Psychotherapy Feedback on the Counseling Center Assessment of Psychological Symptoms (CCAPS): Effects on Outcome and Client Moderators of Effectiveness

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**Background**

While psychotherapy is effective for a majority of people, research consistently shows that some people do not achieve positive outcomes from treatment (Finch, Lambert, & Schaalje, 2001). Studies have estimated that 30-50% of clients do not improve, with 5-10% of clients deteriorating, or reliably worsening, during treatment (Lambert & Ogles, 2004). Further, clinicians overestimate the change they are inducing in their clients (Walfish, McAlister, O’donnell, & Lambert, 2012) and failing to predict negative outcomes (Hannan et al., 2005).

Routine outcome monitoring (ROM) aims to address this clinician blind spot and reduce negative outcomes by capturing client progress at regular intervals throughout treatment, ideally at every session, and providing that information back to the treating clinician in real-time, allowing the clinician to adjust treatment if indicated. Building on this, patient-focused research uses ROM data from past clients to model average change trajectories over the course of treatment, often stratified by initial distress and other client characteristics at intake. A client’s actual change during treatment can be compared to their predicted change trajectory based on historical data, and this information is provided to clinicians as feedback to inform treatment (Boswell, Kraus, Miller, & Lambert, 2013). The feedback can alert a clinician when a client off track for a positive outcome or inform the clinician that progress is on track with similar clients’ progress. Many ROM feedback systems have been developed for use in psychotherapy, including the OQ-45 (Lambert et al., 2013), CORE-OM (Barkham et al., 2001), PCOMS (Duncan & Miller, 2008), and TOP (Kraus, Seligman, & Jordan, 2005). Across systems, feedback has largely been shown to improve outcomes (Lambert, Whipple, & Kleinstäuber, 2018), and ROM has quickly become a recommended standard in psychotherapy treatment, with APA including ROM as a component of effective evidence based care (APA Presidential Task Force on Evidence-Based Practice, 2006).

The current study evaluates the effectiveness of a new ROM feedback system developed for use in college counseling centers. It also tests for differential effects of feedback across different domains of distress, explores client moderators of feedback’s effectiveness, and assesses for differential effects by counseling center. Before presenting the specific aims of this investigation, the literature on the impact of feedback on outcomes is reviewed, with special attention to when and for whom feedback is most effective. First, however, the methods behind ROM feedback will be illustrated by focusing on two of the most commonly used systems: the Outcome Questionnaire 45 (OQ-45; Finch et al., 2001) and the Partners for Change Outcome Management System (PCOMS; Miller, Duncan, Sorell, & Brown, 2005).

The OQ-45 assesses client functioning across three domains: psychological symptoms, interpersonal problems, and social role functioning. It provides scores in each domain, as well as a total score, which is most commonly used. In clinical practice, clinicians are presented with a graphical representation of their clients’ scores over time, as well as an expected change trajectory to which their clients’ actual change is compared. This expected change trajectory is based on longitudinal treatment data from thousands of previous clients and is stratified by initial OQ-45 score. Change is modeled according to the dose-effect model (Howard, Kopta, Krause, & Orlinsky, 1986), which characterizes change as a decelerating logarithmic curve, with rapid initial decrease in symptoms, followed by increasingly more sessions needed to achieve the same amount of change. The OQ-45 also provides several alerts, indicating that clients are deviating significantly from the expected recovery curve in either the positive or negative direction. A positive alert can be indicative that a client is making progress more quickly than expected and may be ready to terminate therapy earlier, while a negative alert indicates that therapy is not progressing as quickly as expected, and the client might be at risk for a negative treatment outcome. Alerts are based on 80% tolerance intervals around the expected scores at each session, with scores falling outside the upper limit of the tolerance interval generating a negative alert indicative that they are at risk of being in the approximately 10% of clients likely to have a negative outcome. The OQ-45 also provides clinical support tools and an assessment for signal cases, systems for helping clinicians problem solve off track cases by identifying factors that have been shown to relate to client outcome.

