# THE RELATIONSHIP BETWEEN THERAPY HOMEWORK COMPLIANCE AND TREATMENT OUTCOME IN ANXIOUS YOUTH

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## ABSTRACT

**Objective:** Although therapy homework has been identified as integral for treating anxiety in adults, therapy homework has not been directly studied in anxious youth. The present study examined therapy homework compliance as a predictor of differential outcomes for youth treated for an anxiety disorder. **Methods:** Participants (*N* = 39) were youth who received 16 weeks of cognitive-behavioral therapy for a principal anxiety disorder diagnosis. Measures of anxiety and symptom severity were completed at pre- and post-treatment. A measure of therapy homework compliance was completed by therapists during every session with the youth. **Results:** Five facets of therapy homework compliance emerged as differentially important to treatment outcome: (a) overall therapy homework compliance, (b) therapy homework compliance during psychoeducation sessions, (c) total number of psychoeducation homework tasks completed throughout treatment, (d) overall quality of completed therapy homework, and (e) overall quantity of therapy homework completed. **Conclusions:** Results provide a critical first step examining the relationship between therapy homework compliance and treatment outcome in anxious youth. The findings indicate that specific facets of therapy homework predict decreases in posttreatment responder status and symptom severity for anxious youth.

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# CHAPTER 1

# INTRODUCTION

Psychological disorders present a meaningful health concern for children and adolescents (hereafter referred to as youth). An estimated 49.5 percent of youth between the ages of 13-18 are diagnosed with at least one psychological disorder in their lifetime (U.S. National Comorbidity Survey; Merikangas et al., 2010). Anxiety is one of the most common mental health problems among youth, with approximately 10-20 percent of youth meeting diagnostic criteria for an anxiety disorder (e.g., Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Left untreated, anxiety often persists into adulthood and puts individuals at increased risk for the development of other psychological disorders, chronic medical conditions, hospitalization, impairments in family and occupational functioning, substance use, educational underachievement, reduced life satisfaction, and suicide (e.g., Kendall, Safford, Flannery-Schroeder, & Webb, 2004; King & Ollendick, 1989; Lopez, Turner, & Saavedra, 2005; Pine, Cohen, Gurley, Brook, & Ma, 1998; Swan & Kendall, 2016; Wolk, Kendall, & Beidas, 2015).

Given the prevalence of and the impairments associated with youth anxiety disorders, there is a public health imperative to identify and provide the most efficacious treatments. Substantial research has been dedicated to improving anxiety treatment. Through the course of this research, cognitive-behavioral therapy (CBT) has emerged as a "gold-standard," efficacious treatment for a range of anxiety disorders (e.g., Davis, Palitz, Knepley, & Kendall, 2019; Deacon & Abramowitz, 2004; Hollon & Beck, 2013; Kendall & Hedtke, 2006). Response rates for CBT are approximately 60 percent (Kendall, Hudson, Gosch, Flannery-Schroeder, & Suveg, 2008; Walkup et al., 2008), suggesting that, though the treatment is efficacious for many, at least one-third of youth who receive CBT remain significantly symptomatic after treatment. As there continues to be room for improvement in CBT for anxiety, it is important to examine the features of the treatment to identify the components that are associated with beneficial treatment outcome.

CBT for anxiety differs slightly based on the specific treatment manual and client age; however, there are several common components including psychoeducation (i.e., teaching youth about their diagnoses and raising awareness of symptoms), skills learning (e.g., cognitive restructuring, relaxation, problem solving), exposure tasks (i.e., behavioral experiments), and homework (i.e., tasks to be completed between sessions) (e.g., Clark, 2014; Palitz, Davis, & Kendall, 2019; Peris et al., 2015; Rifkin et al., in press; Wise et al., 2018). One of the main manual-based CBT approaches to youth anxiety treatment is *Coping Cat* (Kendall & Hedtke, 2006) and its adolescent counterpart, *C.A.T. Project* (Kendall, Choudhury, Hudson, & Webb, 2002). *Coping Cat* addresses the main principles of CBT: (1) recognizing anxious feelings and somatic reactions to anxiety, (2) identifying the negative thoughts that arise during anxiety-provoking situations, (3) developing coping skills to manage and/or reduce symptoms of anxiety during anxiety-provoking situations, (4) behavioral exposure to anxiety-provoking situations, and (5) evaluating performance and self-reinforcement (Palitz et al., 2019). To help reinforce and generalize skills learned in therapy, individualized homework tasks are assigned by many CBT practitioners (Kazantzis & Dattilio, 2010; Kendall & Hedtke, 2006; Swan, Carper, & Kendall, 2016).

Research has evaluated the association between components of CBT and improved outcomes. Though psychoeducation alone has not been shown to predict treatment outcome (Becker, Becker, & Ginsburg, 2003), when part of an extended program it has been found to lead to improved symptomatology within the first several weeks of treatment (Dannon, Iancu, &

Grunahus, 2002). Cognitive restructuring, which involves identifying and testing more adaptive patterns of thinking, is one of the more commonly taught therapeutic skills. Recent research has identified an association between cognitive restructuring and decreases in anxiety symptoms (Peris et al., 2015; Ruocco, Freeman, & McLean, 2018). Relaxation techniques such as deep breathing and progressive muscle relaxation are taught to help clients address somatic symptoms of anxiety (Ollendick & Cerny, 1981). Though not empirically supported treatments on their own, relaxation approaches have been shown to have a moderate effect on the reduction of anxiety symptoms ($d$ = .57, Piacentini et al., 2011).

The skill of problem solving helps clients to generate adaptive ideas for ways to manage anxiety, typically by engaging in coping thoughts or coping behaviors. Research has found that problem solving is an efficacious skills intervention for a range of disorders, including generalized anxiety disorder (GAD; Provencher, Dugas, & Ladouceur, 2004). Research has also indicated that increases in direct problem solving mediate decreases in anxiety symptoms ($\eta^2$ = .07; Hogendoorn et al., 2014). Problem solving training was also found to be associated with decreased anxiety and indecision in a group of adolescents experiencing anxiety about choosing a career path (Salami, 2004).

Exposures allow clients to use the coping skills they have developed in therapy in "real-life" anxiety-provoking situations. To facilitate an anxious reaction with effective coping, exposures are individualized for each client (Davis et al., 2020). Research indicates that exposure has been found to be effective in the treatment of a variety of disorders including posttraumatic stress disorder (e.g., $d$ = .31, Bryant et al., 2008; Foa, Rothbaum, Riggs, & Murdock, 1991; $g$ = .9, Resick et al., 2008; $d$ = .27, Schnurr et al., 2007), panic disorder, agoraphobia, social anxiety disorder (SoP), and GAD (e.g., Kaczkurkin & Foa, 2015; Peris et al., 2015; Wise et al., 2018).

Results of a recent meta-analysis examining 75 randomized controlled trials (RCTs) of CBT for anxious youth indicated that both the presence and amount of in-session exposure was positively associated with greater symptom improvement from pre-to post-treatment and between CBT and waitlist control conditions (Whiteside et al., 2020). Peris and colleagues (2017) found that (a) the percentage of sessions containing exposure, (b) youth mastery of exposures, and (c) youth compliance with exposures all significantly predicted reductions in anxiety severity ($R^2$ =.23, $R^2$ = .26, $R^2$ = .27 respectively).

Homework is a component of CBT that allows youth to continue developing the skills they learn in therapy in anxiety-provoking situations they experience in their daily lives. In youth anxiety treatments such as *Coping Cat*, homework generally consists of psychoeducation tasks (e.g., writing about anxiety-provoking situations that occurred during the week) and/or exposure tasks (e.g., engaging in typically avoided anxiety-provoking situations with the use of coping skills). Unlike many of the other components of CBT, the association between compliance with homework tasks and treatment outcome has been understudied. The lack of research on therapy homework is surprising given its longstanding asserted importance to the treatment process (e.g., Beck, Rush, Shaw, & Emery, 1979; Kelly, 1955), the high percentage of therapists who report assigning homework (98 percent; Kazantzis & Deane, 1999), and the potential for homework to impact treatment outcome.

Existing therapy homework literature is mixed, disproportionately examines adults, and lacks thorough focus on treatment for anxiety disorders. The adult anxiety literature generally suggests that there is a positive association between greater homework compliance and improved treatment outcome ($R^2$ = .03-.09, LeBeau, Davies, Culver, & Craske, 2013; $r$ = -.29, Leung & Heimberg, 1996; Rees, McEvoy, & Nathan, 2005). However, findings for the treatment of panic disorder and agoraphobia are mixed ($R^2$ = .03, Cammin-Nowak et al., 2013; Edelman & Chambless, 1993; Schmidt & Woolaway-Bickel, 2000; Woods, Chambless, Steketee, 2002).

The youth anxiety literature is even more sparse and more mixed. Only two studies have explicitly examined the association between homework compliance and treatment outcome in anxious youth. Neither study found a significant association between compliance and outcome (Arendt, Thastum, & Hougaard, 2016; Hughes & Kendall, 2007). However, a study examining the relationship between autism symptoms and treatment outcome for anxiety found that family CBT was more effective than individual CBT due in large part to the higher number of at-home exposures completed by youth in family CBT ($\omega^2$ partial = .07, Puleo & Kendall, 2011). This finding suggests that homework compliance may indeed be important to treatment outcome for anxious youth. A more thorough review of the homework compliance literature can be found in the Appendix (i.e., Expanded Literature Review).

Homework compliance research has been limited by a number of different factors, including lack of (a) standardized and/or multi-question measurement tools, (b) examination of the importance of factors such as the quantity and quality of homework compliance, and (c) differentiation between types of homework tasks (e.g., psychoeducation or exposure [*in-vivo*, imaginal, interoceptive]). The current study addressed the aforementioned gaps in the literature and evaluated the role of homework compliance in the treatment of youth anxiety. The associations between treatment outcome and compliance, with specific reference to four facets of homework compliance: (a) session type (psychoeducation versus exposure), (b) number of homework tasks completed by type (psychoeducation versus exposure [*in-vivo*, imaginal, interoceptive]), (c) overall homework quality, and (d) overall homework quantity.

Exploratory analyses examined associations between treatment outcome and (a) homework compliance tracking method (i.e., no tracking versus any tracking method [i.e., reward chart, therapy notebook, other method]), (b) homework compliance reward attainment (i.e., no reward versus any reward provided [i.e., material, social, extension of privileges, restoration of privileges]), and (c) the extent to which youth "leaned in" to homework completion (see question 5 of the Homework Compliance Questionnaire [HCQ] in the Appendix). Exploratory analyses also examined the association between homework quantity and quality and factors that may be associated with both constructs (i.e., familial accommodation, comorbid behavioral diagnoses [e.g., Attention Deficit/Hyperactivity Disorder [ADHD], Oppositional Defiant Disorder [ODD]).

Given the positive association between homework compliance and improved treatment outcome in the adult literature (e.g., LeBeau, Davies, Culver, & Craske, 2013; $r = -.29$, Leung & Heimberg, 1996; Rees, McEvoy, & Nathan, 2005), the longstanding asserted importance of homework compliance to treatment (e.g., Beck et al., 1979), and the positive relationship between treatment outcome and psychoeducation and exposure (e.g., Hogendoorn et al., 2014; Ruocco et al, 2018; Whiteside et al., 2020; Wise et al., 2018), it was hypothesized that overall homework compliance, psychoeducation homework compliance, and exposure homework compliance will be positively associated with treatment outcome.

Given the finding that completion of exposure homework tasks is a better predictor of outcome than completion of self-monitoring and psychoeducational tasks for adults (Cammin-Nowak et al., 2013), it was hypothesized that compliance with exposure homework tasks would bear a stronger association with treatment outcome than compliance with psychoeducation homework tasks. This hypothesis was also reasonable given that exposure homework tasks have been identified as a better predictor of outcome for youth given that exposure is considered to be the critical element of treatment (e.g., Hudson & Kendall, 2002; Peris et al, 2015).

Exposing oneself to anxiety more frequently may allow for increased trials of coping skills and greater association of decreased anxiety and coping behavior with previously feared situations (Foa & Kozak, 1986). Thus, it was hypothesized that quantity of homework compliance would bear a stronger association with treatment outcome than quality of homework compliance. This hypothesis was also supported by previous literature (e.g., Rees et al., 2005; Puleo & Kendall, 2011). There are no specific hypotheses regarding the relationship between homework quality and quantity and familial accommodation and comorbid behavioral diagnoses; however, associations may be present given accommodation's role in maintaining the severity of anxiety (e.g., Kagan, Frank, & Kendall, 2017) as well as symptoms of inattention and defiance in ADHD and ODD, respectively.

# CHAPTER 2

# METHODS

## Participants

Participants were 39 youth, ages 7-17 ($M_{age}$ = 11.99, SD = 2.99 years; 22 females). The sample was 76.9 percent White, 7.7 percent Black, 2.6 percent Asian, 5.1 percent Latino, and 7.7 percent other races. Youth were eligible to participate if they met criteria for at least one principal anxiety disorder diagnosis (i.e., diagnostician-rated as the most severe diagnosis). Diagnoses were determined by Independent Evaluators (IEs) using the Anxiety Disorder Interview Schedule for Children and Parents (ADIS-5-C/P), a semi-structured diagnostic interview completed by youth and by their parents (Albano & Silverman, 2016). IEs were graduate students who had not previously worked with the youth and their parents and were blind to treatment details. Youth were excluded if they reported psychotic symptoms, were actively suicidal at the time of intake, or had a principal diagnosis of obsessive-compulsive disorder. Participants completed CBT through the Child and Adolescent Anxiety Disorders Clinic (CAADC) at Temple University.

