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Patient Adherence Predicts Outcome From Cognitive Behavioral Therapy in Obsessive-Compulsive Disorder

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Objective: To examine the effects of patient adherence on outcome from exposure and response prevention (EX/RP) therapy in adults with obsessive-compulsive disorder (OCD). ***Method:*** Thirty adults with OCD were randomized to EX/RP ($n = 15$) or EX/RP augmented by motivational interviewing strategies ($n = 15$). Both treatments included 3 introductory sessions and 15 exposure sessions. Because there were no significant group differences in adherence or outcome, the groups were combined to examine the effects of patient adherence on outcome. Independent evaluators assessed OCD severity using the Yale–Brown Obsessive Compulsive Scale. Therapists assessed patient adherence to between-session EX/RP assignments at each session using the Patient EX/RP Adherence Scale (PEAS). Linear regression models were used to examine the effects of PEAS scores on outcome, adjusting for baseline severity. The relationship between patient adherence and other predictors of outcome was explored using structural equation modeling. ***Results:*** Higher average PEAS ratings significantly predicted lower posttreatment OCD severity in intent-to-treat and completer samples. PEAS ratings in early sessions (5–9) also significantly predicted posttreatment OCD severity. The effects of other significant predictors of outcome in this sample (baseline OCD severity, hoarding subtype, and working alliance) were fully mediated by patient adherence. ***Conclusions:*** Patient adherence to between-session EX/RP assignments significantly predicted treatment outcome, as did early patient adherence and change in early adherence. Patient adherence mediated the effects of other predictors of outcome. Future research should develop interventions that increase adherence and then test whether increasing adherence improves outcome. If effective, these interventions could then be used to personalize care.

Keywords: obsessive-compulsive disorder, exposure and response prevention, cognitive behavioral therapy, treatment predictors, treatment compliance

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Cognitive behavioral therapy consisting of exposure and response prevention (EX/RP) is an effective treatment for obsessive-compulsive disorder (OCD; American Psychiatric Association, 2007). However, only about half of the patients who receive EX/RP achieve minimal symptoms (Simpson et al., 2008; Simpson, Huppert, Petkova, Foa, & Liebowitz, 2006). Treatment outcome might be improved by developing more personalized care (Insel, 2009). One approach to personalized care is to identify factors that interfere with EX/RP outcome, develop interventions to address these factors, and provide these interventions to the individuals who need them.

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One factor thought to affect EX/RP outcome is whether patients adhere to the treatment procedures. Specifically, EX/RP therapists help patients face feared situations (*exposures*) to promote habituation to the anxiety that these situations trigger. Patients are asked to refrain from avoidance behaviors and rituals (*response prevention*) to break the connection between rituals and anxiety relief. Together, these procedures help disconfirm patients' irrational beliefs. Therapists practice these steps with patients in session and assign specific exercises for between-session practice. Adherence to between-session assignments is thought to be critical for good outcome because repeated practice in different contexts is theorized to be essential to the emotional processing of the fear structure (Foa & Kozak, 1986; Kozak & Foa, 1997).

Some studies suggest that patient adherence to EX/RP procedures is associated with treatment outcome (Abramowitz, Franklin, Zoellner, & DiBernardo, 2002; De Araujo, Ito, & Marks, 1996; Tolin, Maltby, Diefenbach, Hannan, & Worhunsky, 2004). However, Woods, Chambless, and Steketee (2002) found no significant relationship between EX/RP outcome and patient homework adherence. Unfortunately, patient adherence was assessed differently across these studies, none of the adherence measures has demonstrated validity or reliability, and some studies did not measure patient adherence prospectively. Thus, the effect of patient EX/RP adherence on treatment outcome has yet to be adequately examined.

To address this significant gap, in the current study, we examined the relationship between patient adherence to between-session assignments and treatment outcome in 30 adults with OCD who received EX/RP as part of a clinical trial. We used the Patient EX/RP Adherence Scale (PEAS) to prospectively assess adherence to between-session assignments because of its excellent interrater reliability and good construct validity (Simpson, Maher, et al., 2010). We hypothesized that patient adherence to between-session EX/RP assignments would be inversely associated with posttreatment OCD severity. We also examined whether early patient adherence predicted posttreatment OCD severity. Finally, we explored the relationship between patient adherence and other variables that predicted outcome in this sample.

