TREATMENT ADHERENCE AND SUDDEN SYMPTOM CHANGES DURING COGNITIVE BEHAVIORAL THERAPY FOR YOUTH ANXIETY

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APPROVED: _____
Brian C. Chu, PhD

_____
G. Terence Wilson, PhD

DEAN: _____
Francine Conway, PhD

Abstract

Research on the relationship between therapist adherence and treatment outcome in cognitive behavioral therapy (CBT) has yielded mixed findings (e.g., Webb et al., 2012). A new avenue for clarifying this relationship is to examine the relationship between adherence and symptom change at "critical sessions" in therapy. Sudden gains (SGs) and sudden regressions (SRs), which refer to large, stable symptom change occurring between two consecutive treatment sessions, may represent critical sessions in therapy, as they have been associated with treatment outcome among adults and children with various psychological disorders (e.g., Aderka et al., 2012; Conklin, Wyszynski & Chu, submitted for publication). The current study uses observational coding to assess the relationship between therapist extensiveness (a dimensional adherence construct), child involvement in session, and SGs/SRs during CBT for youth anxiety. Participants include 68 youth (ages 8 – 17 years) with a principal anxiety disorder diagnosis who were treated in an open efficacy trial of the *Coping Cat*, a manual-based CBT protocol (Kendall & Hedtke, 2006). Therapist extensiveness of four key *Coping Cat* interventions (i.e., relaxation, exposure, cognitive restructuring, and problem-solving) was assessed via observational coding, and child involvement in therapy sessions was assessed via therapist report (CIRS). Client symptom change across treatment sessions was measured by symptom report (STAIC) at each therapy session. It was hypothesized that greater therapist extensiveness would predict and be predicted by SGs, while lower therapist extensiveness would predict and be predicted by SRs. It was also hypothesized that SGs would predict greater child involvement while SRs would predict reduced child involvement. Logistic regression analyses demonstrated that total therapist extensiveness

predicted SGs at the trend level, while extensiveness did not predict SRs. Multiple regression analyses demonstrated that SGs predicted significantly greater therapist exposure extensiveness and overall extensiveness in the next session. SRs predicted greater therapist cognitive restructuring extensiveness at the trend level. Methodological limitations, such as insufficient power to detect significant effects, recommendations for future research, and clinical implications are discussed.

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Introduction and Literature Review

Anxiety disorders are commonly occurring emotional problems among youth, with average prevalence rates of 11% and 12.3% for adolescents and school age youth, respectively (Costello, Egger, Copeland, & Angold, 2011). Youth with anxiety disorders experience significant distress and functional impairment in school, peer, and family domains (Kendall, Furr, & Podell, 2010). Without treatment, anxiety-disordered youth are at greater risk for psychopathology in adolescence and adulthood, including anxiety, depression, and substance use disorders (Costello et al., 2011). Given the prevalence of and impairment associated with youth anxiety disorders, the development of effective treatments warrants ongoing attention.

Cognitive behavioral therapy (CBT) for youth anxiety has been designated "probably efficacious" according to the American Psychological Association Task Force on Psychological Intervention guidelines, based on strong research support (Silverman, Pina, & Viswesvaran, 2008). Systematic reviews demonstrate that approximately 60% of anxiety-disordered youth recover following a course of CBT, while 30% to 40% retain their primary anxiety disorder diagnosis (Cartwright-Hatton, Roberts, Chitsabesan, Fothergill, & Harrington, 2004; James, Soler, & Weatherall, 2005). Thus, despite its strong empirical support, CBT for youth anxiety has room for improvement.

While many forms of psychotherapy, including CBT, have been shown to be effective, knowledge about how treatments work is lacking (Kazdin, 2006). Therapy process research aims to examine this question by linking specific treatment interventions

and strategies with proximal and distal outcomes, such as within- and across-treatment session change. Ultimately, process research aims to elucidate the most critical interventions that a therapist can provide in specified contexts to enhance psychological interventions with strong empirical support.

Researchers have hypothesized a number of possible critical interventions, or "active ingredients," that may underlie treatment success. These ingredients are generally divided into two categories: "common factors" and "specific factors" (Castonguay, 1993). Common factors refer to processes cutting across most psychological interventions (e.g., therapeutic alliance, client motivation, client involvement) while specific factors refer to theory-driven interventions prescribed by particular treatments (Holtforth & Castonguay, 2005). Current process research in youth treatment samples has focused predominantly on common factors (see Shirk & Karver, 2003; Karver, Handelsman, Fields, & Bickman, 2006), but fewer efforts have investigated specific interventions and their impact on immediate change. Although substantial research has documented the efficacy of integrative treatment packages (e.g., Silverman et al., 2008), less is known about how specific evidence-based strategies promote change on a session-to-session basis. Nevertheless, this research may be the most useful to providing specific clinical recommendations for delivery of evidence-based practice.

A potential avenue for improving CBT for youth anxiety is to examine which specific factors contribute most to treatment success, and to enhance the dose and effectiveness of these vital interventions. One way to examine specific intervention factors in treatment outcome studies is to measure treatment adherence, which examines how frequently the therapist implements procedures specific to a particular treatment

manual. Although treatment adherence often serves as a manipulation check in treatment studies, it can also be used to examine whether overall treatment adherence or adherence to specific procedures impacts intra-therapy outcomes on the way to enhancing overall outcomes at the end of therapy (or beyond).

Treatment Adherence and Treatment Outcomes

Although findings have been mixed, positive associations between adherence to theoretically-driven treatment techniques and treatment outcomes have been found across a variety of disorders and problems including, depression (e.g., Strunk, Brotman, & DeRubeis, 2010), anxiety (e.g., Podell et al., 2013) and adolescent delinquent behaviors (e.g., Hogue et al., 2008). Several studies of cognitive therapy (CT) for depression have found that greater treatment adherence predicts superior outcomes. In CT for depression, distorted, negative thinking styles are thought to underlie depressogenic behaviors and low mood. Thus, treatment strategies aimed at modifying negative automatic thoughts are thought to be essential for alleviating depression. Such treatment strategies may include cognitive restructuring techniques (e.g., examining evidence for and against thoughts), behavioral techniques (e.g., behavioral experiments to test negative predictions) as well as homework.

DeRubeis, Feeley, and colleagues (DeRubeis & Feeley, 1990; Feeley, DeRubeis & Gelfand, 1999) examined whether adherence to two factor analytically derived components of CT for depression – concrete and abstract techniques – were associated with treatment outcome. Concrete techniques included specific, theoretically-driven treatment procedures, such as cognitive restructuring, behavioral experiments, and homework, while abstract techniques included broader topics, such as discussions about

treatment rationale and treatment progress, as well as exploring personal meanings of thoughts. In an open trial of CT for depression of unconstrained duration (median = 42 weeks; range = 10-60 weeks), DeRubeis & Feeley (1990) found concrete, but not abstract, CT techniques assessed in the second session significantly predicted greater subsequent symptom change at week 12, when controlling for patient-rated alliance, and observer rated facilitative conditions (e.g., therapist warmth, empathy). The first 12 sessions were selected as the observation period for this study to correspond to the typical length of treatment in efficacy studies (e.g., Hollon et al., 1992). Adherence to CT concrete techniques at later sessions (measured at randomly selected sessions from session 4-12) did not predict subsequent symptom change, but was rather predicted by prior symptom change (DeRubeis & Feeley, 1990). Feeley et al. (1999) replicated the finding of early treatment adherence predicting treatment outcome in a randomized controlled trial of 12 weeks of CT for depression. Thus, preliminary support suggests that adherence to specific cognitive techniques early in CT, (i.e., before session four) may be predictive of improved outcomes later in therapy, whereas adherence measured later in therapy may have reciprocal relations with ongoing clinical change.

Strunk et al. (2010) built on previous findings by using repeated measures methodology to study process variables in CT. Examining session-to-session data provides the opportunity to examine more precise relations between treatment process variables and symptom change. In this study, three observer-rated process variables were examined as predictors of symptom change across the first four sessions: adherence to three factor analytically derived components of CT (cognitive methods, behavioral methods/homework, and negotiating/structuring the session); patient facilitation and

inhibition of therapist adherence; and therapeutic alliance. Results indicated that adherence to cognitive methods was the strongest predictor of session-to-session BDI improvement. Negotiating/structuring sessions and patient facilitation/inhibition of therapist adherence were also significantly associated with intersession symptom improvement, while alliance did not predict early symptom change.

