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A Daily Phone Diary Procedure to Assess Behavioral Engagement in the Treatment of Adolescent Anxiety and Depressive Disorders

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UNIVERSITY OF MIAMI

A DAILY PHONE DIARY PROCEDURE TO ASSESS BEHAVIORAL
ENGAGEMENT IN THE TREATMENT OF ADOLESCENT ANXIETY AND
DEPRESSIVE DISORDERS

By

Carolyn Snell

A DISSERTATION

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Doctor of Philosophy

Coral Gables, Florida

December 2011

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A Daily Phone Diary Procedure to Assess Behavioral Engagement in the Treatment of Adolescent Anxiety and Depressive Disorders

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Anxiety and depressive disorders are common conditions for adolescents and are associated with significant impairments in functioning. Cognitive behavior therapy (CBT) is an effective treatment modality for these youth, and the behavioral components of CBT protocols, in particular, are thought to be one of the active mechanisms through which positive symptom changes are produced. However, few procedures are available to measure the behavioral changes taking place in adolescents' daily lives as they make therapeutic progress. This study examined adolescents' "behavioral engagement" throughout treatment, a construct defined as time spent in social, athletic and academic activities. Behavioral engagement was measured using the Daily Phone Diary (DPD), a validated measure of daily activities utilized in the child health literature, which employs the principles of Ecological Momentary Assessment (EMA). Twenty-four adolescents reported each activity they engaged in throughout the day, in chronological order, over the past 24 hours. Participants were diverse in their ages, ethnicities, socioeconomic statuses and internalizing disorder diagnoses. Activities were reported during phone calls scheduled before, during, and after

treatment using a transdiagnostic formulation of CBT and, for a randomized subset of the sample (N=8), both before and following a Waitlist comparison condition. Results indicated that “behavioral engagement” is a construct that is measurable and that daily phone diaries are an acceptable method of data collection for this population. Based on theoretical and empirical literature, three key categories of activities on the DPD comprised behavioral engagement: 1) Time spent socially engaged with others; 2) Time spent on any physical or athletic activity; and 3) Time doing homework. Results supported good inter-rater reliability and potentially reasonable test-retest reliability; data collection via the DPD was feasible and acceptable in this context. Tests of convergent validity with other measures of anxiety and depressive symptoms suggested that prior to treatment, more time spent in some activity categories was associated with more internalizing symptoms for those with anxiety disorders only, but fewer internalizing symptoms for those with depression as well as anxiety. Tests of convergent validity with other measures of weekly mood were promising. Future studies will explore alternate definitions of behavioral engagement, examine this construct in a larger sample that has completed a full course of CBT, and explore this construct’s potential role as a mediator of clinical improvement.

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Chapter 1: Introduction

Anxiety and depressive disorders are among the most common psychiatric diagnoses of childhood (Costello, Mustillo, Erkanli, Keeler & Angold, 2003; Gurley, Cohen, Pine & Brook, 1996). Both are characterized by avoidance, either of feared situations or of experiences more globally, and are associated with a variety of adverse developmental outcomes (Albano & Detweiler, 2001; Alloy, Kelly, Mineka, & Clements, 1990; Bell-Dolan & Brazeal, 1993; Mowrer, 1939). Effective, empirically- supported treatments are available, in particular cognitive behavioral therapy (CBT), and these have been described in detail in the psychological treatment literature over the past few decades (Kendall & Suveg, 2006; Walkup et al. 2008). This literature suggests that treatment components that reduce avoidance, by means of exposure and behavioral activation, play critical roles in recovery for youth with these conditions (Kazdin & Weisz, 1998; Ollendick & King, 1998). However, there are few methods available to measure this reduction in avoidance as therapy progresses (Hudson, 2005).

