

Is It the Symptom or the Relation to It? Investigating Potential Mediators of Change in Acceptance and Commitment Therapy for Psychosis

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Cognitive and behavioral interventions have been shown to be efficacious when used as an adjunct to pharmacotherapy for psychotic disorders. However, little previous research has investigated potential mediators of change in psychological treatments for psychosis. Acceptance and mindfulness-based therapies do not focus on directly reducing the psychotic symptoms themselves, but instead attempt to alter the patient's relationship to symptoms to decrease their negative impact. The current study examined this issue with data from a previously published randomized trial comparing brief treatment with Acceptance and Commitment Therapy (ACT) versus treatment as usual for hospitalized patients with psychotic symptoms (Gaudiano & Herbert, 2006a). Results showed that the believability of hallucinations at posttreatment statistically mediated the effect of treatment condition on hallucination-related distress. Hallucination frequency did not mediate outcome. The current study is a first step toward understanding the

potential mechanisms of action in psychological treatments for psychosis.

INCREASINGLY, COGNITIVE-BEHAVIORAL THERAPIES (CBT) are being used as adjuncts to medications for patients with psychotic disorders. Research shows that these interventions produce large and clinically significant effects on outcomes compared with treatment as usual (Gaudiano, 2006; Gould, Mueser, Bolton, Mays, & Goff, 2001; Zimmermann, Favrod, Trieu, & Pomini, 2005). CBT is not a static field, however. Whereas earlier approaches emphasized direct cognitive change, Tai and Turkington (2009) recently noted that researchers are increasingly investigating acceptance and mindfulness as potential strategies in psychosocial interventions for psychosis. For example, Chadwick and colleagues (Chadwick, Hughes, Russell, Russell, & Dagnan, 2009; Chadwick, Taylor, & Abba, 2005) have reported promising results in terms of the acceptability, safety, and potential clinical benefits using a mindfulness-based group intervention for those experiencing voices.

Kazdin (2007) notes that there are important reasons to study the potential mechanisms of action of evidence-based psychotherapies: (a) it could lead

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to more parsimonious interventions; (b) it could explain how what is done in therapy produces specific therapeutic outcomes; (c) it could lead to better targeting of these mechanisms to further optimize outcomes; (d) it could improve our ability to disseminate effective treatments; (e) it could lead to a better understanding of the moderators of treatment; and (f) it could increase our knowledge of basic psychological processes that may operate in contexts outside of psychotherapy. Unfortunately, the mechanisms of action in psychological treatments for psychosis remain unclear (Gaudiano, 2005), and it is not known if these new CBT approaches to psychosis will yield processes of change that can provide functional targets for further treatment development.

Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999) provides another example of a newer approach that has been applied to psychosis. ACT is a form of behavior therapy that focuses on modifying the functions rather than the forms of symptoms using acceptance and mindfulness strategies. In an ACT approach, the focus is not so much on reducing the frequency or changing the specific content of inner experiences, but rather on changing their relation to behavior. Emerging research shows that ACT is efficacious in the psychological treatment of a wide range of problems, including drug dependence, chronic pain, epilepsy, depression, social phobia, work stress, trichotillomania, and borderline personality disorder (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Öst, 2008; Powers, Zum Vörde Sive Vörding, & Emmelkamp, 2009). Clinical and experimental research suggests that the processes targeted by ACT are changed during treatment and are associated with improvements in target behaviors across clinical populations (Hayes, Levin, Plumb, Boulanger, & Pistorello, in press; Hayes et al., 2006).

Bach and Hayes (2002) conducted the first study of ACT for hospitalized patients with psychotic symptoms. Inpatients with psychotic symptoms were randomly assigned to treatment as usual alone (TAU) or TAU plus 4 individual sessions of ACT. ACT produced lower believability for psychotic symptoms and reduced rehospitalization rates at 4-month follow-up (20% vs. 40%). Gaudiano and Herbert (2006a) replicated and extended these findings. Inpatients with affective and nonaffective psychoses were randomly assigned to enhanced treatment as usual or TAU plus brief (3 sessions on average varying based on length of stay) ACT treatment. At hospital discharge, ACT produced greater improvements in affective symptoms, social impairment, and hallucination-related distress. Although not reaching

statistical significance, 4-month rehospitalization rates in the TAU group were 45% compared with 28% in the ACT group.

Simply stated, the assumption of acceptance and mindfulness approaches to psychotic disorders is that what is most important to functioning may not be psychotic symptoms in isolation, but also patients' psychological relationship to these symptoms. For example, Shawyer et al. (2007) reported that greater acceptance of voices was associated with lower depression, greater confidence in coping with command hallucinations, and greater subjective quality of life in a sample of patients with psychotic-spectrum disorders. However, it is unclear whether psychosocial interventions can successfully target and change acceptance- and mindfulness-based processes in these patients. One of the best ways to test this hypothesis is through statistical mediation, but successful tests of the mediation of psychotic symptom outcomes have been absent to date in the CBT for psychosis literature (Gaudiano, 2005).

A process hypothesized to promote change in ACT is cognitive *defusion*, the goal of which is "to change the way one interacts with or relates to thoughts by creating contexts in which their unhelpful functions are diminished" (Hayes et al., 2006, p. 8). In other words, the literal quality of thoughts is undermined so that they are experienced more specifically as thoughts (I'm having the thought "I am going crazy") rather than as their literal content ("I am going crazy"). Thus, in accord with ACT theory, the focus is not on changing the form or frequency of hallucinations—it is on learning to view them mindfully as ongoing experiences. Clinically, this is thought to reduce their affective and behavioral impact. In accord with this view, Gaudiano and Herbert (2006a) reported that changes in hallucination believability, a measure of cognitive defusion, were associated with changes in hallucination-related distress in the ACT condition. However, formal statistical mediation analyses were not conducted.

The current study provides a more direct test of the idea that what is the key in acceptance and mindfulness-based approaches to psychosis is a change in the patients' psychological relationship to their symptoms. The data from the Gaudiano and Herbert (2006a) clinical trial provide a good platform for an examination of this question using advanced statistical techniques. Measures of believability of one's thoughts have been used in previous ACT clinical trials and have demonstrated successful treatment mediation across a range of comparison conditions (Hayes et al., 2006). CBT for psychosis researchers are increasingly

emphasizing the important role of psychological interventions in decreasing distress related to psychotic symptoms (Birchwood, 2003; Steel et al., 2007). Therefore, we hypothesized that hallucination believability would statistically mediate the relationship between treatment condition and the outcome of hallucination-associated distress. We also examined alternate mediation models using hallucination frequency to explore other potential explanations for the effects of treatment.