Some studies of CT for depression have not found adherence to predict symptom improvement. Webb et al. (2012) studied adherence to CT and therapeutic alliance in two samples, one with more severe depression and the other with moderate levels of depression. CT-concrete interventions, not therapeutic alliance, predicted patient cognitive changes in the more severely depressed sample, while the opposite was found in the less severely depressed sample. Previous research has demonstrated no difference between active treatment and placebo in the treatment of low severity depression (Driessen, Cuijpers, Hollon, & Dekker, 2010), which is consistent with the finding that adherence to CT did not predict outcomes in a less severely depressed sample. Similarly, Castonguay, Goldfried, Wiser, Raue, and Hayes (1996) found that alliance and client emotional involvement, but not a specific CT technique (i.e., therapist's focus on the impact of distorted cognitions on depressive symptoms) predicted improvement in 105 patients receiving CT for depression. In fact, higher adherence to this CT technique was associated with higher post-treatment depression. However, Castonguay et al. (1996) measured process variables during randomly selected session mid-way through treatment and thus temporal precedence of the process variable was not established. In addition, only one CT technique was examined, leaving the possibility that other unexamined treatment techniques predicted symptom change.

Several studies of adherence to family therapy treatments for adolescent substance abuse and behavior problems have identified a positive adherence-outcome relationship. Hogue et al. (2008) correlated therapist adherence with post-treatment outcomes among youth receiving 16-24 weeks of multidimensional family therapy for externalizing behaviors. Higher observer-rated adherence, averaged across early (first available data points between sessions 1-5) and late (3 randomly selected consecutive sessions from session 6 onwards) portions of treatment, was associated with greater reductions in post-treatment externalizing behaviors. Similarly, Huey, Henggeler, Brondino, & Pickrel (2000) found that average parent-, adolescent-, and therapist-rated adherence to multisystemic therapy at randomly selected sessions during the fourth and eight weeks of treatment was associated with reductions in adolescent delinquent behavior by the end of treatment. However, therapist self-reported adherence ratings may be subject to bias, and client-report may not be a reliable indicator of adherence. While Huey et al. (2000) and Hogue et al. (2008) employed average adherence ratings, Robbins et al. (2011) examined adherence to four distinct dimensions of Brief Strategic Family Therapy (joining, tracking and diagnostic enactments, reframing, and restructuring) as predictors of treatment outcome in a sample of drug-abusing adolescents. Results indicated that higher adherence in all four domains rated at randomly selected sessions throughout treatment predicted higher rates of retention (i.e., 8 or more sessions) and that mean joining was significantly positively related to family functioning at end of treatment, while the other 3 domains were not. All of these studies looked at average adherence ratings from sessions at different time points within treatment, which may obscure the effects of adherence at particular time points.

Relatively few studies have examined the relationship between adherence to CBT procedures and outcomes in anxiety disorders. In a sample of 56 adult patients receiving an 11-session CBT intervention for panic disorder, Huppert, Barlow, Gorman, Shear, and Woods (2006) found average observer-rated adherence from randomly selected treatment sessions did not predict residualized panic symptom severity change scores from pre- to post-treatment. Adherence was measured by assessing how thoroughly prescribed interventions were addressed in each session, with 7-15 items rated per session. Items were then averaged to create an overall adherence score for each session. Boswell et al. (2013) examined whether average adherence (i.e., the total percentage of prescribed interventions) in a given session predicted panic symptom severity in the following session among 276 patients receiving CBT for panic disorder. Adherence ratings from randomly selected treatment sessions did not predict symptom severity in the following session. The null findings from these studies may be explained by the use of average adherence ratings collected from randomly selected sessions throughout treatment, which may obscure a more precise relationship between adherence and symptom change.

Two studies of the adherence-outcome relationship in CBT for youth anxiety have been conducted, with one reporting positive findings (Podell et al., 2013) and the other reporting null findings (Liber et al., 2010). Podell et al. (2013) found that an average treatment integrity rating across randomly selected sessions of a 14-session manualized CBT intervention (i.e., a modified version of the *Coping Cat*; Kendall & Hedtke, 2006) predicted greater reductions in anxiety symptom severity at posttreatment among 279 youth. Therapist treatment integrity was assessed via observer ratings on a 24-item CBT checklist (CBTC; Kendall, Gosch, Albano, Ginsburg, & Compton, 2001) measuring

adherence to the manual, treatment implementation, and overall CBT skill. The treatment integrity variable reflected CBTC total score, although the authors did not indicate how many treatment sessions per youth were rated or how the sessions were selected. Post-treatment outcome measures included: treatment responder status, a global functioning rating, clinician-rated anxiety severity (i.e., Pediatric Anxiety Rating Scale; PARS; Research Units on Pediatric Psychopharmacology Anxiety Study, 2002), child self-reported anxiety (i.e., Multidimensional Anxiety Scale for Children; MASC; March, Parker, Sullivan, Stallings, & Conners, 1997) and parent-reported child internalizing symptoms (Child Behavior Checklist; CBCL; Achenbach & Rescorla, 2001). High ratings of therapist treatment integrity were correlated with lower CBCL Internalizing and Anxiety/Depression scores, but were not correlated with any other outcome measures.

In contrast to Podell et al.'s (2010) findings, Liber et al (2010) found that average treatment adherence did not predict subsequent symptom change among 52 youth receiving either a group or individual CBT intervention based upon the Dutch translation of the FRIENDS program (Barrett, Turner & Lowry-Webster, 2000; Utens, De Nijs, & Ferdinand, 2001). Trained coders watched two randomly selected videotaped sessions for each client, from the early and late portions of treatment, and rated the extent to which therapists delivered prescribed treatment interventions (e.g., cognitive restructuring, relaxation exercises). Average adherence ratings were then correlated with posttreatment outcomes, including diagnostic status (assessed via ADIS), child-reported anxiety (MASC) and parent-reported internalizing symptoms (CBCL). There were no significant correlations between adherence and post-treatment symptom severity (MASC/CBCL)

and adherence did not predict post-treatment diagnostic status. The discrepant findings across these two studies may be due to different treatment protocols and distinct adherence measures.

Curvilinear adherence-outcome relations. While the adherence-outcome literature has generally focused on examining linear adherence-outcome relationships, non-linear relationships have also been identified (Barber et al., 2006; Hogue et al., 2008). In a sample of 95 patients receiving individual drug counseling, Barber et al. (2006) found a curvilinear relationship between adherence and outcome interacting with early treatment alliance. Specifically, when therapeutic alliance was high, adherence did not predict treatment outcome, while when alliance was weaker, a moderate (vs. high or low) level of adherence was associated with superior treatment outcomes. Hogue at al. (2008) examined both linear and non-linear adherence-outcome relationships among externalizing youth receiving family therapy. While greater adherence predicted lower post-treatment externalizing symptoms (linear relationship), intermediate levels of adherence predicted the largest reductions in post-treatment internalizing symptoms, with high and low adherence predicting smaller improvements (curvilinear relationship). These findings suggest that more complex adherence-outcome relationships may go undetected in studies that do not include examination of non-linear relationships.

Methodological limitations. The studies reviewed above yield an inconsistent picture with respect to the adherence-outcome relationship. However, for several methodological and conceptual reasons, the designs of many of these studies do not permit examining more precise relationships between adherence and symptom change. First, the majority of the studies reviewed used a single average rating of treatment

adherence. On a conceptual level, the use of average scores may obscure the potential effects of distinct treatment techniques, making it difficult to make recommendations about efficacy of specific treatment components. That is, aggregate adherence measures may combine active and relatively inactive components of treatment into one score, which may wash out the effects of the active components. From a methodological perspective, averaging scores typically restricts variance, which may result in meaningful relationships remaining undetected (Singer & Willet, 2003). While some studies examined multiple factor analytically derived components of treatment adherence, each component often consisted of several distinct treatment techniques (e.g., Robbins et al., 2011; Strunk et al., 2010). Although this method may have advantages over the use of a single average adherence scores, it may nevertheless obscure the distinct effects of specific treatment techniques that load onto the same factor.

Second, many studies measure treatment adherence at one session and correlate it with outcome assessment occurring weeks to months later. The disadvantage of this method is that it does not account for other processes that may occur in between the assessment of adherence and the post-treatment outcome. There is relatively little known about the time period over which therapy interventions affect symptom change (Strunk et al., 2010). However, given findings of nonlinear patterns of symptom change in psychotherapy, including rapid response (e.g., Ilardi & Craighead, 1994) and sudden gains between sessions (e.g., Tang & DeRubeis, 1999a), it seems important to measure adherence and symptom improvement close in time to each other. Unfortunately, many studies of the relationship between adherence and symptom improvement are not designed to examine such proximal effects. Finally, some studies have averaged

adherence ratings across all of treatment (e.g., Campbell, Guydish, Le, Wells, & McCarty, 2015). This method does not control for temporal confounds, and thus cannot rule out the effect of prior symptom change. In addition, this method cannot capture the unique role of adherence, or adherence to particular interventions, at specific points in treatment.