Method

Overview of Study Design

This study was conducted at the Anxiety Disorders Clinic at the New York State Psychiatric Institute, Columbia University, and approved by the institutional review board. Participants provided written consent. The study design and procedures are described in detail elsewhere (Simpson, Zuckoff, et al., 2010). Briefly, 30 adults with OCD were randomly assigned to standard EX/RP (n = 15) or EX/RP augmented by motivational interviewing (MI) strategies (EX/RP + MI; n = 15). Both treatments followed standard EX/RP procedures outlined by Kozak and Foa (1997) and included three introductory sessions, 15 two 90-min exposure sessions a week, and daily homework assignments. There were neither statistical nor clinically meaningful differences in patient adherence or treatment outcome between the EX/RP and EX/RP + MI groups, and therapist adherence to EX/RP procedures was excellent in both conditions (for details, see Simpson, Zuckoff, et al., 2010). Because the mean difference in patient adherence (0.13, 95% confidence interval [CI; −1.07, 1.33]) and in treatment outcome (0.13, 95% CI [−6.91, 7.18]) between the two groups was very small and there was no significant Group × Adherence interaction (p = .46), the groups were combined for the purposes of this study.

Participants

Patients were eligible if they were between 18 and 70 years old and had a principal *Diagnostic and Statistical Manual of Mental Disorders* diagnosis of OCD with a Yale–Brown Obsessive Compulsive Scale (Y-BOCS) score of at least 16. Patients could be on psychotropic medication if they were on a stable dose for at least 12 weeks and if the dose remained stable during the study. Patients were excluded for other psychiatric problems needing immediate treatment (e.g., mania, psychosis, suicidality), an unstable medical condition, or prior EX/RP treatment (≥8 sessions/2 months). Psychiatric diagnoses were determined by a medical doctor or clinical psychologist and confirmed by an independent rater using the Structured Clinical Interview for *DSM–IV* (First, Spitzer, Gibbon, & Williams, 1996).

Assessments

Independent evaluators unaware of treatment condition assessed patients at baseline and after Sessions 3, 11, and 18. OCD severity was assessed using the Y-BOCS (Goodman et al., 1989), clinical response was assessed using the Clinical Global Impression Scale (CGI–Improvement; Guy, 1976), and symptoms of depression were measured with the 17-item HAM-D (Hamilton, 1960).

Therapists evaluated patient adherence to between-session EX/RP assignments at the start of each exposure session (Sessions 5–18) using the PEAS (Simpson, Maher, et al., 2010). The PEAS consists of three items that are averaged: (a) the quantity of exposures attempted (percentage of exposures attempted of those assigned), (b) the quality of exposures attempted (how well the patient performed the attempted exposures), and (c) the degree of ritual prevention (percentage of urges to ritualize that patient successfully resisted). Each item is rated on a 7-point Likert-type scale with anchors; higher ratings indicate better adherence. The PEAS has excellent interrater reliability (intraclass correlation coefficient ≥ 0.97) and good construct validity.

Other characteristics found to predict EX/RP outcome (reviewed in Maher et al., 2010) were also assessed at baseline. These included degree of insight (using the Brown Assessment of Beliefs Scale; Eisen et al., 1998), quality of life (using the Quality of Life and Enjoyment Questionnaire; Endicott, Nee, Harrison, & Blumenthal, 1993), Axis I comorbidity, number of trials of serotonin reuptake inhibitors (SRIs; i.e., clomipramine or the selective SRIs), female gender, employment status, and hoarding subtype (i.e., primary hoarding obsessions and compulsions on the Y-BOCS checklist). After the third introductory session, patients completed the Expectancy Questionnaire (Devilly & Borkovec, 2000) and the Working Alliance Inventory self-report (Horvath & Greenberg, 1989).

Statistical Analyses

Linear regression was used to evaluate whether patient adherence (i.e., mean total PEAS score across all exposure sessions)

predicted posttreatment OCD severity (i.e., Y-BOCS score), adjusting for pretreatment severity. The analyses were conducted for the intent-to-treat (ITT) sample ($n = 30$) and for patients who completed EX/RP treatment ($n = 25$). For the ITT sample, the last available observation for the outcome variable was used; missing sessions after a patient dropped from the study were given a PEAS rating of 1 (the worst score). Sensitivity analyses explored the robustness of these results (see the supplemental materials). To confirm that our findings were not limited to the Y-BOCS, we used logistic regression to examine whether the mean total PEAS score predicted a CGI–Improvement rating of much or very much improved.