Method

SAMPLE

Please refer to the original article for full details about study methodology (Gaudiano & Herbert, 2006a). Forty patients with affective ($n=18$) or nonaffective ($n=22$) psychoses were recruited from a university-affiliated psychiatric inpatient unit in a major metropolitan city in the U.S. Inpatients with *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000)* diagnoses of schizophrenia, schizoaffective disorder, schizophreniform disorder, delusional disorder, brief psychotic disorder, psychotic disorder NOS, major depressive disorder with psychotic features, or bipolar disorder with psychotic features based on chart review were approached for the study. However, the study was not designed to test the treatment of patients from discrete diagnostic categories. Instead, study inclusion criteria required inpatient status, hallucinations and/or delusions currently or during the week prior to hospitalization as determined by a rating of 4 (moderate severity/clinically significant) or higher on the relevant psychotic symptom item(s) (e.g., hallucinatory experiences, unusual thought content) of the Brief Psychiatric Rating Scale (Overall & Gorham, 1962); competency to provide informed consent; and fluency in English. The exclusion criteria were: diagnosis of mental retardation; inability to participate in psychotherapy due to acute medical condition or florid psychosis; or psychotic symptoms due to a general medical condition.

One patient dropped out of each condition and data were missing from the remaining patients who were discharged before assessments could be completed. However, there were no differences in dropout or missing data between the groups. A total of 29 participants (ACT=14; TAU=15) had complete data on hallucination measures used in the current study and were included in the present analyses. Average length of stay on the hospital unit was 9 days ($SD=7$). Those in the ACT condition received an average of 3 treatment sessions ($SD=1$), which varied based on length of stay. Average age

of participants was 39.4 ($SD=10.2$). The sample was predominantly male (55%) and African-American (90%). Educational attainment was relatively low in the sample, with 42% not graduating high school, 41% obtaining a high school diploma or equivalency, and 17% possessing some post-secondary education. The majority of participants were unemployed or receiving disability compensation (83%). Regarding housing status, 31% were homeless or living in a shelter prior to admission, 41% were living with family or friends, 7% were living in supervised housing, and 10% rented/owned property. Only 14% of participants were currently married. Approximately half of the participants had comorbid drug or alcohol use problems (48%) and the majority (83%) possessed at least one major medical condition (e.g., diabetes). Regarding pharmacotherapy, the following antipsychotic medications were prescribed: 45% received risperidone, 24% received haloperidol, 21% received quetiapine, 17% received olanzapine, 7% received ziprasidone, 3% received chlorpromazine (with some patients receiving more than 1 medication).

MEASURES

Current analyses focused on dimensions of hallucinatory experiences. As one of the purposes of the study was to replicate Bach and Hayes (2002), participants were asked to rate the frequency, believability, and distress associated with their hallucinations, using the rating scales originally developed and used in that study. Regarding frequency of hallucinations, participants were asked: "On average, how often have you experienced [specific hallucination]? 1=*never*; 2=*less than once a week*; 3=*about once a week*; 4=*several times a week*; 5=*daily*; 6=*more than once a day*; 7=*almost constant*." Regarding believability of hallucinations, participants were asked: "On a scale from 0 to 10, how much do you believe that [specific hallucination] is real or true? Zero means that you are certain it is not real or true, and 10 means you are absolutely certain that it is real or true." Regarding distress associated with hallucinations, participants were asked: "On a scale from 0 to 10, how bothered are you by [specific hallucination]? Zero means not distressed at all and 10 means the most distressed you've ever been." Ratings were collected at pretreatment shortly after admission and then posttreatment prior to hospital discharge.

Psychometric evidence on single-item ratings focuses especially on convergent validity based on correlations with related measures. To provide preliminary psychometric evidence, we examined

correlations between self-ratings of hallucinations and the Brief Psychiatric Rating Scale (BPRS; Overall & Gorham, 1962), which is an 18-item interviewer-rated measure of psychotic and other psychiatric symptoms, and the Sheehan Disability Scale (SDS; Leon, Shear, Portera, & Klerman, 1992), which is a self-report measure of perceived disability from illness. The baseline BPRS hallucinatory experiences item was significantly correlated with self-ratings of hallucination frequency ($r = .57$, $p < .001$) and believability ($r = .35$, $p = .017$). Furthermore, self-ratings of hallucination-related distress were significantly correlated with baseline disability as measured by the SDS in the areas of work ($r = .46$, $r = .002$), family ($r = .38$, $p = .011$), and social functioning ($r = .29$, $p = .05$).

TREATMENTS

ACT

The ACT protocol used in the current study was delivered in an individual format and was adapted from the intervention described by Bach and Hayes (2002). The ACT protocol was designed so that the sessions could be delivered in a stand-alone format, which did not require the completion of a predetermined number of sessions. Primary session themes included: (a) willingness as an alternative to control/struggle with symptoms; (b) workability as a guide to choosing coping strategies to deal with difficult symptoms; (c) acceptance of uncontrollable versus controllable private events; and (d) thoughts as products of the mind and not the self. In each session, various mindfulness and acceptance exercises as described by Hayes et al. (1999) were introduced to help patients decrease avoidance or struggle with internal experiences, including psychotic symptoms. For example, the metaphor Tug-of-War With a Monster (Hayes et al., p. 109) was introduced to highlight attempts to control distressing symptoms that can actually serve to paradoxically increase them. In this scenario, the patient is asked to imagine being in a tug-of-war with a horrible monster with a bottomless abyss separating them. No matter how hard the patient pulls, the monster always seems to match him/her, and is slowly pulling the person into the abyss. The option of dropping the rope is explored and represents the idea of acceptance as an alternative to continued struggle with symptoms. The patient is encouraged to practice “dropping the rope” to cope with troublesome symptoms such as voices in between sessions. In addition, valued life goals (e.g., family, work, health) were elicited and the role of disturbing thoughts and emotions as barriers to goal attainment was discussed. In general, patients were encouraged to increase their willingness to experi-

ence psychotic symptoms in a nonjudgmental fashion, while simultaneously practicing valued behavioral goals in between sessions. In this way, patients learned to decrease unworkable strategies for dealing with psychotic symptoms that impeded goal attainment (see Bach, Gaudiano, Pankey, Herbert, & Hayes, 2006).