Many of the methodological problems described above could be ameliorated through the use of session-to-session analyses. That is, treatment process variables in a given session could be examined as predictors of symptom change in the subsequent session, rather than as predictors of post-treatment symptom change. For example Chu et al. (2015) examined therapist use of cognitive strategies and exposure extensiveness as mediators of anxiety symptom change within and across exposure sessions during exposure and response prevention for youth obsessive compulsive disorder. Cognitive strategies and exposure extensiveness were rated dimensionally by trained coders during two early exposure sessions (sessions 4-7) and two later exposure sessions (sessions 8-12). Results indicated that therapist cognitive strategies and exposure extensiveness mediated anxiety change both within and across exposures (within any given session), and were associated with higher anxiety scores. Exposure extensiveness was associated with reduced youth avoidance behaviors during exposures, while cognitive strategies were associated with increased youth escape during exposures. It is noteworthy that therapist interventions did not predict later anxiety. The session-to-session mediation analysis identified a relationship between therapist intervention and anxiety change that could not have been established if the only outcome variable was post-treatment anxiety.

Examining treatment processes and symptom change on a session-to-session basis holds promise for detecting more precise effects of treatment interventions. However, examining every session for each patient receiving treatment is time intensive. There is also little reason to believe that every session is equally impactful across therapy. Instead, one approach to process research has focused on intensively examining interventions and change in a smaller number of "critical" sessions in therapy. Examples of this include research targeting sessions where there are demonstrated alliance ruptures deteriorated client engagement, or early response (e.g., Muran et al., 2009; Wilson, Fairburn, Agras, Walsh, & Kraemer, 2002). Another approach identifies sessions where sudden, large symptom improvement occurs (i.e., "sudden gains") and intensively examines therapist and client behavior around these sessions (e.g., Tang & DeRubeis, 1999a).

Sudden Gains

Tang and DeRubeis (1999a) first reported sudden gains (SGs) during CBT for adult depression. In their sample, SGs accounted for 51% of total symptom reduction and were associated with significantly greater improvement at post-treatment and follow-up. These findings have been replicated in other studies of CBT for depression (e.g., Hardy et al., 2005; Tang, DeRubeis, Beberman, & Pham, 2005) as well as in a variety of other disorders, including social phobia (Bohn, Aderka, Schreiber, Stangier, & Hofmann, 2013; Hofmann, Shulz, Meuret, Moscovitch, & Suvak, 2006), obsessive compulsive disorder (Aderka, Anholt et al., 2012), and panic disorder (Clerkin, Teachman, & Smith-Janik, 2008). A meta-analysis of SGs across treatments for anxiety and depression found a medium mean effect size for SGs predicting primary outcome measures at both post-treatment and follow-up (Aderka, Nickerson, Bøe, & Hofmann, 2012).

While SGs have been extensively studied in the adult literature, few have examined this phenomenon in children and adolescents (Aderka, Appelbaum-Namdar, Shafran, & Gilboa-Schectman, 2011; Conklin, Wyszynski & Chu, submitted for publication; Dour, Chorpita, Lee, Weisz, & The Research Network on Youth Mental Health, 2013; Gaynor & Weersing, 2003). Gaynor and Weersing (2003) identified SGs in 28% of their sample of depressed adolescents (ages 13-18) across three treatments: CBT, systemic behavioral family therapy and nondirective supportive therapy. Medium-to-large effect sizes were found for degree of change on all outcome measures among the SG group compared to the no gain group. Aderka et al. (2011) found that children and adolescents (ages 8-17) who experienced SGs (49.2%) during prolonged exposure therapy for posttraumatic stress disorder had significantly lower levels of PTSD and depression symptoms at post-treatment and three-month follow-up than those without SGs.

Inconsistent with previous findings, Dour et al. (2013) found that SGs predicted improvement in post-treatment externalizing but not internalizing symptoms in a sample of 161 children receiving treatment at a community mental health center for elevated problems in anxiety, depression, or conduct-disruptive disorder. Dour et al. (2013) suggested that the range and severity of mental health problems in their sample may have diminished their ability to detect SGs among internalizing children. In addition, they speculated that the SG effect on internalizing symptoms may not be present among young children, or young children may lack the insight to detect such changes. Similar to Dour et al.'s (2013) findings, Conklin et al. (submitted for publication) found no effect of SGs on post-treatment anxiety symptom severity among youth receiving CBT for a primary

anxiety disorder. However, a relatively novel phenomenon was found wherein 29.7% of youth also demonstrated sudden symptom worsening at some point in therapy, based on either child (11.9%) or parent (17.8%) report. This phenomenon, dubbed "sudden regressions" (SRs), had only been documented in two previous studies, which examined eclectic therapy for adult anxiety and depression (Tschitsaz-Stucki & Lutz, 2009), and CBT and interpersonal treatments for a range of diagnoses (Lutz et al., 2013). In the anxious youth sample, SRs significantly predicted higher post-treatment youth internalizing symptoms and trended to predict higher post-treatment externalizing symptoms (Conklin et al., in preparation). Given these findings, examining differential predictors of SGs and SRs may hold promise for delineating effective components of treatment.

Research on predictors of SGs and SRs is surprisingly limited, particularly in youth samples. In the adult literature, several studies have identified therapist and patient variables in the pre-gain session as predictors of subsequent sudden gains. Therapist cognitive interventions and patient cognitive changes have been the most commonly studied predictors of SGs in CT for depression. Tang and DeRubeis (1999a) found significantly greater patient cognitive change in the pre-gain sessions compared to control sessions (defined as the pre pre-gain session), while there were no differences in therapist concrete and abstract CT techniques and therapeutic alliance. In addition, SGs predicted further cognitive changes and improved alliance in subsequent sessions, indicating that SGs may lead to an "upward spiral" in treatment (Tang et al., 1999a). The finding of greater cognitive change in the pre-gain session was replicated in another study of two variations of CBT for depression (Tang, DeRubeis, Beberman, & Pham, 2005).

Identifying reliable patterns of intervention use and client change before and after SGs may help provide specific recommendations for treatment improvement and enhance our understanding of mechanisms of change.

Therapist and patient variables have also been examined as predictors of SGs in treatments for other disorders. In a transdiagnostic group CBT intervention for anxiety disorders, greater patient cognitive change was observed in pre-gain compared to control sessions (Norton et al., 2010). In contrast, a study of CBT and interpersonal psychotherapy (IPT) for social anxiety disorders found that patient cognitive changes followed, rather than preceded, SGs (Bohn et al., 2013). Several therapist and patient variables emerged as significantly differentiating pre-gain from control sessions in a study of CBT for eating disorders (Cavallini & Spangler, 2013). Specifically, greater levels of therapist empathy and cognitive interventions, as well as greater patient cognitive change and motivation were observed in pre-gain sessions compared to control sessions. The only study to have examined predictors of SGs in a youth sample found sessions including relaxation interventions increased the likelihood of having a SG by three times (Dour et al., 2013).

Relatively little is known about the impact of sudden symptom changes on process variables in the subsequent session. Some studies have found improvements in the therapeutic alliance following SGs (e.g., Tang & DeRubeis, 1999a) and alliance worsening following SRs (Lutz et al., 2013). In addition, several studies have identified post-SG improvement in client and therapist variables, such as greater client cognitive change (e.g., Bohn et al., 2013) increased client motivation, and increased therapist empathy (Cavallini & Spangler, 2013). To date, no studies have examined the impact of

SGs or SRs on therapist adherence/extensiveness in the subsequent session. In addition, client involvement in session, which is a construct related to both alliance and client motivation, has not been studied in association with sudden symptom changes. In CBT for youth anxiety, child involvement (i.e., the child's willingness to participate in therapy activities, self-disclose, ask questions) has been associated with treatment gains (Chu & Kendall, 2004).

The Current Study

Together, the literature provides the basis for several important directions. Previous research has yielded mixed findings regarding the relationship between treatment adherence and client improvement. However, several methodological and conceptual features of these studies (e.g., use of average adherence scores; long time lag between measuring adherence and outcome) may obscure the effects of distinct treatment techniques on client symptom change. Studying treatment process variables at "critical sessions" (e.g., SG and SR sessions) provides the opportunity to examine more precise relationships between specific patterns of intervention use and client change.

The current study explores whether a dimensional measure of therapist adherence (i.e., therapist "extensiveness") to prescribed treatment procedures predicts sudden symptom changes among anxiety-discorded youth receiving CBT. In addition, the impact of SGs and SRs on subsequent therapist extensiveness and child involvement will be examined.