## Treatment

Youth received 16 weeks of one-hour weekly CBT sessions using either the *Coping Cat* (Kendall & Hedtke, 2006; used with youth approximately ages 7-12) or *C.A.T. Project* (Kendall et al., 2002; used with youth approximately ages 13-17) protocols. Clinician discretion allowed for flexible use of treatment manuals based on the youth’s cognitive development. The first nine sessions of *Coping Cat* and *C.A.T. Project* focus on psychoeducation. Clients learn how to (a) identify their somatic symptoms of anxiety and other emotions, (b) relax when they begin feeling anxious, (c) challenge anxious thoughts, (d) develop coping thoughts, (e) engage in problem solving to better cope with anxiety, and (f) evaluate and reward their progress. The first nine session include two parent-only sessions which allow the clinician to (a) explain treatment to parents, (b) answer parental questions, (c) hear parental concerns, and (d) work with parents to develop a hierarchy of feared situations that can be used to develop exposure tasks. In the final seven sessions, clients participate in individualized exposure tasks (e.g., *in vivo*, imaginal, interoceptive), which allow youth to approach, rather than avoid, feared situations.

Youth receive homework tasks throughout the course of treatment. Homework tasks assigned during the first nine sessions are psychoeducational in nature (e.g., write about two experiences with anxiety in the past week), whereas tasks assigned during the final seven sessions are exposure-based (e.g., place a phone order for pizza). Youth earn rewards for completion of homework throughout the treatment process (e.g., small trinkets from the CAADC therapy prize shelf, extended curfew, an extra hour of time playing video games or bonding with a parent). Session content is similar in both *Coping Cat* and *C.A.T. Project*; differences lie in the developmental level of content presentation and the order in which the psychoeducation content is presented.

**Measures**

*Anxiety Disorders Interview Schedule for DSM-5, Child and Parent Versions* (ADIS-5-C/P; Albano & Silverman, 2016). The ADIS-5-C/P is a semi-structured diagnostic interview that assesses psychopathology in youth in accordance with the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5; American Psychiatric Association, 2013). Youth and their parents provide separate ratings of impairment to diagnosticians. A diagnosis is considered present if either youth or parent report meets criteria and the diagnostician assigns a clinical severity rating (CSR) of 4 or greater on an 8-point scale. Although psychometric properties of the ADIS-5 have not been reported, the ADIS-IV (Silverman, Albano, & Barlow, 1996) has demonstrated good interrater reliability (ADIS-P: k = 0.98; ADIS-C: k = 0.93; Silverman & Nelles, 1988) and retest reliability (ADIS-P: k = 0.76; Silverman & Eisen, 1992). The ADIS-IV also demonstrated sensitivity to treatment effects in studies examining youth anxiety (e.g., Kendall et al., 1997; Dadds, Heard, & Rapee, 1992). Inter-rater reliability conducted for the purpose of the current study was high (youth-reported GAD *ICC* = 0.82, parent-reported GAD *ICC* = 0.89; youth-reported SoP *ICC* = 0.91, parent-reported SoP *ICC* = 0.93; youth-reported separation anxiety disorder (SAD) *ICC* = 0.94, parent-reported SAD *ICC* = 0.93). Overall inter-rater reliability for the current sample was also high (k > .90)

*Multidimensional Anxiety Scale for Children* (MASC; March, Parker, Sullivan, Stallings, & Conners, 1997). The MASC is a 39-item self-report questionnaire that measures anxiety symptomatology. Items are rated on a 4-point scale (0 = *never*, 3 = *often*). The MASC is comprised of four subscales: Physical Symptoms, Social Anxiety, Harm Avoidance, and Separation Anxiety. An overall anxiety score is also computed. The MASC has demonstrated adequate psychometric properties (March & Albano, 1998; March et al., 1997; March & Sullivan, 1999), and it correlates well with diagnostic status (Villabø, Gere, Torgersen, March, & Kendall, 2012). The MASC has demonstrated good internal consistency and discriminant validity (Villabø et al., 2012). Internal consistency at pre-treatment for the current sample was $\alpha = 0.89$.

*Clinical Global Impression Scale – Improvement and Severity (*CGI-I, CGI-S; Guy, 1976). The CGI scales are single-item measures rated by IEs on a 7-point scale. The CGI-I rating reflects change in anxiety symptoms on a scale from 1 (*very much improved*) to 7 (*very much worse*). Positive treatment response is indicated by a score of either 1 or 2. The CGI-S rating measures anxiety’s overall effect on the youth’s functioning on a scale from 1 (*no illness*) to 7 (*extreme impairment*). Both ratings have been significantly associated with clinician- and client-rated improvement and severity in socially anxious adults (Zaider, Heimberg, Fresco, Schneier, & Liebowitz, 2003). For the current study, IEs provided CGI severity ratings after both the pre- and post-therapy diagnostic assessments and CGI improvement ratings after the post-therapy diagnostic assessment. In analyses conducted for the current study, CAADC diagnosticians blind to treatment details achieved 94.1% inter-rater agreement on identifying responder status.

*Homework Compliance Questionnaire* (HCQ). The HCQ is a 7-item questionnaire developed for the current study. The HCQ measures the type (i.e., psychoeducation task, *in vivo* exposure, imaginal exposure, interoceptive exposure), quantity, and quality of homework compliance. The questionnaire also measures the extent to which youth “lean in” to homework completion (e.g., youth engaging in a long conversation versus youth engaging in a very short exchange for a social anxiety exposure), homework tracking method (e.g., therapy workbook, reward chart), and therapy homework rewards. Response type (e.g., free response, Likert scale) varies by question. Clinicians were trained on the completion of the HCQ and received a document with detailed completion instructions. The HCQ was completed by clinicians following each youth session in which homework was assigned (i.e., sessions 2, 3, 5-8, 10-16). Information needed to complete the HCQ was gathered by clinicians during weekly sessions. The full HCQ – which includes instructions for clinicians – can be found in the appendix.

*Family Accomodation Scale – Anxiety* (FASA; Lebowitz et al., 2013). The FASA is a 13-item scale measuring the frequency of familial accommodation of anxiety. Items are rated on a 5-point Likert scale from 0 (*never*) to 4 (*daily*). The FASA yields an overall accommodations score (9 items) and subscale scores for participation (5 items), modifcation (4 items), distress (1 item), and consequences (3 items). For the current study, parents completed the FASA both pre- and post-treatment. Internal consistency at pre-treatment for the current sutdy was ($\alpha = .87$)

## Procedure

Informed consent and assent for pre- and post-therapy diagnostic assessments and therapy were obtained from both parents and youth, respectively. Following a phone screening for exclusionary criteria with the CAADC clinic coordinator, parents and youth came to the clinic for a pre-therapy diagnostic assessment. Parents and youth were separately interviewed by two graduate student clinicians using the ADIS-5. Participants completed a battery of parent- and self-report measures, including the MASC and the FASA. IEs completed a short battery of measures including the CGI-S following the assessment. Eligible and interested families were assigned a CAADC clinician from whom they received 16 weeks of treatment using either the *Coping Cat* or *C.A.T Project* protocol. Clinicians completed a battery of questionnaires after each session, including the HCQ. Following session 16, families completed a post-therapy diagnostic re-assessment after which they completed a final battery of questionnaires, including the MASC and the FASA. IEs also completed a final battery of questionnaires including the CGI-I and CGI-S following the post-therapy diagnostic re-assessment. All procedures were conducted under the approval of Temple University's institutional review board. Study clinicians were advanced doctoral students. All clinicians attended weekly group supervision led by a licensed psychologist.

## Data Analysis Plan

All analyses for the current study were conducted in IBM Statistical Package for the Social Sciences, Version 24 (SPSS). Main analyses examined the association between homework compliance and treatment outcome. Overall HCQ scores throughout all 16 weeks of treatment were averaged to obtain a total homework compliance score. Overall HCQ scores from weeks in which psychoeducation tasks were assigned were averaged to obtain a psychoeducation session homework compliance score. Similarly, overall HCQ scores from weeks in which exposure tasks were assigned were averaged to obtain an exposure session homework compliance score.

Compliance scores for total type of homework task completed (e.g., psychoeducation, *in vivo*, imaginal, and interoceptive) were calculated by summing the total number of each homework task completed during all weeks of assigned homework. HCQ questions pertaining to homework quality and quantity were averaged to create overall quality and quantity scores for the sample. Change scores (i.e., scores at pre-treatment subtracted from scores at post-treatment) were calculated for the three measures of treatment outcome: (a) ADIS-5 CSRs for principal diagnoses, (b) the MASC, and (c) the CGI-S. Two additional dichotomous measures of treatment outcome were examined: the CGI-I and loss of ADIS-5 diagnoses. Youth with CGI-I scores of 1(very much improved) or 2 (much improved) were considered treatment responders. Youth with any other score were considered non-responders. Youth with post-treatment principal diagnosis ADIS CSRs of 0-3 were considered to have “lost” their diagnosis. Those with CSRs of 4 or above were considered to still have principal anxiety disorder diagnosis.

As a first step to the regression process, Pearson correlation tests examined correlations between key homework compliance variables (i.e., session type, number of homework tasks completed [by type], and overall quality and quantity of homework completed) and key treatment outcome variables (i.e., MASC change scores, CGI-S change scores, ADIS-5 principal diagnoses change scores, CGI-I, and loss of ADIS-5 principal diagnoses).

Hierarchical linear regressions were run to examine possible predictive relationships between key homework compliance and treatment outcome variables that demonstrated significant bivariate correlations. In separate linear regressions, key homework compliance variables (i.e., session type, number of homework tasks completed [by type], and overall quality and quantity of homework completed) were entered as independent variables and key treatment outcome variables (i.e., MASC change scores, CGI-S change scores, and ADIS-5 principal diagnoses change scores) were entered as dependent variables. Due to their dichotomous nature, analyses involving the CGI-I and loss of ADIS-5 principal diagnosis were run using logistic regression. In separate logistic regressions, key homework compliance variables were entered as independent variables and CGI-I and loss of ADIS 5 principal diagnosis were entered as dependent variables.

Exploratory analyses examined the associations between treatment outcome and both homework tracking methods and homework reward attainment. Homework tracking and reward attainment were measured by summing the total number of sessions during which youth tracked their homework completion and received a reward for homework compliance, respectively. In a similar process as the main analyses, a Pearson correlation test was used to examine correlations between homework tracking and reward attainment and each of the five treatment outcome measures (i.e., MASC change scores, CGI-S change scores, ADIS-5 principal diagnoses change scores, CGI-I, and loss of ADIS-5 principal diagnoses). Hierarchical linear regressions examined the possible predictive relationships between homework tracking, reward attainment, and treatment outcome variables that demonstrated significant bivariate correlations. The same procedure was used to examine possible predictive relationships between treatment outcome and the extent to which youth “leaned in” to homework completion. The “lean in” variable was created by averaging the HCQ question pertaining to the degree to which youth “leaned in” to homework completion. Finally, Pearson correlation tests and hierarchical linear regressions examined the relationship between homework quality and quantity and familial accommodation. Familial accommodation was calculated by averaging scores on the FASA completed post-treatment.  Planned analyses involving examining the relationship between homework quality and quantity and comorbid diagnoses could not go forward as no youth in the sample had comorbid ODD diagnoses and only two youth had comorbid ADHD diagnoses.

# CHAPTER 3

## RESULTS

Means and standard deviations are presented in Tables 1 and 2, and bivariate correlations among all key study variables are presented in Tables 4 and 5. Four separate hierarchical linear regressions revealed predictive relationships between elements of homework compliance and treatment outcome as measured by change in CGI-S scores from pre- to post-treatment. Analyses indicated that greater overall therapy homework compliance predicted greater reductions in CGI-S scores, $F(1, 29) = 6.36$, $p = .02$, $R^2 = .18$. Greater compliance with homework assigned during the psychoeducation sessions of treatment was found to predict reductions in CGI-S scores, $F(1, 31) = 6.24$, $p = .02$, $R^2 = .17$. Higher rates of psychoeducation homework compliance (throughout treatment) predicted greater reductions in CGI-S scores, $F(1, 36) = 9.50$, $p < .01$, $R^2 = .21$. Finally, better quality of completed homework predicted greater reductions in CGI-S scores ($F(1, 29) = 10.90$, $p < .01$, $R^2 = .27$). No predictive relationship was found between overall quantity of therapy homework completion and any treatment outcome variable, including the CGI-S, $F(1, 36) = 2.46$, $p = .13$. One linear regression including all aforementioned predictors as independent variables and CGI-S change as the dependent variable was run. Results for the overall model were significant ($F(4, 26) = 2.80$, $p = .05$, $R^2 = .33$), with no one predictor emerging as significant.