Linear regression was also used to explore whether early adherence predicted outcome. The model was first constructed using the mean PEAS ratings from all sessions (Sessions 5–18), adjusting for baseline severity. Then the PEAS ratings from the latter sessions (starting with Session 18) were removed sequentially to determine the minimum number of sessions needed for PEAS ratings to predict outcome. In the ITT and completer samples, the minimum sequence was Sessions 5–9. Thus, a linear model was constructed using the mean PEAS ratings from Sessions 5–9 to explore the association between early adherence and posttreatment OCD severity. As a final step, the model included change in early adherence as an additional independent variable.

Univariate linear regression models were used to explore what predicted outcome in this sample (other than patient adherence), and a stepwise regression was conducted to establish the strongest predictors. Structural equation modeling (Preacher & Hayes, 2004) was then used to examine the relationship between these other predictors of outcome and patient mean adherence and to estimate mediated effects.

All statistical tests were conducted at two-sided level of significance, $\alpha = .05$.

Table 1
Demographic and Clinical Characteristics of the Sample (N = 30)

Characteristic	Value
Demographic	
M age in years (*SD*)	39.9 (13.4)
No. of female participants (%)	14 (47)
No. of Caucasian participants (%)	19 (63)
Marital status, No. (%)	
Single	23 (77)
Married or partnered	6 (20)
Divorced or separated	1 (3)
M years of education (*SD*)	16.1 (2.1)
No. of participants working or in school at least part-time (%)	18 (60)
Clinical	
M Y-BOCS score at baseline, $n = 30$ (*SD*; range)	28.1 (4.2; 22–37)
M Y-BOCS score at study end, $n = 25$ (*SD*; range)	13.8 (7.8; 0–29)
M HAM-D score at baseline (*SD*)	8.2 (5.2)
M age in years at OCD onset (*SD*)	20.5 (10.0)
M duration of OCD in years (*SD*)	18.5 (11.9)
No. of participants of the hoarding subtype[a] (%)	4 (13)
No. of current Axis I diagnoses (%)	
OCD only	15 (50)
Depressive disorder (MDD/dysthymia/NOS)	9 (30)
Other anxiety disorder	12 (40)
No. of participants currently taking SRI medication (%)	11 (37)
M weeks on current SRI (*SD*)	89 (81)
No. of participants currently taking non-SRI medication[b] (%)	
With an SRI	4 (13)
Without an SRI	1 (3)
No. of participants with a history of SRI medication (%)	14 (47)
No. of participants with a history of prior exposure sessions (%)	4 (13)

Note. HAM-D = Hamilton Depression Scale; OCD = obsessive compulsive disorder; MDD = major depressive disorder; NOS = depressive disorder not otherwise specified; SRI = serotonin reuptake inhibitor (i.e., clomipramine and the selective SRIs); Y-BOCS = Yale–Brown Obsessive Compulsive Scale.
[a] Patients were considered to have hoarding subtype if their primary obsessions and compulsions on the Y-BOCS checklist were related to hoarding. [b] Four patients were receiving a non-SRI medication (benzodiazepine, $n = 2$; buproprion, $n = 2$), and one was receiving only a benzodiazepine, each for more than five months.

Results

Sample

Thirty adults with OCD entered and received EX/RP treatment. Demographic and clinical characteristics are presented in Table 1. Five patients dropped out (at Session 4 [EX/RP] and at Sessions 5, 9, 11, and 15 [EX/RP + MI]). The observed mean total PEAS rating was 5.17 ($SD = 0.93$, range = 3.22–6.40). Patient outcome varied: 63.3% had at least a 25% reduction in Y-BOCS score after EX/RP, and 36.7% had an excellent response (i.e., Y-BOCS score ≤ 12).

Effect of Total Mean Patient Adherence on Posttreatment OCD Severity

Patient adherence to between-session EX/RP assignments significantly predicted posttreatment OCD severity. As shown in Table 2, higher PEAS scores predicted lower posttreatment Y-BOCS scores in the ITT and completer samples after adjusting for baseline severity, explaining a large portion of the variance. A 1-unit improvement in mean PEAS adherence led to an additional 4.3-point (ITT sample) or 6.5-point (completer sample) Y-BOCS decrease, both clinically meaningful changes. Sensitivity analyses confirmed this relationship between patient homework adherence and posttreatment OCD severity (see the supplemental materials).

To achieve minimal symptoms after treatment (i.e., Y-BOCS score ≤ 12), patients had to achieve a high degree of adherence. On the basis of the linear regression model, completers had to achieve a mean PEAS rating of 5.6 (for forecasting a future PEAS rating, 95% CI [3.9, 7.3]). In our sample, patients who completed treatment with Y-BOCS scores this low had observed mean PEAS ratings of 5.92 ($SD = 0.31$, range = 5.43–6.40). A PEAS score of 5 on all items ("good") requires attempting assigned exposures and resisting urges to ritualize about 75% of the time and completing attempted exposures with minimal safety aids. A score of 6 ("very good") signifies attempting assigned exposures and resisting urges to ritualize more than 90% of the time and completing assigned exposures as instructed.