Several hypotheses will be examined:

1. Greater relaxation extensiveness will be seen in sessions (N) that precede a SG compared to yoked control sessions that do not precede a SG, consistent with Dour et al. (2013).
2. Greater exposure extensiveness will be seen in sessions (N) that precede a SG compared to yoked control sessions that do not precede a SG, based on large effect sizes of exposure-based treatments for anxiety disorders (e.g., Deacon & Abramowitz, 2004; Eddy, Dutra, Bradley & Westen, 2004) and the assertion that exposure is a key ingredient of CBT for child anxiety (Kazdin & Weisz, 1998).
3. Exploratory analyses will be conducted to examine whether extensiveness of each *Coping Cat* treatment technique differs between sessions (N) that precede a SR compared to yoked control sessions that do not precede a SR. Interventions to be examined include: Affective Education, Relaxation, Cognitive Strategies, Problem-Solving, Exposure, Homework, and Parent Training.
4. Exploratory analyses will be conducted to examine whether there is a curvilinear relationship between the extensiveness of each *Coping Cat* treatment technique at Session N and the occurrence of SGs and SRs between Sessions N and N+1

Based on Tang & DeRubeis' (1999a) finding of an "upward spiral" in treatment following SGs, the following hypotheses will be examined:

5. SGs between sessions N and N+1 will predict greater overall extensiveness (peak and average) at session N+1
6. SRs between sessions N and N+1will predict reduced overall extensiveness (peak and average) at session N+1

7. SGs between sessions N and N+1 will predict greater child involvement at session N+1
8. SRs between sessions N and N+1will predict reduced child involvement at session N+1

Methods

Participants

Participants were 68 youth treated in an open efficacy trial of a manual-based CBT protocol (Kendall & Hedtke, 2006) taking place in a university-based outpatient clinic. Thirty-one youth experienced sudden symptom changes (17 SGs, 8 SRs, 6 both SG and SR; M= 1.17 SGs and 1 SR per youth) during treatment as identified in a previous study (Conklin et al., submitted for publication), as well as 37 yoked controls. The 6 youth with both a SG and SR were matched with different control youth for their SG sessions and their SR sessions.

The sample is 52.9% female (*n* = 36); 79.4% White, 7.4% African American, 2.9% Asian, 1.5% Latino, and 8.8% multiracial. Thirty (44.1%) youth met criteria for a primary diagnosis of generalized anxiety disorder (GAD), 21 (30.9%) of social anxiety disorder (SAD), 8 (11.8%) of panic disorder (PD), 6 (8.8%) of separation anxiety disorder (SEP), and 3 (4.4%) of specific phobia, and based on both child and parent-report. The majority (98.5%) of participating youth were diagnosed with at least one additional disorder: 89.7% were comorbid with another anxiety disorder; 33.8% with a mood disorder (depression or dysthymia); and 39.7% with an externalizing disorder, including attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), and conduct disorder (CD).

Original study inclusion criteria were: (a) ages 7-17; (b) DSM-IV criteria for primary anxiety disorder; (c) English speaking; (d) informed consent/assent from parents/youth. Exclusion criteria were: (a) any non-anxiety primary diagnosis; (b) a diagnosis of intellectual disability, pervasive developmental disorder, psychotic disorder, or bipolar disorder; (c) a suicide attempt within the past year; (d) or current suicidality severe enough to require current hospitalization. Excluded youth were provided with appropriate community referrals.

Yoked controls. Controls were yoked on demographic variables (i.e., age, gender) as well as several pre-treatment clinical variables that were identified as predictors of SGs and SRs in a previous study (Conklin et al., submitted for publication). Predictors of SGs included pre-treatment comorbid school refusal as well as pre-treatment STAIC score, while predictors of SRs included pre-treatment comorbid externalizing disorders, mood disorders, and total number of diagnoses.

Measures

Coping Cat Adherence and Extensiveness Checklist (CCAEC). This is a 12-item treatment integrity checklist adapted from Southam-Gerow et al. (2010) with each item reflecting a specific element of the *Coping Cat* protocol (e.g., relaxation, identification and modification of anxious cognitive strategies, exposures). Independent coders rate therapist extensiveness on each item after watching complete videotaped sessions. Extensiveness is a dimensional rating that reflects the intensity, presence, or significance of a particular task in a given session, rated from 0 “Intervention not used at all” to a 5 “highly extensive, major intervention of session.” Doctoral student coders have

demonstrated ability to achieve reliability (i.e., kappa=0.82) in a previous study (Chu, Skriner, & Zandberg, 2014)

Anxiety disorders interview schedule for children-parent/child versions (ADIS-P/C; Silverman & Albano, 2000). The ADIS-P/C is a semi-structured interview consisting of independent parent and child interviews shown to have good interrater reliability (e.g., κ = .98, parent interview; κ = .93, child interview; Silverman & Nelles, 1988), test retest reliability (i.e., *r* = .76, parent interview; Silverman & Eisen, 1992), and sensitivity to treatment effects (e.g., Flannery-Schroeder & Kendall, 2000; Kendall et al., 1997). The anxiety disorders section of the ADIS-C/P for DSM-IV has demonstrated strong concurrent validity (Wood, Piacentini, Bergman, McCracken, & Barrios, 2002). Diagnosticians were trained to reliability, reaching a minimum agreement of kappa greater than or equal to .80 and then achieved reliability of κ=.91 (range = .78 –1.00) in actual study interviews.

State-trait anxiety inventory for children–trait–child/parent versions (STAIC, STAIC-P). The STAIC-T (Spielberger, 1973) is a 20-item child self-report scale that measures enduring trait anxiety. The STAIC-T-P (Strauss, 1987) is a 26-item parent-report version. Both are rated on a 1 (hardly ever) to 3 (often) scale (youth range = 20 – 60; parent range = 26 – 78). Strong psychometric properties have been reported (Southam-Gerow & Chorpita, 2007). In the present sample, internal consistencies at pre-treatment were strong for both scales (α = .93 for child report and .87 for parent report).

Child involvement rating scale-therapist report (CIRS-T). The CIRS (Chu & Kendall, 2004) is a 10-item child involvement rating scale originally designed as an observational coding scale. Six items assess examples of positive child engagement (e.g.,

self-disclosure, enthusiasm, elaborating on therapy lessons) and four items assess negative child engagement (e.g., withdrawn, avoidant, inattentive). The therapist-report version (CIRS-T) allows the therapist to provide the therapist's perspective on child engagement immediately after a session. The CIRS has been shown to have moderately strong internal consistency (coefficient $\alpha = .73$) and good to excellent interrater reliability, with ICCs ranging from .61 to .76 for single (one session) and composite (sum of two sessions) scores, respectively (Chu & Kendall, 2004).

Procedures

Original open trial procedures. Youth were referred to the clinic by mental health professionals, school personnel, and parents for anxiety disorder treatment. Following an initial phone screen, those who described symptoms of anxiety were invited for an intake interview. All participants consented/assented to all procedures, and all procedures were approved by the university institutional review board. As part of an intake battery, participants were administered the ADIS-C/P and STAIC-T-C/P as well as additional self-report study questionnaires not included in the current study. Following the initial interview, eligible youth who enrolled in treatment entered a two-week baseline assessment phase. After completion of the baseline phase youth received a manual guided, cognitive-behavioral treatment for anxiety that is designed to last 16 sessions but permits flexibility to go longer (Kendall & Hedtke, 2006). This specific treatment has been shown to produce reliable change in several clinical trials (Kendall, 1994; Kendall et al., 1997; Kendall, Hudson, Gosch, Flannery-Shroeder, & Suveg, 2008) and is considered probably efficacious according to the American Psychological Association Task Force on Psychological Intervention guidelines. Throughout treatment,

youth and parent participants completed symptom assessments (STAI-T-C/P) prior to each session, which was used to identify SGs and SRs. Therapists completed the CIRS-T after every session. Diagnostic and symptom outcomes were repeated at post-treatment.

SG and SR calculation. SGs were calculated in Conklin et al. (submitted for publication) using the following criteria established by Tang & DeRubeis (1999a): (1) The gain between session N (the session immediately preceding the gain) and session N+1 (the session immediately following the gain) should be large in absolute terms. Consistent with prior studies (e.g., Hardy et al., 2005; Hofmann et al., 2006), we employed the reliable change index (RCI; Jacobsen & Traux) to derive STAIC-T and STAIC-T-P cutoff scores for a SG**;** (2) The gain's magnitude (N – N+1) should equal 25% or more of the score at session N; (3) The mean score of three time points before the gain (sessions N-2, N- 1, and N) should be significantly larger the mean score of the three sessions after the gain (N + 1, N + 2, N + 3), to exclude random fluctuations in treatment. An independent samples t-test was used to calculate this criterion. Consistent with previous research, a critical value of $t(4)=2.78$ was used to identify the stability of SGs. SRs were calculated according to the same criteria as SGs, but with post-regression scores rising in the opposite direction.

