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A Preliminary Examination of Acceptance and Commitment Therapy (ACT) Versus Exposure and Response Prevention (ERP) for Patients with Obsessive-Compulsive Disorder on an Optimal Dose of SSRIs: A Randomized Controlled Trial in Iran

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Recommended Citation

Zemestani, M., Salavati, M., Seyedolshohadayi, A., Petersen, J. M., Ong, C. W., Twohig, M. P., Ghaderi, E. A. See next page for additional authors. A preliminary examination of Acceptance and commitment therapy (ACT) versus exposure and response prevention (ERP) for patients with obsessive-compulsive disorder on an optimal dose of SSRIs: A randomized controlled trial in Iran. *Behavior Modification*.

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A preliminary examination of Acceptance and commitment therapy (ACT) versus exposure and response prevention (ERP) for patients with obsessive-compulsive disorder on an optimal dose of SSRIs: A randomized controlled trial in Iran

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Abstract

This study compared the effects of adding acceptance and commitment therapy (ACT) or exposure and response prevention (ERP) to adults diagnosed with obsessive compulsive disorder (OCD) already on an optimal and stable dose of selective serotonin reuptake inhibitors (SSRIs). Forty adults on SSRIs who were diagnosed with OCD participated in a randomized controlled trial in Iran of 12 individual weekly sessions of either ACT+SSRI, ERP+SSRI, or continued SSRI only. The results showed significant reductions in OCD symptom severity in ACT+SSRI and ERP+SSRI conditions at posttreatment with significantly greater reductions in both conditions compared to SSRI-only at follow-up. Additionally, psychological inflexibility and use of thought control strategies significantly decreased in the ACT+SSRI condition at posttreatment and follow-up compared to the ERP+SSRI and SSRI conditions. Both conditions led to decreases in perceived importance of stop signals. Results provide cross-cultural support for the treatment of OCD using ACT and ERP as adjuncts to SSRI and modest process of change differences between ACT and ERP. Future directions and study limitations are discussed.

Keywords: Obsessive-compulsive disorder, Acceptance and commitment therapy, Exposure and response prevention, Selective serotonin reuptake inhibitors, Psychological flexibility

A preliminary investigation of Acceptance and commitment therapy (ACT) versus exposure and response prevention (ERP) for patients with obsessive-compulsive disorder on an optimal dose of SSRIs: A randomized controlled trial in Iran

Obsessive-compulsive disorder (OCD) is defined by the presence of (a) obsessions, recurrent, persistent, and intrusive thoughts, urges, or images that cause marked significant or distress and/or (b) compulsions, ritualistic behaviors performed according to rigid rules or in response to obsessions (American Psychiatric Association [APA], 2013). OCD is a chronic and debilitating disorder with a 12-month prevalence of 2.1% and lifetime prevalence of 3.2% among the population all over the world (Osland, Arnold, & Pringsheim, 2018). In the Iranian population, the prevalence of OCD is reported to be 1.8% overall, and 0.7% and 2.8% among males and females respectively (Mohammadi et al., 2004). Iran's most common obsessions are doubts and indecisiveness and the most common compulsion is washing (Ghassemzadeh et al., 2002). Also, unacceptable thoughts (e.g., blasphemous thoughts) and symmetry are the most prevalent obsessions and compulsions among Iranian males, whereas fear of contamination and compulsive washing are higher among Iranian females, (Ghassemzadeh et al., 2002). OCD is associated with distress and interference with work/academic, interpersonal, leisure functioning, and low quality of life (Abramowitz et al., 2009).

ERP is considered the "gold standard" and first-line psychotherapy treatment for OCD as it has been repeatedly demonstrated to be efficacious in clinical research and naturalistic settings (Abramowitz, 2017; Foa & McLean, 2016). Recent meta-analyses show between-condition effect sizes in the 1.18-1.39 range for ERP and similar CBTs for OCD (McKay et al., 2015; Olatunji, Davis, Powers, & Smits, 2013; Öst et al., 2015), supporting their treatment utility.

However, a meta-analysis found that approximately 50% of those who receive these treatments are non-responders at posttreatment and follow-up (Loerinc et al., 2015).

With respect to pharmacological approaches, SSRIs (e.g., fluoxetine, sertraline, paroxetine, fluvoxamine) are the first-line treatment for OCD (Grassi & Pallanti, 2018). Meta-analyses indicate SSRIs are superior to placebo for the treatment of OCD (Soomro, Altman, Rajagopal, & Oakley-Browne, 2008). However, antidepressants alone are insufficient as only 10% of patients with OCD taking a SSRI experience full remission of symptoms; the typical response is a reduction of 20-40% of OCD symptoms (Ballenger, 1999; Mancebo et al., 2006; Math & Janardhan Reddy, 2007; Pigott & Seay, 1999). Additionally, SSRI use potentially results in unpleasant side effects including suicidality, sexual dysfunction, and weight gain (Hirschfeld, 2003; Moret, Isaac, & Briley, 2009).

Consequently, standard SSRI treatment is often combined with psychotherapy to maximize treatment gains. Research has examined SSRIs in combination with forms of CBT with some success (Franklin, Abramowitz, Bux Jr, Zoellner, & Feeny, 2002; Kampman, Keijsers, Hoogduin, & Verbraak, 2002; Simpson et al., 2008; Tenneij, van Megen, Denys, & Westenberg, 2005). However, this combination is not effective for all patients; in one large meta-analysis, researchers reported 43% of patients had a clinically significant response to receiving ERP and an antidepressant (Öst, Havnen, Hansen, & Kvale, 2015). Similarly, only a 41% symptom reduction was reported by patients after receiving CBT with an SSRI in a randomized controlled trial (Kampman, Keijsers, Hoogduin, & Verbraak, 2002). Furthermore, researchers noted a dropout rate of 32% for the combination of ERP and antidepressants, indicating ERP and SSRIs may not be a satisfactory treatment combination for all patients (Öst, Havnen, Hansen, & Kvale, 2015). Given that ACT appears to be comparably effective to existing empirically

supported treatments for various conditions (A-Tjak et al., 2015; Zemestani, Mozaffari, 2020), including OCD (Twohig et al., 2018), examining the combination of ACT and SSRIs in parallel fashion to research on ERP and SSRIs may provide insight into how different combinations of psychotherapy and pharmacotherapy may be similarly or differentially helpful. Because ACT emphasizes context over symptoms, it may provide a more encompassing treatment approach to combine with SSRIs, allowing the client to develop skills for leading a meaningful life in the face of OCD, any potential SSRI side effects, and more.

