples, 13 participants under the age of 18 were excluded from the data. The age range of the remaining 91 participants (60 males and 31 females) was between 18 and 61 years ( $M = 28.22$ ,  $SD = 8.97$ ), and their years of education ranged from 10 to 19 ( $M = 14.06$ ,  $SD = 2.00$ ). Their diagnoses were primarily made by a psychiatrist and were independently verified by a Master's level clinical psychologist using the Structured Clinical Interview for DSM-IV (SCID-IV; First et al., 1996). We could frequently find axis I comorbidity (52.7%). Secondary comorbid diagnoses included depressive (37%), generalized anxiety (4%), bipolar (3%), social anxiety (2%), specific phobia (2%), tic (2%), and body dysmorphic disorder (1%).

## 2.2. Measures

### 2.2.1. Obsessive-compulsive inventory-revised (OCI-R; Foa et al., 2002)

The OCI-R is an 18-item self-report questionnaire that assesses the degree of distress caused by OCD symptoms. Each of the items is rated from 'not at all' (coded as 0) to 'extremely' (coded as 4), and three items constitute a subtype of OCD symptoms. Lee (2005) initially translated the OCI-R into Korean, and one of the authors modified ambiguous or mistranslated words. The items were then back-translated by a bilingual psychologist, and the accuracy of the translation was reviewed by the authors. The back-translation was also mailed to the original developer (Foa, E.B.) of the OCI-R.

### 2.2.2. Padua inventory-Washington State University revision (PI-WSUR; Burns, Keortge, Formea, & Sternberger, 1996)

The PI-WSUR is a 39-item questionnaire that assesses the severity of OCD symptoms. The inventory consists of five subscales, including checking, contamination/washing, harm-obsession, harm-impulse, and grooming. We used a Korean version of the PI-WSUR (Min & Won, 1999; Seol, 2004) with the internal consistency coefficients of total and subscales ranging from .86 to .97.

### 2.2.3. Penn state worry questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990)

The PSWQ is a 16-item questionnaire that assesses the degree of pathological worry. We used a Korean version of the PSWQ (Kim & Min, 1998), which has five negatively worded items (1, 3, 8, 10, and 11). A total score is computed by summation after reverse scoring five negatively keyed items (score range from 16 to 80). The internal consistency coefficient of the Korean version of the PSWQ was .93 (Lim, Kim, Lee, & Kwon, 2008).

### 2.2.4. Brief fear of negative evaluation (BFNE; Leary, 1983)

The BFNE is a 12-item questionnaire that assesses a degree of fear of negative evaluation from others. We used a Korean version of the BFNE (Lee & Choi, 1997), which has four negatively worded items (2, 4, 7, and 10). A total score is computed by summation after reverse scoring four negatively keyed items (score range from 12 to 60). The internal consistency coefficient of the Korean version of the BFNE was .90 (Lee & Choi, 1997).

### 2.2.5. State-trait anxiety inventory, trait version (STAI-T; Spielberger, Gorsuch, & Lushene, 1970)

The STAI-T is a 20-item questionnaire used to assess the degree of trait anxiety. We used a Korean version of the STAI-T, which has seven negatively worded items (1, 6, 7, 10, 13, 16, and 19). A total score is computed by summation after reverse scoring seven negatively keyed items (score range from 20 to 80). According to previous studies, the STAI-T also assesses depression, psychological well-being and so on, in addition to trait anxiety (Caci, Bayle, Dossios, Robert, & Boyer, 2003; Reiss, 1997). For this reason, it is suggested that the STAI-T broadly assesses negative affect rather than specifically assessing trait anxiety. The internal consistency coefficient of the Korean version of the STAI-T was .89 (Lim & Kwon, 2007).

### 2.2.6. Beck depression inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961)

The BDI is a 21-item questionnaire designed to assess a degree of depressive symptoms over a 1-week period. We used a Korean version of the BDI having an internal consistency coefficient of .92 (Lee & Song, 1991).

### 2.3. Procedure

The OCI-R was administered to 702 college students and 91 OCD patients who both gave informed consent. To examine order effect, 467 students completed it before the PI-WSUR, and 121 students completed it after the PI-WSUR. In addition, to examine the test-retest reliability, the OCI-R was readministered to 118 students four weeks after the initial administration. Finally, to examine the convergent and divergent validity of the OCI-R, 467 students completed the PI-WSUR, BDI, PSWQ, STAI-T, and BFNE with the OCI-R. The patients with OCD completed the OCI-R after the structured diagnostic interview.

### 2.4. Statistical analyses

Confirmatory factor analyses (CFA) were conducted with Mplus 4.2 (Múthen & Múthen, 2006). We used robust maximum likelihood estimation because some items departed from the normal distribution (e.g., for item 10, skewness = 2.04 and kurtosis = 3.41). Missing data were handled using the maximum likelihood estimation method. To evaluate goodness-of-fit of the CFA models, we selected multiple indices, including the Tucker-Lewis index (TLI; Tucker & Lewis, 1973), the comparative fit index (CFI; Bentler, 1990), the root mean square error of approximation (RMSEA; Steiger, 1990), and the standardized root mean square residual (SRMR) because each of these indices provides somewhat different information. The TLI and CFI with values close to .95 indicate a good fit (Hu & Bentler, 1999), and the RMSEA with values less than .05 indicates a good fit and with values above than .05 and less than .08 indicates reasonable fit (Browne & Cudeck, 1992). The SRMR with values less than .08 indicates a good fit (Hu & Bentler, 1999).