Table 2
Association Between Total Mean Adherence and Posttreatment Obsessive-Compulsive Disorder Severity

Sample and predictor	*B*	95% CI	*p*	sr^2
Intent to treat				
Baseline Y-BOCS	0.35	[−0.21, 0.90]	.209	.02
Total mean adherence	−4.28	[−5.77, −2.80]	<.001	.46
Completer				
Baseline Y-BOCS	0.19	[−0.42, 0.81]	.523	.01
Total mean adherence	−6.48	[−9.23, −3.72]	<.001	.49

Note. CI = confidence interval; sr^2 = semi-partial correlation, a measure of the unique variance explained by each predictor that is equivalent to the R^2 change in a stepwise model when each predictor is entered separately; Y-BOCS = Yale–Brown Obsessive Compulsive Scale score.

Mean PEAS scores also significantly predicted whether a patient was rated as a responder on the CGI–Improvement Scale (i.e., much or very much improved): A 1-unit PEAS change increased the odds of response by a factor of 3.29 (95% CI [1.34, 8.11], p = .009) in the ITT sample and by a factor of 7.37 (95% CI [1.51, 35.88], p = .013) among completers.

Effect of Early Adherence on Posttreatment OCD Severity

Higher mean PEAS scores during Sessions 5–9 predicted lower posttreatment Y-BOCS scores after adjusting for baseline severity (for the ITT sample, B = −4.15, 95% CI [−2.22, −6.08], p < .001, sr^2 = .34; for completers, B = −4.05, 95% CI [−0.49, −7.62], p = .028, sr^2 = .19). As shown in Table 3, mean PEAS and change in PEAS ratings during Sessions 5–9 each independently predicted posttreatment Y-BOCS scores and together accounted for a large portion of the variance in outcome.

Relationship Between Patient Adherence and Other Predictors of Outcome

In univariate models, three variables besides patient adherence significantly predicted posttreatment Y-BOCS scores after adjusting for baseline severity: hoarding subtype (p = .024), working alliance (p = .001), and treatment expectancy (p = .014). Other baseline characteristics did not: degree of insight (p = .331), depressive severity (p = .111), quality of life (p = .683), total number of SRI trials (p = .456), total number of Axis I comorbid conditions (p = .595), female gender (p = .895), and being employed (p = .115). In the final model, hoarding subtype (p = .043) and working alliance (p = .002) remained significant after adjusting for baseline OCD severity, which was also significant (p = .007). The effects of each were fully mediated by patient adherence (see Figure 1).

Table 3
Association Between Early Adherence and Posttreatment Obsessive-Compulsive Disorder Severity

Sample and predictor	*B*	95% CI	*p*	sr^2
Intent to treat				
Baseline Y-BOCS	0.33	[−0.24, 0.91]	.246	.02
Early mean adherence	−3.82	[−5.56, −2.08]	<.001	.29
Early change of adherence	−3.16[a]	[−5.45, −0.87]	.009	.11
Completer				
Baseline Y-BOCS	0.36	[−0.40, 1.12]	.340	.03
Early mean adherence	−4.17	[−7.49, −0.85]	.016	.20
Early change of adherence	−3.58[a]	[−7.07, −0.09]	.045	.13

Note. CI = confidence interval; sr^2 = semi-partial correlation, a measure of the unique variance explained by each predictor that is equivalent to the R^2 change in a stepwise model when each predictor is entered separately; Y-BOCS = Yale–Brown Obsessive Compulsive Scale score.
[a] Measured in standard deviation units (i.e., 1 *SD* unit increase in early change of adherence corresponds to *B* points of change in posttreatment Y-BOCS).

Discussion

In this study, we examined the relationship between patient adherence to between-session EX/RP assignments and EX/RP outcome using a valid and reliable adherence measure in adults with OCD. As hypothesized, patient adherence significantly predicted posttreatment OCD severity. Moreover, the degree of patient adherence was significantly associated with the degree of improvement and the odds of response. In addition, early patient adherence and change in early patient adherence each significantly predicted posttreatment OCD severity. Patient adherence fully mediated the effects of other significant predictors on outcome.