The PCOMS assesses mental health functioning with the 4-item Outcome Rating Scale (ORS) and therapeutic alliance with the 4-item Session Rating Scale (SRS). It also uses expected trajectories of change for the ORS, based on Bayesian inference. ORS trajectories incorporate a client’s initial score, as well as their change at the current session relative to the initial score (Miller et al., 2005). Clients whose scores fall below the 50th percentile of the expected trajectories are identified as at risk (Anker, Duncan, & Sparks, 2009), indicating that they are making less change than the average client. While other ROM instruments employ other methods to provide feedback on client progress, the OQ-45 and PCOMS provide two examples.

Feedback has been shown to improve outcomes and help prevent negative treatment outcomes across feedback systems and methods. A recently published meta-analysis of 24 studies using either the OQ-45 or PCOMS system examined the effect of feedback across many populations and treatment modalities (Lambert et al., 2018) and found that in a majority of studies (70%), feedback improved outcomes. Consistent with a previous meta-analysis of the OQ-45 (Lambert & Shimokawa, 2011), there was a small (SMD = .14) effect of feedback for all clients, and a larger effect for clients identified as off track (SMD = .33), with significant reductions in deterioration specifically for those off track clients. For the PCOMS, there was a small to moderate effect of feedback for all clients (SMD = .40), with significantly more clients achieving a reliable positive change, but no significant effect in reducing deterioration. A 2016 systematic review found more moderate results, with just over half of studies showing a positive effect of feedback (Gondek, Edbrooke-Childs, Fink, Deighton, & Wolpert, 2016). When considering only off track clients, however, 73% of studies found a positive effect.

While a majority of studies support the effectiveness of feedback, it is important to understand why feedback is effective, under what conditions, and for whom. Answering these questions may shed light on the minority of studies in which feedback was not found to improve outcomes. Contextual Feedback Intervention Theory (Sapyta, Riemer, & Bickman, 2005) suggests that in order for feedback to be effective, it has to provide additional information beyond what a therapist could glean from the client on their own. Studies showing that clinicians fail to identify worsening in their own clients, even when provided with the base rate of it happening, suggest that feedback does just that (Hannan et al., 2005). Additionally, the feedback must be actionable and timely. Feedback should be delivered regularly, optimally on a session by session basis, when treatment can still be altered, not at the end once deterioration has already occurred. Similarly, Feedback Intervention Theory (Kluger & DeNisi, 1996) suggests that feedback elicits a comparison between actual and desired progress. A discrepancy between the two may prompt therapists to change their treatment plan or relax adherence to a specific model of treatment.

In addition to theories on mechanisms by which feedback improves outcomes, research comparing the effects of feedback for all clients versus only off track clients begins to answer the question of when feedback is effective. As found in the meta-analyses and systematic review outlined above, the effect of feedback on symptom improvement is strongest for off track clients, but this does not rule out an attenuated effect for on track clients, and several studies found that even for on track clients, outcomes are improved when they receive feedback (Amble, Gude, Stubdal, Andersen, & Wampold, 2015; Harmon et al., 2007; Shimokawa, Lambert, & Smart, 2010). Some research, including a meta-analysis, found that feedback may also shorten treatment for on track clients, perhaps by indicating to therapists that the client has achieved the amount of change expected and may not need continued treatment (Lambert et al., 2003). When including off track clients as well, however, a systematic review found no effect of feedback on number of sessions in 60% of studies and a negative effect in 20% of studies (Gondek et al., 2016). This finding is not entirely unexpected, as in some cases, offering more sessions may in fact be an indication of clinician responsiveness to feedback indicating that a client needs more treatment to achieve the desired outcome. Lending credence to this, off track clients in feedback conditions indeed received more sessions than off track clients in no feedback conditions (Gondek et al., 2016; Lambert et al., 2003).

Most ROM measures capture a single domain of distress (see the TOP for an exception), and the literature is largely silent on how domain specific feedback and alerts compare to general feedback alerts. One study found that providing feedback separately for wellbeing and affective distress improved outcomes compared to providing feedback on wellbeing alone (Dyer, Hooke, & Page, 2014). Building on these results, it may be that providing feedback on specific domains of distress and impairment (e.g. alerts when clients’ depression scores are off track) may further improve outcomes. This, however, remains to be tested. Further, it is unknown whether certain domains benefit from feedback more than others.