To test whether the difference between two correlation coefficients was significant, we used Fisher's *z*-transformation as suggested by Meng, Rosenthal, and Rubin (1992). In addition, to examine cultural differences on mean scores of the OCI-R, we estimated effect sizes for the mean differences between our data and the data from the studies in other cultural contexts using Cohen's *d* (Cohen, 1988). According to Cohen's (1988) standard, the *d* with values above than .50 indicates medium effect and with values above than .80 indicates large effect.

Finally, to test the diagnostic accuracy of the OCI-R and investigate cultural effects on cutoff scores, we conducted receiver operating characteristic (ROC) analyses using SPSS 15.0. The ROC

analysis derives an area under the ROC curve (AUC), which indicates the discrimination power of a classifier using specificity (i.e., true positive) and sensitivity (i.e., true negative). An AUC value of 1.0 indicates a perfect classifier, .5 indicates chance level, and under .5 indicates that the classifier performs worse than chance. As a criterion for evaluating the optimal cutscores, we used the Youden index (*J*), which is defined as  $J = \text{sensitivity} + \text{specificity} - 1$  (Youden, 1950). The index ranges from 0 to 1, and the largest value (i.e., the value closest to 1) indicates the corresponding cutscore is the optimal threshold.

## 3. Results

### 3.1. Factor structure

To test the stability of the factor structure of the OCI-R in a Korean sample, we separately conducted CFA with the data from college students and patients with OCD. As a result, the goodness-of-fit indices for the Korean version of the OCI-R indicated that the data fit well to the six-factor structure model (for the college student group,  $\chi^2 (120, N = 702) = 412.30, p < .001, TLI = .900, CFI = .921, RMSEA = .059, SRMR = .042$ ; for the OCD patient group,  $\chi^2 (120, N = 91) = 175.11, p < .001, TLI = .902, CFI = .923, RMSEA = .071, SRMR = .073$ ). The significant Chi-square value suggested that the six-factor model is not adequate. However, because the value tends to be substantial when sample size is large, the result of the Chi-square test may well be ignored when assessing large sample sizes (Jöreskog & Sörbom, 1993). Table 1 presents the factor loadings and squared multiple correlations (SMC) for items. All items showed acceptable SMC values of  $>.30$ , except for item 16. For a comparison, the one-factor model, in which 18 items loaded on the one factor, was also tested. As a result, the goodness-of-fit indices indicated poor fits (for the college students group,  $\chi^2 (135, N = 702) = 1062.18, p < .001, TLI = .718, CFI = .751, RMSEA = .099, SRMR = .071$ ; for the OCD patient group,  $\chi^2 (135, N = 91) = 489.17, p < .001, TLI = .439, CFI = .505, RMSEA = .170, SRMR = .131$ ).

### 3.2. Descriptive statistics, internal consistency, and test-retest reliability (four-week interval)

Table 2 presents the means, standard deviations, and Cronbach's alphas of the OCI-R total and its subscales, and Table 3 shows descriptive statistics of the other measures. Compared with college students, patients with OCD scored higher on the OCI-R total and its subscales (for the total scale,  $t (102) = 8.74$ ; for the subscales,  $t$ -range = 5.11–14.14, all  $ps < .001$ , two-tailed) except for the hoarding and ordering subscales,  $t (102) = 1.08$  and 1.83,  $p = .28$  and  $.07$ , respectively. Notably, for the college student group, the mean scores of the hoarding, ordering, and obsessing subscales were significantly higher than those of other subscales ( $t$ -range = 9.50–16.97, all  $ps < .001$ ). The coefficient alpha for the entire scale was very high, and the alphas of the subscales were adequate except for the neutralizing subscale (for the college student group,  $\alpha = .67$ ). The corrected correlations between items and total score were moderate to high (for the college student group,  $r$ -range = .37–.63; for the OCD patient group,  $r$ -range = .31–.68).

Additionally, we calculated Spearman correlations among the subscales of the OCI-R. As presented in Table 4, the correlations between the OCI-R total and its subscales were moderate to high. Furthermore, the correlations among the subscales were low to moderate, indicating the subscales are related to each other, but not redundant.

**Table 1**  
Factor loadings and squared multiple correlations from confirmatory factor analysis.

| Item | Factor 1: hoarding | Factor 2: checking | Factor 3: ordering | Factor 4: neutralizing | Factor 5: washing | Factor 6: obsessing | SMC       |
|------|--------------------|--------------------|--------------------|------------------------|-------------------|---------------------|-----------|
| 1    | .62 (.87)          |                    |                    |                        |                   |                     | .38 (.76) |
| 7    | .72 (.85)          |                    |                    |                        |                   |                     | .52 (.72) |
| 13   | .71 (.68)          |                    |                    |                        |                   |                     | .51 (.47) |
| 2    |                    | .71 (.84)          |                    |                        |                   |                     | .50 (.71) |
| 8    |                    | .78 (.84)          |                    |                        |                   |                     | .61 (.71) |
| 14   |                    | .73 (.89)          |                    |                        |                   |                     | .54 (.79) |
| 3    |                    |                    | .62 (.76)          |                        |                   |                     | .38 (.57) |
| 9    |                    |                    | .70 (.69)          |                        |                   |                     | .49 (.48) |
| 15   |                    |                    | .75 (.81)          |                        |                   |                     | .56 (.65) |
| 4    |                    |                    |                    | .73 (.71)              |                   |                     | .53 (.51) |
| 10   |                    |                    |                    | .71 (.95)              |                   |                     | .51 (.90) |
| 16   |                    |                    |                    | .53 (.51)              |                   |                     | .28 (.26) |
| 5    |                    |                    |                    |                        | .61 (.64)         |                     | .37 (.41) |
| 11   |                    |                    |                    |                        | .67 (.87)         |                     | .45 (.76) |
| 17   |                    |                    |                    |                        | .73 (.78)         |                     | .54 (.61) |
| 6    |                    |                    |                    |                        |                   | .68 (.57)           | .46 (.32) |
| 12   |                    |                    |                    |                        |                   | .74 (.90)           | .55 (.80) |
| 18   |                    |                    |                    |                        |                   | .87 (.83)           | .75 (.68) |

Note:  $n = 702$  (college students). Parenthesized values are factor loadings and squared multiple correlations from the OCD patient group ( $n = 91$ ). SMC = squared multiple correlations.