ACT is a modern CBT with growing empirical support for the treatment of OCD (Bluett, Homan, Morrison, Levin, & Twohig, 2014; Twohig et al., 2018). ACT is an experiential and contextual behavioral approach to psychotherapy in which emphasis is placed on the context and function of internal experiences, rather than the content and frequency with which they occur (Twohig, Woidneck, & Crosby, 2013). The hypothesized process of change in ACT is psychological flexibility (Twohig, Vilardaga, Levin, & Hayes, 2015). Psychological flexibility is defined as the ability to mindfully respond to inner experiences while acting consistently with personal values (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Based on the findings of recent meta-analyses, psychological inflexibility is significantly correlated with OCD symptoms (Bluett et al., 2014; Haaland et al., 2017), and psychological flexibility predicted improvement in ACT for OCD (Twohig, Vilardaga, Levin, & Hayes, 2015).

A growing body of research shows ACT and ACT-informed treatments effectively treat OCD (Bluett et al., 2014; Twohig et al., 2018; Twohig, Vilardaga et al., 2015). In the first randomized trial of ACT for OCD, ACT outperformed progressive relaxation training (PRT), with response rates in the 55–65% range at post-treatment and 3-month follow-up (Twohig et al., 2010). In addition, Twohig et al. (2018) found ERP and ACT+ERP both led to significant

decreases in OCD symptoms, depression, psychological inflexibility, and obsessional beliefs at posttreatment that were maintained at six-month follow-up. There was also clinically significant change in 70% of ACT+ ERP and 68% of ERP at posttreatment, and 60% in ACT+ERP and 64% in ERP at follow-up, indicating both conditions in this study were effective treatments for OCD (Twohig et al., 2018).

In Iranian mental healthcare systems, SSRIs are considered the first-line treatment for OCD, due to the limited availability of psychotherapy, so most patients start off with a pharmacological intervention (e.g., Sabahi, Sepehri, Mohsenbeigi, & Sepehri, 2014; Sayyah & Rahim, 2018). Psychotherapy is then added to the treatment plan by referring patients to the clinical psychologist if patients do not respond to medication alone. In the context of a mostly Western-centric evidence base for the utility of combining SSRIs with CBT, it is worth examining the effectiveness of adding psychotherapy to SSRIs in an Iranian sample because such data will tell us if results replicate across cultures. This research question is particularly pertinent given the structure of Iranian mental healthcare systems wherein patients with OCD receive SSRIs almost by default, signifying considerable homogeneity in treatment options offered. Identifying an evidence-based alternative like SSRIs in combination with a CBT for Iranian patients may thus go a long way toward improving overall treatment response rates.

Research has already been done to evaluate OCD treatment approaches in Iran. One study randomized patients diagnosed with OCD to ACT ($n = 30$), clomipramine ($n = 30$), or ACT+clomipramine ($n = 30$; Baghooli, Dolatshahi, Mohammadkhani, Moshtagh, & Naziri, 2014). Individual data tracking showed decreases in OCD symptom severity and increases in quality of life with no significant differences among conditions (Baghooli et al., 2014). In another randomized controlled trial, 23 adults on an optimal dose of SSRI completed group ACT

for OCD. Results showed group ACT+SSRI led to a significantly larger decrease in OCD and depressive symptoms and a significantly larger increase in psychological flexibility than the SSRI-only group ($n = 23$; Rohani et al., 2018). In addition, 69 adolescents who were on a stable dose of SSRI were randomized to ACT ($n = 22$), CBT ($n = 22$), or continued SSRI for OCD ($n = 25$; Shabani et al., 2019). ACT and CBT outperformed the continued SSRI condition and were equivalent in reducing OCD severity. However, ACT showed bigger changes in its hypothesized change processes: psychological inflexibility, valued living, and mindfulness (Shabani et al., 2019). On the whole, the current evidence in Iran suggests psychotherapy combined with SSRIs may be superior to SSRI alone though it is unclear if specifically adding ACT to SSRI use consistently improves outcomes. Thus, more work is needed to identify reliably effective treatments for OCD.

In addition to determining treatment effectiveness, looking at processes of change measures can help shape intervention development and refinement. This understanding can then be used to inform theoretical models and their application. For example, ERP and ACT are hypothesized to effect change in different ways, so we would expect ERP to shift its specific change process (e.g., decreases in dysfunctional beliefs; Polman, Bouman, Van Hout, De Jong, & Den Boer, 2010) more so than psychological inflexibility and vice versa for ACT.

For ACT, we would expect psychological inflexibility to decrease more so than for ERP. Moreover, we would expect decreases in thought control strategies in ACT given the deliberate approach of observing thoughts without reacting to them. However, given use of cognitive reappraisal in ERP, thought control strategies may remain the same or increase in this group. A metacognitive process related to OC symptoms is maladaptive subjective criteria for stopping compulsions (i.e., stop signals; Myers, Fisher, & Wells, 2009; Myers et al., 2017). Given both

ERP and ACT address compulsions—albeit using different strategies—we would expect maladaptive stop signals to decrease in both groups. For example, patients who receive ERP might formulate more realistic criteria for stopping rituals (e.g., checking lock once instead of five times) whereas those who receive ACT might choose to stop rituals based on entirely new criteria of values rather than rules or feelings (i.e., “I will stop washing my hands to be with my family even though I do not feel perfectly clean”).

The present study investigated the relative effectiveness of ACT+SSRI, ERP+SSRI, and continued SSRI among adults in Iran on a stable dose of SSRIs. In addition, to examine change processes relevant to ACT and ERP, we included measures of psychological flexibility, thought control strategies, and stop signals. We predicted ACT+SSRI and ERP+SSRI would reduce OCD symptoms over continued SSRI use alone. We also predicted the ACT+SSRI condition would increase psychological flexibility and decrease use of thought control strategies compared to the other two conditions. Finally, we predicted both ACT+SSRI and ERP+SSRI would decrease self-reported importance of internal stop signals.

Method

Participants

Participants were recruited from private and public outpatient mental health centers in Sanandaj, Iran. Private outpatient centers include individual psychiatric and psychological clinics and public outpatient centers including a public psychoneurological specialized clinic that was part of a psychiatric hospital. Study information was provided to psychiatrists and clinicians in these centers and they were encouraged to refer potentially eligible persons. Potential participants who were interested were asked to complete an in-person baseline interview to determine eligibility. All enrolled participants provided written informed consent. Informed

consent procedures were implemented at the first contact with participants. Following informed consent procedures, the Structured Clinical Interview for DSM-5 (SCID-5; First & Williams, 2016) was administered as the primary clinical diagnostic instrument. Following eligibility assessment, participants provided demographic and other background information. In addition, an assessment battery was completed by participants at pretreatment, posttreatment, and 3-month follow-up (see Measures section).