Missing data were handled in the following ways: To calculate criteria 1 and 2, we compared adjacent sessions and excluded any sessions with missing data (100 of 2199 child sessions and 143 of 2460 parent sessions). For criterion 3, consistent with previous research (Hoffman et al., 2006), we excluded possible gains that had more than two missing data points out of the six total data points included in the comparison. Only one SG and one SR were excluded based on this criterion.

Sampling procedure. For all youth experiencing a SG or SR, the pre-SG/SR session (session N) and the session immediately following the SG/SR (session N+1) were selected for coding. For SG/SR youth with missing session videos for either session N or session N+1, videos from the next closest session were selected, when possible. Corresponding sessions were selected from yoked controls.

Observational coding procedures. Four graduate students, one post-baccalaureate student, and one licensed psychologist received one month of training on the CCAEC consisting of 6 training tapes and weekly group discussions to form consensus. In addition, all coders had taken a 3-month course covering general principles of CBT for anxious youth as well as training in the implementation of the *Coping Cat* manual. All but one coder has had experience treating anxious youth using the *Coping Cat* manual.

To establish pre-study reliability, intraclass correlation coefficients (ICCs) were calculated based on coders' ratings of 5 sets each consisting of 3 videotapes. Two-way mixed, single measure ICC reliabilities were good to excellent: Affective education = 0.78, Relaxation = 0.84, Cognitive strategies = 0.68, Problem solving= 0.77, Self-evaluation = .67, Exposure = .85, FEAR steps = .92, Rapport-building = .68, Homework = .62, Treatment planning = 0.74, and Parent training = 0.75. The current study used ratings for four core interventions: Relaxation, Cognitive strategies, Problem-Solving, and Exposure).

Throughout the study, all raters coded a "universal session" biweekly and met to compare scores, maintain consensus, and prevent drift. Ratings from these universal

sessions will were used to assess interrater reliability for study codes (see Results section).

Results

Description of Sample

Sudden gains. There were 24 total SGs across 23 unique cases. Descriptive statistics for SG pre-treatment demographic and clinical variables are presented in Table 1. Control cases were matched as closely as possible to SG cases on pre-treatment clinical and demographic variables in the following order of priority: pre-treatment STAIC score, comorbid school refusal, primary diagnosis, gender, and age. Pre-treatment STAIC score and comorbid school refusal were prioritized first, as they were the only pre-treatment variables that were identified as predictors of SGs in a previous study (Conklin et al., submitted for publication). Despite attempts at matching controls as closely as possible to SG cases, those with SGs were significantly more likely to be female (p=.04) and had significantly higher pre-treatment STAIC scores compared to controls (p=.03). These variables were thus entered as covariates in all analyses.

Sudden regressions. There were 14 total SRs across 14 unique cases. Descriptive statistics for SR pre-treatment demographic and clinical variables are presented in Table 1. Control cases were matched as closely as possible to SR cases on pre-treatment clinical and demographic variables in the following order of priority: pre-treatment externalizing disorder, pre-treatment mood disorder, pre-treatment total number of diagnoses, primary diagnosis, gender, and age. Pre-treatment mood, externalizing, and total number of diagnoses were prioritized first as they were previously identified as

predictors of SRs (Conklin et al., submitted for publication). There were no significant differences between SRs and control cases on any of these variables.

Reliability of Extensiveness Ratings

To establish reliability of raters throughout the study, intraclass correlation coefficients (ICCs) were calculated using bi-weekly ratings of 12 universal sessions. Two-way mixed, single measure ICC reliabilities were good to excellent: Affective education = 0.80, Relaxation = 0.84, Cognitive strategies = 0.79, Problem solving= 0.92, Self-evaluation = .88, Exposure = .98, FEAR steps = 1.0 Rapport-building = .77, Homework = .65, and Parent training = 0.92.

Missing data

Sudden gains. A total of five SG cases had missing extensiveness data due to missing or non-working session videotapes. Two SG cases (8.3%) had missing data for Session N and three SG cases (12.5%) had missing data for Session N+1. One control case (4.2%) had missing data for session N and two control cases (8.3%) had missing data for session N+1. Little's MCAR test was not significant (χ^2 (47)= 49.6, p=.37), suggesting that data was missing at random. Two control cases (4.2%) had missing Child Involvement Rating Scale (CIRS) data for Session N+1, while no SG cases had missing CIRS data.

Sudden regressions. A total of six SR cases had missing extensiveness data. Three SR cases (21.4%) had missing data in Session N and three cases (21.4%) had missing data in Session N+1. Two control cases (14.3%) had missing data in Session N and one control case (7.1%) had missing data in Session N+1. Little's MCAR test was not significant (χ^2 (24)= 25.3, p=.39), suggesting that data was missing at random. One

SR case (3.6%) had missing CIRS data in Session N, and one control case (3.6%) had missing CIRS data in Session N+1.

After missing data pattern analysis established data were missing at random, multiple imputation was conducted in SPSS 22 to replace missing values, following best-practice recommendations (Graham, 2009).

Extensiveness Descriptive Statistics

Sudden gains. Mean extensiveness raw scores for the four core *Coping Cat* interventions are presented in Table 2. Extensiveness is a dimensional rating that reflects the intensity, presence, or significance of a particular task in a given session, rated from 0 "Intervention not used at all" to a 5 "highly extensive, major intervention of session." A rating of 2 is typically used as the threshold for an intervention to be considered adherent. For all techniques with the exception of problem-solving, the full range of extensiveness (0-5) was observed (problem solving range = 0-3). Not every intervention is expected in each treatment session and thus most mean scores for core interventions were relatively low, falling below 2.5. Univariate ANOVAs were used to compare mean extensiveness scores for SG versus control cases. The total extensiveness score for the session preceding a sudden gain (Session N) was significantly greater in SG compared to control cases ($F(1,46) = 4.5$; $p = .04$). Exposure extensiveness in the session following a sudden gain (Session N+1) was significantly greater in SG compared to control cases ($F(1,46) = 4.3$; $p = .04$). There was a trend for greater total extensiveness in session N+1 among SG compared to control cases ($F(1,46) = 3.6$; $p = .07$). There were no significant differences between SG and control cases on relaxation, cognitive restructuring, and problem-solving extensiveness.

Sudden regressions. For SR and control cases, mean extensiveness raw scores are presented in Table 3. Mean extensiveness ranged from 0 to 4 or 5 for all interventions with the exception of Session N+1 problem-solving (range 0-2). Although the full range of extensiveness scores was observed, most mean scores were again relatively low, falling below 2.5. Univariate ANOVAs were used to compare mean extensiveness scores for SR versus control cases. Session N extensiveness did not differ between SR and control cases for any of the four core *Coping Cat* interventions or total extensiveness score. Cognitive restructuring extensiveness in Session N+1 was significantly greater in SR compared to control cases ($F(1, 26) = 7.5$; $p = .01$). There were no significant differences between SR and control cases on any other mean extensiveness ratings

Predictors of Sudden Symptom Changes

Sudden gains. Logistic regression analyses were conducted to determine whether relaxation and exposure extensiveness in Session N predicted SGs (yes/no) occurring between Session N and Session N+1. The following pre-treatment demographic and clinical factors were added as covariates: gender, age, and pre-treatment STAIC score. Because the *Coping Cat* involves two major phases of treatment, skill-building (sessions 1-7), and exposure (session 8 and beyond), analyses were conducted separately for each phase of treatment as well as for both phases combined. Contrary to expectations, there was no association between relaxation or exposure extensiveness in Session N with the occurrence of SGs in Session N+1 (Table 4). ..

Exploratory logistic regression analyses were conducted to examine whether other major *Coping Cat* interventions predicted SGs. Separate regressions were conducted to determine whether cognitive strategies, problem solving, and total extensiveness in

Session N predicted SGs (yes/no) occurring between Session N and Session N+1 (Table 4). Gender, age, and pre-treatment STAIC score were added as covariates. Cognitive strategies and problem solving were not associated with the occurrence of SGs. Total extensiveness during the exposure phase predicted SGs at the trend level (p=.09). .

To test for curvilinear relationships between extensiveness and SGs, all logistic regressions described above were repeated with the squared value of each extensiveness rating added as an additional predictor variable (i.e., relaxation^2, exposure^2, cognitive strategies^2, problem solving^2, and total extensiveness^2). All curvilinear relationships were nonsignificant.