Avoidance is by definition an absence of activity, either because the activity involves confronting a feared object or situation, as is the case for individuals with anxiety, or because the individual is avoiding experience more broadly, as in depression. One methodological barrier to measuring how avoidance decreases with treatment is that it is difficult to measure what adolescents with anxiety and depression are *not* doing, as opposed to what they are doing (Hudson, 2005). An alternative approach is assessment of daily activities; in other words, how engaged individuals are with their environments. An increasingly popular way of measuring daily activities is ecological momentary assessment (EMA), which examines behaviors close in time to when they occur

(Moskowitz & Young, 2006). The major aim of this study is to determine whether use of EMA can feasibly and reliably measure behavioral engagement in youth with internalizing disorders receiving cognitive-behavioral therapy. Behavioral engagement is a measure of the extent to which adolescents' daily lives are socially and physically "active" and their behavior is goal-driven; in theory, it is the opposite of behavioral avoidance.

In order to highlight the importance of developing a tool to measure behavioral engagement in these youth, the prevalence and consequences of anxiety and depression will be reviewed. Anxiety and depressive disorders are common psychiatric diagnoses of adolescence and are associated with a poorer prognosis in later development. There is evidence that anxiety and depression share several important characteristics and may be best conceptualized as falling on a continuum rather than representing distinct problems. After providing an overview of these diagnoses and their impact on youth, with particular attention to the critical role of avoidance in each, empirically based treatments will be described. The concept of behavioral engagement will then be discussed, as a theoretically and empirically-supported construct with the potential to play a significant role in clinical improvement following treatment. Finally, potential methods for defining and measuring behavioral engagement within the context of adolescent daily activities during treatment will be discussed in the context of the current investigation.

Anxiety and Depressive Disorders in Youth

Anxiety disorders are widely recognized as the most common psychiatric disorders affecting children and adolescents (Costello, Mustillo, Erkanli, Keeler & Angold, 2003; Gurley, Cohen, Pine & Brook, 1996), with community prevalence

estimates ranging as high as 20% for youth ages 5-18 (Bell-Dolan, Last & Strauss, 1990). Although transient fears and feelings of anxiety are considered part of normal development, high and stable levels of anxiety are associated with significant impairments in functioning, affecting school, peer involvement, and age-appropriate developmental goals (Albano & Detweiler, 2001; Bell-Dolan & Brazeal, 1993). Long-term outcomes include increased risk for other anxiety disorders later in development, depression, and development of other psychological problems over time (Feehan, McGee & Williams, 1993; Ferdinand & Verhulst, 1995). In a study considering total social costs of anxiety and depression, along with a wide array of physical and mental health conditions, the World Health Organization identified a significant burden of disease associated with anxiety and depressive disorders (Murray & Lopez, 1996).

While not as common as anxiety disorders in younger children, depressive disorders occur in adolescents at rates comparable to those reported in adult populations (Hammen & Rudolph, 2003). While estimates vary, lifetime prevalence of major depression in 15 to 18-year-olds is approximately 14%, with an additional 11% of adolescents evidencing milder depressive symptoms (Kessler & Walters, 1998). Depression co-occurs with all anxiety disorders (Angold, Costello & Erkanli, 1999). In fact, a large meta-analysis found a highly significant association between depression and anxiety disorders (Angold, Costello & Erkanli, 1999). Some have argued that the degree of comorbidity between the two classes of diagnoses is so high that it likely reflects methodological and diagnostic shortcomings (Hammen & Rudolph, 2003). Others have suggested that anxiety and depression may be best conceptualized as different manifestations of the same underlying “general neurotic syndrome” (Andrews, Stewart,

Morris-Yates, Holt & Henderson, 1990). Similarly, Alloy, Kelly, Mineka, and Clements (1990) asserted that depression represents a shift from a sense of helplessness and anxiety to a sense of hopelessness. In other words, depression reflects an active disengagement from the environment that occurs as a result of an inability to master environmental threat(s). Within this view, the avoidance response of last resort is disengagement from the environment, and depression is therefore viewed as falling on the same continuum as anxiety, but with greater severity.

These conceptualizations, in turn, suggest the need for a transdiagnostic approach to anxiety and depression treatment and assessment. Similarly, they suggest the need to evaluate specific therapeutic changes that occur within such an approach, which have received less attention. The current study will develop and evaluate a possible measure of critical changes in therapy, which includes two treatment techniques designed to reduce avoidance: behavioral activation and exposure, within this transdiagnostic approach.