No predictive relationships were found between the CGI-S – or any other variable of treatment outcome – and compliance with *in vivo* ($F(1, 36) = 2.76$, $p = .11$), imaginal ($F(1, 36) = .02$, $p = .90$), or interoceptive exposure homework compliance ($F(1, 36) = .15$, $p = .70$). Similarly, no predictive relationship was found between overall exposure homework compliance and any treatment outcome variable, including the CGI-S, $F(1, 30) = 2.68$, $p = .11$. Both better homework quality ($F(1, 29) = 5.50$, $p = .03$, $R^2 = .19$) and a higher rate of psychoeducation homework compliance ($F(1, 30) = 4.66$, $p = .04$, $R^2 = .14$) were found to predict greater reductions in MASC change scores. Greater homework compliance during psychoeducation sessions predicted the loss of principal ADIS diagnosis at post-treatment, $\chi^2 (1) = 4.15$, $p = .04$. This model explained 15.9% (Nagelkerke $R^2$) of the variance in loss of principal diagnosis and correctly classified 60% of cases.

Greater quantity of homework tasks completed predicted treatment response (i.e., CGI-I score), $\chi^2 (1) = 7.83$, $p < .01$. The model explained 28% (Nagelkerke $R^2$) of the variance in responder status and correctly classified 73.7% of the cases. The full model logistic regression examining the predictive relationship between overall homework compliance scores and responder status was significant ($\chi^2 (1) = 5.87$, $p = .02$); however, the $p$ value for homework compliance was trending ($p = .06$). A similar pattern was observed in the analyses examining the relationship between responder status and compliance with tasks assigned during exposure sessions ($\chi^2 (1) = 6.57$, $p = .01$; exposure session $p = .06$).

Exploratory analyses revealed a relationship between greater reward attainment and loss of principal ADIS diagnosis at post-treatment that was trending towards significance, $\chi^2 (1) = 3.67$, $p = .06$. The full model explained 14.5% (Nagelkerke $R^2$) of the variance in loss of principal diagnosis and correctly classified 62.5% of cases. No predictive relationships emerged between tracking method and any measure of treatment outcome. Greater "leaning in" to homework completion predicted reductions in CGI-S scores ($F(1, 9) = 5.40$, $p = .05$, $R^2 = .38$). These results should be interpreted with caution given the low sample size for this variable. Results of the final exploratory analysis found no association between homework quality and FASA score.

Table 1.

*Means and standard deviations of homework compliance questionnaire variables*

| Variable | Mean (Standard Deviation) |
|---|---|
| HCQ – quality | 4.59 (1.29) |
| HCQ – quantity | 4.23 (2.48) |
| HCQ – compliance: psychoeducation sessions | 6.74 (2.39) |
| HCQ – compliance: exposure sessions | 10.84 (5.31) |
| HCQ – compliance: all sessions | 8.83 (3.23) |
| HCQ – number of psychoeducation tasks completed | 5.66 (2.63) |
| HCQ – number of *in vivo* tasks completed | 15.47 (12.71) |
| HCQ – number of imaginal tasks completed | 1.61 (3.58) |
| HCQ – number of interoceptive tasks completed | .39 (1.55) |
| HCQ – number of other tasks completed | .45 (2.60) |
| HCQ – reward attainment[a] | 7.94 (4.62) |
| HCQ – homework tracking[b] | 8.33 (4.30) |
| HCQ – "lean in" | 3.31 (.91) |

*Note.* HCQ = Homework Compliance Questionnaire; [change] = change score [a] = total sessions during which a reward was received;[b] = total sessions during which a homework tracking method was used

Table 2.

*Means and standard deviations of outcome variables*

| Variable | Mean (Standard Deviation) |
|---|---|
| $MASC^{change}$ | -17.84 (22.89)* |
| $CGI\text{-}S^{change}$ | -.97 (1.09)* |
| ADIS $CSR^{change}$ | -2.18 (1.80)* |
| $FASA^{change}$ | -3.24 (6.91)* |

*Note.* $^{change}$ = change score; MASC = Multidimensional Anxiety Scale for Children; CGI-S = Clinical Global Impression Scale - Severity = Child; ADIS CSR = Anxiety Disorders Interview Schedule Clinical Severity Rating
*Negative values represent improvement

Table 3.

*Means and standard deviations of homework compliance (by type)*

| Variable | Assigned | Completed |
|---|---|---|
| HCQ – number of psychoeducation tasks | 8.08 (2.44) | 5.66 (2.63) |
| HCQ – number of overall exposure tasks | 23.26 (16.77) | 17.47 (14.36) |
| HCQ – number of *in vivo* tasks | 20.55 (15.62) | 15.47 (12.71) |
| HCQ – number of imaginal tasks | 2.18 (4.48) | 1.61 (3.58) |
| HCQ – number of interoceptive tasks | .53 (1.91) | .39 (1.55) |

*Note.* HCQ = Homework Compliance Questionnaire

Table 4.

*Bivariate correlations among key therapy homework compliance and treatment outcome variables*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. MASC$^{change}$ | -- | .14 | .11 | .06 | -.24 | -.43* | -.14 | -.33 | -.11 | -.38 | -.02 | -.31 | .33 |
| 2. CGI-S$^{change}$ | | -- | .53** | -.20 | -.44** | -.52** | -.25 | -.41* | -.29 | -.43* | -.61* | -.10 | -.10 |
| 3. ADIS CSR$^{change}$ | | | -- | -.51** | -.12 | -.21 | .04 | -.28 | .07 | -.04 | -.08 | -.35* | -.09 |
| 4. ADIS Dx$^{change}$ | | | | -- | .15 | .21 | .27 | .34* | -.25 | .28 | -.45 | .33 | -.02 |
| 5. CGI-I | | | | | -- | .27 | .37* | .24 | .37* | .38* | .02 | .13 | .32 |
| 6. HCQ – quality | | | | | | -- | .60** | .92** | .68** | .83** | .98** | .15 | -.11 |
| 7. HCQ – quantity | | | | | | | -- | .64** | .99** | .95** | .16 | -.07 | .11 |
| 8. HCQ – compliance: psychoeducation sessions | | | | | | | | -- | .64** | .82** | .90** | .15 | -.15 |
| 9. HCQ – compliance: exposure sessions | | | | | | | | | -- | .97** | .38 | -.13 | .13 |
| 10. HCQ – compliance: all sessions | | | | | | | | | | -- | .73* | -.00 | -.11 |
| 11. HCQ – “lean in” | | | | | | | | | | | -- | .12 | .23 |
| 12. HCQ – reward attainment | | | | | | | | | | | | -- | .16 |
| 13. HCQ – homework tracking | | | | | | | | | | | | | -- |

*Note.* $^{change}$ = change score; MASC = Multidimensional Anxiety Scale for Children; CGI-S = Clinical Global Impression Scale - Severity = Child; ADIS CSR = Anxiety Disorders Interview Schedule Clinical Severity Rating; ADIS Dx = loss of principal ADIS diagnosis; CGI-I = Clinical Global Impression Scale – Improvement responder status; HCQ = Homework Compliance Questionnaire; [a] = total sessions during which a reward was received;
[b] = total sessions during which a homework tracking method was used
† <.1 *p < .05. **p < .01. ***p < .001.

Table 5.

*Bivariate correlations among number of completed assignments (by homework type) and treatment outcome variables*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. MASC$^{change}$ | -- | -* | -* | -* | -* | -.37* | -.09 | -.02 | -.30 | .01 |
| 2. CGI-S$^{change}$ | | -- | -* | -* | -* | -.46** | -.26 | -.27 | -.02 | -.06 |
| 3. ADIS CSR$^{change}$ | | | -- | -* | -* | -.28 | .04 | .00 | .14 | .08 |
| 4. ADIS Dx$^{change}$ | | | | -- | -* | .31 | .25 | .30 | .04 | -.16 |
| 5. CGI-I | | | | | -- | .27 | .31 | .30 | .17 | .02 |
| 6. HCQ – psychoeducation | | | | | | -- | .43** | .45** | .05 | .13 |
| 7. HCQ – exposure total | | | | | | | -- | .96** | .55** | .10 |
| 8. HCQ – exposure: *in vivo* | | | | | | | | -- | .33* | -.04 |
| 9. HCQ – exposure: imaginal | | | | | | | | | -- | .11 |
| 10. HCQ – exposure: interoceptive | | | | | | | | | | -- |

*Note.* $^{change}$ = change score; -* = reported in Table 2; MASC = Multidimensional Anxiety Scale for Children; CGI-S = Clinical Global Impression Scale - Severity = Child; ADIS CSR = Anxiety Disorders Interview Schedule Clinical Severity Rating; ADIS Dx = loss of principal ADIS diagnosis; CGI-I = Clinical Global Impression Scale – Improvement responder status; HCQ = Homework Compliance Questionnaire
† <.1 *p < .05 **p < .01. ***p < .001.

# CHAPTER 4

## DISCUSSION

The present study examined various elements of therapy homework compliance as predictors of treatment outcome for youth treated for an anxiety disorder. Results provided mixed support for the study's hypotheses. Findings support the hypothesis that greater overall homework compliance is associated with better treatment outcome, specifically as measured by reduced IE-rated symptom severity at the post-treatment assessment. Contrary to the hypothesis, compliance with homework assigned during the psychoeducation sessions of treatment – and not the exposure sessions – predicted decreases in symptom severity and loss of principal diagnosis at post-treatment. Similarly, higher rates of completed psychoeducation homework tasks throughout treatment – and not exposure homework tasks – predicted decreases in symptom severity as measured by the CGI-I and the MASC. Mixed findings emerged with regard to the importance of homework quality and quantity. Quality of homework completion predicted decreases in symptom severity as measured by the CGI-I and the MASC; however, quantity of homework completion predicted positive treatment response.

Overall, findings suggest that homework compliance predicts decreases in symptom severity. Homework compliance – perhaps driven by greater compliance with homework assigned during the psychoeducation sessions – and both quality and quantity of homework compliance emerged as important to treatment outcome. It is somewhat surprising that exposure homework compliance did not emerge as a significant predictor of treatment outcome given its consistent identification as an integral part of anxiety treatment (e.g., Peris et al., 2015; Whiteside et al., 2020; Wise et al., 2018). Psychoeducation and exposure homework tasks were completed at similar rates – 70% and 75%, respectively – however, there was far more spread in the rate of exposure homework completion than in the rate of psychoeducation homework completion (see Table 3). This spread may have affected results. It may also be possible that psychoeducation homework compliance is a proxy for other factors that are related to treatment outcome, such as overall treatment engagement and "buy in" (e.g., Glenn et al., 2013). Also of note, in *Coping Cat* and *C.A.T. Project*, psychoeducation homework tasks are predetermined tasks that are completed in the therapy notebook. Thus, psychoeducation homework tasks are more easily and accurately tracked; therapists do not have to rely on youth report of homework compliance, which may be influenced by social pressure to please the therapist.

Findings related to homework quality and quantity suggest differential effects of these constructs on treatment outcome. Homework quality appears to be important for reduction in symptom severity, suggesting that the more accurately youth complete therapy homework, the less anxiety they will experience. Homework quantity appears to be important for general treatment response and not symptom severity. This suggests that completing more homework tasks – regardless of their quality – may make youth more likely to see improvements in the management of their anxiety, even if they do not see significant reductions in anxious symptomatology.

Results of the current study provide additional support for some of the past findings in the sparse therapy homework compliance literature. The finding that overall homework compliance predicts better treatment outcome supports the general consensus of the adult therapy homework literature that compliance and outcome are associated (e.g., Kazantzis, Deane, & Ronan, 2000; Kazantzis, Whittington, Dattilio, 2010). The predictive relationship between better therapy homework quality and improved treatment outcome is not unprecedented. Select studies in the adult homework compliance literature have found that homework quality is more predictive of treatment outcome than homework quantity (e.g., Cammin-Nowak et al., 2013; Schmidt & Woolaway-Bickel, 2000). Past research also supports the current study's findings on the positive association between homework quantity and treatment outcome (e.g., e.g., Rees et al., 2005; Puleo & Kendall, 2011). Findings of the current study also support findings in the youth OCD treatment literature that indicate an association between greater homework compliance and better treatment outcome (e.g., Kircanski & Peris, 2015; Olatunji et al., 2015; Park et al., 2014). Of note, the magnitude of the association between homework compliance and treatment outcome in the current study ($R^2$ = .17 - .33) is approximately equal to that between exposure and treatment outcome in the extant youth literature ($R^2$ = .23-.27; Peris et al., 2017). The relationship between homework compliance and treatment outcome in the current study is stronger than noted in the adult homework compliance literature ($R^2$ = .03-.09; LeBeau et al., 2013).

Though current findings provide support for some existing research, they also contradict past findings in both the adult and youth literatures. Perhaps most notably, current findings contradict Cammin-Nowak and colleagues' finding that exposure homework is a better predictor of treatment outcome than psychoeducation homework (2000). Current findings also contradict past homework compliance studies in the youth anxiety literature, neither of which found a relationship between homework compliance and treatment outcome (Arendt et al., 2016; Hughes & Kendall, 2007).

The current study is the third to examine homework compliance and treatment outcome in youth and the first whose main analyses examine this relationship. Findings from this study help to expand the homework compliance and outcome literature and further elucidate the relationship between the two constructs. The current study is also the first to use a multi-question measurement to assess homework compliance. Future research would benefit from the continued development and psychometric validation of homework compliance measures. Future research should also examine homework compliance and treatment outcome in larger and more diverse (e.g., ethnicity, gender, age, diagnoses) samples of youth. Youth in the current sample are mostly White and female, and all have principal anxiety disorder diagnoses.