Sudden regressions. A series of logistic regressions was conducted to examine whether the likelihood of a SR occurring (yes/no) was predicted by extensiveness of individual *Coping Cat* techniques (relaxation, cognitive strategies, problem-solving, exposure, total extensiveness). The following pre-treatment demographic and clinical factors were added as covariates: gender, age, and pre-treatment total number of diagnoses. Due to the small size of the SR sample, analyses were not conducted separately for the skill-building and exposure phases of treatment. Contrary to expectations, there was no association between relaxation, cognitive strategies, problem-solving, or exposure extensiveness and the occurrence of SRs (Table 5). All logistic regressions were repeated with the squared value of each predictor variable to determine whether there is a curvilinear relationship between extensiveness and SGs. No significant curvilinear relationships emerged between extensiveness and SRs.

Predictors of Extensiveness in Session N+1

Sudden gains. Hierarchical multiple regressions were conducted to determine whether SGs between sessions N and N+1 predicted relaxation, cognitive strategies, problem-solving, exposure, and total extensiveness Session N+1 (Table 6). The following variables were added as covariates: gender, age, pre-treatment STAIC score, and session N extensiveness. Analyses were conducted separately for the skill-building and exposure phases of treatment, as well as both phases combined. During the exposure phase of treatment, SGs predicted greater exposure extensiveness (*B*(*SE*) = 2.6(.76), *p*=.001) and greater total extensiveness (*B*(*SE*) = 4.4 (2.2), *p*=.04) in Session N+1. SGs did not predict Session N+1 extensiveness for any of the other core *Coping Cat* interventions in any phase of treatment.

Sudden regressions. Hierarchical multiple regressions were conducted to determine whether SRs between sessions N and N+1 predict relaxation, cognitive strategies, problem-solving, exposure, and total extensiveness Session N+1 (Table 7). The following variables were added as covariates: gender, age, pre-treatment total number of diagnoses, and session N extensiveness. Again, due to the small SR sample size, analyses were conducted only for all phases of treatment combined. There was a trend for SRs to predict greater cognitive restructuring extensiveness in Session N+1 (*B*(*SE*) = 1.1 (.61), *p*=.07). SRs did not predict Session N+1 extensiveness for any of the other core *Coping Cat* interventions.

Predictors of Child Involvement Session N+1

Sudden gains. Mean raw Child Involvement Rating Scale (CIRS) scores for Session N and N+1 are presented in Table 8. Univariate ANOVAs were used to compare

mean CIRS scores for SG versus control cases. Mean CIRS did not differ significantly between SG and control cases.

A hierarchical multiple regression was conducted to determine whether SGs (yes/no) between sessions N and N+1 predicted greater child involvement at session N+1. The following variables were added as covariates: gender, age, pre-treatment STAIC score, and session N CIRS. There was no association between SG and Session N+1 CIRS (*B*(*SE*) = -.65(.17), *p*=.71).

Sudden regressions. Mean Child Involvement Rating Scale (CIRS) scores for Session N and N+1 are presented in Table 8. Univariate ANOVAs were used to compare mean CIRS scores for SR versus control cases. Mean CIRS did not differ significantly between SR and control cases.

A hierarchical multiple regression was conducted to determine whether SRs (yes/no) between sessions N and N+1 predicted greater child involvement at session N+1. The following variables were added as covariates: gender, age, pre-treatment STAIC score, and session N CIRS. There was no association between SR and Session N+1 CIRS (*B*(*SE*) = -1.1(2.7), *p*=68).

Discussion

In an effort to elucidate the "active ingredients" of an evidence-based CBT treatment for child anxiety (the *Coping Cat*), this observational study examined the relationship between therapist extensiveness, sudden symptom changes, and child involvement. Consistent with expectations, overall extensiveness was significantly greater in sessions preceding SGs (Session N) compared to sessions where no SGs took place (control cases), and total extensiveness during the exposure phase predicted SGs at

the trend level. However, contrary to hypotheses, the extensiveness of specific *Coping Cat* interventions (i.e., relaxation, cognitive restructuring, problem-solving, and exposure), did not predict the occurrence of SGs or SRs (neither linear nor curvilinear relationships were detected).

Few prior studies have identified specific treatment procedures as predictors of SGs. The rather sparse literature on predictors of SGs in CBT treatments has primarily identified patient cognitive change in Session N, rather than elevation of a specific therapist intervention, as predicting SGs (e.g., Tang et al., 1999a; Tang et al., 2005; Norton et al., 2010). Indeed, Tang et al., (1999a) found that patient cognitive change, but not therapist concrete CT techniques, predicted SGs in CT for depression. Perhaps there were unexplored mechanisms, other than therapist adherence to specific treatment techniques, underlying patient change in these studies. Alternatively, it is possible that therapist adherence in sessions prior to Session N contribute to patient cognitive changes in Session N, which in turn predict SGs. Future studies should assess this possibility by measuring therapist adherence in the sessions preceding Session N.

The current study adds to the mixed findings regarding the relationship between adherence and symptom improvement in CBT. Many prior studies finding a positive relationship between therapist adherence and patient symptom improvement have measured adherence within the first few sessions of treatment and then correlated it with later symptom change (e.g., DeRubeis & Feeley, 1990; Feeley et al., 1999). For example, DeRubeis and Feeley (1990) found that adherence to CT techniques assessed in the second session predicted post-treatment symptom change, while adherence measured at later sessions (i.e., sessions 4-12) did not predict subsequent symptom change, but rather

was predicted by prior symptom change. It is possible that only adherence in early treatment sessions have an impact on patient symptom improvement. The possible importance of therapist adherence early in treatment is consistent with research identifying early "rapid response," in which a large portion of patient symptom improvement occurs within the first several sessions (Tang & DeRubeis, 1999b). The null findings of the current study may be explained by the fact that adherence was measured at sessions throughout the full course of treatment.

We did not assess the quality or appropriateness of the *Coping Cat* interventions (i.e., therapist competence). It is possible that therapist competence, as opposed to extensiveness, is a predictor of session-to-session symptom change as well as post-treatment outcome. Studies that have measured competence have generally reported a positive association between competence and treatment outcome for several different disorders including depression (e.g, Trepka, Rees, Shapiro, Hardy, & Barkham, 2004), generalized anxiety disorder (e.g., Westra, Constantino, Arkowitz, & Dozois, 2011) and substance use disorder (Martino, Ball, Nich, Frankforter, & Carroll, 2008). However, a meta-analysis of 17 studies reporting data on therapist competence found a significant relationship between competence and outcome in the treatment of depression, but not in the treatment of other disorders (Webb, DeRubeis, & Barber, 2010). Future research could expand upon the current study findings by examining the association of both adherence and competence with sudden symptom changes in CBT for youth anxiety.

It is also possible that extensiveness of theory-specific treatment techniques has no direct impact on patient symptom change. Perhaps non-specific therapy factors (e.g., alliance) rather than theory-specific techniques that are the most critical mechanisms

underlying symptom change. Indeed, some prior studies have found non-specific therapist factors to play a role in predicting patient symptom change in CBT. Huppert et al. (2001) divided 14 CBT therapists into three groups according to whether they had an above average, average, or below average effect size on symptom change among patients with panic disorder. Therapists with more experience (i.e., more years conducting therapy) had better patient outcomes, but there were no significant differences among the three groups in terms of their adherence to treatment procedures. The "average" group had the highest global competence rating, while the "below average" and "above average groups" did not differ significantly on competence. These findings suggest that factors other than therapist adherence and competence may play a role in patient improvement in CBT.

However, in the current study it seems unlikely that there is no relationship between extensiveness and SGs, given the finding that the overall extensiveness score for Session N was significantly greater among SG cases compared to control cases. In addition, although not statistically significant, SG cases tended to have higher Session N cognitive restructuring and exposure extensiveness compared to control cases. It is possible that when entered into the regression model that controlled for pre-treatment demographic and clinical variables, extensiveness no longer accounted for a significant portion of the variance in SG occurrence. In particular, pre-treatment STAIC score emerged as a significant or marginally significant predictor of SGs in several regression analyses, and this may have washed out the impact of extensiveness.

The current study may have lacked adequate power to detect significant relationships between extensiveness of specific interventions and SGs/SRs. For

regression analyses with four predictor variables, a sample of 39 is needed for 80% power to detect a large effect, and a sample of 84 is needed to detect a medium effect. Both the SG (*n*=48) and SR (*n* =28) samples were relatively small and may have lacked power to detect small or medium effects. Due to the distinct skill-building and exposure phases of the *Coping Cat* treatment protocol, it was hypothesized that there may be different "critical interventions" within these two phases. Because certain interventions are typically used more extensively during different phases of treatment (e.g., exposures are rarely conducted during the skill-building phase), there was also concern that averaging across the entire treatment would obscure the effects of particular interventions. Analyses were thus repeated for each of the two phases of treatment as well as all of treatment combined (for SGs only due to small SR sample size). Study power was thus further reduced when the two phases of treatment were analyzed separately.