All participants were on optimal target doses of fluoxetine (20-80 mg), fluvoxamine (50-300 mg), clomipramine (150-250 mg), and sertraline (50-200 mg) for at least six months and monitored by independent psychiatrists unaware of study aims. Medication dosages remained constant throughout the study and participants received no other psychotropic medication. Primary inclusion criteria included (1) receiving the optimal and stable dose of SSRI for at least six months prior to and during the study, (2) meeting DSM-5 (American Psychiatric Association, 2013) criteria for OCD following stable medication; (3) scoring at least 16 on the Yale-Brown Obsessive Compulsive Scale Self-Report (Y-BOCS-SR) following stable medication, (4) being aged 18 years or older, and (5) having at least a high school education in order to meet the literary requirements of treatment. Participants were excluded if they met diagnostic criteria for other DSM-5 psychiatric disorders that necessitated priority treatment not provided by the study including current diagnosis of psychotic disorders, bipolar disorder, active suicidal ideation, current substance abuse or dependence, and any personality disorder. Participants were also excluded if they had received any form of psychological treatment in the past year.

Forty adults who met study inclusion criteria and agreed to participate were randomized to either ACT+SSRI ($n = 13$), ERP+SSRI ($n = 12$), or SSRI ($n = 15$). Randomization was conducted by an independent assessor (EG) using computer-generated blocks of random

numbers who had no involvement in recruitment or posttreatment assessments. When groups were evenly balanced, pre-prepared blocked randomization lists were used to allocate participants to each group. See Table 1 for participant baseline sociodemographic and clinical characteristics and Figure 1 for the participant flowchart. Scores on all measures appear in Table 2 and are graphed in Figure 2.

Procedure

The method was based on a randomized controlled trial design using the Consolidated Standards of Reporting Trials (CONSORT) guidelines (Schulz, Altman, & Moher, 2010). The study was registered in Iran's Clinical Trial Center coded as IRCT2017081335675N1 and all study procedures were approved by the Kurdistan University of Medical Sciences' ethics committee coded as IR.MUK.REC.1396.77. Data were gathered by volunteers who held a master's degree in clinical psychology, had no involvement in the intervention phase of the study, and were blind to the intervention arm. From posttreatment to follow-up, none of the participants received any other form of psychosocial intervention.

Continued SSRI management. The SSRI management condition consisted of continued use of SSRIs at the same levels prior to entering the study. Clients continued to be monitored by the mental health center's psychiatrists once a month for three months in 30-minute sessions. Participants taking psychotropic medications were advised not to make any changes during the active phase of their treatment. Medication adherence was assessed at each visit by verbal report and by pill counts. No psychological treatment was provided during the trial period. Following completion of the study, all participants in the SSRI management condition participated in the same treatment provided to those in the ACT or ERP condition.

Adjunctive Acceptance and Commitment Therapy (ACT). The participants in the ACT condition received SSRI management in addition to 12 individual weekly 90-minute sessions using an ACT treatment manual. Treatment rationale, model, objectives, and themes followed the standard ACT treatment manual used by Twohig et al. (2010) and Twohig, Vilardaga et al. (2015). Cultural adaptation of the treatment was based on results from empirical studies (Rohani et al, 2018) as well as personal experiences of the therapists in treatment with this population. The original manual includes 8 sessions, but for the current study the number was increased to 12 sessions. Most patients in Iran have problems in terms of receiving psychotherapy, so the number of sessions was increased to avoid non-attendance and resistance. This general attitude towards mental health problems, OCD, and psychotherapy were discussed during two of the therapy sessions.

All sessions had essential objectives that included reviewing homework assignments and discussion of events between sessions, in-session exercises, and metaphors adapted to Iranian culture. Each session had a central theme based on ACT theory. Themes included creative hopelessness, control as the problem, self-as-context, defusion, contact with present moment, committing to learning how to become aware of each moment, acceptance, values, and committed action, integrating ACT practices into daily life. Sessions involved a variety of experiential exercises, interspersed with discussions of the role of acceptance in psychological flexibility. Out-of-session behavioral commitments involved engagement in previously avoided but meaningful activities. Focus was on values and increasing psychological flexibility, not on habituation. The goal of these commitments was not to reduce obsessions or anxiety levels; rather they were presented as opportunities to engage in important life values while practicing ACT skills (e.g., acceptance, defusion, present moment awareness) if private experiences arose

that might interfere with valued actions. Participants were instructed to practice homework assignments every day between sessions for approximately a half hour.

One example of a cultural adaption was the use of the “vasvaseye Sheytan” or “Satan temptation” metaphor, in which the praying and approaching to God represents values, the intrusive religious blasphemous thoughts (obsessions) are Satan temptations. This metaphor likens the experience of religious obsessions to getting caught in the temptations of the Satan. The client practices ignoring the Satan temptations in praying times and allowing them to pass with mindfulness techniques. We also linked treatment to religion by discussing how avoidance strategies like compulsions can lead to not praying or postponing prayers. In the ACT sessions with these clients we told them that these avoidance strategies keep them from their values (the approach to God). We also discussed how giving Satan attention only increases his interest in you. During the praying, the client has the opportunity to do exposure practices and ignore the temptations of Satan and just watch them with mindfulness techniques.

Adjunctive Exposure and Response Prevention (ERP). The ERP condition consisted of SSRI management in addition to 12 individual weekly 90-minute sessions using an established ERP treatment manual for OCD (Foa & Kozak, 2004; Foa, Yadin, & Lichner, 2012). Sessions included information-gathering, psychoeducation about the cognitive-behavioral model of OCD and rationale for ERP, monitoring obsessional triggers, developing hierarchies, teaching anxiety (SUDS) ratings, and monitoring SUDS ratings during exposure tasks in-session and as homework. ERP entailed prolonged exposure to obsessional cues that induced discomfort and strict abstinence of ritualizing behavior until the discomfort abated (leading to habituation of anxiety). Exposure proceeded in a hierarchical fashion and sessions was dedicated to developing the exposure hierarchy and response prevention plan. Sessions also included in-session graduated

exposure therapy (in vivo and imaginal exposure), the assignment of between-session exposure practices, and instructions to refrain from rituals during and between sessions. Similar to the ACT condition, participants in the ERP condition were instructed to practice exposure exercises between sessions, upwards of 30 minutes daily. Participants were taught to monitor their subjective distress during exposure trials and observe habituation within and between trials.

Therapist and treatment fidelity

All sessions were run by one trained master's-level clinical psychologist who had at least two years of clinical experience. The therapist had a strong background in CBT and underwent extensive training in delivering ACT and ERP for OCD, receiving certification prior to treating study patients. Furthermore, the therapist received supervised training in delivering ACT and ERP for OCD. All sessions were audiotaped and were reviewed weekly by a supervisor to establish internal validity. At the end of each session, the supervisor and the therapist discussed the contents of the sessions to ensure adherence to the ACT and ERP treatment protocols. The adherence of intervention was under the supervision of one doctoral-level clinical psychologists (MZ) with varying lengths of post-qualification experience and extensive experience in the treatment of OCD.