Despite heterogeneity in results regarding the effects of feedback, there is little research examining whether certain types of clients benefit more from treatment that utilizes a feedback system, especially client characteristics than can be measured from the outset of treatment. The most frequently studied client characteristic is level of initial distress, although this research has produced mixed results. One study found that feedback produced more positive effects for clients that started therapy with higher distress, the clients who were most likely to otherwise have a poor outcome in therapy (Lambert et al., 2001). Another study, however, found that client initial distress did not moderate the effect of feedback (Amble, Gude, Ulvenes, Stubdal, & Wampold, 2015), and yet another review paper found that studies including more severe clients produced smaller effects of feedback, although this effect was across studies, not within a single study (Davidson, Perry, & Bell, 2015). Similarly, studies of ROM feedback in more distressed populations (e.g. psychiatric hospital or inpatient) have typically found smaller effects of feedback than studies including outpatients or clients seen at college counseling centers (Probst et al., 2013; Simon, Lambert, Harris, Busath, & Vazquez, 2012). The mixed findings regarding the effect of initial distress on feedback seem likely due to differences in the populations and ranges of severity included. Regarding diagnosis, Lambert et al. (2018) found in their meta-analysis that the effect of feedback did not differ by diagnosis, although the ROM measures included in the study did not offer diagnosis specific feedback, and the authors indicate that more work should be done in this area. The authors also acknowledge that some clients (or therapists) do not respond to feedback, but recognize that “we have no knowledge of the extent to which this is a function of patient variables, therapist factors, or something connected to the nature of the feedback” (pp 533-534).

To our knowledge, only one study has been published that assessed client moderators beyond diagnosis or initial severity (Errázuriz & Zilcha-Mano, 2018). Unexpectedly, this study found that for clients with prior psychiatric hospitalizations, receiving feedback actually produced worse outcomes than not receiving feedback. Also unexpected, for clients who started with greater distress and went off track during treatment, receiving no feedback was better than receiving feedback that they were off track. The authors hypothesize that for these highly distressed and potentially more vulnerable clients, receiving feedback that they are not progressing as expected may be a negative experience that may further impede treatment progress. The paucity of studies, let alone the unexpected results observed, indicate that more attention to client moderators of feedback’s effectiveness is needed.

Taken as a whole, the literature suggests that while feedback is generally effective, more can be done to extend its positive impact and to understand under what conditions and for whom it is effective. The present study aims to address these gaps by evaluating the impact of one specific multidimensional feedback system developed and refined to meet the needs of clients treated in college counseling centers, as well as to examine both client moderators and the impact of feedback on multiple domains of specific distress and impairment.

**The Center for Collegiate Mental Health and The Counseling Center Assessment of Psychological Symptoms**

The Center for Collegiate Mental Health (CCMH) is a nationally representative practice research network (PRN) (Hayes, Locke, Castonguay, & Locke, 2011), built on a collaborative infrastructure involving multiple stakeholders, including university administrators, psychological researchers, industry partners, and over 600 university and college counseling centers. As a PRN, CCMH facilitates the collection of information that will both inform clinical practice and advance research on the mental health services provided to university counseling clients, while not adding substantial burden to everyday clinical practice.

The Counseling Center Assessment of Psychological Symptoms (CCAPS; Locke et al., 2011) is a routine outcome monitoring instrument developed by CCMH specifically for use in the college population. It captures distress across the most common domains seen in college counseling centers and is intended to be used at intake and throughout treatment. It is currently used in over 600 counseling centers. When the CCMH was launched (Locke, Crane, Chun-kennedy, & Edens, 2008), clinicians using the CCAPS received a report for each client that provided CCAPS scores in a tabular format (see Appendix A), with CCAPS scores as percentiles normed on a large sample of treatment seeking college students. It offered no comparison of a client’s progress to their expected progress or indication of whether their progress was on or off track for a positive outcome.