TAU

Treatment as usual consisted of psychopharmacology, case management, and other non-study therapy delivered on the unit. All patients participating in the study were taking antipsychotic medication during their hospitalization. Group therapy was offered daily and focused on psychoeducation about illness, daily functioning, symptom identification, mood management techniques, stress reduction, relapse prevention, and goal setting. Patients also received unstructured individual therapy and case management as appropriate. Patients were referred to appropriate community services upon discharge. TAU was enhanced in the following way for the study. Pretreatment assessment results were shared with the interdisciplinary treatment team and used for treatment planning purposes. The same study therapist provided both treatments and met with participants in the TAU condition daily (approximately 15 min) to provide additional support. This contact was designed to help control for the possible confound of extra individual attention in the ACT condition. Care was made not to discuss or suggest coping strategies used in the intervention. It is important to note that TAU participants were receiving equal amounts of formal therapy compared to ACT participants, as unit therapy was conducted concurrently with the ACT sessions.

PROCEDURE

Patients meeting criteria for the study were identified based on chart review at intake conducted by a research assistant or through direct referral from a hospital intake coordinator. Patients were approached about the study after approval was obtained from the treating physician. Informed consent was obtained using an Institutional Review Board-approved protocol. Afterward, participants completed assessment measures and were randomly allocated to TAU alone or TAU plus ACT. Simple randomization without blocking or stratification based on a computer-generated list was used without concealment. Staff were not blind to treatment condition. Patients completed the measures again prior to discharge. Formal ratings of treatment fidelity were not conducted due to privacy issues regarding the recording of sessions on the hospital unit. However, an ACT expert and

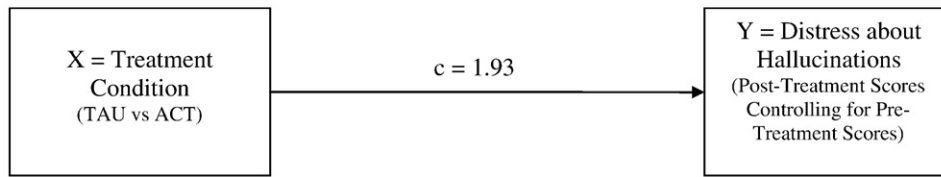
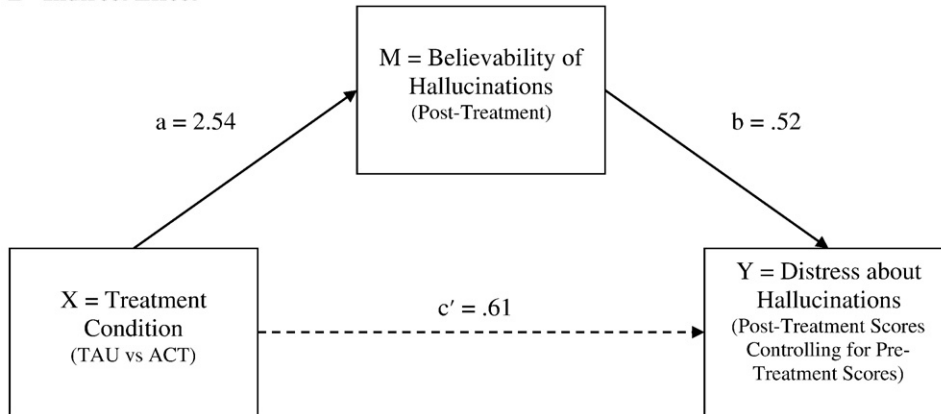
A Direct Effect**B Indirect Effect**

FIGURE 1 (A) Unstandardized regression weights indicating a direct effect of treatment (X) condition on outcome (Y). (B) Unstandardized regression weights indicating that treatment condition is exerting a significant indirect effect on outcome through the proposed mediator (M), $p < .01$. TAU = Treatment as Usual; ACT = Acceptance and Commitment Therapy.

trainer (J.D.H.) provided regular supervision and consultation on cases.

STATISTICAL ANALYSES

Mediation analyses were conducted using a non-parametric bootstrapping approach to test the coefficient of the cross products of the treatment to mediator relation and the mediator to outcome relation controlling for treatment (Preacher & Hayes, 2004, 2008). Mediation analysis (see Figure 1) is ultimately focused on the difference between the direct effect of treatment (X) on outcome (Y), also called the “c” path, and the indirect effect of treatment on outcome after accounting for the mediating variable (M), or the “c’ path.” The size of the indirect effect is determined by two relations: the impact of treatment on the putative mediator (the X – M relation), or the “a” path, and the relation of the mediator to outcome after controlling for treatment (the M[X] – Y relation), or the “b” path. Perhaps the best known method for examining mediation is a series of causal steps described by Baron and Kenny (1986), which involves determining in a series of regressions whether the *a*, *b*, and *c* relations are significant and the *c’* relation is not. Although intuitively easy to understand, this method has two problems: (a) it never formally determines whether the difference

between the *c* and *c’* paths is statistically significant (MacKinnon, Fritz, Williams, & Lockwood, 2007), and (b) it separately tests the significance of the *a* and *b* paths without adjusting for the fact that as the *a* path becomes larger it is a mathematical necessity that the *b* path becomes smaller and vice versa (Preacher & Hayes, 2004, 2008).

A solution to these problems is a test of the statistical significance of the cross product of the *a* and *b* coefficients ($a*b$), which in finite data sets is generally equal to the difference between the direct and indirect effects ($c-c'$). Because mediation can be

Table 1
Descriptive Statistics for Hallucination Measures at Pre- and Posttreatment by Condition

Hallucination Measures	Pretreatment <i>M</i> (<i>SD</i>)	Posttreatment <i>M</i> (<i>SD</i>)	Cohen's <i>d</i> (Pre-Post)
Frequency			
TAU	4.60 (2.41)	3.67 (2.26)	0.40
ACT	5.50 (1.74)	3.93 (2.13)	0.81
Distress			
TAU	6.20 (3.67)	6.87 (3.20)	-0.19
ACT	8.29 (2.34)	6.50 (3.25)	0.63
Believability			
TAU	7.20 (3.43)	6.87 (2.98)	0.09
ACT	7.57 (3.60)	5.71 (3.83)	0.54

Note. TAU = Treatment as Usual ($n = 15$); ACT = Acceptance and Commitment Therapy ($n = 14$).