Our findings are consistent with prior research (Abramowitz et al., 2002; De Araujo et al., 1996; de Haan et al., 1997; Tolin et al., 2004) and advance the literature in several important ways. First, unlike the prior studies, we used a patient adherence scale with demonstrated reliability and validity and measured patient adherence prospectively at each exposure session. Because dismantling

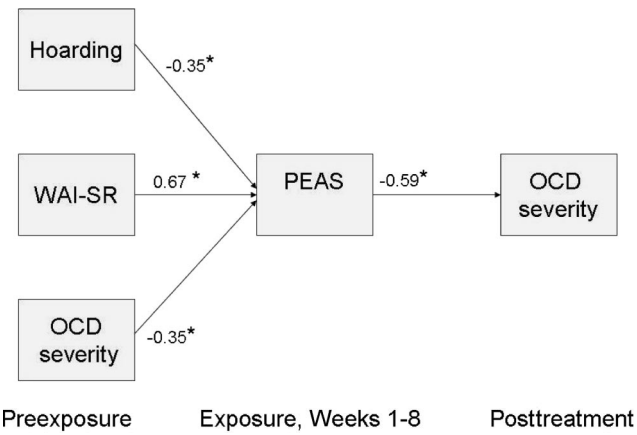

Figure 1. Structural equation model for predictors of posttreatment obsessive-compulsive disorder (OCD) severity being mediated by patient adherence. The values on the paths are standardized betas for direct relationships between predictors and PEAS and between PEAS and posttreatment severity. The parameters for the fully saturated model are model $\chi^2(7) = 62.37$, $p < .01$; R^2 for posttreatment OCD severity = .62; R^2 for mediator (PEAS) = .72. Direct effects of predictors on posttreatment OCD severity are not significant, demonstrating full mediation by PEAS. Indirect effects of predictors through mediator (PEAS) on posttreatment OCD severity: hoarding subtype (0.21, p = .03), WAI-SR (−0.40, p = .01), baseline OCD severity (0.21, p = .03). OCD = obsessive-compulsive disorder; PEAS = Patient EX/RP Adherence Scale; WAI-SR = Working Alliance Inventory self-report. * $p < .01$.

studies found that exposures and ritual prevention are each key to good EX/RP outcome (Foa, Steketee, Grayson, Turner, & Latimer, 1984), the scale focuses on the quantity and quality of patient adherence to these essential EX/RP procedures. Such focus may be key to revealing the relationship between patient adherence and treatment outcome. Second, our data indicate that it is important for patients to achieve better than good homework adherence across all exposure sessions: Only these patients are likely to achieve minimal symptoms. Third, we found that not only mean adherence but also early adherence (both mean early adherence and change in early adherence) affect treatment outcome. Finally, patient adherence fully mediated other predictors of outcome in this sample. If true in other samples, this may explain why OCD predictor studies often have found small or inconsistent effects on treatment outcome: Study samples vary in patient characteristics, different patient characteristics can affect patient adherence, and patient adherence—although rarely measured—may be one of the strongest predictors of outcome and mediate other predictors' effects.

These findings have clinical implications. Consistent with other studies (Maher et al., 2010), the data suggest that patients with severe OCD symptoms need not be excluded from EX/RP as practice guidelines suggest (American Psychiatric Association, 2007). Instead, therapists should carefully monitor patient adherence to between-session assignments to ascertain who is likely to have a good response. If the link between patient adherence and treatment outcome is proven to be causal, then interventions that improve patient adherence should be provided to those with poor early adherence, and this should lead to better treatment outcome. Such therapeutic tailoring is consistent with a personalized care model.

The study has several limitations. The sample size and number of therapists was small, and the study was designed for other purposes. Thus, replication is warranted. We suspect that when EX/RP is delivered in a weekly format (as it is by most community providers), the effects of between-session patient adherence on OCD outcome might be even more robust. Second, like many studies of patient adherence, there is the potential confound between patient adherence and treatment outcome measures. Thus, we conducted sensitivity analyses, which yielded similar findings (see the supplementary materials), and examined early adherence, where this confound is not present. Third, therapists rated patient adherence using patients' self-reports. A subset of sessions was reviewed by independent raters as part of another study, and reliability was excellent (Simpson, Maher, et al., 2010). However, self-reports are subject to patient recall.

In summary, patient adherence to between-session EX/RP assignments significantly predicted treatment outcome, as did early patient adherence and change in early adherence. Patient adherence mediated the effects of other predictors of outcome. Future studies should establish that the link between patient adherence and treatment outcome is causal, and researchers should develop interventions to improve adherence. These interventions could then be used to personalize care.

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