The OCI-R total and its subscales demonstrated high test-retest reliabilities over a four week period except for the obsessing subscale (see Table 4). The moderate correlation that was found in the obsessing subscale indicated that the subscale is temporally less stable than other subscales.

### 3.3. Convergent and divergent validity

To examine the convergent and divergent validity of the OCI-R, we calculated Spearman correlations with several measures. As indicated in Table 5, there was a strong correlation between the OCI-R and the PI-WSUR total scores. In addition, the checking, washing, and obsessing subscales of the OCI-R showed the highest correlations with the checking, contamination/washing, and harm-obsession subscales of the PI-WSUR, respectively, indicating that the OCI-R total and its subscales have good convergent validity.

The correlation between the OCI-R and the PSWQ total scores, which was the highest among the correlations with other measures, was significantly lower than the correlation between the OCI-R and the PI-WSUR ( $z = 8.32$ ,  $p < .001$ , two-tailed), suggesting that the divergent validity of the OCI-R is good. In addition, the correlations of the OCI-R checking and washing subscales with corresponding subscales of PI-WSUR were significantly higher than those with other symptom subscales of the PI-WSUR, indicating that the divergent validity of the checking and washing subscales are good ( $z$ -range = 4.94–10.65, all  $ps < .001$ ).

**Table 2**  
Mean scores (SD) and Cronbach's alphas for the OCI-R total and its subscales.

|              | Mean (SD)                  |                            |                            |                            | $\alpha$ |     |
|--------------|----------------------------|----------------------------|----------------------------|----------------------------|----------|-----|
|              | CS men <sup>a</sup>        | CS women <sup>b</sup>      | CS total <sup>c</sup>      | OCD total <sup>d</sup>     | CS       | OCD |
| OCI-R total  | 17.26 <sub>a</sub> (11.05) | 17.72 <sub>a</sub> (11.02) | 17.46 <sub>a</sub> (11.03) | 29.51 <sub>b</sub> (12.53) | .90      | .87 |
| Hoarding     | 3.55 <sub>a</sub> (2.60)   | 3.70 <sub>a</sub> (2.29)   | 3.62 <sub>a</sub> (2.47)   | 3.27 <sub>a</sub> (2.89)   | .73      | .82 |
| Checking     | 2.66 <sub>a</sub> (2.47)   | 2.54 <sub>a</sub> (2.57)   | 2.61 <sub>a</sub> (2.51)   | 4.64 <sub>b</sub> (3.42)   | .78      | .89 |
| Ordering     | 3.45 <sub>a</sub> (2.57)   | 3.60 <sub>a</sub> (2.72)   | 3.52 <sub>a</sub> (2.64)   | 4.15 <sub>a</sub> (3.17)   | .73      | .80 |
| Neutralizing | 2.12 <sub>a</sub> (2.23)   | 1.90 <sub>a</sub> (2.25)   | 2.02 <sub>a</sub> (2.24)   | 3.82 <sub>b</sub> (3.27)   | .67      | .74 |
| Washing      | 1.98 <sub>a</sub> (2.13)   | 2.11 <sub>a</sub> (2.16)   | 2.04 <sub>a</sub> (2.14)   | 5.54 <sub>b</sub> (3.47)   | .71      | .80 |
| Obsessing    | 3.50 <sub>a</sub> (2.83)   | 3.83 <sub>a</sub> (2.75)   | 3.65 <sub>a</sub> (2.80)   | 8.08 <sub>b</sub> (2.91)   | .80      | .80 |

Note: Means that do not share subscripts in the same row differ at  $p < .01$  (two-tailed). CS = college student sample. OCD = OCD patient sample. OCI-R = Obsessive-Compulsive Inventory-Revised.

<sup>a</sup>  $n = 392$ .

<sup>b</sup>  $n = 310$ .

<sup>c</sup>  $n = 702$ .

<sup>d</sup>  $n = 91$ .

In contrast, the correlation of the OCI-R obsessing subscale with the PI-WSUR harm-obsession subscale was not significantly different from the correlations with the PSWQ, the STAI-T, as well as the checking subscale of the PI-WSUR ( $z$ -range = .18–1.33, all  $ps > .05$ ), indicating that the divergent validity of the obsessing subscale is questionable.

### 3.4. Order effects

To examine the possibility of an order effect on the OCI-R, its total scores were separately calculated when it was administered before and after the PI-WSUR. As a result, even though the difference was not statistically significant,  $t(160) = 1.92$ ,  $p = .057$ , there was a tendency towards higher scores when the OCI-R was presented before the PI-WSUR ( $M = 18.13$ ,  $SD = 10.65$ ) as compared to when it was presented following the PI-WSUR ( $M = 15.62$ ,  $SD = 13.30$ ). Notably, we could find the significant order effect for the PI-WSUR,  $t(586) = 2.257$ ,  $p = .024$ . That is, the PI-WSUR total score was higher when it administered before the OCI-R ( $M = 34.76$ ,  $SD = 19.23$ ) than after the OCI-R ( $M = 30.47$ ,  $SD = 18.46$ ).

### 3.5. Gender effects

To examine gender differences in the OCI-R score, the total and subscale scores were calculated for each gender group in the college student sample, which are presented in Table 2. As a result, no gender differences were found,  $t$ -range = .55–1.57, all  $ps > .05$ .