Measures

All measures were administered in translated Persian format.

Structured Clinical Interview for DSM-5 (SCID-5; First & Williams, 2016). The SCID-5 is a semi-structured clinical interview for the diagnosis and assessment of psychological and psychiatric disorders using the Diagnostic and Statistical Manual, 5th edition. The SCID-5 uses modules to assess for conditions such as mood disorders, anxiety disorders, and obsessive-compulsive and related disorders. The SCID-5 has demonstrated good internal consistency (>

.80), as well as excellent reliability and validity in diagnosis of severity of mental disorders (Shankman et al., 2018).

Yale-Brown Obsessive-Compulsive Scale Self-Report (Y-BOCS-SR; Goodman et al., 1989). The Y-BOCS-SR was used as a 10-item self-report scale for assessment of the severity of OCD symptoms. The sum of all items yields a total score (range = 0–40), with scores of 16 or greater generally denoting clinically significant levels of OCD symptoms. It has demonstrated both good interrater reliability for the total score (r_s between .80 and .97) and 2-week test–retest reliability (between .81 and .97) and has shown excellent treatment sensitivity (Goodman et al., 1989; Steketee, Frost, & Bogart, 1996). Previous research has supported the use of self-report Y-BOCS as a moderately effective alternative to the clinician-administered versions in clinical samples (du Mortier et al., 2019; Hauschildt, Dar, Schröder, & Moritz, 2019). In the current study, the internal consistency (Cronbach's α) at pretreatment was .71.

Stop Signals Questionnaire (SSQ; Myers, Fisher, & Wells, 2009). The SSQ is a 12-item self-report measure that evaluates the importance of a variety of stop signals, the metacognitive cues an individual experiences when rituals have been sufficiently completed (Myers, Fisher, & Wells, 2009). The questionnaire defines stop signals and presents a list of 12 of them. It asks respondents to rate how important each of the signals is for stopping their rituals on a five-point Likert scale (0=not at all important and 4=extremely important). Internal consistency for the scale was good ($\alpha=.89$) and corrected total item correlations ranged from .48 to .67. Three-month test–retest reliability was acceptable with a coefficient of .63 (Myers et al., 2009). In the current study, Cronbach's α at pretreatment was .78.

Acceptance and Action Questionnaire - II (AAQ-II; Bond et al., 2011). The AAQ-II is a seven-item, seven-point Likert-type self-report measure of experiential avoidance/psychological

inflexibility. The items reflect: (a) unwillingness to experience unwanted emotions and thoughts and (b) the inability to be in the present moment and behave according to value-directed actions when experiencing unwanted psychological events. Higher scores indicate greater psychological inflexibility and lower scores reflect larger experiential willingness and ability to act in the presence of difficult thoughts and feelings. Bond et al. (2011) reported good test-retest reliability ($r=.81$) at a three-month interval and good internal consistency ($\alpha=.78$ to $.87$). In the current study, Cronbach's α at pretreatment was $.82$.

Thought Control Questionnaire (TCQ; Wells & Davies, 1994). The TCQ is a 30-item self-report measure that assesses use of thought control strategies. This is a widely used measure for obsessive-compulsive and anxiety-related disorders and has been shown to change as a result of cognitive-behavioral interventions (Reynolds & Wells, 1999). The TCQ has demonstrated good test-retest reliability ($r=.83$). In the current study, Cronbach's α at pretreatment was $.74$.

Statistical Analyses

Power. Significant differences in symptom severity between SSRI-only versus ACT+SSRI ($d = 1.02$ compared to SSRI-only) and CBT+SSRI ($d = 1.42$ compared to SSRI-only) were detected in a previous clinical trial in Iran that used a similar intervention with a sample that was on stable doses of SSRI (Shabani et al., 2019). We expected that the current study would yield similarly large effect sizes, stipulating group sizes between 12 and 21 to detect significant between-group differences at a power of 0.80 and alpha of 0.05 for two comparisons (ACT+SSRI to SSRI-only and CBT+SSRI to SSRI-only). Thus, our study with 13 in the ACT+SSRI group, 12 in the CBT+SSRI group, and 15 in the SSRI-only group should be sufficiently powered to detect large differences in OCD severity between active conditions and the SSRI-only control condition. Group differences between the two active conditions were not

expected for OCD severity based on previous trials comparing ACT and other forms of CBT (Arch et al., 2012; Twohig et al., 2018). Furthermore, the same study found significant differences between their CBT+SSRI and ACT+SSRI conditions on the Action and Fusion Questionnaire (psychological inflexibility measure for adolescents; Shabani et al., 2019). Thus, our study should be adequately powered to detect group differences in change processes as well. However, these power calculations are only a guide for current analyses because power calculation for multilevel analyses, which increase power by using all available data, require knowledge of random variances, which is typically impossible to determine a priori.

Multilevel analyses. Multilevel analyses were conducted in RStudio (RStudio Team, 2015) with R (R Core Team, 2018) using the following packages: lme4 (Bates, Maechler, Bolker, & Walker, 2015), texreg (Leifeld, 2013), and cowplot (Wilke, 2018). Linear mixed effects (i.e., multilevel) models were used to examine the effect of condition on outcomes over time. The outcomes of interest were OCD symptom severity (Y-BOCS-SR), importance of stop signals (SSQ), psychological inflexibility (AAQ-II), and use of thought control strategies (TCQ). For each outcome, a series of nested models with increasing complexity were specified and compared in terms of model fit using a χ^2 -difference test based on the likelihood function. Three models were tested for each outcome variable. The first model contained only time (measured in three discrete values: pretreatment, posttreatment, follow-up) as a fixed effect. The second model contained time and condition (ACT+SSRI, ERP+SSRI, SSRI-only) as independent fixed effects. The third and final model tested added a time \times condition interaction term to the second model. All models included random intercepts for individual participants. Final models were estimated using the maximum likelihood criterion. All coefficient *p*-values reported are based on the Satterthwaite approximation to degrees of freedom. Power analyses were not conducted due to

difficulty doing so for multilevel modeling without full information on parameters (e.g., intra-individual correlations; Hox, Moerbeek, & van de Schoot, 2017).

Correlations between change scores. We examined Pearson correlations between changes in the hypothesized processes of change and changes in OCD symptom severity. There are two possible patterns that would not contradict the role of the hypothesized processes of change as actual processes of change: (1) changes in processes from pre- to posttreatment are correlated with changes in symptoms from pre- to posttreatment and (2) changes in processes from pre- to posttreatment are correlated with changes in symptoms from posttreatment to follow-up. In the first pattern, we assume that process changes are closely linked to symptom changes such that they would be correlated within the same time period, whereas, in the second pattern, we assume that there is a lagged response from process changes to symptoms changes. While positive results from these tests are insufficient to show that the hypothesized processes of change *caused* improvement in symptoms (given that we did not experimentally manipulate the process variables), negative results in both tests would provide disconfirming evidence and suggest that the hypothesized processes of change did not influence symptoms.