Therapists in the current study all received the same training. Thus, there may be limited variation amongst study therapists on factors such as type of homework assigned, amount of homework assigned, homework tracking method, and reward provision. Future research could examine homework compliance and outcome when assigned by therapists who have received more diverse training, as well as in therapists who are treating anxious youth using other manual-based treatments or non-manualized treatment. Finally, future research may benefit from examining the relative importance of homework compliance and in-session compliance. This may be an important distinction with regard to exposure tasks, which are completed both in-session and between session.

**Conclusions**

The current findings provide support for a predictive relationship between therapy homework compliance and treatment outcome in anxious youth. The five main factors that emerged as most important were the (a) overall extent of homework compliance, (b) completion of homework during the psychoeducation phase of treatment, (c) the number of psychoeducation tasks completed, (d) quality of homework completion, and (e) quantity of homework completion. The homework compliance literature remains sparse, particularly in youth. Future research is necessary to further examine homework compliance and to improve treatment effectiveness for anxious youth.

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## APPENDIX A
## EXPANDED LITERATURE REVIEW

Psychological disorders are widespread among both youth and adults. According to the US National Comorbidity Survey, 49.5 percent of youth between the ages of 13-18 are diagnosed with a psychological disorder in their lifetimes (Merikangas et al., 2010). In 2016, 18.3 percent of adults had been diagnosed with a mental disorder in the past year (National Survey on Drug Use and Health, 2016). Psychological disorders are associated with unwanted functional impacts such as impaired academic achievement, school dropout, and impaired social relations, (King & Ollendick, 1989; Swan & Kendall, 2016; U.S. Department of Education, 2014; Wolk, Kendall, & Beidas, 2015). Left untreated, psychological disorders often persist and put individuals at increased risk for the development of other psychological disorders, chronic medical conditions, hospitalization, impairments in family and occupational functioning, substance use, reduced life satisfaction, and suicide (Agency for Healthcare Research and Quality, 2009; Colton & Manderscheid, 2006; Pine, Cohen, Gurley, Brook, & Ma, 1998; U.S. Department of Health and Human Services, 1999).

Given the risks associated with psychological disorders, it is not surprising that substantial research has been dedicated to improving their treatment. Through the course of this research, cognitive-behavioral therapy (CBT) has emerged as an efficacious treatment for psychological disorders in both youth and adults, including Major Depressive Disorder (MDD), Obsessive-Compulsive Disorder (OCD), Panic Disorder (PD), Social Anxiety Disorder (SocAD), Generalized Anxiety Disorder (GAD), and Posttraumatic Stress Disorder (PTSD) (Davis, Palitz, Knepley, in press; Deacon & Abramowitz, 2004; Driessen et al., 2017; Hollon & Beck, 2013; Kendall & Hedtke, 2006). CBT differs slightly based on the specific treatment manual, client age, and the disorder being treated; however, there are several common components, including psychoeducation, skills learning (e.g., behavioral activation, cognitive restructuring, relaxation, problem solving), exposures (behavioral experiments), and homework.

**Psychoeducation**

The psychoeducation phase of CBT typically involves teaching the client about their disorder(s) and helping clients increase their awareness of their symptoms and their emotional experience. For example, a therapist may help a depressed client identify the symptoms associated with an impending depressive episode. A client with an anxiety disorder diagnosis may be taught to identify the physiological symptoms associated with their experience of anxiety (e.g., butterflies in their stomach, racing heartbeat) (e.g., Kendall & Hedtke, 2006). Clients with poor emotional awareness may be taught to identify their emotions (Fréchette-Simard, Plante, & Bluteau, 2018). Psychoeducation is considered to be an important part of treatment, perhaps particularly for anxious individuals, who have been found to have poor understanding of their emotions (e.g., Frechette-Simard et al., 2018; Mathews, Koehn, Abtahi, & Kerns, 2016).

**Skills Learning**

Once the client understands more about their condition(s), they are taught a series of skills designed to help them manage the impairing symptoms. The specific skills taught in CBT vary depending on the client's diagnosis and symptom presentation. Here, we review a subset of the most commonly taught CBT skills. Individuals with depression are often taught the skill of *behavioral activation*. Through behavioral activation, clients are encouraged to re-engage in their daily lives by using activation strategies that counteract patterns of avoidance, withdrawal, and inactivity and help clients to access sources of naturally occurring positive reinforcement in their lives (Jacobson, Martell, & Dimidijian, 2001). Clients may first track their behaviors and depressive symptoms in order to clearly identify the connection between decreased depressive symptoms and increased engagement in certain activities (Hopko, Lejuez, Ruggiero, & Eifert, 2003; Jacobson et al., 2001). Clients then work with their therapist to develop a plan to engage in specific individualized activities that help to improve mood, such as going out to dinner with friends, taking a walk, or running along the river. Behavioral activation has been found to be effective for the treatment of both depression and anxiety disorders (e.g., Brown & Lewinsohn, 1984; Boswell, Iles, Gallagher, & Farchione, 2017; Lewinsohn & Atwood, 1969; Zeiss, Lewinsohn, & Munoz, 1979)

*Cognitive restructuring* is used with clients who have a variety of mental health conditions. Therapists first help clients to become aware of maladaptive thinking patterns (i.e., negative self-talk [negative cognition]) before helping them to identify and test more adaptive ways of thinking (e.g., Beck, Rush, Shaw, & Emery, 1979; Clark, 2014; Dobson, 2010; Ellis & Harper, 1975). Throughout this process, therapists encourage clients to consider the connection between their maladaptive thoughts and their emotional experience. The therapist and client then collaborate to examine the evidence that supports or refutes maladaptive thoughts, with a focus on exploring less negative alternative explanations. Throughout this process, therapists may ask questions such as, "What's the evidence to support this view?" and "Is there another way to look at this observation?" Therapists may also ask, "What's so bad about this?" For example, therapists may say, "If your friend does not wave hello to you because they are mad at you, is that the worst thing that could happen (Stark et al., 2006)?" The process of teaching cognitive restructuring may also involve engagement in behavioral experiments designed to help gather evidence against maladaptive thoughts and for alternative cognitions (Seligman & Ollendick, 2011). For example, if a client is worried that she is a burden to her friends, a therapist may have her survey them to test that belief. Depressed clients may have a greater tendency to form misattributions about past events. Here, the therapist helps identify the client's core beliefs and directly and indirectly challenges negative attributions with the aim of replacing them with more realistic and positive interpretations of past events (Stark et al., 2006). Cognitive restructuring appears to be an important element of CBT – especially for youth – with two recent studies finding an association between changing one's maladaptive thoughts and decreases in anxiety symptoms (Peris et al., 2015; Ruocco, Freeman, & McLean, 2018).

In the context of CBT, *relaxation* is presented as a skill to be purposefully enacted to help clients cope with symptoms, particularly symptoms of an internalizing nature (Barrios & O'Dell, 1989; Morris & Kratochwill, 1983; Reinecke & Ginsburg, 2008). Techniques such as deep breathing and progressive muscle relaxation – an exercise that involves tensing and relaxing various muscle groups with a goal of becoming more adept at perceiving the physiological indicators of muscle tension – are often taught, with adaptations available for youth (e.g., Ollendick & Cerny, 1981). Although relaxation is perhaps most commonly used in treatment for anxiety (e.g., Kendall & Hedtke, 2006; Manzoni, Pagnini, Castelnuovo, & Molinari, 2008), techniques such as progressive muscle relaxation have a place in reducing depressive symptoms (e.g., Costa & Barnhofer, 2016; Klainin-Yobas, Oo, Yew, & Lau, 2015; Reynolds & Coats, 1986; Wilson, 1982).

The skill of *problem solving* helps individuals to generate alternate ideas for ways to manage distress, anxiety, and other emotions, as well as ways to handle the situations that evoke these emotions and interpersonal distress. For example, an individual with a fear of public speaking may generate the following ideas for reducing anxiety during a speech: (a) come up with coping thoughts such as, "the worst thing that will happen is that I'll be a little embarrassed for an hour if I mess up," (b) make sure I practice my speech beforehand, and (c) give my speech first, so that I can get it over with. Therapists may also help clients generate "silly" ideas, such as refusing to give the speech and getting fired or failing the assignment as a result. Such "silly" ideas often exemplify the need to come up with viable ways to manage negative emotions. The skill of problem solving is commonly taught in the treatment of youth anxiety (Kendall & Hedtke, 2006); however, it has also been found to be effective in the treatment of depression (e.g., Chen, Jordan, & Thompson, 2006). In a population of depressed adults, one's opinion about one's own ability to problem-solve (i.e., problem solving appraisal) appears to be particularly important to reduction in depressive symptoms (Chen et al., 2006).

**Exposures (behavioral experiments)**

*Exposures* have been identified as an important element of CBT that allows clients to practice the skills that they learn in therapy in real-world situations. Through exposures, individuals get practice managing negative emotions and/or symptoms, and in so doing, learn that they can get through difficult situations and the experience of negative emotions with decreased distress. Therapists design exposures to be individualized to each client and their specific set of difficult situations and symptoms. For example, an exposure for a youth with SocAD might involve having the youth start a conversation with a classmate during lunch. Therapists often design exposures in a graded fashion (i.e., assigning easier exposures first to build mastery) and, particularly in youth, set up a system for self-reward (e.g., extra leisure time with Mom) (Kendall & Hedtke, 2006). Research indicates that exposure is a highly effective element of CBT across a variety of disorders. For example, exposures have been found to be effective in the treatment of posttraumatic stress disorder independent of precipitating event (e.g., Bryant et al., 2008; Foa, Rothbaum, Riggs, & Murdock, 1991; Resick et al., 2008; Schnurr et al., 2007). Exposure-based CBT has also been found to be one of the most efficacious treatments for obsessive-compulsive disorder (OCD; Simpson, Huppert, Petkova, Foa, & Liebowitz, 2006; Skapinakis et al., 2016), as well as anxiety disorders such as PD, agoraphobia, SocAD, and GAD (e.g., Kaczkurkin & Foa, 2015; Peris et al., 2015; Wise et al., 2018). Behavioral activation is frequently employed in CBT for depression and is similar to exposure. Both behavioral activation exercises and exposures involve exposing the client to situations that they are avoiding due to their symptoms (e.g., anxiety about talking to groups of people, anhedonia). Much like exposures for anxiety and associated disorders, behavioral activation has been found to be effective for the treatment of depression (e.g., Cullen, Spates, Pagoto, & Doron, 2006).

**Homework**

*Homework* is another potentially important component of many CBT protocols. In the context of therapy, homework refers to the task(s) clients agree to complete between sessions. Homework is typically individualized for each client and may involve tasks such as tracking physical symptoms of anxiety, writing down negative automatic thoughts that were experienced during the week, or exposures such as inviting a classmate over for a playdate. Homework is designed to help individuals continue to develop the skills they learn in therapy in real-world situations in their daily lives. The role of homework as an integral factor in CBT treatment outcome, particularly in youth, has not been adequately studied.

The practice of assigning therapy homework has existed for, at least, more than half of a century. Psychological texts identifying homework as an integral element of therapy first appeared over 60 years ago (Kelly, 1955). The idea that homework is critical to the therapeutic process gained further traction following the assertion by Beck and colleagues (1979) that homework should not be considered an elective element of therapy. Surveys of practicing therapists have indicated that the non-elective view of homework has held relatively steady over the past several decades. In one survey, most therapists (i.e., 98%) reported using homework in their practice (Kazantzis & Deane, 1999). This appears to be especially true for CBT-oriented therapists according to a survey of 827 psychologists (Kazantzis & Dattilio, 2010). All clinicians surveyed by Kazantzis and Dattilio (2010) reported using homework as part of therapy at least "sometimes."

The literature on homework – specifically the relationship between clients' compliance with assigned homework tasks and treatment outcome – is surprisingly small given its asserted importance to the treatment process, the frequency with which homework is assigned, and the potential for homework to impact treatment outcome. The extant literature disproportionally focuses on adults; however, interest in the relationship between homework compliance and treatment outcome in youth, as well as adults, has increased over the past decade.

The present review defines therapy homework, reviews theories on the association between homework compliance and treatment outcome, reviews the findings from research on the relationship between homework compliance and treatment outcome across a variety of disorders, reviews the limitations of the existing research, and reviews constructs associated with homework compliance. Finally, this review offers suggestions for future research that will not only further our understanding of the relationship between homework compliance and treatment outcome but also lead to treatment adaptations that may improve treatment.

## Definitions and Measurements

The following section provides definitions for three main constructs: therapy homework assignments, homework compliance, and treatment outcomes. Common assessment methods used to measure these constructs are discussed.

**Therapy Homework**

Therapy homework is assigned to clients as part of treatment for a variety of disorders, including depression (e.g., Primakoff, Epstein, & Covi, 1986), OCD (e.g., Piacentini, Langley, & Robleck, 2007), and anxiety (e.g., Hudson, Kendall, & Davis, in press). Therapy homework can be defined as any task aimed at furthering treatment progress that a therapist asks a client to complete between sessions. In CBT, homework tasks encourage clients to practice skills that they can use in their daily lives outside of therapy sessions (e.g., Primakoff et al., 1986; Hudson & Kendall, 2002). Many CBT protocols involve the assignment of two distinct types of homework tasks– psychoeducation tasks and exposure tasks (e.g., Kendall & Hedtke, 2006; Piacentini et al., 2007). Psychoeducation homework tasks often involve a focus on noticing symptoms, identifying anxious or maladaptive thoughts, and developing strategies for coping with symptoms. In treatments for anxiety disorders and depression, for example, clients may be asked to monitor anxious and/or maladaptive thoughts in diary format or to practice relaxation skills such as deep breathing and progressive muscle relaxation (e.g., Arendt, Thastum, & Hougaard, 2016; Hudson & Kendall, 2002).