**Table 3**  
Mean scores (SD) for measures of OC symptoms, other anxiety symptoms, and negative affect.

|                                       | CS men <sup>a</sup>        | CS women <sup>b</sup>      | CS total <sup>c</sup> | Possible range |
|---------------------------------------|----------------------------|----------------------------|-----------------------|----------------|
| <i>OC symptom measure</i>             |                            |                            |                       |                |
| PI-WSUR total                         | 29.76 <sub>a</sub> (18.19) | 31.28 <sub>a</sub> (18.77) | 30.47 (18.46)         | 0–156          |
| Checking                              | 10.83 <sub>a</sub> (6.97)  | 10.45 <sub>a</sub> (7.31)  | 10.65 (7.13)          | 0–40           |
| Contamination/<br>washing             | 8.69 <sub>a</sub> (6.06)   | 10.85 <sub>b</sub> (6.75)  | 9.70 (6.47)           | 0–40           |
| Harm-obsession                        | 5.31 <sub>a</sub> (4.46)   | 5.90 <sub>a</sub> (4.69)   | 5.59 (4.57)           | 0–24           |
| Harm-impulse                          | 3.63 <sub>a</sub> (4.62)   | 2.60 <sub>b</sub> (3.67)   | 3.15 (4.23)           | 0–36           |
| Grooming                              | 1.29 <sub>a</sub> (2.03)   | 1.53 <sub>a</sub> (2.00)   | 1.40 (2.02)           | 0–12           |
| <i>Other anxiety symptom measures</i> |                            |                            |                       |                |
| PSWQ                                  | 44.19 <sub>a</sub> (11.30) | 47.27 <sub>b</sub> (11.93) | 45.63 (11.69)         | 16–80          |
| BFNE                                  | 21.43 <sub>a</sub> (7.25)  | 22.46 <sub>a</sub> (7.33)  | 21.90 (7.30)          | 12–60          |
| <i>Negative affect measures</i>       |                            |                            |                       |                |
| STAI-T                                | 41.94 <sub>a</sub> (8.88)  | 44.33 <sub>b</sub> (8.98)  | 43.05 (9.00)          | 20–80          |
| BDI                                   | 6.30 <sub>a</sub> (7.01)   | 6.93 <sub>a</sub> (5.70)   | 6.59 (6.44)           | 0–63           |

Note: Means that do not share subscripts in the same row differ at  $p < .01$  (two-tailed). CS = college student sample. PI-WSUR = Padua Inventory–Washington State University Revision. PSWQ = Penn State Worry Questionnaire. BFNE = Brief Fear of Negative Evaluation. STAI-T = State-Trait Anxiety Inventory, Trait Version. BDI = Beck Depression Inventory.

<sup>a</sup>  $n = 249$ .

<sup>b</sup>  $n = 218$ .

<sup>c</sup>  $n = 467$ .

Because there was the significant difference between mean ages for the gender groups, we additionally conducted analyses of covariance (ANCOVA) with age as covariates. The result also confirmed that there are no gender differences,  $F$ -range = .05–2.65, all  $ps > .05$ . In contrast, as presented in Table 3, we could find the significant gender differences in contamination/washing and harm-impulse subscales of the PI-WSUR.  $F(1, 464) = 7.87$  and  $8.04$ , all  $ps = .005$ .

### 3.6. Cultural effects

To examine cultural differences in the OCI-R score, we compared our data with those from the studies in other cultural contexts. As presented in Table 6, for the college student samples, medium effect sizes ( $d > .50$ ) were found in the OCI-R total, neutralizing, washing and obsessing subscale scores between the French and Korean samples,  $d = .62, .62, .59$ , and  $.67$ , respectively; Korean college students scored higher on these subscales than French college students. In addition, the obsessing subscale score for the Icelandic college sample and the neutralizing subscale score for the Spanish college sample were moderately lower than the corresponding subscale scores for the college sample in current study,  $d = .50$  and  $.56$ , respectively. For the OCD patient samples, the

Korean sample displayed the considerably higher score on the obsessing subscale than the German sample,  $d = .80$ .

### 3.7. ROC analyses and cutoff scores

The ROC analyses on the OCI-R total and its subscales showed that the obsessing subscale is the best discriminator between patients with OCD and nonclinical college students,  $AUC = .86$  with an asymptotic 95% confidence interval (CI) of (.82, .90). The discrimination powers of the washing subscale and the OCI-R total scale were also good,  $AUC = .79$  with a 95% CI of (.74, .85) and  $AUC = .77$  with a 95% CI of (.73, .82), respectively. The AUC values for the other subscales ranged from .45 (hoarding) to .68 (checking).

To examine the optimal cutscore, we calculated the Youden index at different cutscores for the OCI-R total scale and obsessing subscale, which is presented in Table 7. For the OCI-R total scale, the optimal cutscore is 22 (sensitivity = .74, specificity = .69,  $J = .43$ ). For the obsessing subscale, the optimal cutscore is 5 (sensitivity = .87, specificity = .67,  $J = .54$ ). As a result of comparisons between current samples and the U.S. samples (Foa et al., 2002), the suggested cutscores for the Korean sample are similar to those for the U.S. sample (for the OCI-R total and obsessing subscale, the suggested cutscores were 21 and 4, respectively).

## 4. Discussion

The present study examined the psychometric properties of the Korean version of the OCI-R in a nonclinical and a clinical sample. We also investigated the order, gender, and cultural effects that have not been clearly determined in previous studies.