After several years of operation and in order to meet the needs of its practitioner stakeholders, CCMH developed a feedback system for the CCAPS. Using CCAPS data previously collected through clinical practice, the feedback system is largely modeled after the OQ-45 feedback system. The feedback system was incorporated into a new CCAPS report with several additional features (see Appendix B for an example of the new report). The main addition to the report was a graphical display of a client’s actual CCAPS scores over time on each subscale, overlaid on colored shading indicating whether the scores correspond to low (white shading), moderate (yellow shading) or high distress (red shading) based on the scale’s clinical cut points. This visual allows for ease of interpreting trends across treatment. Additionally, expected recovery trajectories based on past clients starting at a similar level of distress were added alongside allowing for a comparison to the client’s actual scores. Finally, an alert system was added to indicate if a client was off track from their expected recovery trajectory. This off track alert is displayed as a blue dot, and no alert is displayed if a client’s scores are on track. The example report in Appendix B shows off track alerts on several subscales.

Returning to Contextual Feedback Intervention Theory (Sapyta et al., 2005), the visual discrepancy between a client’s current scores and the low distress range informs therapists about how much additional change a client needs to make to move into that range. Additionally, the visual discrepancy between actual and expected recovery trajectories prompts a therapist when a client is not changing as would be expected. This is reinforced by the off track alert generated when a client deviates significantly, indicating a change to treatment may be needed, or at minimum a conversation with the client about treatment progress and goals. This conversation can be informed by the graphical depiction of the scores mentioned above, which provide context for the alert. By allowing the graphical display of client scores and data derived alerts to work in tandem, the new CCAPS report is able to provide new, actionable information for the therapist and client.

The development of the new feedback system exemplifies an important step of in the evolution of the CCHM PRN by fostering a positive loop between research and practice (McAleavey, Lockard, Castonguay, Hayes, & Locke, 2015). CCAPS data collected as part of routine clinical practice has indeed been used in research to better understand how clients change while in treatment, as well as used to develop the feedback tool that was implemented back into counseling centers with the goal of informing everyday clinical practice and ultimately improving clinical outcomes. The present study will evaluate whether the data derived feedback system did positively impact client outcomes, and if so, on what dimensions of distress and for whom.

**Research questions**

The primary research question assesses the impact of the CCAPS feedback system. Did counseling center outcomes improve after the implementation of the new feedback system? Because the CCAPS as an outcome measure was in place prior to the feedback system being implemented, any effects of the feedback system will be above and beyond the effect of monitoring outcome alone. It should be mentioned that the current study makes no attempt to isolate only the effects of a single component of the new CCAPS feedback system and report (e.g. the effect off track alerts independent of the graphical depiction) or to isolate the effects of the feedback system from any impacts it may have had on how therapists resultingly conducted treatment. Instead, this constellation of report changes and any accompanying behavioral changes are evaluated together as pathways by which feedback can have effects on therapy. The second research question expands on prior research, which has largely been done in unidimensional measures of distress, to assess whether the effect of feedback differ by subscale. Although not directly addressing differential effectiveness by diagnosis, as suggested by Lambert et al. (2018), this question can help to fill this gap in the literature by indicating whether certain domains benefit more from feedback. If the results show that some domains benefit less from feedback than others, this would indicate the need for further research and development of feedback methods specifically attuned to those domains.

Third, several client moderators will be evaluated to answer the question, for whom does feedback most improve outcomes. Some are based on prior research findings, while others are new variables being explored. Similar to prior research, this study will compare on track to off track clients to determine whether the effect of feedback is stronger for off track clients. Also building on prior research, baseline scores on each CCAPS subscale will be tested to determine whether clients who present with more distress benefit more from feedback. Additionally, whether or not a client had previously psychiatric hospitalizations will be included to compare to the surprising result found by Errázuriz and Zilcha-Mano (2018).

Two previously untested moderators will also be examined: each client’s total number of sessions and the frequency with which the CCAPS is administered throughout. Centers have latitude to administer the CCAPS during treatment as frequently or infrequently as they chose. CCMH recommends that it is most effective when administered at every session, which many centers follow, while other centers administer it only at prespecified sessions (e.g. 1st, 3rd, and 7th). This presents a unique opportunity to evaluate the effect of administration frequency within the same measure being used across multiple centers.