Consistent with hypotheses, the presence of a SG predicted greater exposure extensiveness and total extensiveness in Session N+1, but only during the exposure phase of treatment. Since exposure rarely occurs during the early skill-building phase of the *Coping Cat*, it makes sense that this effect was found only during the exposure phase of treatment. This is the first study, to our knowledge, to examine the impact of SGs on therapist extensiveness. While this is a novel finding, it appears to be consistent with prior studies that found therapist adherence to be predicted by prior symptom change (e.g., DeRubeis & Feeley, 1990; Loeb, Wilson, Labouvie, Pratt, Hayaki, Walsh, Agras & Fairburn, 2005). Our findings are also consistent with the notion of an "upward spiral," initially identified by Tang and DeRubeis (1999a) who found that SGs predicted greater

patient cognitive changes and improved therapeutic alliance in the subsequent session among patients receiving CT for depression. This finding has been replicated among anxiety-disordered patients (Bohn et al., 2013). It is possible that in these prior studies, greater therapist extensiveness is the mechanism underlying patient cognitive changes and therapeutic alliance improvement. Unfortunately the current study did not include measures of patient cognitive change or therapeutic alliance, and thus this hypothesis could not be directly tested.

A common methodological problem among previous studies examining adherence as a predictor of treatment outcome was that the temporal precedence of adherence was not established (e.g., Strunk et al., 2010), making it impossible to determine the direction of the relationship between adherence and symptom change. The current study aimed to detect more precise effects of treatment interventions on symptom change by using session-to-session analysis. That is, treatment process variables (i.e., extensiveness of specific interventions) were examined as predictors and outcomes of sudden symptom changes in adjacent sessions, while controlling for prior symptom change. We found that greater exposure extensiveness does not predict, but rather is predicted by SGs. It is possible that in prior studies that did not establish temporal precedence of adherence, the direction of the adherence-outcome relationship was in fact the same as in the current study.

There are several possible mechanisms underlying the relationship between SGs and greater therapist exposure and overall extensiveness in Session N+1. It is possible that SGs lead patients to be more facilitative of, or willing to engage in, therapist interventions. In a study of in CT for depression, Strunk et al. (2010) assessed the extent

to which patients facilitated or impeded (rated on 7-point Likert-type scale) 19 specific CT techniques. Patients who made an effort to use CT techniques suggested by the therapist obtained higher ratings, while those who refused or raised significant objections to techniques received lower ratings. Strunk et al. (2010) found that patient facilitation of therapist adherence predicted intersession symptom improvement, and there was also a trend for prior symptom improvement to predict subsequent patient facilitation of adherence. Strunk et al. (2010) suggested that there may be a reciprocal relationship between symptom change and patients' efforts at facilitation. This hypothesis may fit particularly well for explaining youths' willingness to comply with challenging exposure procedures. The experience of a SG may encourage youth to be more facilitative, leading therapists to be more adherent to exposure interventions. As mentioned previously, several studies have found that SGs lead to patient cognitive changes (e.g., Tang et al., 1999a; Bohn et al., 2013). These cognitive changes could in turn make patients more receptive or motivated to engage in exposure.

Child involvement, a process variable included in the current study (measured via the CIRS), is similar to the concept of patient facilitation. The CIRS contains items measuring positive child engagement (e.g., self-disclosure, enthusiasm, elaborating on therapy lessons) and items assessing negative child engagement (e.g., withdrawn, avoidant, inattentive), which may facilitate/impede therapist interventions. However, child involvement does not appear to underlie the relationship between SGs and subsequent therapist extensiveness in the current study, as we found no relationship between SGs and child involvement. Our null findings may be explained by

methodological issues, most notably that there was very little within-client variation in CIRS ratings across sessions.

Another possibility is that SGs lead to improved therapeutic alliance, which in turn leads to greater therapist adherence. Indeed, prior studies have demonstrated a relationship between therapeutic alliance and adherence, with some suggesting that a good therapeutic alliance is a necessary basis for a positive adherence-outcome relationship (e.g., Barber et al., 2006). Among 61 patients receiving CBT for social phobia, hypochondriasis, or major depressive disorder, Weck et al. (2015) found that observer-rated therapeutic alliance in the first three treatment sessions influenced therapist adherence and competence in the subsequent session.

While SGs may lead to patient changes (e.g., cognitive changes; increased engagement in treatment), they also may influence therapist beliefs, which in turn impact therapist adherence. Therapists who see patients making significant progress may be more confident to implement exposure-based treatment, which though effective, can be difficult for patients. Therapist fears that exposure may exacerbate symptoms (Frueh et al., 2006) especially in patients with comorbid disorders (Becker, Zayfert, & Anderson, 2004) has been identified as a barrier to the implementation of exposure for PTSD. Similarly, Deacon et al. (2013) found that exposure therapists reported concern that prolonged interroceptive exposure could lead patients with panic disorder to lose consciousness, experience symptom exacerbation, or drop out of treatment. Given these common therapist concerns about exposures, it would make sense that therapists who observe sudden and significant symptom improvement may feel reassured and more confident to implement exposures extensively.

SR cases had significantly greater cognitive restructuring extensiveness in Session N+1 compared to controls. The regression model with SRs predicting cognitive restructuring extensiveness in the next session was marginally significant. This finding was inconsistent with the hypothesis that SRs would be associated with lower Session N+1 extensiveness compared to control cases. In the *Coping Cat*, cognitive restructuring is first taught in the early skill-building portion of treatment and then typically used as a tool to facilitate engagement in exposure as well as to process new learning in exposure. It is possible that SRs indicate to therapists that treatment is not progressing, and prompts them to re-teach cognitive restructuring, or to make greater use of cognitive restructuring to encourage resistant clients to engage in exposure. In light of common therapist concerns about exposure described above, it is also possible that SRs lead therapists to become concerned about symptom exacerbation, causing them to lean more heavily on a non-exposure intervention. Future research should examine therapist attitudes and beliefs as possible mediators of the relationship between sudden symptom changes and therapist adherence.

There were no other significant associations between SRs and adherence or child involvement in the current study. These null findings are surprising given that SRs predicted significantly higher internalizing symptom severity in a prior study (Conklin et al., in submitted for publication). As mentioned previously, a likely explanation is inadequate power to detect significant effects due to the small SR sample size. It is also possible that the pre-treatment predictors of SRs identified previously (Conklin et al., submitted for publication), including comorbid externalizing and comorbid mood disorders, are more salient predictors of SRs than treatment process variables.

Alternatively, there may be other treatment process variables associated with SRs that were not measured in the current study. However as the prior literature on SRs is limited to two studies, there is little information about what these variables may be. Lutz et al. (2013) found that therapeutic alliance was rated significantly lower by patients in the session following a SR compared to the session following a SG. Future studies should examine therapeutic alliance as a possible predictor and outcome of SRs.

Limitations

As mentioned above, there were several important limitations in the current study. First, the relatively small sample size may have limited power to detect signification relationships between the extensiveness of specific interventions and the occurrence of SGs/SRs. Our power was further reduced when examining our hypotheses separately in the skill building and exposure phases of treatment. The significant difference in pre-treatment STAIC score between SG and yoke cases may have overshadowed the relationship between other extensiveness and SGs. In addition, the current study did not assess therapist competence or therapeutic alliance, which have been associated with client symptom change in prior studies. Finally, lack of variability in CIRS scores may have limited our ability to detect a relationship between SGs/SRs and child involvement in session.

Conclusions

Despite limitations, the current study offers several important and novel findings. To our knowledge, this is the first study to examine the relationship between therapist extensiveness and SGs/SRs during CBT for youth anxiety. While extensiveness of core *Coping Cat* interventions did not predict SGs or SRs, the finding of greater total

adherence in sessions preceding SGs suggests that the relationship among these variables warrants further investigation in a larger sample. This is also the first study to examine the impact of SGs or SRs on therapist extensiveness in the subsequent session. SGs predicted significantly greater exposure and total extensiveness in the subsequent session, during the exposure phase of treatment. Although the mechanisms underlying this relationship are not yet clear, this finding has important clinical implications. SGs may lead to increased client willingness to engage in exposure and/or increased clinician confidence to implement exposure. Clinicians should thus be encouraged to monitor client symptom change throughout treatment, to identify SGs, and to make clients aware of SGs when they occur. In addition, methods for encouraging clinicians to implement exposure extensively when clients do not exhibit SGs should be developed. Research investigating possible mechanisms underlying the relationship between SGs and subsequent therapist extensiveness, including patient and therapist cognitive and behavioral changes, may prove useful in identifying factors that facilitate adherence to exposure interventions.