Confirmatory factor analysis showed that our data fit well to the six-factor model originally suggested by Foa et al. (2002). Although patients with OCD scored higher on the OCI-R total and its subscales than college students, we failed to find significant differences in the hoarding and ordering subscale scores. Further, the ROC analyses demonstrated that the hoarding and ordering subscales could not discriminate patients with OCD from college students (i.e., the AUC values for the hoarding and ordering subscales were chance level). These anomalies can be seen to result from low score on the hoarding subscale among patients with OCD and high scores on the hoarding and ordering subscales among college students.

The low score on the hoarding subscale among patients with OCD has been consistently reported in previous studies (Foa et al., 2002; Sica et al., 2009; see Table 6). This could be due to a low frequency of hoarding in patients with OCD (Steketee & Frost, 2003) or weak relevance between hoarding and OCD (Grisham et al., 2005), which is also supported by the low correlations between hoarding subscale and other subscales. Moreover, for the OCD patient group, the hoarding subscale did not show a significant

**Table 4**  
Inter-factor correlations and test-retest reliabilities.

|                 | Inter-factor correlations <sup>a</sup> |                         |           |           |                         |           | Test-retest reliability <sup>b</sup> |
|-----------------|--|-------------------------|-----------|-----------|-------------------------|-----------|--------------------------------------|
|                 | 1                                      | 2                       | 3         | 4         | 5                       | 6         |                                      |
| OCI-R total     | .69 (.60)                              | .75 (.71)               | .75 (.72) | .73 (.71) | .72 (.52)               | .71 (.51) | .79                                  |
| 1. Hoarding     |  |                         |           |           |                         |           | .69                                  |
| 2. Checking     | .47 (.33)                              |                         |           |           |                         |           | .71                                  |
| 3. Ordering     | .40 (.44)                              | .52 (.46)               |           |           |                         |           | .75                                  |
| 4. Neutralizing | .45 (.43)                              | .54 (.46)               | .46 (.34) |           |                         |           | .78                                  |
| 5. Washing      | .38 (.07 <sup>c</sup> )                | .47 (.15 <sup>c</sup> ) | .51 (.36) | .54 (.25) |                         |           | .73                                  |
| 6. Obsessing    | .37 (.19 <sup>c</sup> )                | .38 (.29)               | .38 (.29) | .43 (.27) | .44 (.10 <sup>c</sup> ) |           | .59                                  |

Note:  $n = 702$  (college students). Parenthesized values are correlation coefficients from the OCD patient group ( $n = 91$ ). OCI-R = Obsessive-Compulsive Inventory–Revised.

<sup>a</sup> Spearman correlations were calculated.

<sup>b</sup>  $n = 118$  (college students); the test-retest interval was four weeks.

<sup>c</sup> The correlation coefficients are not significant at  $p < .05$  (two-tailed).

**Table 5**  
Convergent and divergent validity.

|              | PI-WSUR    |            |                       |                |              |          | Other anxiety symptom |      | Negative affect |     |
|--------------|------------|------------|-----------------------|----------------|--------------|----------|-----------------------|------|-----------------|-----|
|              | Total      | Checking   | Contamination/washing | Harm-obsession | Harm-impulse | Grooming | PSWQ                  | BFNE | STAI-T          | BDI |
| OCI-R Total  | <b>.75</b> | .70        | .54                   | .58            | .29          | .45      | .49                   | .43  | .43             | .32 |
| Hoarding     | .46        | .42        | .32                   | .41            | .22          | .19      | .29                   | .28  | .33             | .20 |
| Checking     | .58        | <b>.64</b> | .38                   | .44            | .17          | .30      | .37                   | .26  | .33             | .21 |
| Ordering     | .49        | .46        | .40                   | .31            | .14          | .40      | .31                   | .28  | .17             | .14 |
| Neutralizing | .56        | .56        | .39                   | .45            | .23          | .36      | .33                   | .25  | .29             | .16 |
| Washing      | .60        | .47        | <b>.65</b>            | .40            | .19          | .44      | .29                   | .22  | .17             | .16 |
| Obsessing    | .57        | .50        | .33                   | <b>.54</b>     | .31          | .28      | .49                   | .46  | .53             | .44 |

Note:  $n = 467$  (college students). All correlations were significant at  $p < .01$  (two-tailed). Bold values indicate correlations with the corresponding subscales. OCI-R = Obsessive-Compulsive Inventory-Revised. PI-WSUR = Padua Inventory-Washington State University Revision. PSWQ = Penn State Worry Questionnaire. BFNE = Brief Fear of Negative Evaluation. STAI-T = State-Trait Anxiety Inventory, Trait Version. BDI = Beck Depression Inventory.

correlation with the washing subscale, which is a more characteristic OCD symptom.

In addition, the high scores on the hoarding and ordering subscales among college students have been also reported in previous studies (Foa et al., 2002; Hajcak et al., 2004; also see Table 6). However, its reason remains unclear. Given that inability to discard worthless objects and preoccupation with orderliness belong to the diagnostic criteria of obsessive-compulsive personality disorder in the DSM-IV-TR (American Psychiatric Association, 2000) and that the hoarding and ordering subscales of the OCI-R were found to be highly correlated with obsessive-compulsive personality features (Gönner et al., 2008), the high scores on the hoarding and ordering subscales might be related to high levels of OCPD traits among college students. However, because there have been few reports on OCPD traits of college students, these speculative associations need to be examined in the future.

The internal consistency of the Korean version of the OCI-R was satisfactory. However, the neutralizing subscale showed the lowest internal consistency as in the previous studies (Foa et al., 2002; Fullana et al., 2005; Hajcak et al., 2004). This is likely due to the heterogeneous contents of its items. That is, item 4 (“I feel compelled to count while I am doing things”) and item 10 (“I feel I have to repeat certain numbers”) refer to the counting behaviors, whereas item 16 (“I feel that there are good and bad numbers”), which showed the lowest squared multiple correlation, refers to superstitious thinking.