Finally, this study will assess whether there is a center effect of feedback, as the CCAPS feedback system was implemented in hundreds of UCCs across the country. This question makes a valuable contribution to the literature, which to our knowledge has not previously assessed for differential effects by location, and the presence of a center effect would suggest center characteristics that moderate feedback’s effectiveness. Although such potentially explanatory center characteristics are not measured in the present study, testing for a center effect will inform future research directions on identifying characteristics of centers for which feedback was especially helpful. Such characteristics may be able to be implemented elsewhere to magnify positive effects of feedback.

**Methods**

**Procedure**

Data for the present study were collected within CCMH which, as mentioned above, is a practice research network of over 600 university and college counseling centers. Participating centers collect data locally as part of clinical routine using standardized measures and can elect to contribute their center’s deidentified data to the centralized CCMH repository after securing IRB approval. Each year of CCMH data captures a single academic year, spanning from July 1 to June 30 of the following year. Four years of CCMH data from two discrete time periods are used in the present study, and centers are included if they contributed data to the repository during all four years. The first time period (2013-2015) captures data from before the CCAPS feedback system was implemented, and the second time period (2016-2018) begins one year after the feedback system was released on July 27, 2015. This intentional one-year gap accounts for the gradual adoption of the new system over the year following its release. While many centers began using the new feedback system as soon as it was made available, others began using it at a later date (e.g. the start of the following semester) after having a chance to train staff in the new system. Any centers who had not updated by July 1, 2016 (the start of the next CCMH data year) were excluded. This one-year gap also allows for centers to become accustomed to the new system, ensuring that any clinical benefits coinciding with its release are not simply attributable to novelty.

A dichotomous variable will be created indicating whether a client received treatment before or after the new CCAPS feedback system and accompanying report were released. These will be referred to as no feedback and feedback conditions. It is important to note that these two conditions occurred one after the other temporally, not simultaneously, and clients were not randomized to conditions. Although using an archival control has the drawback of not controlling for any effects of time, in comparison to randomizing entire centers to different conditions simultaneously, it has the benefit of each center’s archival data serving as its own control in respect to center policies, types of treatment provided, and characteristics of clients generally seen at the center. Approximately 340,000 clients received treatment at 105 centers during these four years, 130,000 in the no feedback condition and 210,000 in the feedback condition.

**Measures**

**Counseling Center Assessment of Psychological Symptoms (CCAPS).** The CCAPS (Locke, Bieschke, Castonguay, & Hayes, 2012; Locke et al., 2011) is a multidimensional instrument designed to assess common mental health concerns of students seeking treatment at college counseling centers. There are two versions of the CCAPS available: the CCAPS-62 and the CCAPS-34, and CCAPS administered as the 62-item version can be scored as CCAPS-34. The CCAPS-34 is recommended for repeated measures use throughout treatment, and treatment feedback, including graphical expected recovery curves and off track alerts, are only available for the 34-item version. The CCAPS-34 (Locke, McAleavey, et al., 2012) has 34 items capturing distress across seven domains: Depression (6 items), Generalized Anxiety (6 items), Social Anxiety (5 items), Academic Distress (4 items), Eating Concerns (3 items), Alcohol Use (4 items), and Hostility (6 items), as well as a general distress index (DI) aggregating distress across multiple domains (20 items). In completing the CCAPS, clients are asked to rate themselves over the past two weeks on a Likert scale, from 0 (*not at all like me)* to 4 (*extremely like me*). Each subscale is scored by taking the average of the questions that load onto that subscale. As such, higher subscale scores indicate more distress, with scores ranging from 0 to 4.

All CCAPS-34 subscales have demonstrated good internal consistency (Cronbah’s alpha ranging from .82-.91), criterion validity (strong correlations with other established measures of similar constructs), discriminant validity (weak correlations with unrelated constructs; Locke, McAleavey, et al., 2012), and all subscales with related diagnostic categories have demonstrated expected elevations in clients with the corresponding diagnoses (McAleavey et al., 2012).

The methods behind the feedback system for the CCAPS-34 were based largely on those used in the OQ-45 (Finch et al., 2001). Expected treatment response trajectories and off track alerts were based on approximately 30,000 clients seen in counseling centers across the United States in 2012-2014. Each subscale was modeled independently using linear mixed effects modeling with fixed and random effects for intercept and session number. Session number was log transformed consistent with research showing decelerating recovery trajectories. Baseline CCAPS values on each subscale were binned so that each bin spanned at least 1% of baseline scores on that subscale. The number of bins per subscale ranges from 13 to 49 depending on the distribution of the subscale. A separate model was then run for each bin, resulting in a predicted slope and predicted CCAPS score for each session through session 20. This provides graphical expected recovery curves that account for baseline severity (The Center for Collegiate Mental Health, 2019).