Table 2
Pearson Correlations between Hallucination Measures at Pre- and Posttreatment

	Pre-Frequency	Pre-Distress	Pre-Believability	Post-Frequency	Post-Distress
Pre-Distress	.57**	—	—	—	—
Pre-Believability	.64**	.66**	—	—	—
Post-Frequency	.56**	.51**	.50**	—	—
Post-Distress	.44*	.66**	.59**	.55**	—
Post-Believability	.43*	.47*	.54**	.38*	.81**

Note. $n=29$; * $p<.05$; ** $p<.01$.

said to have occurred when the difference between the direct and indirect effects ($c-c'$) is statistically significant, the cross-product of the coefficients test is widely recognized as the best and most direct test of mediation (MacKinnon et al., 2007). A method described by Sobel (1982) is the most common cross-product of the coefficients test, but it assumes a normal distribution of the cross products—an untenable assumption in most cases that can negatively affect statistical power (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002).

In the present study, the statistical significance of the cross-product of coefficients ($a*b$) was tested

using a nonparametric bootstrapping method that does not require any distributional assumptions and that is appropriate for smaller samples (Preacher & Hayes, 2004, 2008). From the original dataset, 5,000 identically sized datasets were created by randomly drawing participants and replacing each value as it was sampled. Confidence intervals for the 5,000 $a*b$ values were then derived using z -score based bias corrections. In this approach, mediation is significant if the upper and lower bounds of these bias-corrected and accelerated (Efron & Tibshirani, 1993) confidence intervals do not contain zero.

Table 3
Bootstrapped Point Estimates and Bias-Corrected and Accelerated (BCa) Confidence Intervals (CIs) for the Indirect Effects of Treatment Condition on Outcome

Mediator	Path	Normal Theory Tests				Bootstrap Results for Indirect Effects (BCa; 95% CI)				
		Coefficient	SE	<i>t</i>	<i>p</i>	Point Estimate	Lower	Upper		
Post-Treatment Hallucination Ratings:	Believability	Effect of Treatment Condition on the Following Variables: Post-Treatment Hallucination Distress, Controlling for Pre-Treatment Hallucination Distress								
		<i>a</i>	2.54	1.24	2.05	.05	1.28*	0.37	3.59	
		<i>b</i>	0.52	0.10	5.17	.00				
		Total (<i>c</i>)	1.93	0.90	2.15	.04				
		Direct (<i>c'</i>)	0.61	0.69	0.88	.39				
		Frequency	<i>a</i>	0.50	0.75	0.67	.51	0.20	-0.21	1.76
			<i>b</i>	0.37	0.23	1.64	.11			
			Total (<i>c</i>)	1.93	0.90	2.15	.04			
			Direct (<i>c'</i>)	1.74	0.88	1.99	.06			
		Believability	Post-Treatment Hallucination Frequency, Controlling for Pre-Treatment Hallucination Frequency							
	<i>a</i>		1.90	1.27	1.50	.14	0.21	-0.15	1.39	
	<i>b</i>		0.10	0.11	0.89	.38				
	Total (<i>c</i>)		0.26	0.70	0.37	.71				
	Direct (<i>c'</i>)		0.08	0.74	0.10	.92				
	Distress		Post-Treatment Hallucination Believability, Controlling for Pre-Treatment Hallucination Believability							
			<i>a</i>	0.59	0.98	0.60	.55	0.54	-0.85	2.42
			<i>b</i>	0.87	0.16	5.26	.00			
			Total (<i>c</i>)	1.39	1.17	1.18	.25			
			Direct (<i>c'</i>)	0.88	0.83	1.06	.30			

Note. *The mediator is significant at $p<.05$ if the CI does not contain zero.

Results

PRELIMINARY ANALYSES

A total of 60 patients were assessed for eligibility, 40 consented to participate and were randomized to conditions, 1 patient withdrew from each condition, and complete data from 29 patients were included in the current analyses. Mean baseline BPRS total scores were 58.1 ($SD=8.2$). Long and Brekke (1999) reported a mean of 35.8 ($SD=10.8$) in an outpatient sample diagnosed with schizophrenia or schizoaffective disorder. There were no significant differences between the groups on baseline BPRS scores and they did not correlate with changes in hallucination-related distress. Primary study outcomes are presented in the original manuscript and thus will not be reported here (Gaudiano & Herbert, 2006a).¹ The current analyses were limited to testing the statistical mediation of treatment effects based on patients' ratings of hallucinations. Descriptive statistics for the measures are presented in Table 1. Independent samples *t*-tests indicated that there were no significant differences between conditions on measures at pre-treatment (all $ps=ns$). Pre-post effect size improvements in the ACT group were moderate to large in magnitude for hallucination ratings ($ds=.54-.81$). A small to medium effect size improvement was found in the TAU condition for hallucination frequency ($d=.40$), but there was little change in terms of either distress or believability from pre- to posttreatment. Pearson correlations between the study measures at each time point are presented in Table 2. All correlations were significant (all $ps<.05$) and were moderate to large in magnitude ($rs=.38-.81$).

MEDIATION ANALYSES

As reported previously in Gaudiano and Herbert (2006a), ACT produced significantly more improvement at the end of treatment in hallucination distress compared with TAU alone based on an analysis of covariance controlling for pretreatment scores in both intent-to-treat and completer analyses ($F=4.62$; $dfs=1, 26$; $p<.05$, $\eta^2=.15$). In the current study, we examined whether hallucination believability (M) at posttreatment mediated the relationship between treatment condition (X) and

hallucination distress (Y) at posttreatment controlling for pretreatment scores. All mediation analyses are presented in detail in Table 3. Analysis of the indirect effect indicated that hallucination believability was a significant mediator (99% *BCa* $CI=0.15-4.62$). A total of 68% of the variance of the effect of treatment on distress was explained by hallucination believability at posttreatment using the formula: $1 - (c'/c) * 100$.²

We hypothesized that changing the relationship to the psychotic experience would be more important than changing the content or frequency of that experience. To test this view further, we examined whether hallucination frequency mediated the relationship between treatment condition and distress, using the same statistical approach. Hallucination frequency was not a significant mediator in this model ($p=ns$). We also examined whether hallucination believability mediated the relationship between treatment condition and hallucination frequency. Again, results did not support believability as a significant mediator in this model ($p=ns$).