The test-retest reliability of the Korean version of the OCI-R was slightly higher than that reported by Hajcak et al. (2004) and Fullana et al. (2005). Among the subscales, the obsessing subscale showed the lowest test-retest reliability, which was also found by Fullana et al. (2007).

Although the convergent and divergent validity of the Korean version of the OCI-R was good, the divergent validity of the obsessing subscale was poor because of high correlation with

negative affect (Fullana et al., 2005; Gönner et al., 2008; Hajcak et al., 2004). Given that negative affect serves as a higher vulnerability factor of anxiety disorder (Clark & Watson, 1991), the high correlation might imply that the obsessing subscale is more affected by the vulnerability factor than the other subscales. This possibility is also supported by the findings that patients with other anxiety disorders as well as OCD have consistently scored higher on the obsessing subscale than the other subscales (Abramowitz & Deacon, 2006; Foa et al., 2002; Gönner et al., 2008; Huppert et al., 2007). Moreover, based on clinical observation, Foa et al. (2002) pointed out that many patients with other anxiety disorders also suffer from unpleasant intrusive thoughts.

Despite the poor divergent validity, the discriminant power of the obsessing subscale was good; the obsessing subscale was the best classifier between patients with OCD and college students in the present study. Additionally, in previous studies, the obsessing subscale could effectively discriminate patients with OCD from patients with other anxiety disorders (Abramowitz & Deacon, 2006; Foa et al., 2002). This good discriminant validity might be due to the fact that most patients with OCD commonly have obsessional thoughts and are more distressed by the intrusive thoughts than patients with other anxiety disorders.

No significant order effect for the OCI-R was found. However, the OCI-R total score, when administered following another OC symptom measure, was observed to have a tendency to decrease. A similar but significant order effect for the PI-WSUR was also found.

There were no significant gender effects on the OCI-R total and its subscale. However, we found the significant gender differences in the PI-WSUR contamination/washing and harm-impulse subscales. Although the reason that the gender effects were different between the OCI-R and the PI-WSUR is unclear, the subscales of the OCI-R might be less sensitive to group differences because the subscales of the OCI-R are shorter than those of the PI-

**Table 6**  
Cultural differences in mean scores.

|              | College student         |                        |                       |             |             | OCD patient            |             |             |             |
|--------------|-------------------------|------------------------|-----------------------|-------------|-------------|------------------------|-------------|-------------|-------------|
|              | French                  | Icelandic              | Spanish               | U.S.        | Korean      | German                 | Italian     | U.S.        | Korean      |
| OCI-R total  | 11.4 (8.6) <sup>a</sup> | 13.5 (9.2)             | 15.6 (9.3)            | 18.9 (11.4) | 17.5 (11.0) | 26.1 (13.3)            | 25.0 (13.9) | 28.0 (13.5) | 29.5 (12.5) |
| Hoarding     | 3.1 (2.5)               | 3.2 (2.5)              | 3.9 (2.4)             | 4.4 (2.7)   | 3.6 (2.5)   | 2.3 (2.8)              | 1.9 (2.5)   | 3.7 (3.9)   | 3.3 (2.9)   |
| Checking     | 1.7 (2.3)               | 2.2 (2.3)              | 2.3 (2.3)             | 3.0 (2.6)   | 2.6 (2.5)   | 6.5 (4.3)              | 3.6 (3.5)   | 4.8 (3.9)   | 4.6 (3.4)   |
| Ordering     | 2.8 (2.6)               | 3.2 (2.6)              | 4.1 (2.5)             | 4.5 (3.2)   | 3.5 (2.6)   | 4.9 (4.1)              | 4.3 (3.8)   | 4.8 (4.0)   | 4.2 (3.2)   |
| Neutralizing | .8 (1.6) <sup>a</sup>   | 1.2 (1.8)              | .9 (1.5) <sup>a</sup> | 1.8 (2.2)   | 2.0 (2.2)   | 2.5 (3.2)              | 2.7 (3.9)   | 3.2 (3.8)   | 3.8 (3.3)   |
| Washing      | .9 (1.6) <sup>a</sup>   | 1.4 (2.0)              | 1.2 (1.8)             | 2.4 (2.6)   | 2.0 (2.1)   | 4.6 (4.4)              | 4.4 (4.6)   | 4.4 (4.3)   | 5.5 (3.5)   |
| Obsessing    | 2.0 (2.2) <sup>a</sup>  | 2.4 (2.4) <sup>a</sup> | 3.3 (3.0)             | 2.9 (2.8)   | 3.7 (2.8)   | 5.3 (3.8) <sup>a</sup> | 8.0 (3.6)   | 7.2 (3.8)   | 8.1 (2.9)   |

Note: Parenthesized values are standard deviations. The French sample ( $n = 583$ ) is from Zermatten et al. (2006). The Icelandic sample ( $n = 816$ ) is from Smári et al. (2007). The Spanish sample ( $n = 381$ ) is from Fullana et al. (2005). The U.S. college student sample ( $n = 395$ ) is from Hajcak et al. (2004) Study 1. The Korean college student sample ( $n = 702$ ) is from the current study. The German sample ( $n = 167$ ) is from Gönner et al. (2008). The Italian sample ( $n = 52$ ) is from Sica et al. (2009). The U.S. OCD patient sample ( $n = 215$ ) is from Foa et al. (2002). The Korean OCD patient sample ( $n = 91$ ) is from the current study.

<sup>a</sup> The mean scores show the considerable differences with the mean scores from the current study; effect sizes for the mean differences are medium to large (Cohen's  $d > .50$ ).