In addition to expected recovery curves, off track alerts are also provided for each subscale. Off track alerts are based on one tailed 90% tolerance intervals around the expected trajectory for each bin. When actual client scores fall above the tolerance boundary, an off track alert is generated, alerting the therapist that the client is at risk of a negative treatment outcome. Diverging from the OQ-45 methodology, no positive rapid response alerts are displayed, so only an upper limit to the tolerance interval was needed. The CCAPS is intended to be used with clients in individual treatment, so only CCAPS administered at individual therapy appointments are included in the recovery curves and considered in the calculation of off track alerts.

One relevant limitation of the CCAPS feedback system relates to ceiling effects. For some subscales (Anxiety, Eating, Academics, and Social Anxiety), clients starting treatment near the ceiling of the subscale are not able to receive off track alerts because the upper limit of the tolerance interval falls above the ceiling of the scale, making it impossible for clients to score above the tolerance interval. The inability to alert is indicated on the CCAPS report by a line through the area where an alert would normally appear.

**Standardized Data Set (SDS).** The SDS collects information on demographics, academics, and mental health history and is most often administered at the beginning of treatment (Hayes et al., 2011). The present study includes one item from the SDS: prior psychiatric hospitalizations.

**Analyses**

Three different client outcomes (deterioration, pre to post change, and rate of change) will be examined to evaluate whether outcomes were improved in the feedback condition compared to the no feedback condition, answering research question one. For each outcome, results on each of the eight CCAPS subscales will be compared to determine whether the effect of feedback differed by subscale, answering research question two. Mixed effects modeling will be used to control for nesting of clients within centers, and analyses will be conducted using the *nlme* package (Pinheiro, Bates, DebRoy, Sarker, & R Core Team, 2019) in the R programming language (version 3.5.2; R Core Team, 2018). To address research question four, a random effect of feedback at the center level will be included in each model, assessing whether the effect of feedback differed by center. Finally, answering research question three, several moderators of feedback will be tested. In analyses for each outcome on each subscale, only clients starting above the low cut-point (The Center for Collegiate Mental Health, 2019) for that subscale will be included, testing the impact of feedback on clients beginning treatment with at least moderate distress.

**Deterioration.** First, the rate of deterioration, or reliable worsening, in each condition will be evaluated. For this analysis, all clients with at least two individual therapy appointments and two CCAPS administrations within 14 days of their first and last appointments respectively will be included. This ensures that the data captures the full effect of treatment. Clients will be classified as deteriorated if their change on a CCAPS subscale from first to last administration exceeds the subscale’s Reliable Change Index (RCI) in a negative direction, e.g. they worsen by more than the RCI of the scale. The RCI is a method developed by Jacobson and Truax (1991) to determine whether change exceeds measurement error based on the reliability of the scale (The Center for Collegiate Mental Health, 2019). Due to ceiling effects on each subscale, some clients start treatment with a score high enough that they are not able to deteriorate. These clients will be removed from this analysis, and the rate at which this occurs will be reported.

Deterioration analyses will be modeled using two-level mixed effects logistic regressions for each CCAPS subscale, with clients nested within counseling centers. The models will include the dichotomous feedback variable, testing whether rates of deterioration differed by feedback condition. Additionally, random effects for the intercept and feedback variable will be included to test whether centers differ in their rate of deterioration and if the effect of feedback differed by center. The general model equation implemented across all subscales is presented here:

where the overall effect of feedback on deterioration is represented by , while represents center specific variance for that effect. As feedback is specifically targeted at reducing deterioration in clients at risk for negative outcomes, it is hypothesized that clients in the feedback condition will be less likely to deteriorate than clients in the no feedback condition.