Avoidance

One of the hallmark characteristics anxiety and depressive disorders share in common is avoidance. This avoidance may take the form of disengagement from specific feared situations or from a variety of experiences, including pleasant ones. Avoidance can lead to withdrawal from schoolwork, social interactions, and other activities.

Avoidance is a critical aspect of anxiety disorders, and deeply embedded in the theoretical, diagnostic and empirical literatures on these conditions. From an evolutionary psychology perspective, anxiety serves an adaptive function, providing a powerful incentive, in the form of physiological and psychic discomfort, to avoid stimuli and

situations that are potentially dangerous to us (Mowrer, 1939). Thus, fears and phobias cause intense anxiety that preferentially lead us to avoid potential sources of danger from our evolutionary past (e.g. heights, darkness, snakes; Öhman, Dimberg, & Öst, 1985). More diffuse socially and societally complex sources of anxiety may protect us from engaging in social behaviors that would lead to our isolation from the group (thus retaining others' potential aid in situations where we need it) and provide us with incentives to plan for future contingencies that may cause us to worry (Buss, 2005; Marks & Nesse, 1994). In all of these cases, anxiety causes us to avoid engaging in situations that are potentially harmful to us.

From a diagnostic perspective, avoidance plays an integral role in the criteria for many anxiety disorders (American Psychiatric Association, 2000). In the case of phobias, the feared situation must be avoided in order for the person to meet criteria for the diagnosis (American Psychiatric Association, 2000). Likewise with social phobia, feared situations must be avoided or endured with intense distress in order for a diagnosis to be warranted (American Psychiatric Association, 2000). In the case of post-traumatic stress, avoidance of stimuli associated with the trauma is one of the diagnostic areas in which an individual must experience symptoms in order to receive a diagnosis (American Psychiatric Association, 2000). All of these cases highlight the critical importance of avoidance as a component of anxiety. It is also a potential factor maintaining anxiety, since as long as individuals do not experience feared situations, they cannot habituate and overcome them (Mowrer, 1947). Thus, behavioral engagement is not only a marker of the absence of anxiety, but a potential pathway to recovery.

The empirical literature provides numerous examples of how avoidance is manifested in the daily lives of youth with anxiety disorders. School avoidance has received significant attention, since it has such profound negative consequences for children's learning and socialization (Fremont, 2003). Similarly, studies have found that avoidance of social situations is very common. A study by La Greca and Lopez (1998) found that social anxiety led to poorer social functioning (less support from classmates, less social acceptance), and that girls with greater social anxiety reported fewer friendships, and less intimacy, companionship, and support in their close friendships. In keeping with the transdiagnostic approach in the present study, youth with depressive disorders not only avoid specific unpleasant situations, but also avoid experiences likely to improve their affect, such as physical activities (Rothson, Edwards, Bhui, Viner, Taylor & Stansfeld, 2010).

Behavioral Engagement

As other researchers have acknowledged, behavioral avoidance is a difficult construct to assess, because it measures something that is *not* occurring rather than something that *is* occurring (Hudson, 2005). Assessment of avoidant behavior through standardized behavioral avoidance tests (BATs) is time consuming and difficult. Moreover, these measures are relatively straightforward in the case of specific phobia, where there is one clearly identifiable feared stimulus, but become more problematic when applied to disorders with more complex and diffuse fear structures, such as social phobia or generalized anxiety (Hudson, 2005). As a result, it may be more informative to measure behavioral engagement, because it is comprised of distinct and observable behaviors, rather than the absence of such behaviors.

Rather than measuring what adolescents with anxiety and depression are avoiding doing, assessment of daily activities measures the degree to which adolescents are engaged with their environments on a daily basis. There are two possible approaches, which could also be combined: 1) an ideographic approach to measuring behavioral engagement in which activities that relate to a particular adolescent's fear and avoidance hierarchy are rated as behaviorally engaged, and 2) identifying general activity categories that represent greater engagement with the environment. The first approach has the advantage of assessing the most treatment-relevant behaviors, but it is difficult to assess for specific hierarchy items unobtrusively. The second has the advantage of capturing common youth engagement activities without requiring questions about whether an individual has been engaging in treatment-relevant exposure or behavioral activation outside of session.