As exposure homework tasks require clients to practice reducing and/or managing their symptoms in their daily lives, they are individualized to each client based on symptom presentation. A client with SocAD may be assigned the exposure homework task of talking to three new people during the week between therapy sessions, whereas a client with OCD may be assigned to eat a cookie from a countertop that has not been cleaned. A client with PTSD may be assigned to draft a narrative describing his/her traumatic experience in order to desensitize him- or herself to the anxiety provoked by discussing the experience, and a client with depression may be assigned to take a 15-minute walk twice during the week to experience the benefits of engaging in their lives (e.g., increased energy, lighter mood). Homework is typically assigned on a weekly basis (e.g., Kendall & Hedtke, 2006; Piacentini et al., 2007) and can be measured as the number of between-session tasks a therapist assigns a client.

**Homework Compliance**

At the most basic level, homework compliance can be viewed as a “yes/no” construct that describes whether or not the assigned therapy homework was completed. Although researchers have referenced homework compliance as a construct (e.g., Burns & Spangler, 2000; Gaynor, Lawrence, & Nelson-Gray, 2006; LeBeau, Davies, Culver, & Craske, 2013; Neimeyer & Feixas, 2016), very little research has either fully defined homework compliance or discussed different elements of the construct (e.g., Kazantzis et al., 2016). It is likely that elements such as how *much* of the homework was completed (i.e., quantity of compliance) and how *accurately* the homework was completed (i.e. quality of compliance) are important to consider when defining clients’ compliance with assigned homework. Thus, homework compliance may best be defined as the extent to which a client completes homework as frequently and accurately as assigned.

Homework compliance has historically been measured using relatively vague Likert scale prompts such as, “Rate the child’s degree of compliance with the homework task (e.g., Hughes & Kendall, 2007),” which rely heavily on individual therapists’ judgment and do not directly take into account the quantity or quality of homework completion. Only two measures of homework compliance are currently available: the Patient Adherence Scale for Exposure and Response Prevention Therapy (PEAS; Simpson et al., 2010) and the Homework Compliance Scale (HCS; Primakoff et al., 1986). Both the PEAS and the HCS utilize a 7-point Likert scale to assess degree of compliance after each session. The HCS asks a general question about whether or not homework was completed during the previous week, whereas the PEAS asks three questions: one question assessing quality of completion, one question assessing quantity of completion, and, as the scale was developed to measure homework completion for OCD treatment, one question assessing degree of OCD ritual prevention (Primakoff et al., 1986; Simpson et al., 2010). Neither the PEAS nor the HCS have been psychometrically validated. With only two developed measures – one composed of three questions and the other composed of just one question – there is clear indication of a need for more detailed and psychometrically validated measures of homework compliance.

**Treatment Outcome**

At a basic level, treatment outcome refers to the results of a treatment program. Research typically examines "good" or "improved" treatment outcome as an indication that treatment has been successful. Historically, research has considered treatment to be successful if there is: (a) elimination of symptoms, (b) reduction of symptoms, or (c) improved management of symptoms. Treatment outcome can be measured in several ways depending on how success is operationalized. Research examining treatment outcome based on elimination or reduction of symptoms typically measures the construct by reduction in severity ratings on semi-structured diagnostic interviews or loss of a clinically-elevated severity rating (e.g., a clinical severity rating [CSR] of 0-3 on the Anxiety Disorders Interview Schedule – Fifth Edition [ADIS-5]) (e.g., Arendt et al., 2015; Burns & Nolen-Hoeksema, 1991; Burns & Spangler, 2000; Cammin-Nowak et al., 2013; Hughes & Kendall, 2007). Good treatment outcome based on improved management of symptoms can be measured by a change in scores on measures of specific skills (e.g., emotion regulation skills, emotional understanding skills) (e.g., Suveg, Kendall, Comer, Robin, 2006).

Measures of treatment outcome are typically similar across studies, and there does not exist great concern that these assessment methods do not capture client improvement throughout the course of treatment. Thus, no suggestions for changes in treatment outcome measurement are provided. However, it should be noted that researchers should consider the goals of the treatment program and the research question when determining how to measure treatment outcome (i.e., elimination of symptoms, reduction of symptoms, improvement in symptom management). The identified goals will determine what "good" treatment outcome is and how the construct should be measured in a particular study.

## Review of Theories: Homework Compliance and Treatment Outcome

Over the past several decades, researchers have posited mechanisms by which homework compliance may aid the treatment process. Some have theorized that homework compliance leads to treatment progress by giving the client an opportunity to practice skills learned in therapy in his/her daily life (e.g., Carroll, Nich, & Ball, 2005). Along with helping the client to master skills learned in therapy, homework compliance is also posited to generalize these skills to a number of feared and/or avoided situations, which may not be easily replicated in session (e.g., Burns & Spangler, 2000). Between-session practice with recognizing symptoms and engaging in feared or avoided situations is important as clients spend only 45-60 minutes of each week practicing skills in therapy. Some depression researchers have theorized that the main mechanism through which homework compliance leads to clinical improvement is the correction of faulty cognitions (Primakoff et al., 1986; Salkovskis, Hackmann, Wells, Gelder, & Clark, 2006). Depression researchers have theorized that homework compliance may lead clients to experience increased reinforcing events and decreased negative thinking, thereby leading to a decrease in their avoidance of certain activities or situations (e.g., Addis & Jacobson, 2000).

Anxiety-specific theories posit that, over time, individuals become conditioned to experience fear reactions to certain stimuli (Craske, Treanor, Conway, Zbozinek, & Vervliet, 2014). Anxiety researchers have theorized that compliance with homework tasks – particularly tasks focused on exposure to feared situations – reduces symptoms by extinguishing the conditioned association between the stimulus and the feared event/outcome and re-conditioning the individual to associate the stimulus with neutral events/outcomes (Craske et al., 2014). The extinguishing and conditioning of associations between stimuli and events can be done via exposure tasks both in and between sessions. Another similar theory holds that anxiety is reduced through extinction- and counterconditioning-based tasks, which are often assigned for homework, if and when these tasks are combined with habituation – a process that involves slowly acclimating an individual to the feared situation (e.g., Foa & McNally, 1996; Myers & Davis, 2007). Homework compliance has also been theorized to lead to anxiety reduction by allowing the client to associate feared situations with decreased anxiety and coping behavior instead of with threat and avoidance (Foa & Kozak, 1986). Although there are differences between these theories, there is a common thread running through each of them: homework compliance aids in the treatment process by helping clients to take action toward managing symptoms and negative emotions, as well as facing their fears. Clients who comply with assigned homework tasks may be more likely to spontaneously engage in previously avoided situations and to effectively manage their negative emotions, as they are getting more practice with these skills than their peers who do not comply with homework tasks. As avoidance is curtailed and clients face more fears in daily life, clients are likely to see symptom reduction.

## Age and Disorder Specific Findings

Theoreticians suggest that, when implemented and completed correctly, homework plays an essential role in the treatment process and leads to symptom reduction across a number of disorders (Addis & Jacobson, 2000; Carroll et al., 2005; Burns & Spangler, 2000; Foa & Kozak, 1986; Foa & McNally, 1996; Primakoff et al, 1986). The research literature to support this theory, however, is small, the findings are mixed, and the work is largely focused on adults. Literature on the relationship between homework compliance and treatment outcome, separated by age and by disorder, is reviewed below and is followed by a summary.

## Homework Compliance and Treatment Outcome in Adults

Literature on the relationship between homework compliance and treatment outcome in adults is reviewed below. Findings are separated by disorder: anxiety, depression, obsessive-compulsive disorder, schizophrenia, and substance abuse.

### Anxiety.

Findings from studies examining the relationship between homework compliance and treatment outcome in adults with anxiety disorder diagnoses have been somewhat mixed. Leung and Heimberg (1996) examined homework compliance in 104 adults who were receiving treatment for interpersonal and/or performance anxiety. Homework compliance was measured weekly using the 7-point HCS (Primakoff et al., 1986). A rating of “0” on the HCS indicates that no homework was assigned, “1” indicates that the patient did not attempt to complete the assigned homework, and “6” indicates that the patient completed more of the assigned homework than was requested (see Table 1). Treatment outcome was measured using changes in scores on the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1989) from pre- to post-treatment. Results of multiple hierarchical regression analyses identified that homework compliance was significantly related to treatment outcome, such that increased compliance was associated with better outcome. Homework compliance accounted for 6.3% of the variance in post-treatment SIAS scores (Leung & Heimberg, 1996).

Rees and colleagues (2005) examined homework compliance in 94 adults who met diagnostic criteria for a principal diagnosis of either an anxiety disorder or depression. Treatment consisted of 10 weeks of group CBT. Both quantity (i.e., how much homework was completed) and quality (i.e., how accurately homework was completed) of homework completion were considered. Quantity was measured using information recorded on a Homework Task Monitoring Form (HTMF; Rees et al., 2005). The HTMF is a client-centered tracking tool on which participants record each assigned homework task and note whether or not it was completed during the week ("yes/no"). Quality was measured by accuracy ratings on the Thought Diary Evaluation Form, which assesses clients' accurate completion of thought records. Ratings were provided by two independent raters. Treatment outcome as measured by pre- to post-treatment changes in scores on the Beck Depression Inventory Revised (BDI-II; Beck & Steer, 1987), the Beck Anxiety Inventory (BAI; Beck, Epstein, Brown & Steer, 1988), and the Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q; Endicott, Nee, Harrison, & Blumenthal, 1993). Results of a multiple regression analysis indicated that the quantity of completed homework significantly predicted lower levels of depression, anxiety, and better quality of life at both the end of treatment and at one-month follow-up. Results from the regression further found that the amount of homework completed was a better predictor of outcome than the accuracy of completed homework, suggesting that clients should be encouraged to complete homework regardless of the accuracy of completion (Rees et al., 2005).

LeBeau and colleagues (2013) examined homework compliance in 84 adults (mean age = 35 years) with principal anxiety disorder diagnoses. Participants received 12 sessions of either CBT or Acceptance and Commitment Therapy (ACT). Therapists measured homework compliance on a scale from 0 (none completed) to 4 (fully completed) on a weekly basis. Ratings were based on participants' daily homework logs completed during the weeks between sessions (see Table 1). Changes in ADIS CSRs from pre- to post-treatment were used to measure treatment outcome (LeBeau et al., 2013). Results indicated that homework compliance was a significant predictor of treatment outcome at post-treatment in adults with a principal anxiety disorder diagnosis ($R^2 = .09$). No differences were found based on therapy protocol (i.e., CBT versus ACT) (LeBeau et al., 2013).

Although, overall, the adult anxiety literature suggests that homework compliance is associated with better treatment outcome, literature specific to diagnoses of panic disorder and agoraphobia in adults is much more mixed. Cammin-Nowak and colleagues (2013) examined the role of homework compliance on treatment outcome in 292 adults (mean age = 35.5 years) with panic disorder and agoraphobia. Participants received individualized CBT, during which the quality, quantity, and extent of homework compliance was measured on a weekly basis by both therapists and participants. Therapists rated quality and quantity of compliance on 4-point scales (i.e., 0 [excellent] to 3 [excellent]; and 0 [not at all] to 3 [more than assigned], respectively), and participants rated extent of compliance on a 7-point scale (i.e., 0 [not at all] to 6 [completely done]). Homework tasks included reflective homework, which involved reflecting on the content of psychoeducational sessions during anxious experiences; interoceptive exposures, which involved reducing fears of bodily sensations; and in-situ exposures, which involved engaging in feared situations (Cammin-Nowak et al., 2013). Treatment outcome was measured using changes in scores from pre- to post-treatment on the Hamilton Anxiety Rating Scale (Hamilton, 1959), the Panic and Agoraphobia Scale (Bandelow, 1997), and the Mobility Inventory (Chambless, Caputo, Jason, Gracely, & Williams, 1985).

Though compliance was high overall, results indicated that participants were least compliant with in-situ exposure homework (92% completion) as compared to reflective (98.4% completion) or interoceptive exposure homework (96.3% completion) (Cammin-Nowak et al., 2013). Therapist ratings indicated that 59.2% of homework was completed as assigned and 70.7% of completed homework assignments were rated as "good" or "excellent" quality (Cammin-Nowak et al., 2013). Results of regression analyses indicated that homework compliance – specifically the quality of completed homework – was found to significantly predict better treatment outcome as measured by reduced scores on measures of panic disorder and agoraphobia symptoms at post-treatment ($R^2 = .03$). This finding is in contrast to Rees and colleagues (2005) findings that quantity of compliance is more important than quality of compliance for adults with anxiety. Additionally, the quality ($R^2 = .07$), quantity ($R^2 = .06$), and extent ($R^2 = .05$) of compliance with exposure homework tasks emerged as a better outcome predictor than compliance with self-monitoring and psychoeducation homework tasks, suggesting that exposures are as critical to the treatment process as researchers have posited (e.g., Hudson & Kendall, 2002).