Finally, because our hypothesized mediator (believability) and outcome (distress) variables were measured at the same time point (posttreatment), we also tested a "reverse" mediation model as recommended (Baron & Kenny, 1986). In this case, we examined the effect of hallucination distress on the relation between treatment condition and hallucination believability. However, hallucination distress was not a significant mediator in this model ($p=ns$). This result is consistent with the hypothesis that hallucination believability acted as a mediator of the effect of treatment on distress, and

¹ In a previous article (Gaudiano & Herbert, 2006b), we examined a different question regarding the relationship between pretreatment frequency and believability variables and posttreatment distress in the entire sample, regardless of the effect of treatment. In contrast, the current study formally tested the effect of treatment condition on improvements in hallucination distress as mediated by changes in believability. In other words, the current paper specifically examined the mediation of treatment effects, whereas the previous article did not.

² We conducted mediation analyses in the same manner as past studies (e.g., Lundgren, Dahl, & Hayes, 2008). However, to rule out potentially confounding variables, we reran the mediation analysis using both baseline distress and believability as covariates and results remained significant: Point estimate = 1.11, $SE = .75$, 95% *BCa* $CI = .11-3.41$. In addition, we examined the mediational results with baseline BPRS scores as a covariate. It too remained significant (Point estimate = 1.37, $SE = .75$, 95% *BCa* $CI = 0.37-3.38$). Furthermore, it is recommended to conduct mediation analyses using only treatment completers for conceptual reasons (Hofmann, 2004; Kraemer, Wilson, Fairburn, & Agras, 2002). To examine the robustness of our findings, we reran the analysis in the intent-to-treat sample ($n = 40$) using expectation maximization imputation (Dempster, Laird, & Rubin, 1977), which produced the same result: Point estimate = 1.00, $SE = .52$, 95% *BCa* $CI = 0.27-2.48$. Another analysis based on the conservative last observation carried forward method also demonstrated that believability was a significant mediator of treatment outcome: Point estimate = .76, $SE = .48$, 95% *BCa* $CI = 0.13-2.26$. Thus, although the magnitude of the effect changed somewhat from completers only to intent-to-treat analyses, the overall mediation effect remained significant and showed good consistency throughout the dataset.

not vice versa; although the lack of temporality cannot be fully overcome using this approach.

Discussion

Although limitations in study design preclude definitive conclusions because mediators were assessed after outcome effects were already being observed, the results support the functional importance of the patient's relationship to their psychotic symptoms in the outcomes achieved by an acceptance-based treatment for psychosis. Hallucination believability, which can be understood as the patient taking a more cognitively detached or "defused" stance toward these experiences, appeared to explain the effect of ACT on hallucination-related distress relative to those receiving TAU alone. Other mediational models tested that were inconsistent with the proposed mechanisms of the treatment were not statistically significant.

ACT proposes a general model of psychopathology focusing on the importance of improving psychological flexibility through which the treatment is hypothesized to produce its effects (Hayes et al., *in press*, 2006). Validation of such a model would require converging lines of evidence that the approach works in similar ways even when the therapeutic target or population changes. Several ACT studies have reported similar mediation effects as those obtained in the current study. In a reanalysis of an earlier study comparing ACT with traditional cognitive therapy for depressed outpatients (Zettle & Hayes, 1986), Hayes et al. (2006) reported that the effects of ACT on self-reported and interviewer-rated depressive symptoms were statistically mediated by the believability of automatic thoughts, but not their frequency. Another early pilot study of cognitive therapy versus ACT for depression delivered in a group format also found that believability of automatic thoughts mediated the effect of ACT on self-reported depressive symptoms (Zettle, Rains, & Hayes, *in press*). Furthermore, automatic thought frequency and dysfunctional attitudes were not significant mediators when tested in this study. In a more recent trial, Varra, Hayes, Roget, and Fisher (2008) randomly assigned substance abuse counselors to receive education alone or an ACT workshop designed to increase willingness to face the emotional and cognitive barriers to learning before being exposed to an educational program about the use of evidence-based pharmacotherapy for addiction. Results showed ACT participants acknowledged more barriers to using this knowledge (e.g., co-workers would not like it) but greater decreases in the believability of these apparent

barriers, such that believability mediated the effect of treatment condition on increasing evidence-based pharmacotherapy referrals at follow-up. Also, Lundgren et al. (2008) investigated mechanisms of change in a clinical trial of ACT versus supportive therapy for medication-resistant epilepsy. The ACT process variables of posttreatment psychological flexibility mediated the effect of ACT on seizure outcomes at 1-year follow-up. Furthermore, ACT processes have been effectively targeted by the treatment and associated with improvement in other studies of diabetes (Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007), nicotine addiction (Gifford et al., 2004), stigma and burnout (Hayes et al., 2004), workplace stress (Bond & Bunce, 2000), and emotional disorders (Forman, Herbert, Moitra, Yeomans, & Geller, 2007).

To our knowledge, no previous clinical trial of a cognitive-behavioral intervention has formally demonstrated statistical mediation of treatment effects on psychotic symptom outcomes. Recently, Garety and colleagues (2008) tested the effects of TAU alone, TAU plus CBT, and TAU plus family therapy for reducing relapse in patients with psychosis. These authors tested the following hypothesized mediators in CBT: cognitive schemas, insight, and reasoning. CBT failed to reduce relapse rates, but did show significant effects on depression, social functioning, and delusional distress. However, no mediation effects were found for CBT for any of the variables examined. In another recent study, Granholm, Ben-Zeev, and Link (2009) examined social disinterest attitudes as a potential mechanism of action in cognitive-behavioral group therapy versus supportive contact in patients with schizophrenia. Although improvements in social disinterest predicted better functional outcomes in the study, the cognitive-behavioral condition did not produce greater improvements in social disinterest relative to the control group.