**Table 7**  
Sensitivity and specificity at different cutscores of the OCI-R total and obsessing subscale.

| Cutscore           | Sensitivity | Specificity | Youden index |
|--------------------|-------------|-------------|--------------|
| OCI-R total        |             |             |              |
| 5                  | 1.00        | .09         | .09          |
| 10                 | .98         | .27         | .24          |
| 15                 | .89         | .46         | .35          |
| 20                 | .78         | .64         | .42          |
| <b>22</b>          | <b>.74</b>  | <b>.69</b>  | <b>.43</b>   |
| 25                 | .58         | .77         | .35          |
| Obsessing subscale |             |             |              |
| 3                  | .97         | .40         | .36          |
| 4                  | .95         | .55         | .50          |
| <b>5</b>           | <b>.87</b>  | <b>.67</b>  | <b>.54</b>   |
| 6                  | .76         | .77         | .53          |
| 7                  | .67         | .83         | .50          |

Note: Bold values indicate the optimal cutscores. OCI-R = Obsessive-Compulsive Inventory-Revised.

WSUR. That is, the subscales of the OCI-R have only three items, whereas the subscales of PI-WSUR consist of seven to ten items except for the grooming subscale.

For the cultural effects, the Korean samples including college student and OCD patient samples scored higher on the obsessing subscale than French, Icelandic, and German samples. Although there have been no reports that Korean people are distressed by more obsessions than Western people, this might reflect a high level of negative affectivity among the Asian people (see Chang, 2002). Besides, the Korean college sample scored higher on the neutralizing subscale than the French and Spanish college samples; further examination is required to determine whether or not cultural factors caused this difference.

Finally, the optimal cutscores for the OCI-R total and obsessing subscale were similar between the current samples and the U.S. samples from Foa et al. (2002). However, because Foa et al. (2002) did not use the Youden index to select the optimal cutscore, it was not possible to make a direct comparison between two cutscores.

The present study has several limitations. First of all, because the nonclinical sample in this study included only college students, the sample is not representative of a nonclinical general population. In addition, because this study included no clinical comparison groups with other psychiatric diagnoses such as anxiety or depressive disorder, the discriminant validity and cutscores could not be thoroughly examined. Finally, there are possibilities that the cultural differences in the OCI-R scores were caused simply by the differences in characteristics of samples, differences in severity, subtypes, or comorbidity of clinical samples, or differences in the way items are interpreted in each culture, not by cultural factors.

In conclusion, the present study demonstrates that the Korean version of the OCI-R is similar to the original version of the OCI-R in the psychometric properties and could be a useful tool for screening and detection of OCD. However, there are some negative results including the low internal consistency of the neutralizing subscale, weak discriminant validity of the hoarding and ordering subscales, and poor divergent validity of the obsessing subscale. Finally, no significant order and gender effects were found, whereas the cultural differences were found in the neutralizing and obsessing subscales.

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## References

- Abramowitz, J. S., & Deacon, B. J. (2006). Psychometric properties and construct validity of the obsessive-compulsive inventory-revised: replication and extension with a clinical sample. *Journal of Anxiety Disorders, 20*, 1016–1035.
- Abramowitz, J. S., Tolin, D. F., & Diefenbach, G. J. (2005). Measuring change in OCD: sensitivity of the obsessive-compulsive inventory-revised. *Journal of Psychopathology and Behavioral Assessment, 27*, 317–324.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th-TR ed.). Washington, DC: Author.
- Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory of measuring depression. *Archives of General Psychiatry, 4*, 561–571.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*, 238–246.
- Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological Methods and Research, 21*, 230–258.
- Burns, G. L., Keortge, S. G., Formea, G. M., & Sternberger, L. G. (1996). Revision of the Padua inventory of obsessive compulsive disorder symptoms: distinctions between worry, obsessions, and compulsions. *Behaviour Research and Therapy, 34*, 163–173.
- Caci, H., Bayle, F. J., Dossios, C., Robert, P., & Boyer, P. (2003). The Spielberger trait anxiety inventory measures more than anxiety. *European Psychiatry, 18*, 394–400.
- Chang, E. C. (2002). Cultural differences in psychological distress in Asian and Caucasian American college students: examining the role of cognitive and affective concomitants. *Journal of Counseling Psychology, 49*, 47–59.
- Clark, L. A., & Watson, D. (1991). Tripartite model of anxiety and depression: psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology, 100*, 316–336.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New York: Academic Press.
- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (1996). *Structured Clinical Interview for DSM-IV Axis I Disorders*. New York: Biometric Research. New York State Psychiatric Institute.
- Foa, E. B., Huppert, J. D., Leiberg, S., Langner, R., Kichic, R., & Hajcak, G. (2002). The obsessive-compulsive inventory: development and validation of a short version. *Psychological Assessment, 14*, 485–496.
- Foa, E. B., Kozak, M. J., Salkovskis, P. M., Coles, M. E., & Amir, N. (1998). The validation of a new obsessive-compulsive disorder scale: the obsessive-compulsive inventory. *Psychological Assessment, 10*, 206–214.
- Fullana, M. A., Tortella-Feliu, M., Caseras, X., Andion, O., Torrubia, R., & Mataix-Cols, D. (2005). Psychometric properties of the Spanish version of the obsessive-compulsive inventory-revised in a non-clinical sample. *Journal of Anxiety Disorders, 19*, 893–903.
- Fullana, M. A., Tortella-Feliu, M., Caseras, X., Taberner, J., Torrubia, R., & Mataix-Cols, D. (2007). Temporal stability of obsessive-compulsive symptom dimensions in an undergraduate sample: a prospective 2-year follow-up study. *Behavior Modification, 31*, 815–824.
- Göner, S., Leonhart, R., & Ecker, W. (2008). The obsessive-compulsive inventory-revised (OCI-R): validation of the German version in a sample of patients with OCD, anxiety disorders, and depressive disorders. *Journal of Anxiety Disorders, 22*, 734–749.
- Grisham, J., Brown, T., Liverant, G., & Campbell-Sills, L. (2005). The distinctiveness of compulsive hoarding from obsessive-compulsive disorder. *Journal of Anxiety Disorders, 19*, 767–779.
- Hajcak, G., Huppert, J. D., Simons, R. F., & Foa, E. B. (2004). Psychometric properties of the OCI-R in a college sample. *Behaviour Research and Therapy, 42*, 115–123.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55.
- Huppert, J. D., Walther, M. R., Hajcak, G., Yadin, E., Foa, E. B., Simpson, H. B., et al. (2007). The OCI-R: validation of the subscales in a clinical sample. *Journal of Anxiety Disorders, 21*, 394–406.
- Jöreskog, K. G., & Sörbom, D. (1993). *Structural equation modeling with the SIMPLIS command language*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kim, J. W., & Min, B. B. (1998). *Intolerance of uncertainty and problem orientation in worry*. Poster presented at annual convention of the Korean Psychological Association, Seoul, Korea.
- Lim, Y. J., & Kwon, S. M. (2007). The state-trait anxiety inventory, trait version: examination of a method factor. *Korean Social Science Journal, 34*, 31–48.
- Leary, M. R. (1983). A brief version of the fear of negative evaluation scale. *Journal of Personality and Social Psychology Bulletin, 9*, 371–376.
- Lee, E. H. (2005). *Incompleteness and its relationship to OCD symptoms and personality characteristics*. Unpublished master's thesis, Seoul National University, Korea.
- Lee, J., & Choi, C. (1997). Study of the reliability and the validity of the Korean versions of social phobia scales (K-SAD and K-BFNE). *Korean Journal of Clinical Psychology, 16*, 251–264.
- Lee, Y. S., & Song, J. Y. (1991). Study of reliability and validity of the BDI, the SDS, and the MMPI depression scale. *Korean Journal of Clinical Psychology, 10*, 98–113.
- Lim, Y. J., Kim, Y. H., Lee, E. H., & Kwon, S. M. (2008). The Penn state worry questionnaire: psychometric properties of the Korean version. *Depression and Anxiety, 25*, E97–E103.