Woods and colleagues (2002) examined homework compliance in 82 adults (mean age = 35.8 years) with diagnoses of panic disorder with agoraphobia and OCD. Participants completed exposure homework tasks on a daily basis for 14 weeks. Homework compliance was measured by participants on the basis of quality and quantity of compliance, which were measured objectively rather than subjectively. Quality was measured as the average change in subjective units of distress (SUDS) ratings (i.e., ratings of how anxious the participants were from the beginning to the end of an exposure homework task). Quantity was measured as the total number of completed homework assignments and the total number of hours spent on homework.

Treatment outcome was measured by pre- to post-treatment changes in ratings of participants' three pre-identified general problems (i.e., target symptom ratings), as well as their scores on a measure of behavioral avoidance (Behavioral Avoidance Test; Steketee, Chambless, Tran, Worden, & Gillis, 1995). Results indicated that neither homework quality nor quantity was associated with better treatment outcome.

Edelman and Chambless (1993) examined homework compliance in 28 adults who met diagnostic criteria for agoraphobia. Participants were enrolled in one of three studies in which they received 10 sessions of in vivo exposure treatment for agoraphobia. Homework consisted of at-home exposures for agoraphobia. Homework compliance was measured using participant-reported information on the total amount of time participants spent doing homework and the extent to which participants followed homework instructions. Treatment outcome was measured by changes in pre- to post-treatment scores on the Behavioral Avoidance Test (Edelman & Chambless, 1993), the Mobility Inventory for Agoraphobia (Chambless et al., 1985), and the Agoraphobic Cognitions and Body Sensations Questionnaires (Chambless, Caputo, Bright & Gallagher, 1984). Results indicated that participants who engaged in higher levels of compliance reported significantly greater reduction in avoidance behaviors and fear of fear (Edelman & Chambless, 1993). An additional study comparing the 28 participants who received therapy with homework assignments to 20 participants who received therapy without homework assignments found no difference in treatment outcome between groups (Edelman & Chambless, 1993). Finally, researchers examined the effect of in-session treatment compliance on treatment outcome in participants enrolled in all three studies (N = 56) and found that in-session compliance was significantly associated with decreased avoidance of anxiety-provoking situations. Taken together, findings from this study suggest that the relationship between homework compliance and treatment outcome is complicated, and that overall treatment compliance may be of greater importance than homework compliance.

Schmidt and Woolaway-Bickel (2000) examined the relationship between homework compliance and outcome in 48 adults who had a diagnosis of panic disorder (mean age = 35 years). Participants received a 12-session protocol of CBT, which included weekly homework assignments. Participants rated their compliance using measurements of the amount of time they spent doing homework during the past week. Therapists measured quality and quantity of homework completion. Quality was measured using a 6-point scale assessing the overall quality of the completed homework (i.e., 0 [poor] to 5 [excellent]) and quantity was measured using the percentage of assigned homework that was completed (i.e., 0%-100%). Treatment outcome was measured by changes in pre- to post-treatment scores on a variety of self-report measures including the Mobility Inventory for Agoraphobia (Chambless et al., 1985), the Multicenter Panic Anxiety Scale (Shear et al.,1997), the Sheehan Patient-Rated Anxiety Scale (Breier, Charney, & Heninger, 1984), the Sheehan Disability Scale (Ballenger et al., 1988). A composite measure of clinically significant change was also computed for outcome analyses. The composite measure classified participants as "recovered" if scores on measures of panic frequency, anxiety, and phobic avoidance fell in the average range. Therapist-rated compliance indicated that participants completed 60% of assigned homework over the course of treatment, and that most completed homework was of "good" quality. Findings indicated that participant compliance ratings were not significantly associated with most outcome measures; however, therapist compliance ratings significantly predicted better treatment outcome (Schmidt & Woolaway-Bickel, 2000). Similar to Cammin-Nowak and colleagues' (2013) findings, Schmidt and Woolaway-Bickel found that the quality of homework completion was a better predictor of treatment outcome than the quantity of homework completion. Overall, the adult anxiety literature suggests a positive association between increased homework compliance and better treatment outcome ($R^2$ = .03-.09), with more mixed findings for treatment of panic disorder and agoraphobia.

**Depression.**

Addis and Jacobson (2000) examined homework compliance in CBT for adult depression. Adults (N = 150) with diagnoses of current major depressive disorder were assigned to one of three 20-session treatments: behavioral activation (BA), changing negative automatic thoughts (AT), or a complete CBT protocol. Therapists rated homework compliance on a 7-point scale following each session. No additional information about compliance measurements used in this study is available. Overall compliance ratings were assessed at sessions 4-6 (i.e., early compliance) and at sessions 10-12 (mid-treatment compliance). Treatment outcome was measured using changes in pre- to post-treatment scores on the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and the Hamilton Rating Scale for Depression (Ham-D; Hamilton, 1960). Outcome was not found to be different across treatment condition, and thus all three treatment conditions were combined for analyses. Additionally, only midtreatment compliance ratings differed across conditions, with AT having greater compliance than BA. Results indicated that greater homework compliance significantly predicted better treatment outcome throughout different stages of treatment ($R^2$ = .05). The total combined effect of early treatment compliance, midtreatment compliance, and acceptance of treatment rationale on outcome was approximately 20% (Addis & Jacobson; 2000).

Burns and Nolen-Hoeksema (1991) examined homework compliance in 307 adults (mean age 36.6 years) who received 12 weeks of CBT to treat mood disorders. BDI scores indicated that, on average, participants were moderately depressed (mean BDI = 21.7). Homework compliance was assessed using both client and therapist ratings of estimated frequency of homework completion during the course of treatment. This rating was provided during the last session and was made on a 5-point scale (i.e., 1 [never] to 5 [more than three days per week, on average]). Treatment outcome was measured by changes in pre- to post-treatment scores on the BDI. Results of regression analyses indicated that greater homework compliance, as rated by both clients and therapists, was significantly associated with improved treatment outcome ($R^2$ = .06; Burns & Nolen-Hoeksema, 1991).

Burns and Spangler (2000) sought to replicate the Burns and Nolen-Hoeksema (1991) findings using 122 of the original participants and 399 depressed adults who had not previously been studied (i.e., replication group). There were no significant differences in age, gender, education levels, or income between participants in the original versus the replication sample. Measurement methods for both homework compliance and treatment outcome were the same as in the 1991 study. Results of the 2000 study successfully replicated results of the 1991 study – homework compliance was significantly associated with reductions in depression in both the original and replication samples ($R^2$ = .12). Results of causal effects models indicated that the magnitude of the casual effect of homework compliance on changes in BDI scores was large, with homework compliance scores accounting for a reduction of 4.35 points on the BDI (and a reduction of 17.4 points after controlling for severity of initial depression) (Burns & Spangler, 2000).

Coon and Thompson (2003) examined the relationship between homework compliance and treatment outcome in 102 older adults who received 3-4 months of CBT only or desipramine and CBT treatment for mild to moderate depression. Therapists rated homework compliance using the average percent of homework completed during the previous week. Treatment outcome was measured by changes in pre- to post-treatment BDI and Ham-D scores. Results indicated that greater homework compliance was associated with significantly lower levels of post-treatment depression as measured by both the BDI ($R^2$ = .09) and the Ham-D ($R^2$ = .08) (Coon & Thompson, 2003).

Neimeyer and Feixas (1990) evaluated the relationship between homework compliance and treatment outcome in group CBT for adult depression. Participants were 63 adults (mean age = 46.5 years) diagnosed with unipolar depression who were assigned to one of two 10-week group CBT protocols. One protocol used weekly homework assignments, and the other protocol required no homework completion. Homework assignments consisted of general reading on CBT goals and individualized assignments (e.g., thought records, behavioral experiments). Homework compliance was assessed during brief "go arounds" at the start of each session. Homework quality was measured using thought records completed during the week. Treatment outcome was measured by changes in pre- to post-treatment scores on the BDI and level of depression as assessed by an IE using the Ham-D. Results of a multiple regression analysis indicated that assignment to the CBT protocol that assigned homework significantly predicted more substantial improvement in symptoms of depression as rated by the IE, but this finding was not maintained at 6-month follow-up (Neimeyer & Feixas, 1990). These findings are supported by results from a small, study (N =14) that found a significant association between greater homework compliance and improved Ham-D scores ($R^2$ = .08; Bryant, Simmons, & Thase, 1999). When taken together with Rees and colleagues' (2005) finding that homework compliance was significantly associated with reductions in both levels of depression and anxiety, Neimeyer and Feixas's findings indicate a fairly consistent association between greater homework compliance and better treatment outcome for adults with depression ($R^2 = .05 - .12$).

**Obsessive-Compulsive Disorder.**

The findings on the relationship between homework compliance and treatment outcome in adult OCD are mixed. Abramowitz and colleagues (2002) examined homework compliance and treatment outcome in 28 adults (mean age = 35.2 years) receiving 18 sessions of Exposure and Response Prevention Therapy (EX/RP) for OCD. Therapists rated homework compliance for the entire duration of treatment using a 7-point scale (0 [poor] to 6 [outstanding]). Treatment outcome was measured using changes in IE-provided pre- to post-treatment scores on the Yale Brown Obsessive Compulsive Scale (Y-BOCS; Goodman, Price, Rasmussen, Mazure, Delgado, et al., 1989; Goodman, Price, Rasmussen, Mazure, Fleischmann, et al., 1989). Results of partial correlation analyses indicated that greater homework compliance was significantly associated with decreased severity of OCD symptoms ($R^2 = .37$).

De Araujo and colleagues (1996) examined homework compliance and treatment outcome in 46 adults seeking treatment for OCD. Participants received nine weeks of one of two forms of exposure therapy with ritual prevention. Therapists rated homework compliance by calculating the percentage of completed versus assigned homework that participants completed each week. Treatment outcome was measured by changes in the individuals' targeted obsessions and rituals as well as changes in pre- to post-treatment scores on the Clinical Global Impression Scale (De Araujo et al., 1996). Regression analyses evaluated the predictive ability of several factors including age, gender, symptom duration, age of onset, referral type (e.g., self-referred versus other-referred), symptom severity, and symptom type. Findings indicated that homework compliance during the first week of treatment was the best predictor of post-treatment outcome as measured by both improvement in target obsessions ($R^2$ = .10) and CGI scores ($R^2$ = .26). Week 1 homework compliance also emerged as the best predictor of outcome at 6-month follow-up as measured by improvement in target obsessions ($R^2$ = .28) and CGI scores ($R^2$ = .43). In a study comparing the effectiveness of CBT versus EX/RP for adult OCD, Whittal and colleagues (2005) examined 83 adults with diagnoses of OCD. Homework compliance was measured using the HCS (see Table 1), and treatment outcome was measured by reduction in YBOCS scores from pre- to post-treatment. Results again indicated that homework compliance was a significant predictor of treatment outcome for participants in both the CBT and EX/RP conditions ($R^2$ = .12; Whittal et al., 2005).

Although there is support for a moderate to strong relationship between homework compliance and treatment outcome in the adult OCD literature ($R^2$ = .12 - .43), not all research supports these findings. For example, Lax and colleagues (1992) examined the relationship between homework compliance and treatment outcome in 49 adults who received clomipramine and exposure to treat OCD. Results did not find a meaningful predictive relationship between homework compliance and treatment outcome. These findings are consistent with Woods and colleagues' (2002) finding that homework compliance was not associated with treatment outcome for adults with OCD and agoraphobia.

**Schizophrenia.**

Only one study of homework compliance in treatment for adult schizophrenia was found. Dunn and colleagues (2006) examined 29 adults (mean age = 38 years) who received treatment for schizophrenia spectrum disorder. Therapists and participants completed homework compliance ratings using an 11-point visual analogue scale (i.e., 0 [none of the agreed homework was completed] to 10 [all of the agreed homework was completed]) following sessions 3, 9, 15, and 21. Treatment outcome was measured using pre- to post-treatment scores on the Positive and Negative Symptoms of Schizophrenia scale (Kay, Opler, & Lindermayer, 1989; Dunn et al., 2006). Homework compliance did not predict better outcome for either positive or negative symptoms of schizophrenia at post-treatment (Dunn et al., 2006).

**Substance Abuse.**

Research examining the relationship between homework compliance and treatment outcome in adults struggling with substance abuse is sparse. Carroll and colleagues (2005) examined homework compliance in 21 adults with cocaine dependence. Over the course of 12 weeks, participants received either CBT or Interpersonal Therapy (IPT) along with either disulfiram or placebo. Therapists assessed compliance on a weekly basis using a 3-point scale identifying whether the participant (a) made no attempt to do the assigned homework, (b) attempted the assigned homework, but did not fully complete the assignment, or (c) completed the assignment successfully (Carroll et al., 2005). Treatment outcome was measured by rate of cocaine usage. Approximately 86% of participants who were assigned homework attempted or completed homework, with 52% of participants completing homework at least once during the course of treatment. Results indicated that participants who had higher homework compliance had a significantly higher percentage of days abstinent from cocaine during treatment. Higher compliance was also associated with significantly less cocaine use at 12-month follow-up.

## Homework Compliance and Treatment Outcome in Youth

This section reviews the research findings regarding the relationship between homework compliance and treatment outcome in youth. Findings are separated by disorder: anxiety, obsessive-compulsive disorder, and depression.

**Anxiety.**

One of the first efforts to specifically examine the role of homework compliance in treatment outcome in youth (Hughes & Kendall, 2007) examined 138 youth (ages 9-13) who received treatment for anxiety disorders using the 16-week *Coping Cat* treatment. Therapists rated each client's compliance with homework tasks using a one-question prompt on a weekly basis (see Table 1). Ratings were provided on a scale from 1 (no compliance) to 7 (total compliance). Treatment outcome was measured by changes in pre- to post-treatment IE CSRs on the youth version of the ADIS (ADIS-C/P; Silverman, 1991). Results indicated that homework compliance did not predict better outcome at either post-treatment or one-year follow-up.