Results

Multilevel Findings

For all outcome variables, the best-fitting model included the two-way time \times condition interaction term, indicating the trajectories of OCD symptom severity, importance of stop signals, psychological inflexibility, and use of thought control strategies over time were significantly different among conditions (see Figure 2). Coefficients from the respective best-fitting models are presented in Table 3. Effect sizes were calculated from raw data using Cohen's d with $d = 0.2$ reflecting a small effect size, 0.5 a medium effect size, and 0.8 a large effect size.

OCD symptom severity. The ACT+SSRI and ERP+SSRI groups showed decreases in OCD symptom severity from pretreatment to posttreatment with gains maintained at follow-up whereas the SSRI group had a relatively stable trajectory over time (see Figure 2, Panel A). Coefficients from the best-fitting model suggest the ERP+SSRI group outperformed the SSRI group over time (see Table 3). In addition, the ACT+SSRI group reported less OCD severity at follow-up than the ERP+SSRI group. The posttreatment effect size between ACT+SSRI and SSRI-only was large, $d = 2.70$, and the follow-up effect size between ACT+SSRI and SSRI-only was also large, $d = 2.70$. The posttreatment effect size between ERP+SSRI and SSRI-only was large, $d = 2.65$, and the follow-up effect size between ERP+SSRI and SSRI-only was also large, $d = 2.64$.

Importance of stop signals. The trajectories of importance of stop signals mirrored those for OCD symptom severity in which the ACT+SSRI and ERP+SSRI groups showed bigger decreases over time relative to the SSRI group (see Figure 2, Panel B). Furthermore, scores in the ACT+SSRI and ERP+SSRI groups were maintained from posttreatment to follow-up. The ERP+SSRI group showed more improvement than the SSRI group over time and the ACT+SSRI group had lower SSQ scores than the ERP+SSRI group at follow-up. The posttreatment effect size between ACT+SSRI and SSRI-only was large, $d = 2.90$, and the follow-up effect size between ACT+SSRI and SSRI-only was also large, $d = 3.29$. The posttreatment effect size between ERP+SSRI and SSRI-only was large, $d = 2.01$, and the follow-up effect size between ERP+SSRI and SSRI-only was also large, $d = 1.95$.

Psychological inflexibility. The ACT+SSRI group showed a bigger decrease in psychological inflexibility over time than the decrease in the ERP+SSRI group, which in turn demonstrated significantly more improvement over time than the SSRI group (see Figure 2,

Panel C and Table 3). Scores in the SSRI group were most consistent over time compared to the other two groups. In addition, whereas the ERP+SSRI group seemed to maintain levels of psychological inflexibility from posttreatment to follow-up, the ACT+SSRI group appeared to show further decreases in scores from posttreatment to follow-up. The posttreatment effect size between ACT+SSRI and ERP+SSRI was large, $d = 1.88$, and the follow-up effect size between ACT+SSRI and ERP+SSRI was also large, $d = 3.17$.

Use of thought control strategies. Only the ACT+SSRI group showed a decreasing trend for TCQ scores from pretreatment to follow-up (see Figure 2, Panel D), which was significantly different from the ERP+SSRI group. There was no significant difference in the trajectories of TCQ scores between the ERP+SSRI and SSRI groups (see Table 3). Although means increased over time in the ERP+SSRI condition, overlapping error bars within the group suggest these changes were non-significant, indicating a consistent trajectory in this group. The posttreatment effect size between ACT+SSRI and ERP+SSRI was large, $d = 2.35$, and the follow-up effect size between ACT+SSRI and ERP+SSRI was also large, $d = 2.71$.

Correlations Between Change Scores

Contemporaneous correlations. Decreases in psychological inflexibility, use of thought control strategies, and importance of stop signals from pre- to post-treatment were significantly associated with a decrease in OCD symptom severity from pre- to posttreatment (AAQ: $r = .83$, $p < .001$; TCQ: $r = .45$, $p = .004$; SSQ: $r = .92$, $p < .001$). That is, improvement in processes of change was significantly correlated with improvement in symptoms within the same timeframe.

Lagged correlations. Decreases in psychological inflexibility, use of thought control strategies, and importance of stop signals from pre- to post-treatment were not significantly associated with a decrease in OCD symptom severity from posttreatment to follow-up (AAQ: $r =$

.26, $p < .830$; TCQ: $r = .09$, $p = .45$; SSQ: $r = .22$, $p = .168$). That is, improvement in processes of change during treatment was not significantly correlated with improvement in symptoms that occurred after the end of treatment.

Discussion

This preliminary study compared ACT+SSRI, ERP+SSRI, and continued SSRI for the treatment of adults with OCD. As predicted, results showed ACT+SSRI and ERP+SSRI were both highly effective treatments for OCD with significantly larger reductions in OCD symptom severity in both conditions compared to SSRI-only at posttreatment and follow-up. Specifically, adding ACT and ERP resulted in greater than 50% reductions in OCD symptoms versus marginal gains in continued SSRI. Only one participant dropped out across all conditions. The average number of sessions attended for the ACT+SSRIs and ERP+SSRIs groups were 11.2 ($SD = 4.31$) and 11.6 ($SD = 4.27$) respectively.

Findings suggest ACT and ERP are useful adjuncts to SSRIs for the treatment of OCD in an Iranian sample. Hence, they could be reasonable additive options for clients with OCD already on SSRIs, particularly in countries such as Iran where this study was conducted. This study also shows the successful cross-cultural implementation of two versions of CBT for OCD: ACT and ERP. This is important because it suggests both treatments can be disseminated and implemented with high session completion and low drop out in countries different from where they originated and with discrepant cultural characteristics. There is substantial research on the effectiveness of ERP for OCD but the research on ACT as a treatment for OCD is limited. This study adds to the literature showing ACT for OCD can be useful at levels similar to ERP. Given the single dropout, this study also adds to literature supporting similar dropout rates for ERP as compared to other treatments for OCD (e.g., Ong et al., 2016).

We also investigated changes in hypothesized processes of change for the ACT+SSRI and ERP+SSRI conditions: psychological inflexibility and thought control strategies respectively. As expected, ACT+SSRI had a stronger effect on reducing psychological inflexibility. Additionally, ACT+SSRI decreased use of thought control strategies whereas ERP+SSRI increased use of thought control strategies. Finally, ACT+SSRI and ERP+SSRI were both effective in reducing the perceived importance of experiencing certain stop signals (i.e., indicators a ritual has been sufficiently completed) before disengaging in rituals. Correlations between change scores on process and the outcome measure were also supportive. These process of change findings suggest ACT and ERP may have impacted different hypothesized processes of change: ACT decreased psychological inflexibility whereas ERP decreased use of thought control strategies). However, both conditions shifted the perceived importance of stop signals—potentially an overlapping process of change.