**Pre to post change.** Second, pre to post change will be compared across the two conditions. Similar to the deterioration analyses above, change scores will be calculated from each client’s first and last CCAPS administration. Analyses of pre to post change will be modeled using two-level linear mixed effects models, again with clients nested within centers. Similar to the previous model, this will include fixed and random effects for the intercept and feedback condition. While the analysis of deterioration captures only feedback’s effect on negative treatment outcomes, this analyses tests whether feedback resulted in more average change. The general model equation implemented across all subscales is presented here:

where the overall effect of feedback on pre to post change is represented by , while represents center specific variance around that effect. It is hypothesized that clients seen in the feedback condition will experience more change than clients in the no feedback condition.

**Rate of change.** As the third type outcome, clients’ rate of change will be compared across feedback conditions to test whether clients’ symptoms across the CCAPS domains improved more quickly in the feedback condition. This will be modeled with a three-level mixed effects linear model, with sessions nested within clients nested within centers. The model will include fixed and random effects for the intercept, which represents a client’s baseline score, and fixed and random effects for session number, representing the rate of change during treatment. Additionally, fixed and random effects for the interaction between session number and feedback will be included at the center level, capturing the effect of feedback on rate of change. In line with the dose effect model of therapy (Howard et al., 1986) and prior research on the CCAPS (Lefevor, Janis, & Park, 2017), the effect of session will be log transformed. Clients with at least two sessions will be included in these analyses, and only individual therapy sessions will be included. The general equation implemented across subscales is as follows:

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where the overall effect of feedback on rate of change is represented by , with center specific variance around that represented by It is hypothesized that clients seen in the feedback condition will have steeper slopes, experiencing more rapid change during treatment.

It should be mentioned here that although client outcomes are the focus of the present study, these are not the only type of outcomes that should matter in evaluating such a system. Other outcomes that are left to future research include outcomes at the therapist and center levels, such as therapist satisfaction and burnout. Future directions for such research will be explored in the discussion in connection with the findings from the present study.

**Moderators.** Several moderators will be examined to determine for whom feedback is most effective, addressing research question three. Interactions between each moderator and the dichotomous feedback condition variable will be added to each of the models outlined above. Due to the large sample size, interactions significant at the *p* < .01 level will be interpreted. As indicated in the introduction, five moderators will be examined: whether a client went off track, initial CCAPS score, prior psychiatric hospitalization, frequency of CCAPS administration, and total number of administrations. The operationalization of each variable is detailed below.

First, whether or not a client went off track at any point during treatment will be dichotomized into two categories: not off track and off track. For clients seen in the feedback condition, going off track resulted in an off track alert. For clients in the no feedback condition, however, no alert was produced, and the therapist would not have been aware that the client was off track. As outlined in the CCAPS section, going off track is triggered by a client’s score falling above the upper bound of the 90% tolerance interval around the expected treatment trajectory for their baseline score. Although prior research did not consistently find a differential effect for on track and off track clients, it is hypothesized that the effect of feedback will be stronger for clients who go off track than clients who remained on track during treatment.

Second, each client’s initial CCAPS score on the subscale being analyzed will be standardized and grand mean centered. It is anticipated that within the restricted range of distress captured by the CCAPS, clients with higher baseline distress will benefit more from feedback, although the empirical findings on this question are also mixed. Third, prior psychiatric hospitalizations will be dichotomized into no lifetime history of psychiatric hospitalization and one or more psychiatric hospitalization at any point in the client’s life. It is anticipated that clients with prior psychiatric hospitalizations will benefit less from feedback, consistent findings from one previous study (Errázuriz & Zilcha-Mano, 2018), although in a different population and setting.

Fourth, the frequency of CCAPS administration throughout treatment will be captured by dividing each client’s total number of CCAPS administrations by their total number of individual sessions, representing the proportion of sessions with a CCAPS. It is anticipated that the effect of feedback will be stronger for clients with more frequent CCAPS administrations, since more frequent administrations will provide more data about client progress, and therapists will have more opportunity to use the feedback to inform treatment. Fifth and finally, the total number of individual therapy sessions will be standardized and grand mean centered. It is anticipated that clients with more sessions will have better outcomes, and that this effect will be stronger in the feedback condition.

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**Appendix A**

Original CCAPS Report without Feedback



**Appendix B**

Updated CCAPS Report with Feedback and Off Track Alerts