A recent examination of the relationship between homework compliance and treatment outcome was conducted by Arendt and colleagues (2016). This study examined homework compliance in 98 youth (mean age = 11.80 years) receiving group CBT for anxiety. Homework compliance was measured on a weekly basis using youth and parent report of the amount of minutes spent completing homework during the previous week (see Table 1). Treatment outcome was measured by changes in IE-rated ADIS-C/P CSRs and the client-reported Spence Children's Anxiety Scale (Spence, 1997) from pre- to post-treatment. Results did not provide evidence for an association between homework compliance and treatment outcome at either post-treatment or 3-month follow-up (Arendt et al., 2016).

The aforementioned findings have also been supported by findings of studies that did not explicitly examine the relationship between homework compliance and treatment outcome in youth anxiety. For example, in a study examining the relationship between autism symptoms and treatment outcome for anxiety, results of an ANOVA found that family CBT was more effective than individual CBT due in large part to the higher number of at-home exposures completed by youth in family CBT ($F(1,45) = 4.54$, $p < .05$; $\omega^2$ partial = .07; Puleo & Kendall, 2011). This supports findings in the adult anxiety and depression literature that increased quantity of homework completion is related to better treatment outcome (Rees et al., 2005). Additionally, in research examining the implementation of CBT for youth anxiety and depression, therapists identified homework as both the least helpful and most difficult to implement element of the *Coping Cat* treatment (Chu et al., 2015). In a distinct departure from the adult anxiety research, findings from the youth anxiety literature suggest that greater homework compliance is not associated with better treatment outcome.

**Obsessive-compulsive Disorder.**

Park and colleagues (2013) examined the impact of D-Closerine (DCS) on homework compliance for 30 youth (mean age = 12.2 years) with OCD who received 10 sessions of CBT, including seven exposure and response prevention (ERP) sessions. Youth were either given DCS or placebo one hour before each ERP session. ERP sessions involved repeated exposure to participants' feared stimuli. Therapists provided ratings of homework compliance on a weekly basis (see Table 1); treatment outcome was measured by changes in pre- to post-treatment scores on the Children's Yale-Brown Obsessive-Compulsive Scale (CY-BOCS; Scahill, Riddle, McSwiggin-Hardin et al., 1997). Results of a random effects model indicated that homework compliance in both treatment conditions (DCS and placebo) was directly associated with treatment outcome (Est = -1.54, SE = 0.54, $p = 0.006$). As mean homework compliance scores increased by one point, CY-BOCS scores decreased by 1.54 points (Park et al., 2013). These results are consistent with findings in the adult literature that increased homework compliance is related to better outcome.

Olatunji and colleagues (2015) examined 27 youth (ages 12-18) receiving 10 sessions of CBT for the treatment of OCD. Sessions primarily consisted of ERP; youth were provided either DCS or placebo immediately after each session. Homework compliance was measured by the therapist-administered PEAS on a weekly basis (Simpson et al., 2010). Treatment outcome was measured by changes in CY-BOCS scores from pre- to post-treatment. Results of mixed effects regression models were consistent with the adult literature, indicating that increased homework compliance was significantly associated with better treatment outcome across both the DCS and placebo conditions ($b = –0.49$, $t(55) = –2.89$, $p = .006$). However, results also indicated that homework compliance and treatment outcome were significantly related for only youth who took DCS ($b = –1.01$, $t(47) = –3.70$), and not placebo ($b = 0.02$, $t(38) = 0.08$) after each session (Olatunji et al., 2015). As DCS is said to aid in the fear extinction process (Olatunji et al, 2015), this finding suggests that greater fear extinction leads to better outcome. As homework tasks – particularly exposure homework tasks – are designed to facilitate fear extinction/new learning, these findings may also suggest that the completion of a higher number of homework tasks would lead to better treatment outcome. Additionally, results from a study examining ERP in youth with OCD found that increased completion of exposures – specifically exposures targeting multiple symptoms at once – was significantly predictive of better outcomes ($R^2 = .12$; Kircankski & Peris, 2015). Although direct tests are needed, the aforementioned findings along with Puleo and Kendall's (2011) finding that increased homework completion is significantly associated with better outcome suggests that the quantity of homework compliance may be more important in youth than adults (e.g., Cammin-Nowak et al., 2013; Schmidt & Woolaway-Bickel, 2000).

**Depression.**

Research examining the relationship between homework compliance and treatment outcome in youth depression is sparse. Using a very small sample (10 youth, ages 14-18) Gaynor and colleagues (2006) examined homework compliance and treatment outcome in the treatment of youth depression. The study aimed to provide a single case analysis of homework compliance in CBT for depression, and data was collected from more than 110 sessions across the 10 participants. Youth received a combination of a group-based CBT intervention (i.e., the Adolescent Coping with Depression program; Clarke, Lewinsohn, & Hops, 1990) and a newly developed treatment (i.e., Learning Through In Vivo Experience [LIVE]; Gaynor et al., 2006). Therapists rated homework compliance for the previous week at the end of each session. Similar to the methods used by Schmidt and Woolaway-Bickel (2000), compliance was measured using the proportion of homework completed versus assigned. Treatment outcome was measured by changes in BDI scores from pre- to post-treatment. Treatment completers (i.e., participants who completed all sessions; 8/10 participants) were found to have completed 56% of assigned homework on average, and greater compliance was found to be associated with better outcome at post-treatment ($R^2$ = .05; Gaynor et al., 2006). Despite small sample size, correlation coefficients were very similar to those reported in better powered studies (e.g., Bryant et al., 1999). These preliminary findings provide evidence that homework compliance may be related to treatment outcome in youth depression. Additional research with sufficient sample sizes is needed to be able to draw more concrete conclusions.

## Summary of Findings in Adults and Youth

The findings reported in the literature on the relationship between homework compliance and treatment outcome are mixed. Although not entirely consistent (e.g., Burns & Nolen-Hoeksema, 1991; Burns & Spangler, 2000; Edelman & Chambless 1993; Schmidt & Woolaway-Bickel, 2000; Woods et al., 2002), results are more consistent in adults than in youth. The overall evidence indicates that, in adults, greater homework compliance is a small to moderate predictor of better treatment outcome across a variety of psychological disorders and types of treatment. The findings from the youth literature are considerably sparser and more mixed than findings in adults. Significant findings are rare, but where they exist, effect sizes are typically reported to be similar to those found in the adult literature – small to moderate. Specifically, youth findings suggest that homework compliance and treatment outcome (a) are associated for youth OCD (Kircanski & Peris, 2015; Olatunji et al., 2015; Park et al., 2014); (b) may be associated for youth depression (Gaynor et al., 2006); and (c) are not associated for youth anxiety (Arendt et al., 2016; Chu et al., 2015; Hughes & Kendall, 2007; Puleo & Kendall 2011). Findings do not align based on disorder across adults and youth. For example, the youth OCD literature suggests that homework compliance and treatment outcome are associated (e.g., Kircanski & Peris, 2015; Olatunji et al., 2015; Park et al., 2014), whereas the adult OCD literature consists of mixed findings about the association between homework compliance and treatment outcome (e.g., De Araujo et al., 1996; Lax et al., 1992). Findings also do not align based on treatment protocol used, homework compliance measure, or treatment outcome measure.

## Explanations for Inconsistent Findings

There are several limitations within the current literature on homework compliance and treatment outcome that may be contributing to inconsistent findings. First, the reviewed studies mostly relied on weekly, retrospective assessments of homework compliance, typically provided by therapists (e.g., Cammin-Nowak et al., 2013; Hughes & Kendall, 2007; LeBeau et al., 2013; Park et al., 2013). Where weekly retrospective ratings were not taken, a single retrospective rating of homework compliance over the entire course of therapy was taken (e.g., Burns & Nolen-Hoeksema, 1991; Burns & Spangler 2000). Retrospective ratings are likely to be highly influenced by "guesses" and individual therapist rating bias, which may contribute to mixed findings.

Inconsistent findings may also be associated with undetected differences in the methods used to assess homework compliance (e.g., continuous assessment, retrospective assessment, therapist report, client report, parent report; see Table 1) and treatment outcome (reduction in symptoms, self-reported questionnaire scores, or IE-rated ADIS CSRs). No two studies used the exact same homework compliance and treatment outcome measurement tools, eliminating the ability to examine results based on the presence or absence of methodological overlap. Inconsistent findings may also be associated with the level of motivation in the samples studied. That is, individuals enrolled in some studies may be completing a very large proportion of the assigned homework tasks on average, leaving less variability to detect in analyses. Not all of studies report the percentage of homework completed during the course of treatment, but of those that do, homework completion was generally reported to be between 56% - 98.4% (e.g., Cammin-Nowak et al., 2013). Of note, even when percentage of homework completion is provided, these values lack consistent specificity. For example, some studies specify different completion rates for different types of homework assignments (e.g., Cammin-Nowak et al., 2013), others report rates of completion at certain levels of quality (e.g., good or excellent) and quantity (e.g. Cammin-Nowak et al., 2013, Schmidt & Woolaway-Bickel, 2000), and others simply report overall attempts at completing homework without regard to quality or quantity (e.g., Carroll et al., 2005, Gaynor et al., 2006). The use of mono-method measurement may also contribute to mixed findings. In many of the reviewed studies, ratings of both treatment outcome and homework compliance are based on self-report alone; therapists' ratings of homework compliance are based on their clients' report. Few studies used IE interview/questionnaire ratings for treatment outcome (e.g., Hughes & Kendall, 2007; Neimeyer and Feixas, 1990) or parent ratings for homework compliance (e.g., Arendt et al., 2016).

The lack of psychometrics on measures of homework compliance may be another factor contributing to mixed findings. None of the homework measures in the reviewed studies have been evaluated for reliability or validity, and only two – the HCS and the PEAS – are questionnaire-based assessments. Homework compliance measures vary in number of questions, rating scale used, question specificity, reporter (e.g., therapist, parent, client, combination), and reporting frequency (e.g., weekly, once at the end of therapy). The degree of variety in homework compliance assessment may not only encourage over- or underestimation but may also lead to meaningful differences in the type of information being obtained and used in analyses. For example, knowing that a client spent 3 hours completing a therapy homework task does not tell us about what percentage of the assigned homework was completed or how well it was completed.

With specific regard to measuring homework compliance, individuals may feel motivated to overstate homework compliance in order to "look good" to their therapists or to receive therapy rewards. It is also possible that youth aren't reflecting accurately about the entire week when retrospectively rating homework compliance. Inconsistent findings may also be due to erroneous errors such as youth indicating that they completed the homework accurately because they believe this to be true, even when it is not the case. The aforementioned explanations for inconsistent findings merit further examination in both the adult and youth literature. Such examination may help to further elucidate the relationship between homework compliance and treatment outcome across disorder and age group.

## Areas for Future Research

There are several areas for future research on the association between homework compliance and treatment outcome. The usefulness of updates to homework compliance measures, the relative importance of homework assignment type (psychoeducation versus exposure) and assessment elements (quantity versus quality), an increased examination of youth populations and constructs associated with homework compliance, and an increased number of experimental studies are discussed.

### Updates to Homework Compliance Measurements

The literature has relied heavily on unstandardized, non-specific, retrospective measurements of homework compliance and thus, the adult and youth literature alike use insufficient homework compliance measures (see Table 1). Researchers have called for better homework compliance assessment tools (Dozois, 2010). Insufficient measures contribute to unintended variability in therapist and client ratings across studies, which in turn may impact study findings and our understanding of the true relationship between homework compliance and treatment outcome. The standardization and validation of homework compliance measures is critical to the future of the literature. Measures are best when they include assessments of homework quality and quantity; provide specific prompts for therapists, clients, and parents; and provide a full range of response options (e.g., multi-point scale).

### Psychoeducation Homework versus Exposure Homework

Few studies have examined the relative importance of psychoeducational homework tasks (e.g., noticing the experience of anxiety, developing coping skills) and exposure homework tasks (e.g., using learned coping skills in real-world feared situations) in the adult literature. Cammin-Nowak and colleagues (2013) found that completion of exposure homework tasks was a better predictor of outcome than completion of self-monitoring and psychoeducational tasks. However, Kazantzis and colleagues (2000) did not find evidence that homework type influenced the relationship between homework compliance and treatment outcome. Thus, findings are mixed, and additional research is needed to clarify the importance of homework type. Of note, the youth literature has not examined the importance of homework type. However, it would be reasonable to hypothesize that exposure homework tasks are a better predictor of outcome for youth given that exposure is considered to be the critical element of treatment (e.g., Hudson & Kendall, 2002; Peris et al, 2015). The implications of such research are potentially large. If exposure homework tasks are found to better predict outcome than psychoeducation tasks, then increasing the amount of exposure homework assigned during the course of treatment merits consideration. Thus, it is critical that this theory be evaluated.