In theory, ACT and ERP could share similar processes of change as both entail interacting with fear-provoking stimuli in new ways (e.g., approach instead of avoid), focus on changing behaviors (typically compulsions) that compromise quality of life, and identify specific thoughts, feelings, and behaviors as part of an OCD case formulation. However, the therapies diverge with respect to what they ask clients to do with those identified thoughts and feelings. Research thus far has been mixed as to whether ACT and ERP truly differ in the process of change variables they affect. For example, one ACT+ERP versus ERP study saw no differences in process of change (Twohig et al., 2018), though this study heavily emphasized ERP in both conditions. In contrast, another Iranian study comparing ACT+SSRI to ERP+SSRI for adolescent OCD also found process of change differences between ACT and ERP in the predicted direction (Shabani et al., 2019). Other studies have supported psychological flexibility

as a key process of change in ACT for OCD (Rohani et al., 2018; Twohig, Vilaradaga, et al., 2015). Nonetheless, the specificity of psychological flexibility as a process of change in ACT is unclear. That is, while ACT may shift psychological flexibility, other therapies may do so too (Twohig et al., 2018).

In the present study, psychological inflexibility also decreased in the ERP+SSRI condition albeit to a lesser extent than ACT+SSRI. One reason ERP could lead to increases in psychological flexibility is its provision of opportunities to interact with previously avoided stimuli in a different way (i.e., approach), expanding the individual's behavioral repertoire—a key component of psychological flexibility. Conversely, the differential changes in thought control strategies over time supported distinct targets in ACT versus ERP. Namely, the ACT+SSRI condition led to reductions in thought control strategies—consistent with the acceptance-based approach of observing thoughts without reacting to them—whereas the ERP+SSRI condition resulted in increases in thought control strategies—consistent with a cognitive reappraisal approach in which the premise is thoughts can be changed with cognitive effort.

At the same time, the observed changes in psychological inflexibility and thought control strategies only show that the treatments affected different hypothesized processes of change (i.e., procedure shifted process), but they do not tell us whether those processes of change actually functioned as such (i.e., process shifted outcome). While our change score correlation results provided preliminary evidence that psychological inflexibility and thought control strategies may be relevant processes of change in treatment for OCD, they are insufficient to confirm this hypothesis given lack of experimental control over the process variables. The link between treatment and process and that between process and outcome are important because they signal

malleability and clinical relevance respectively (Hofmann & Hayes, 2018). For example, it is possible that ACT decreased psychological inflexibility, but that treatment response was ultimately not attributable to this change. Thus, establishing a causal link between decreases in psychological inflexibility and thought control strategies and improvement in outcomes is also needed to support their role as empirically grounded processes of change.

This study has a number of limitations. First, the relatively small number of participants per group might have precluded detection of significant differences between the active conditions. Future work with larger samples would provide more power to detect differences between ACT+SSRI and ERP+SSRI if they exist. At the same time, that the current study found significant differences over time between active conditions on the AAQ-II and TCQ suggesting it was sufficiently powered to detect differences on these measures. Although there were only differences between active groups at follow-up for the Y-BOCS-SR and SSQ (favoring the ACT+SSRI group), which could be attributable to low power, it is also plausible both conditions were equally effective with respect to these outcomes given other trials with larger sample sizes have found few differences in symptom severity between ACT and other forms of CBT (Arch et al., 2012; Craske et al., 2014; Twohig et al., 2018). Overall, we recognize that the small sample size of the present study has significant limitations for generalizability, particularly considering the diverse clinical presentations of OCD. Second, our outcome measures were based on self-report, highlighting the need for multimethod assessment in future similar studies. In particular, using the clinician-administered version of the Y-BOCS would increase reliability and validity of results. Furthermore, the present study did not use measures on dysfunctional beliefs or other ERP-related constructs. This limitation is especially important to consider given the utility of assessing OCD symptoms from a variety of perspectives, particularly clinician-based interview

measures that can provide a deeper understanding of symptoms and severity. Third, unmeasured cultural variables might have confounded current findings. For example, Iran has a collectivistic culture that reinforces conformity (Zemestani, Abbarini, & Castonguay, 2019), which could have affected treatment adherence and survey item responses. Consequently, it is possible the positive treatment response and low variability were partly a product of culturally specific behavior and not entirely attributable to the interventions per se. In other words, culture might have been a moderating influence on our results. Additionally, treatment acceptability or engagement should be monitored in future studies to see if there are between-condition differences. As noted earlier, acceptability was likely high given the low drop-out, but replication and formal assessment of acceptability are needed to clarify which aspects of treatment might enhance its acceptability. Lastly, only one therapist provided treatment in both conditions and the present study does not conduct formal analyses of treatment fidelity for either condition. Future research should use multiple therapists of varying backgrounds to increase generalizability of findings, as well as fidelity measures. Lastly, we wanted to note that the SSRI-only group was lacking a comparable psychotherapy “placebo.” It is possible that the differences between the active and control groups can be attributed to this discrepancy and it is a topic worth addressing in future research,

Despite these limitations, this study provides preliminary support for the effectiveness of ACT+SSRI for OCD and adds to the literature supporting the use of ERP in conjunction with SSRIs for treating OCD. Additionally, this study was conducted in a Middle East country while much of the ACT, ERP, and OCD literature arises from North America and Europe; therefore, this study provides a diverse cultural application of ACT and ERP for the treatment of OCD. While further research on ACT for OCD is warranted, these findings are particularly encouraging and support the applicability and effectiveness of ACT in its standard form in other

cultures. In sum, the results of this study provide preliminary cross-cultural support for both ACT and ERP as treatments for OCD and as a successful adjunct to SSRIs.

Funding: None.

Conflict of interest: The authors declare that they have no conflicts of interest.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All study procedure approved by the Kurdistan University ethic review board.

Informed consent: Informed consent was obtained from all individual participants included in the study.