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Table 1. *Descriptive Statistics*

	Sudden Gains								
	Yoke (*N* = 24)			SG (*N* = 24)			Total (*N* = 48)		
	M (SD)	*Min*	*Max*	*M (SD)*	*Min*	*Max*	*M (SD)*	*Min*	*Max*
Age	12.4(3.0)	8	17	11.9(2.5)	7	16	12.1(2.7)	7	17
Pre-treatment STAIC	38.3(7.4)	25	51	43(7.3)*	30	60	40.6(7.6)	25	60
	N(%)			*N(%)*			*N(%)*		
Sex (female)	7 (29.2)			14 (58.3)*			21(43.8)		.
Comorbid School Refusal	13 (54.2)			13 (54.2)			26 (54.2)		.
	Sudden Regressions								
	Yoke (*N* = 14)			SR (*N* = 14)			Total (*N* = 28)		
	M (SD)	*Min*	*Max*	*M (SD)*	*Min*	*Max*	*M (SD)*	*Min*	*Max*
Age	10.8(2.3)	8	14	11.3(2.9)	8	15	11.0(2.5)	8	15
Pre-treatment Number Dx	4.0(1.4)	1	7	4.9(1.6)	2	8	4.4(1.5)	1	8
	N(%)			*N(%)*			*N(%)*		
Sex	7 (50.0)			9 (64.3)			16 (57.1)		
Comorbid Mood Dx	9 (64.3)			10 (71.4)			13 (46.4)		.
Comorbid Externalizing Dx	6 (42.9)			7 (50.0)			19 (67.9)		

*SG/SR significantly different from yoke at $p<.05$

Table 2. *Sudden Gain Raw Adherence Scores*

	Session N								
	Yoke (*N* = 23)			SG (*N* = 22)			Total (*N* = 45)		
	M (SD)	*Min*	*Max*	*M (SD)*	*Min*	*Max*	*M (SD)*	*Min*	*Max*
Relaxation	1.1(1.6)	0	5	1.4(1.7)	0	5	1.2(1.6)	0	5
Cognitive Strategies	1.8(1.3)	0	5	2.4(1.6)	0	5	2.1(1.5)	0	5
Problem Solving	.30(.77)	0	3	.50(1.0)	0	3	.40(.89)	0	3
Exposure	.83(1.6)	0	5	1.5(1.9)	0	5	1.2(1.8)	0	5
Total Adherence	4.0(2.3)	0	7	5.8(3.2)*	0	11	4.9(2.9)	0	11
	Session N+1								
	Yoke (*N* = 22)			SG (*N* = 21)			Total (*N* = 43)		
	M (SD)	*Min*	*Max*	*M (SD)*	*Min*	*Max*	*M (SD)*	*Min*	*Max*
Relaxation	1.0(1.3)	0	5	.90(1.5)	0	5	.95(1.4)	0	5
Cognitive Strategies	1.8(1.4)	0	5	2.3(1.7)	0	5	2.0(1.6)	0	5
Problem Solving	.45(1.1)	0	4	.57(1.1)	0	3	.51(1.1)	0	4
Exposure	.64(1.3)	0	5	1.8(2.1)*	0	5	1.2(1.8)	0	5
Total Adherence	3.9(2.7)	0	8	5.5(3.0)†	0	10	4.7(3.0)	0	10

*SG significantly different from yoke at $p<.05$; † $p < .09$

Table 3. *Sudden Regression Raw Adherence Scores*

	Session N								
	Yoke (*N* = 12)			SR (*N* = 11)			Total (*N* = 23)		
	M (SD)	*Min*	*Max*	*M (SD)*	*Min*	*Max*	*M (SD)*	*Min*	*Max*
Relaxation	1.4(1.6)	0	4	1.0(1.7)	0	5	1.2(1.6)	0	5
Cognitive Strategies	1.7(1.4)	0	4	1.9(.94)	0	3	1.8(1.2)	0	4
Problem Solving	.92(1.3)	0	4	.73(1.2)	0	3	.83(1.2)	0	4
Exposure	1.8(2.1)	0	5	1.7(2.1)	0	5	1.7(2.0)	0	5
Total Adherence	5.8(3.9)	0	11	5.4(3.1)	0	9	5.6(3.5)	0	11
	Session N+1								
	Yoke (*N* = 13)			SR (*N* = 11)			Total (*N* = 24)		
	M (SD)	*Min*	*Max*	*M (SD)*	*Min*	*Max*	*M (SD)*	*Min*	*Max*
Relaxation	1.2(1.4)	0	4	.64(1.0)	0	3	.96(1.3)	0	4
Cognitive Strategies	1.1(1.2)	0	4	2.6(1.4)*	0	5	1.8(1.5)	0	5
Problem Solving	.23(.60)	0	2	.36(.81)	0	2	.29(.69)	0	2
Exposure	1.4(1.9)	0	4	1.9(2.0)	0	5	1.6(1.9)	0	5
Total Adherence	3.9(2.2)	0	6	5.5(3.1)	0	10	4.6(2.7)	0	10

*SR significantly different from yoke at $p<.05$

Table 4. *Session N Extensiveness Predicting SGs*

	SG Skill-Building Phase (N = 24)		SG Exposure Phase (N= 24)		SG Combined (N = 48)	
	B(*SE*)	*p*	*B*(*SE*)	*p*	*B*(*SE*)	*p*
Relaxation	-.13(.27)	.64	.45(.68)	.50	.00(.21)	.99
Cognitive Strategies	.00(.34)	.99	4.5(5.3)	.40	.33(.25)	.20
Problem-Solving	.71(.71)	.32	1.2(.77)	.11	.55(.42)	.19
Exposure	.33(.75)	.66	.44(.31)	.16	.11(.20)	.59
Total Extensiveness	.01(.09)	.90	.37(.22)	.09†	.06(.07)	.37

† $p < .09$

Table 5. *Session N Extensiveness Predicting SRs*

	B(*SE*)	*p*
Relaxation	-.30(.31)	.39
Cognitive Strategies	.40(.39)	.31
Problem-Solving	.22(.50)	.66
Exposure	.04(.25)	.88
Total Adherence	.03(.11)	.81

Table 6. *SGs Predicting Session N+1 Extensiveness*

	SG Skill-Building (*N* = 24)			SG Exposure (*N* = 24)			SG Combined (*N* = 48)		
	B(*SE*)	*t*	*p*-value	*B*(*SE*)	*t*	*p*-value	*B*(*SE*)	*t*	*p*-value
Relaxation	-.07(.81)	-.09	.93	-.33(.35)	-.96	.34	-.08(.44)	-.19	.85
Cognitive Strategies	-.68(.87)	-.77	.44	.74(.47)	1.6	.12	.11(.48)	.23	.82
Problem-Solving	-.06(.57)	-.11	.92	-.03(.46)	-.06	.95	-.01(.35)	-.02	.98
Exposure	-.14(.14)	-1.0	.31	2.6(.76)	3.4	.001**	.70(.59)	1.2	.23
Total Adherence	-.64(.14)	-.44	.66	4.4(2.2)	2.0	.04*	.96(1.4)	.69	.49

*p < .05; **p < .01

Table 7. *SRs Predicting Session N+1 Extensiveness*

	B(*SE*)	*t*	*p*
Relaxation	-.48(.53)	-.91	.37
Cognitive Strategies	1.1(.61)	1.9	.07[†]
Problem-Solving	.38(.24)	1.6	.11
Exposure	1.0(.72)	1.4	.16
Total Adherence	3.3(2.2)	1.5	.14

[†] $p < .09$

Table 8. *CIRS Descriptive Statistics*

	Sudden Gains								
	Yoke			SG			Total		
	M (SD)	*Min*	*Max*	*M (SD)*	*Min*	*Max*	*M (SD)*	*Min*	*Max*
Session N CIRS (*N*=48)	20.1(7.4)	5	30	21.6(5.9)	9	30	20.8(6.7)	5	30
Session N+1 CIRS (*N*=46)	20.1(6.7)	5	29	20.3(7.0)	6	30	20.2(6.7)	5	30
	Sudden Regressions								
	Yoke			SR			Total		
	M (SD)	*Min*	*Max*	*M (SD)*	*Min*	*Max*	*M (SD)*	*Min*	*Max*
Session N CIRS (*N*=27)	21.2(7.3)	4	30	22.9(5.6)	12	30	22(6.4)	4	30
Session N+1 CIRS (*N*=27)	21.2(7.0)	7	29	20.6(7.2)	6	30	20.9(7.0)	6	30