- Mataix-Cols, D., Rosario-Campos, M. C., & Leckman, J. F. (2005). A multidimensional model of obsessive-compulsive disorder. *The American Journal of Psychiatry*, *162*, 228–238.
- McKay, D., Abramowitz, J. S., Calamari, J. E., Kyrios, M., Radomsky, A., Sookman, D., et al. (2004). A critical evaluation of obsessive-compulsive disorder subtypes: symptoms versus mechanisms. *Clinical Psychology Review*, *24*, 283–313.
- Meng, X.-L., Rosenthal, R., & Rubin, D. B. (1992). Comparing correlated correlation coefficients. *Psychological Bulletin*, *111*, 172–175.
- Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the penn state worry questionnaire. *Behaviour Research and Therapy*, *28*, 487–495.
- Min, B. B., & Won, H. T. (1999). Reliability and validity of the Korean translations of the maudslay obsessional-compulsive inventory and Padua inventory. *Korean Journal of Clinical Psychology*, *18*, 163–182.
- Múthen, L. K., & Múthen, B. O. (2006). *Mplus (Version 4.2) [computer software]*. Los Angeles: Múthen & Múthen.
- Reiss, S. (1997). Trait anxiety: it's not what you think it is. *Journal of Anxiety Disorders*, *11*, 201–214.
- Seol, S. H. (2004). Cognitive appraisal and control strategies for worry and obsession. Unpublished master's thesis, Seoul National University, Korea.
- Sica, C., Ghisi, M., Altoè, G., Chiri, L. R., Franceschini, S., Coradeschi, D., et al. (2009). The Italian version of the obsessive compulsive inventory: its psychometric properties on community and clinical samples. *Journal of Anxiety Disorders*, *23*, 204–211.
- Smári, J., Ólason, D. T., Eypórsdóttir, A., & Frölunde, M. B. (2007). Psychometric properties of the obsessive compulsive inventory-revised among Icelandic college students. *Scandinavian Journal of Psychology*, *48*, 127–133.
- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the state-trait anxiety inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Steiger, J. H. (1990). Structural model evaluation and modification: an interval estimation approach. *Multivariate Behavioral Research*, *25*, 173–180.
- Steketee, G., & Frost, R. (2003). Compulsive hoarding: current status of the research. *Clinical Psychology Review*, *23*, 905–927.
- Thordarson, D. S., Radomsky, A. S., Rachman, S., Shafran, R., Sawchuk, C. N., & Hakstian, A. R. (2004). The Vancouver Obsessional Compulsive Inventory (VOCI). *Behaviour Research and Therapy*, *42*, 1289–1314.
- Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, *38*, 1–10.
- Watson, D., & Wu, K. D. (2005). Development and validation of the schedule of compulsions, obsessions, and pathological impulses (SCOP). *Assessment*, *12*, 50–65.
- Wu, K. D., & Watson, D. (2005). Relations between hoarding and obsessive-compulsive disorder. *Behaviour Research and Therapy*, *43*, 897–921.
- Youden, W. J. (1950). Index for rating diagnostic tests. *Cancer*, *3*, 32–35.
- Zermatten, A., Van der Linden, M., Jermann, F., & Ceschi, G. (2006). Validation of a French version of the obsessive-compulsive inventory-revised in a non-clinical sample. *Revue Européenne De Psychologie Appliquée*, *56*, 151–155.