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Table 1

Demographic and clinical characteristics of the study groups

	ACT+ SSRIs (n = 13)	ERP+ SSRIs (n = 12)	SSRIs (n = 15)	t or χ^2	P
Age: (years; M \pm SD)	35.69 (9.34)	36.12 (7.76)	31.73 (7.81)	1.14	0.33
Sex: n (%)				0.19	0.91
Male	5 (38.0)	5 (41.7)	7 (46.7)		
Female	8 (61.5)	7 (58.3)	8 (53.3)		
Marital status				2.17	0.32
Married	11 (84.6)	9 (75.0)	9 (60.0)		
Single	2 (15.4)	3 (25.0)	6 (40.0)		
Educational level: n (%)				3.26	0.64
Master's degree	4 (30.8)	6 (50.0)	10 (66.7)		
High school diploma	7 (53.8)	2 (16.7)	3 (20.0)		
High school	2 (15.4)	4 (33.3)	2 (13.3)		
Employment status: n (%)				0.38	0.47
Unemployed	7 (53.8)	6 (50.0)	3 (20.0)		
Free job	3 (23.1)	4 (33.3)	4 (26.7)		
Government job	3 (23.1)	2 (16.7)	8 (53.3)		
Comorbid diagnosis: n (%)				2.62	0.51
Major depressive disorder	6 (46.1)	5 (41.6)	8 (53.3)		
Generalized anxiety disorder	1 (7.7)	2 (16.7)	1 (6.6)		
Social anxiety disorder	0 (0)	3 (25.0)	1 (6.6)		
Specific phobia	2 (15.4)	0 (0)	2 (13.3)		
Psychotropic medication: n (%)				1.07	0.39
Fluoxetine	3 (23.1)	4 (33.3)	5 (33.3)		
Fluvoxamine	3 (23.1)	3 (25.0)	3 (20.0)		
Clomipramine	1 (7.7)	2 (16.7)	3 (20.0)		
Sertraline	6 (46.2)	3 (25.0)	4 (26.7)		
Medication dosage: (milligrams; M \pm SD)	138.46 (50.14)	129.16 (66.39)	126.1 (63.89)	0.15	0.85
Medication duration: (months; M \pm SD)	11 (6.32)	10 (7.18)	11.5 (8.02)	1.10	0.43

Note. ACT = Acceptance and commitment therapy; ERP = exposure and response prevention; SSRIs = selective serotonin reuptake inhibitors.

Table 2

Means and Standard Deviations at Pre-treatment, Post-treatment, and Follow-Up by Condition

Measure	ACT+SSRIs (n = 13)			ERP+SSRIs (n = 12)			SSRIs (n = 15)		
	Pre	Post	Follow	Pre	Post	Follow	Pre	Post	Follow
Y-BOCS-SR	27.46 (3.97)	12.07 (2.81)	11.69 (2.32)	26.18 (3.84)	13.09 (1.92)	13.90 (1.81)	25.13 (4.80)	21.40 (3.99)	23.0 (4.51)
SSQ	27.38 (5.61)	10.07 (3.91)	10.15 (3.41)	28.0 (4.80)	12.81 (4.93)	14.18 (4.87)	25.80 (4.53)	22.33 (4.51)	23.40 (4.56)
AAQ-II	50.53 (5.81)	29.30 (2.35)	26.07 (2.43)	47.27 (6.0)	35.54 (4.05)	35.36 (3.35)	44.46 (6.09)	40.53 (4.50)	41.33 (5.30)
TCQ	65.0 (7.22)	58.92 (3.94)	57.84 (2.73)	66.81 (6.19)	70.0 (5.36)	68.81 (5.03)	66.40 (8.33)	72.46 (6.73)	72.46 (6.35)
SUDS	9.30 (0.75)	1.76 (0.43)	1.30 (0.48)	9.09 (1.04)	2.81 (0.75)	2.54 (0.75)	8.60 (1.05)	6.46 (1.40)	6.46 (1.55)

Note. Y-BOCS-SR = Yale-Brown Obsessive-Compulsive Questionnaire; SSQ = Stop Signals Questionnaire; AAQ-II = Acceptance and Action Questionnaire - II; TCQ = Thought Control Questionnaire; SUDS = Subjective Units of Distress Scale.

Table 3

Coefficients for Best-Fitting Mixed Effects Models for Outcomes of Interest

	Y-BOCS-SR	SSQ	AAQ-II	TCQ
Intercept	25.13*** (0.94)	25.80*** (0.94)	44.47*** (1.26)	66.40*** (1.55)
Time (Post ^a)	-3.73*** (0.84)	-3.47*** (0.90)	-3.93*** (1.15)	6.07*** (1.39)
Time (Follow-up ^a)	-2.13* (0.84)	-2.40** (0.90)	-3.13** (1.15)	6.07*** (1.39)
Group (ERP+SSRI ^b)	1.70 (1.40)	2.53 (1.41)	4.20* (1.89)	0.18 (2.33)
Group (ACT+SSRI ^b)	2.33 (1.37)	1.58 (1.38)	6.07** (1.85)	-1.40 (2.28)
Time (Post ^a) × Group (ERP+SSRI ^b)	-10.02*** (1.27)	-12.03*** (1.35)	-9.48*** (1.72)	-2.90 (2.08)
Time (Follow-up ^a) × Group (ERP+SSRI ^b)	-10.87*** (1.27)	-11.68*** (1.35)	-10.12*** (1.72)	-3.65 (2.08)
Time (Post ^a) × Group (ACT+SSRI ^b)	-11.65*** (1.24)	-13.84*** (1.32)	-17.30*** (1.68)	-12.14*** (2.04)
Time (Follow-up ^a) × Group (ACT+SSRI ^b)	-13.64*** (1.24)	-14.83*** (1.32)	-21.33*** (1.68)	-13.22*** (2.04)
BIC	639.08	647.07	706.35	750.72
Log likelihood	-293.21	-297.20	-326.84	-349.03
Number of observations	120	120	120	120
Number of participants	40	40	40	40

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.^a Reference level is pretreatment.^b Reference level is ERP+SSRI.