To understand why mediation is a demanding test that is difficult to demonstrate, it is important to distinguish mediation from correlation. Successful *a* path results (X impacted M) are common in the treatment literature: patients often report process changes that clinicians directly target. If the *c* path is significant (X impacted Y), this fact will often yield a significant correlation between a potential mediator and outcome (M will correlated with Y). In a cross-product test of mediation, if either the *a* or *b* path is zero, the cross product will be zero. Because an *a* path is often readily achieved simply by the patient being trained in the underlying model of treatment, it is most commonly the *b* path that is at fault when mediation is not found. Mediation goes beyond simple correlation precisely

in this area. The *b* path examines the M-Y relation *controlling for treatment* [$M(X) - Y$]. Mediators that are merely aspects of patient socialization or agreement with a treatment model cannot succeed due to that fact alone, because a successful *b* path requires that the mediator has to be robustly related to outcome throughout the entire dataset (including the control group) above and beyond the treatment impact on the mediator. For example, a participant dealing with psychosis in an ACT treatment program might learn that it fits the model to agree to the counterintuitive idea that one may not need to stop hearing voices for positive behavior change to occur. For this construct to work as a mediator, however, control participants who affirmed such an idea would *also* have to do better on outcome measures even though their treatment providers may be expressing the opposite message to them. This example is not arbitrary since there is evidence that use of more acceptance and mindfulness-based coping with voices by persons with psychotic disorders indeed predicts positive outcomes, despite the fact that few providers have currently adopted this approach (Farhall, Greenwood, & Jackson, 2007; Shawyer et al., 2007).

In their review of the literature on the continuum of psychotic symptoms in nonclinical and clinical samples, Stip and Letourneau (2009) concluded that the social, cultural, and developmental contexts of these experiences appear to be most related to actual impairment and dysfunction. Newer functional models of psychopathology such as ACT propose that impairment is influenced by the patient's response to and interaction with their symptoms, and not simply the presence of the symptoms themselves (Abba, Chadwick, & Stevenson, 2007; Bach et al., 2006; Hayes et al., 1999; Martell, Addis, & Jacobson, 2001). Patients understandably often attempt to avoid or control uncomfortable internal experiences, including psychotic symptoms. However, according to these newer models of CBT, the more inflexibly an individual uses strategies such as avoidance, the more likely it is that functional impairment will result, as individuals forgo the pursuit of their personal goals due to avoidance of internal distress (Hayes et al., 1999).

Pharmacological treatments for psychosis traditionally have focused on reducing the frequency and intensity of psychotic symptoms and have not been shown to be as effective in promoting functional improvement (Juckel & Morosini, 2008; Lieberman et al., 2005). Adjunctive psychosocial interventions, such as cognitive-behavioral and family therapies (Pilling et al., 2002), have been shown to produce benefits beyond medications

alone, but further research is needed to test whether or not they target different psychopathological processes that can further improve functioning and well-being. The current findings suggest that psychological treatments can be helpful for targeting the believability of psychotic symptoms and promoting acceptance of internal distress in the service of patients' valued goals, when used as an adjunct to pharmacological strategies that attempt to directly reduce these symptoms.

Several limitations also should be considered. The sample was 90% African-American. This is a strength in that there is little research on psychological therapies for non-White patients with psychosis. The original Bach and Hayes (2002) study population was largely White, but mediation was not examined and it is possible that the present results may not generalize to other racial/ethnic groups. Cultural differences exist in the presentation and interpretation of psychotic symptoms (Whaley & Geller, 2003) and research suggests that cultural factors may influence the course of illness of psychotic disorders (Rosenfarb, Bellack, Aziz, Kratz, & Sayers, 2004). Furthermore, the sample size was relatively small and analyses were based on treatment completers, thus requiring independent replication. However, supplemental analyses conducted in the intent-to-treat sample showed the same mediation effect, suggesting consistency throughout the dataset. Furthermore, the bootstrapping method we used would likely go against our favor if the sample contained outliers. Bootstrapping demands consistency throughout the dataset. For instance, let us assume an outlier is in the opposite direction of the hypothesized relation. In bootstrapped data sets, that one extreme score would likely result in several other similarly extreme scores, and consequently bootstrapped mediational analyses would fail.

It should be noted that the measurement of the outcome and mediator variable occurred at the same time point. The timing of changes is important in mediation analyses. Future research should examine whether the mediator changes prior to changes in outcome to better establish a cause-effect relationship (Kazdin, 2007). In addition, ACT sessions were held concurrently with other group therapy offered on the unit to those in the TAU condition. However, patients in the TAU alone condition did not receive an alternative form of individual study psychotherapy, so it cannot be conclusively demonstrated using this dataset that the changes in believability were produced specifically by ACT. It also is possible that other effective psychotherapies that target distress, including traditional cognitive and behavioral interventions

that do not explicitly focus on acceptance, would produce similar findings. As noted, staff were not blind to treatment condition and this may have influenced outcomes. However, this would be more likely to affect interviewer ratings than the self-report measures used in the current analyses.

Defusion can be difficult to measure using self-report since the concept refers to one's relationship to thoughts, not their content. Said in another way, defusion is more a meta-cognitive than directly cognitive concept. There are specific fusion/defusion measures in some domains (e.g., Avoidance and Fusion Questionnaire for Youth; Greco, Lambert, & Baer, 2008), and since the conduct of this study some have begun to appear in the area of psychosis (e.g., Voices Acceptance and Action Scale; Shawyer et al., 2007). From the earliest ACT studies, believability of thoughts as distinct from their occurrence has been used as a convenient proxy for defusion (e.g., Zettle & Hayes, 1986). It needs to be acknowledged that the two concepts, while highly correlated, are not isomorphic. For example, "I am going to die" is believable to all, but one can be defused from this thought or entangled with it. When dealing with most clinically relevant thoughts, however, distinguishing between whether a thought occurred, and whether it was believable when it occurred, is a readily understandable way to ask participants how they stand in relation to their own thoughts in particular areas. Although hallucination believability was measured in an attempt to replicate the Bach and Hayes (2002) study of ACT for psychosis, future studies should examine other potential mediators, including more traditional cognitive constructs. The Psychotic Symptom Rating Scale (Haddock, McCarron, Tarrier, & Faragher, 1999) is a psychometrically sound interviewer-rated measure that examines various dimensions of psychotic experiences (e.g., degree of conviction, associated distress) and should be considered for inclusion in future research.