**Homework Quantity versus Quality**

The relative importance of homework quantity versus homework quality merits examination in both the adult and youth literatures. The findings are mixed: (a) quantity and quality of homework completion are equally unimportant (e.g., Woods et al., 2002), (b) quantity is more important than quality (e.g., Rees et al., 2005; Puleo & Kendall, 2011), and (c) quality is more important than quantity (e.g., Cammin-Nowak et al., 2013; Schmidt & Woolaway-Bickel, 2000). Future research needs to examine the relative importance of homework quantity versus quality. If homework quality is more important than quantity, therapists can increase the focus on guiding clients in accurate homework completion. Conversely, if homework quantity is more important than quality, therapists can assign multiple homework assignments. In the case that both quantity and quality are comparably important, therapists could strive to balance the focus on amount and accuracy of homework completion.

### Further Research on Youth

There are several necessary directions for research on homework compliance and treatment outcome. First, more in-depth examination of homework compliance in youth treatment is perhaps one of the most needed areas of research. Future homework compliance studies in youth need to examine potential age differences in homework compliance in childhood and adolescence (approximately ages 7-17). Younger children may, for example, be less likely to complete homework without parental supervision. However, parents are likely to have more control over the activities of younger children and may be more likely to ensure that homework assignments are completed. Age differences may exist in motivation to complete homework assignments. It is also possible that, overall, youth of all ages are less likely than adults to complete homework due to an overall negative connotation with homework.

Research examining youth with a range of psychological disorders (e.g., anxiety, depression, OCD, Oppositional Defiant Disorder, Attention-Deficit/Hyperactivity Disorder) is needed. Youth with SocAD may be more likely to complete homework assignments for fear of the social judgement and related consequences they may incur if they do not. Youth with perfectionism-related GAD may be more likely to complete homework given their anxiety about completing tasks fully and correctly. However, youth with depression may not feel motivated or able to engage in homework completion.

Research examining the degree to which findings are consistent across treatment protocols is also needed as many youth receive manual-based treatment. There may be elements of standardized treatments that lend youth to complete homework assignments at a higher rate than in unstructured treatments. For example, anxious youth enrolled in a manual-based treatment such as *Coping Cat* that allows youth to earn rewards for homework compliance may be particularly motivated to complete therapy homework. Homework compliance motivators may be lacking in unstructured therapy.

**Research on Constructs Associated with Homework Compliance**

Future research on homework compliance and treatment outcome would be wise to examine client characteristics, environmental pressures, and social factors that may impact homework compliance, particularly if research confirms that homework compliance is associated with more favorable treatment outcome. Initial research suggests that referring to homework tasks by a different name (e.g., Show-That-I-Can tasks, challenges) may lead to increased compliance (Hudson & Kendall, 2002), as may the provision of both positive and social reinforcements (e.g., therapist and parental praise, rewards) (Hudson & Kendall, 2002; Houlding, Schmidt, & Walker, 2010). Additionally, parental reminders and support (Puleo & Kendal, 2011) and the aligning of homework task rationale with the client's therapy goals may increase both motivation and compliance (Houlding et al., 2010). Though the extant literature provides an initial understanding of the role of homework, the research is restricted with regard to populations and treatments examined.

**Further Experimental Studies**

The vast majority of the research on the association between homework compliance and treatment outcome is correlational (e.g., Arendt et al., 2016; Coon & Thompson, 2003; Neimeyer & Feixas, 1990). Indeed, only one identified study used experimental methods (e.g., Edelman & Chambless, 1993). Experimental studies comparing treatments that only differ on homework-related factors (e.g., amount of assigned homework) are essential to test the role and importance of homework compliance to treatment outcome. As firmer conclusions can be drawn from experimental studies than from correlational studies, more experimental research will strengthen the homework compliance and treatment outcome literature. For example, specific ideas for experimental studies related to the treatment of anxiety include, but are not limited to, (a) homework versus no homework, (b) one assignment per week versus five assignments per week, and (c) psychoeducation-only homework versus exposure-only homework.

## Conclusion

Long-held theories that homework tasks are important to treatment (e.g., Kelly, 1955; Beck et al., 1979) have sparked initial research examining whether or not increased compliance with assigned homework tasks leads to better treatment outcome in both adults and youth with psychological disorders. Although studies are sparse and findings are mixed, the adult literature suggests that homework is associated with better treatment outcome.  The youth literature is less robust, more inconsistent, and frequently does not replicate findings in the adult literature. Additionally, literature on the relationship between homework compliance and treatment outcome across adults and youth does not universally provide information on the degree of the relationship or what elements of homework are important (e.g., quality, quantity, general attempts at completion). Such lack of specificity makes it difficult to interpret and identify common threads in findings across studies. The critical next steps – particularly in the less-frequently studied youth population – include (a) creating a psychometrically sound measure of homework compliance, (b) examining the effect of homework type on treatment outcome, (c) examining the role of sample-level differences on the relationship between homework compliance and treatment outcome, (d) examining the relative importance of homework quality versus quantity, (e) examining other constructs that may be related to homework compliance and may thus impact treatment outcome, and finally, (f) examining the association between homework compliance and treatment outcome using experimental designs.

Table 1

*Homework Measurement Tools*

| Measure | Description | Rating Scale | Time of Rating | Studies Used In |
|---|---|---|---|---|
| - | Therapists provide homework compliance ratings based on clients' verbal account as well as homework forms clients completed during the week | 7-point scale: 0 (poor) to 6 (outstanding) | Following the final session | Abramowtiz et al., 2002 |
| - | Therapists provided ratings. No specific criteria was provided | 7-point scale | Following each session | Addis et al., 2000 |
| - | Parents and youth were asked to estimate the average amount of time they spent each day completing homework tasks | Answer categories were 5, 10, 20, 30, 40, 50, 60, and more than 60 minutes | Following each session | Arendt et al., 2016 |
| - | Therapists and clients provided estimates of how frequently they completed homework tasks on average throughout therapy | 5-point scale: 1 (never) to 5 (more than three days per week, on the average) | Following the final session | Burns & Nolen-Hoeksema, 1991; Burns & Spangler, 2000 |
| - | Therapists and clients provided ratings based on the extent to which the client completed the homework, the quality of completion, and the quantity of completion | Completion scale:7-point scale: 0 (not at all) to 6 (completely done)<br>Quantity scale: 4-point scale: 0 (not at all) to 3 (more than assigned)<br>Quality scale: 4-piont scale: 0 (unsatisfactory) to 3 (excellent) | Following each session | Cammin-Novak et al., 2013 |
| - | Therapists use weekly session report form to record review of clients' homework | 3-point scale: a) client made no attempt to do the assignment, b) client made some attempt, but did not fully complete the assignment, or c) client completed the assignment successfully | Following each session | Carroll et al., 2005 |
| - | Therapists reported incidence of homework completion throughout the course of treatment | The percent of homework completed across the previous week | Following each session | Coon & Thompson, 2003 |
| - | Therapists rated completed versus agreed upon homework tasks | Percentage of completed versus agreed upon homework tasks | Following each session | De Araujo et al., 1996 |

| Measure | Description | Rating Scale | Time of Rating | Studies Used In |
|---|---|---|---|---|
| - | Therapists and clients use single visual analogue scale to rate level of homework compliance between the present and previous session | 11-point scale: 0 (none of the agreed homework was completed) to 10 (all of the agreed homework was completed | Following sessions 3, 9, 15, and 21 | Dunn et al., 2006 |
| - | Participants indicate the total amount of time they spent doing homework and the extent to which they followed homework instructions. | Rating scale was not provided. | During each week between therapy sessions | Edelman & Chambless, 1993 |
| - | Therapists provided ratings based on one prompt: Rate the child's degree of compliance with the homework task | 7-point scale: 1 (no homework compliance) to 7 (total compliance). Compliance ratings from each week were averaged to create a total score | Following each session | Hughes & Kendall, 2007 |
| - | Therapists used clients' daily homework logs to consider the proportion of assigned homework tasks that were completed | 5-point scale: 00 (none completed) to 4 (fully completed) | Following each session. An overall homework compliance score was derived by averaging ratings from all sessions. | LeBeau et al., 2013 |
| Homework Compliance Scale (Primakoff et al., 1986) | Therapists evaluate degree of each client's compliance | 7-point scale, with 0 indicating that no homework was assigned: 1 (the patient did not attempt assigned homework) to 6 (the patient did more of the assigned homework than was requested | Following each session. An overall homework compliance score was derived by summing Homework Compliance Scale scores for sessions 2-12 and dividing by the number of sessions attended | Leung & Heimberg, 1996; Primakoff et al., 1986; Whittal et al., 2005 |
| - | Homework quality was measured using completion of a thought record during the week; Overall amount of homework completed was verbally assessed at the start of each session | None given. | At the beginning of each session. | Neimeyer & Feixas, 1990 |
| The Patient Adherence Scale for Exposure and Response Prevention (Simpson et al., 2010) | Therapists provide answers to three questions: quantity of exposures attempted, quality of exposures attempted, and degree of ritual prevention | 7-point scale. Scores for all three questions are averaged to create a total score | Following each session | Olatunji et al., 2015 |
| - | Therapists provide ratings based on parent and youth report on the extent to which the homework task was completed. | 7-point scale: 0 (did not complete any assigned homework) to 6 (completed all homework and made efforts above and beyond assignments) | Following sessions 2-10 | Park et al., 2014 |

| Measure | Description | Rating Scale | Time of Rating | Studies Used In |
|---|---|---|---|---|
| Homework Task Monitoring Form | Clients rate compliance based on the amount of assigned homework they completed each day between sessions. | Homework is rated as either completed (i.e., Yes)_or not completed (i.e., No) | Every day between sessions | Rees, McEvoy, Nathan, 2005 |
| - | Clients rated compliance based on the number of days and hours spent completing homework tasks. Therapists rated quantity and quality of homework completion | Quantity: Percentage of assigned homework tasks that were completed Quality: 6-point scale: 0 (poor) to 5 (excellent) | Following each session | Schmidt & Woolaway-Bickel, 2000 |
| - | Therapists rated homework compliance quantity and quality | Quantity: the total number of assignments completed and the total number of hours spent on homework Quality: the average change in subjective units of distress ratings from the beginning to the end of an exposure homework task | Following each session | Woods et al., 2002 |

## APPENDIX B
## HOMEWORK COMPLIANCE QUESTIONNAIRE

ID#: _______________ Session #: ____________

Homework Compliance Questionnaire

Please write legibly.

Thank you.

1. Last week's assigned homework task(s) (e.g., session 1 psychoeducation STIC task, ask an acquaintance at school 3 questions about themselves):

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

2. Number of homework tasks assigned for the week (e.g., 1 session 1 STIC task, 3 in-vivo exposures, 2 imaginal exposures):

Psychoeducation (i.e., preassigned homework for sessions 1-8) __________________

In-vivo (i.e., engaging with a feared situation in the moment) __________________

Imaginal (i.e., engaging with feared thoughts) __________________

Interoceptive (i.e., evoking specific physiological feelings) __________________¬

Other (describe) _____________________________________________________

3. Number of homework tasks completed during the week (e.g., client completed the session 1 STIC task, 4 in-vivo exposures, 0 imaginal exposures):

Psychoeducation ________________

In-vivo ________________

Imaginal ________________

Interoceptive ________________¬

Other (describe)

______________________________________________________________

4. Of the tasks completed, based on your expertise, rate the overall degree to which the client reported having completed the homework as assigned.

Examples:

Rating of 7: The client completed the assigned task of asking an acquaintance 3 questions

Rating of 4: The client was asked to ask an acquaintance 3 questions, and they only asked 1 question

Rating of 0: The client was asked to ask an acquaintance 3 questions and instead asked a close relative 1 question

0 1 2 3 4 5 6 7

Homework tasks were not at all completed as assigned

Homework tasks were somewhat completed as assigned

Homework tasks were entirely completed as assigned

5. Of the tasks completed, based on your expertise, rate the overall degree to which the client reported having "leaned in" to the assigned homework.

Examples:

Rating of 7: The client was asked to ask an acquaintance 3 questions, and they ended up engaging in a long conversation with the acquaintance

Rating of 4: The client was asked to ask an acquaintance 3 questions, and they asked 3 questions that could elicit a detailed response (e.g., "What's your favorite thing about soccer?")

Rating of 0: The client was asked to ask an acquaintance 3 questions, and they ask 3 very basic questions (e.g., "Can I use your pen?")

0 1 2 3 4 5 6 7

Minimally Somewhat Maximally (e.g., could not have done more to intensify the completed homework)

6. Which of the following do you believe is true of your client's report of homework completion during the past week (Circle your response)?

My client is underreporting homework completion

My client is overreporting homework completion

My client is accurately reporting homework completion

My client is not completing homework

7. How did the client track homework completion during the past week (Circle your response)?

Reward Chart

Therapy Workbook

Other method (please describe): ________________________________________

Homework was not formally tracked

8. What reward(s) did the client report were provided for homework completion during the past week (Circle your response)?

| |
|---|
| My client did not report receiving a reward for homework completion |
| A material award (i.e., something that can be purchased – a toy, an ice cream cone, something from prize shelf) |
| A social reward (i.e., rewards based on spending more time with others – an extra 30 minutes of alone time with a parent, playing game with therapist) |
| A privilege-based reward (i.e., extension of privileges or allowance of extra privileges – 30 minutes of extended curfew/television/video game time, getting to leave therapy early) |
| Restoration of privileges (i.e., privileges are contingent upon homework completion – no phone/television/video game time if homework is not completed) |
| My client is working towards a larger goal at a later point (i.e., client is working towards a reward that is not provided weekly – getting a dog at the end of treatment, going on a weekend trip of their choice) |