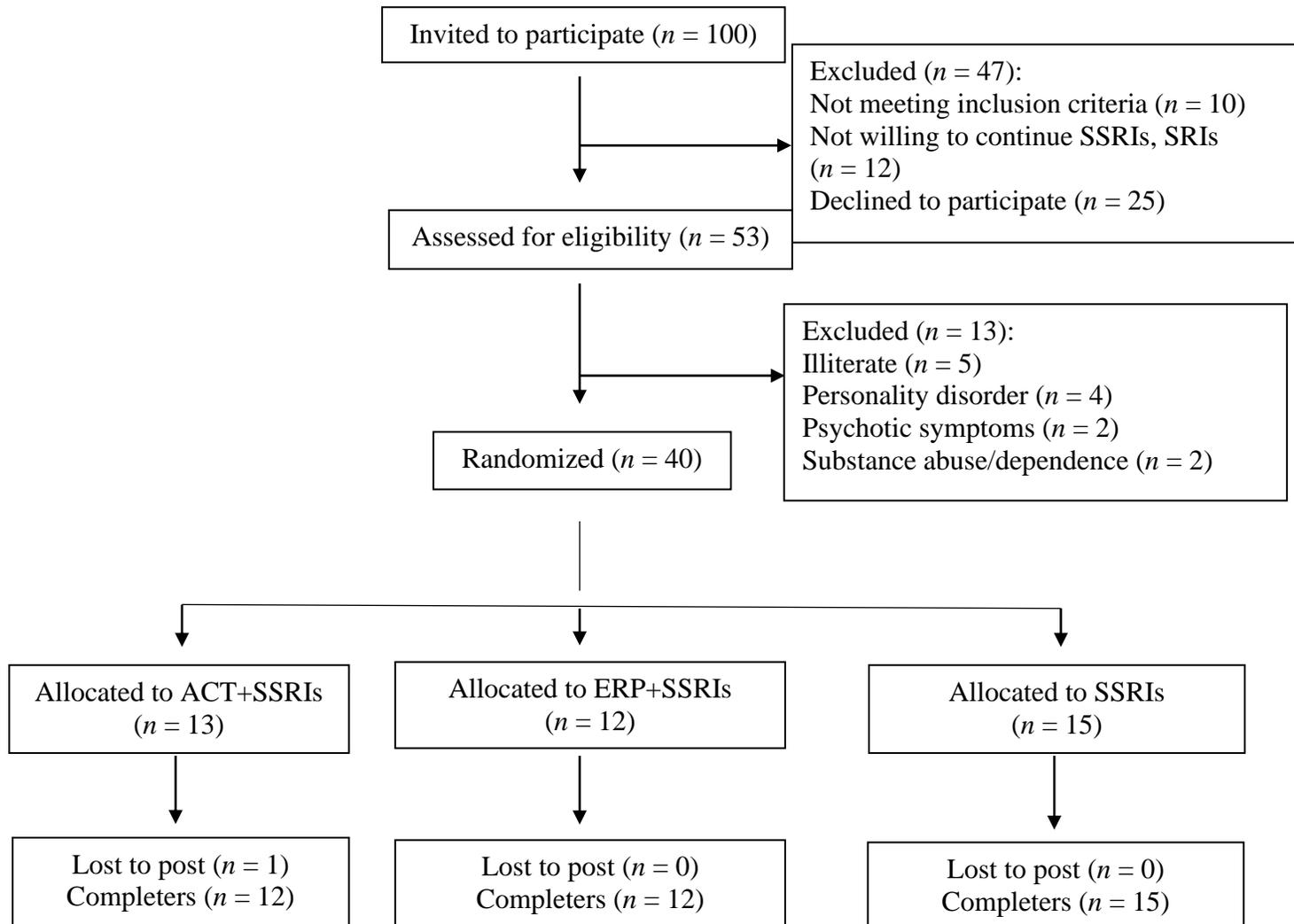


Figure 1. Participant flowchart.

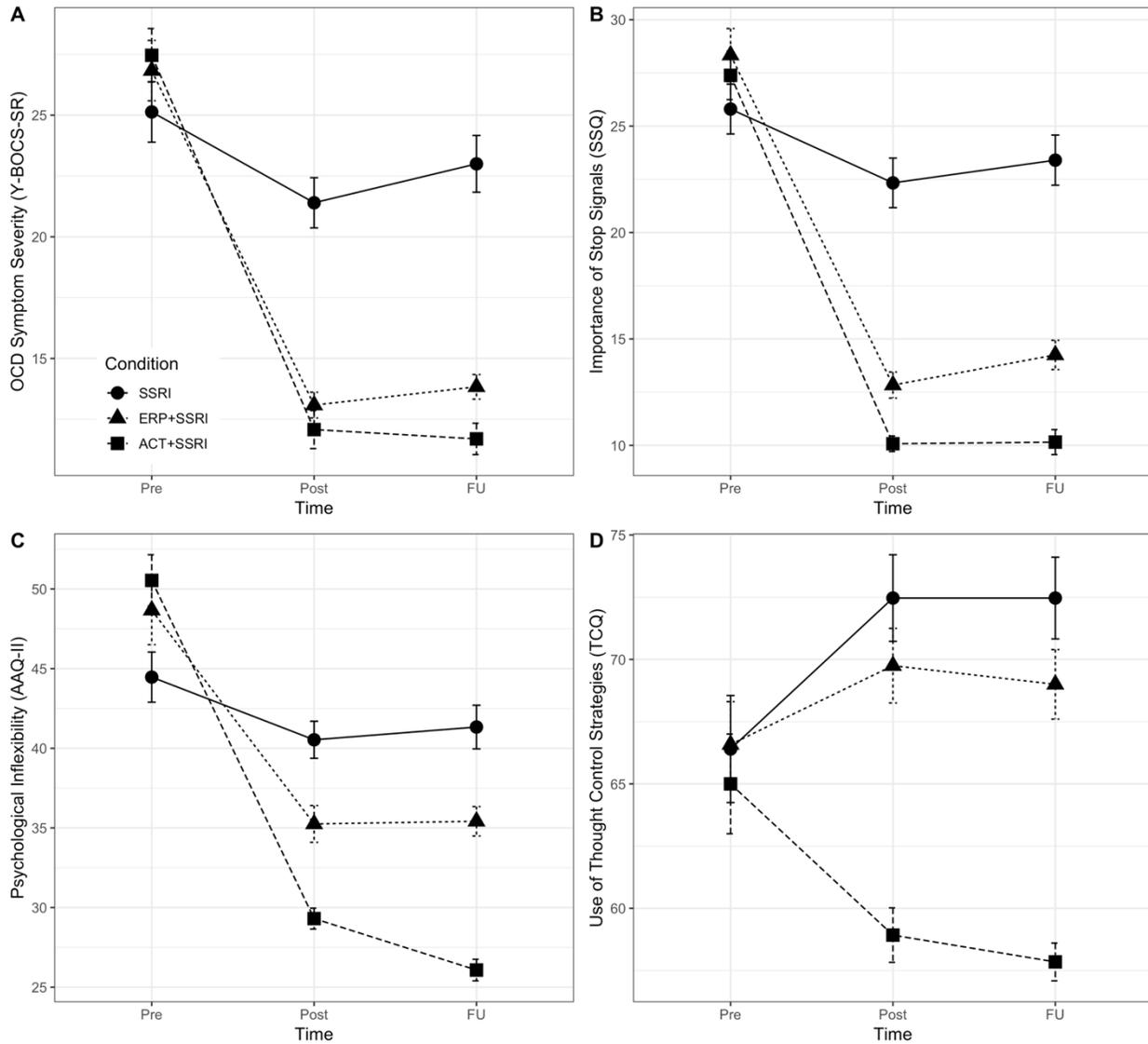


Figure 2. Plots of mean outcome scores over time by condition. This figure shows the trajectories of mean scores (with standard error bars) for each experimental condition over the course of the study for outcomes of interest: OCD symptom severity, importance of stop signals, psychological inflexibility, and use of thought control strategies.