We did not collect information on history of illness or past experience with psychotherapy or mindfulness, which could have influenced patients' responses to our intervention. Furthermore, we were unable to collect follow-up data (beyond hospital readmission rates) due to the characteristics of our sample and therefore the longer-term effects of treatment on hallucination frequency, believability, and distress are not known. Finally, chart diagnoses were not confirmed using structured clinical interviews. However, we explicitly targeted patients hospitalized for psychiatric reasons who were experiencing psychotic symptoms as confirmed by the Brief Psychiatric Rating Scale

(Overall & Gorham, 1962). The cross-diagnostic effects of our treatment seem particularly promising because they better match routine practice populations.

Although results of the mediation analyses were consistent with our hypotheses, this study only represents a first step in testing mechanisms of action in acceptance- and mindfulness-based interventions for psychosis. Comparisons of ACT with other forms of psychotherapy for this population would be particularly helpful to determine if other psychological treatments work through similar or different mechanisms. The effects of ACT for psychotic patients observed thus far have been established using relatively brief interventions, and longer-term treatment approaches are needed given the chronic and impairing nature of psychosis.

References

- Abba, N., Chadwick, P., & Stevenson, C. (2007). Responding mindfully to distressing psychosis: A grounded theory analysis. *Psychotherapy Research*, 18, 77–87.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: Author.
- Bach, P., Gaudiano, B. A., Pankey, J., Herbert, J. D., & Hayes, S. C. (2006). Acceptance, mindfulness, values, and psychosis: Applying Acceptance and Commitment Therapy (ACT) to the chronically mentally ill. In R. A. Baer (Ed.), *Mindfulness-based treatment approaches: Clinician's guide to evidence base and applications* (pp. 93–116). San Diego: Academic Press.
- Bach, P., & Hayes, S. C. (2002). The use of acceptance and commitment therapy to prevent the rehospitalization of psychotic patients: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 70, 1129–1139.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173–1182.
- Birchwood, M. (2003). Pathways to emotional dysfunction in first-episode psychosis. *British Journal of Psychiatry*, 182, 373–375.
- Bond, F. W., & Bunce, D. (2000). Mediators of change in emotion-focused and problem-focused worksite stress management interventions. *Journal of Occupational Health Psychology*, 5, 156–163.
- Chadwick, P., Hughes, S., Russell, D., Russell, I., & Dagnan, D. (2009). Mindfulness groups for distressing voices and paranoia: A replication and randomized feasibility trial. *Behavioral and Cognitive Psychotherapy*, 37, 403–412.
- Chadwick, P., Taylor, K. N., & Abba, N. (2005). Mindfulness groups for people with psychosis. *Behavioural and Cognitive Psychotherapy*, 33, 351–359.
- Dempster, A., Laird, N., & Rubin, D. (1977). Maximum likelihood from incomplete data via the EM algorithm. *Journal of the Royal Statistical Society, Series B*, 39, 1–38.
- Efron, B., & Tibshirani, R. J. (1993). *An introduction to the bootstrap*. Boca Raton: Chapman & Hall.
- Farhall, J., Greenwood, K. M., & Jackson, H. J. (2007). Coping with hallucinated voices in schizophrenia: A review of self-

- initiated strategies and therapeutic interventions. *Clinical Psychology Review*, 27, 476–493.
- Forman, E. M., Herbert, J. D., Moitra, E., Yeomans, P. D., & Geller, P. A. (2007). A randomized controlled effectiveness trial of acceptance and commitment therapy and cognitive therapy for anxiety and depression. *Behavior Modification*, 31, 772–799.
- Garety, P. A., Fowler, D. G., Freeman, D., Bebbington, P., Dunn, G., & Kuipers, E. (2008). Cognitive-behavioural therapy and family intervention for relapse prevention and symptom reduction in psychosis: randomised controlled trial. *British Journal of Psychiatry*, 192, 412–423.
- Gaudiano, B. A. (2005). Cognitive behavior therapies for psychotic disorders: Current empirical status and future directions. *Clinical Psychology: Science and Practice*, 12, 33–50.
- Gaudiano, B. A. (2006). Is symptomatic improvement in clinical trials of cognitive-behavioral therapy for psychosis clinically significant? *Journal of Psychiatric Practice*, 12, 11–23.
- Gaudiano, B. A., & Herbert, J. D. (2006a). Acute treatment of inpatients with psychotic symptoms using Acceptance and Commitment Therapy: Pilot results. *Behaviour Research and Therapy*, 44, 415–437.
- Gaudiano, B. A., & Herbert, J. D. (2006b). Believability of hallucinations as a potential mediator of their frequency and associated distress in psychotic inpatients. *Behavioral and Cognitive Psychotherapy*, 34, 497–502.
- Gifford, E. V., Kohlenberg, B. S., Hayes, S. C., Antonuccio, D. O., Piasecki, M. M., Rasmussen-Hall, M. L., & Palm, K. M. (2004). Acceptance theory-based treatment for smoking cessation: An initial trial of Acceptance and Commitment Therapy. *Behavior Therapy*, 35, 689–705.
- Gould, R. A., Mueser, K. T., Bolton, E., Mays, V., & Goff, D. (2001). Cognitive therapy for psychosis in schizophrenia: An effect size analysis. *Schizophrenia Research*, 48, 335–342.
- Granholm, E., Ben-Zeev, D., & Link, P. C. (2009). Social disinterest attitudes and group cognitive-behavioral social skills training for functional disability in schizophrenia. *Schizophrenia Bulletin*, 35, 874–883.
- Greco, L. A., Lambert, W., & Baer, R. A. (2008). Psychological inflexibility in childhood and adolescence: Development and evaluation of the Avoidance and Fusion Questionnaire for Youth. *Psychological Assessment*, 20, 93–102.
- Gregg, J. A., Callaghan, G. M., Hayes, S. C., & Glenn-Lawson, J. L. (2007). Improving diabetes self-management through acceptance, mindfulness, and values: a randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 75, 336–343.
- Haddock, G., McCarron, J., Tarrier, N., & Faragher, E. B. (1999). Scales to measure dimensions of hallucinations and delusions: the psychotic symptom rating scales (PSYRATS). *Psychological Medicine*, 29, 879–889.
- Hayes, S. C., Bissett, R., Roget, N., Padilla, M., Kohlenberg, B. S., Fisher, G., et al. (2004). The impact of acceptance and commitment training and multicultural training on the stigmatizing attitudes and professional burnout of substance abuse counselors. *Behavior Therapy*, 35, 821–835.
- Hayes, S. C., Levin, M., Plumb, J., Boulanger, J., & Pistorello, J. (in press). Acceptance and commitment therapy and contextual behavioral science: Examining the progress of a distinctive model of behavioral and cognitive therapy. *Behavior Therapy*.
- Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour Research and Therapy*, 44, 1–25.
- Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York: Guilford.
- Hofmann, S. G. (2004). Cognitive mediation of treatment change in social phobia. *Journal of Consulting and Clinical Psychology*, 72, 393–399.
- Juckel, G., & Morosini, P. L. (2008). The new approach: psychosocial functioning as a necessary outcome criterion for therapeutic success in schizophrenia. *Current Opinion in Psychiatry*, 21, 630–639.
- Kazdin, A. E. (2007). Mediators and mechanisms of change in psychotherapy research. *Annual Review of Clinical Psychology*, 3, 1–27.
- Kraemer, H. C., Wilson, G. T., Fairburn, C. G., & Agras, W. S. (2002). Mediators and moderators of treatment effects in randomized clinical trials. *Archives of General Psychiatry*, 59, 877–883.
- Leon, A. C., Shear, M. K., Portera, L., & Klerman, G. L. (1992). Assessing impairment in patients with panic disorder: The Sheehan Disability Scale. *Social Psychiatry and Psychiatric Epidemiology*, 27, 78–82.
- Lieberman, J. A., Stroup, T. S., McEvoy, J. P., Swartz, M. S., Rosenheck, R. A., Perkins, D. O., et al. (2005). Effectiveness of antipsychotic drugs in patients with chronic schizophrenia. *New England Journal of Medicine*, 353, 1209–1223.
- Long, J. D., & Brekke, J. S. (1999). Longitudinal factor structure of the Brief Psychiatric Rating Scale in Schizophrenia. *Psychological Assessment*, 11, 498–506.
- Lundgren, T., Dahl, J., & Hayes, S. C. (2008). Evaluation of mediators of change in the treatment of epilepsy with acceptance and commitment therapy. *Journal of Behavioral Medicine*, 31, 225–235.
- MacKinnon, D. P., Fritz, M. S., Williams, J. M., & Lockwood, C. M. (2007). Distribution of the product confidence limits for the indirect effect: Program PRODCLIN. *Behaviour Research Methods*, 39, 384–389.
- MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*, 7, 83–104.
- Martell, C. R., Addis, M. E., & Jacobson, N. S. (2001). *Depression in context: Strategies for guided action*. New York: W. W. Norton & Company.
- Öst, L. G. (2008). Efficacy of the third wave of behavioral therapies: A systematic review and meta-analysis. *Behaviour Research and Therapy*, 46, 296–321.
- Overall, G., & Gorham, D. (1962). The Brief Psychiatric Rating Scale. *Psychological Reports*, 10, 799–812.
- Pilling, S., Bebbington, P., Kuipers, E., Garety, P., Geddes, J., Orbach, G., & Morgan, C. (2002). Psychological treatments in schizophrenia: I. Meta-analysis of family intervention and cognitive behaviour therapy. *Psychological Medicine*, 32, 763–782.
- Powers, M. B., Zum Vörde Sive Vörding, M. B., & Emmelkamp, P. M. (2009). Acceptance and Commitment Therapy: A meta-analytic review. *Psychotherapy and Psychosomatics*, 78, 73–80.
- Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, 36, 717–731.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behaviour Research Methods*, 40, 879–891.
- Rosenfarb, I. S., Bellack, A. S., Aziz, N., Kratz, K. M., & Sayers, S. (2004). Race, family interactions, and patient stabilization

- in schizophrenia. *Journal of Abnormal Psychology*, 113, 109–115.
- Shawyer, F., Ratcliff, K., Mackinnon, A., Farhall, J., Hayes, S. C., & Copolov, D. (2007). The voices acceptance and action scale (VAAS): Pilot data. *Journal of Clinical Psychology*, 63, 593–606.
- Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. In S. Leinhardt (Ed.), *Sociological methodology 1982* (pp. 290–312). San Francisco: Jossey-Bass.
- Steel, C., Garety, P. A., Freeman, D., Craig, E., Kuipers, E., Bebbington, P., et al. (2007). The multidimensional measurement of the positive symptoms of psychosis. *International Journal of Methods in Psychiatric Research*, 16, 88–96.
- Stip, E., & Letourneau, G. (2009). Psychotic symptoms as a continuum between normality and pathology. *Canadian Journal of Psychiatry*, 54, 140–151.
- Tai, S., & Turkington, D. (2009). The evolution of cognitive behavior therapy for schizophrenia: current practice and recent developments. *Schizophrenia Bulletin*, 35, 865–873.
- Varra, A. A., Hayes, S. C., Roget, N., & Fisher, G. (2008). A randomized control trial examining the effect of acceptance and commitment training on clinician willingness to use evidence-based pharmacotherapy. *Journal of Consulting and Clinical Psychology*, 76, 449–458.
- Whaley, A. L., & Geller, P. A. (2003). Ethnic/racial differences in psychiatric disorders: a test of four hypotheses. *Ethnicity & Disease*, 13, 499–512.
- Zettle, R. D., & Hayes, S. C. (1986). Dysfunctional control by client verbal behavior: The context of reason giving. *The Analysis of Verbal Behavior*, 4, 30–38.
- Zettle, R. D., Rains, J. C., & Hayes, S. C. (in press). Processes of change in acceptance and commitment therapy and cognitive therapy for depression: A mediational reanalysis of Zettle and Rains (1989). *Behavior Modification*.
- Zimmermann, G., Favrod, J., Trieu, V. H., & Pomini, V. (2005). The effect of cognitive behavioral treatment on the positive symptoms of schizophrenia spectrum disorders: a meta-analysis. *Schizophrenia Research*, 77, 1–9.

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