Each of these two approaches has its counterpart in the theoretical and neurocognitive literatures on the behavioral inhibition system (BIS) and behavioral activation system (BAS) and their roles in psychopathology. The behavioral inhibition system is theorized to govern our anxiety responses and to be sensitive to non-reward and aversive outcomes (Gray, 1972, 1981). The behavioral activation system is associated with reward, happiness, and movement towards goals (Gray, 1972, 1981). Anxiety disorders are associated with high BIS activity, and depressive disorders with low BAS, as well as higher BIS (Johnson, Turner & Iwata, 2003; Vergana & Roberts, 2011). The first, ideographic approach to the assessment of behavioral engagement is, within the context of this model, measuring BIS, or the extent to which an individual is avoiding potentially anxiety-provoking situations. The second, general activity approach is

measuring BAS, or the degree to which an individual is engaging with the environment more broadly, particularly as related to building skills and reaching goals.

For a diagnostically diverse clinical population consisting of individuals with both anxiety and depression, the literature on BIS and BAS suggests that a combined approach focused on measuring both engagement in specific feared and avoided situations and more general activity levels would most accurately measure clinical change. The inclusion of this more general activity level is crucial for several reasons. First, research suggests that it is BAS, not BIS, that is associated with the course of depression (McFarland, Shankman, Tenke, Bruder & Klein, 2006). BAS has also been shown to be lower in individuals with depression than in non-depressed individuals, but no lower in previously depressed individuals, suggesting that it tracks clinical improvements (Vergana & Roberts, 2011). Finally, the concept of BAS, and of activity and goal pursuit being more generally related to well-being than an individual's reactions to specific feared situations, is in line with a large body of research on nonclinical populations (e.g. Csikszentmihalyi, 1975). Thus a combined approach of measuring BIS by examining behaviors relevant to individual fear hierarchies and measuring BAS by looking at general activity levels may be the best approach for youth with anxiety and/or depression.

Cognitive Behavior Therapy

Recently, interest has grown in the development and validation of evidence-based treatments in clinical psychology. These are defined as clinical approaches that are supported by the best research findings available in a given area (APA Presidential Task Force on Evidence-Based Practice, 2006). The most established evidence-based treatment for anxiety and depression in youth is cognitive behavioral therapy (CBT), key

components of which are exposure and behavioral activation, which specifically target the daily behaviors that maintain avoidance. In the case of anxiety, exposure involves the planned introduction of feared objects or situations as a method of inducing habituation and lowering anxious responding and subsequent avoidance. For depression, behavioral activation involves increasing pleasurable and goal-oriented activities in a person's life in order to improve their mood. Although they differ in important ways, both exposure and behavioral activation have the goal of increasing the extent to which a patient is actively doing something to provide symptom relief, and both represent components of behavioral engagement as defined above. In recent years, interest in and support for evidence-based treatment of anxiety and depressive disorders in youth has grown substantially, with an emphasis on the study of behavioral and cognitive-behavioral techniques (Kendall & Suveg, 2006, Walkup et al. 2008). These approaches integrate behavioral strategies, such as exposure, relaxation training, and behavioral rehearsal, with a focus on cognitive information-processing factors associated with individuals' anxious and depressive cognitions.

Cognitive-behavioral treatments for anxiety and depression typically contain similar elements, such as planned reintroduction of previously avoided activities and increases in activity level more generally. Exposures for anxiety may be therapist-assisted and conducted in-session, but are often completed outside of the therapy room, as therapeutic homework assignments. Similarly, most behavioral activation for depression is conducted outside of the session, often accompanied by self-monitoring of mood and its relationship to the activities performed. Because of the difficulties involved in

measuring behavior outside of therapy, little is known about how adherent youth are to these exposure and behavioral activation exercises.

The goal of CBT is to teach children to recognize signs of anxious arousal and/or depressed mood, and anxiogenic/depressogenic cognitions, which cue them to use adaptive coping strategies. Reviews of evidence-based treatments for anxiety in youth have concluded that behavioral and cognitive-behavioral approaches have received the most support (Kazdin & Weisz, 1998; Ollendick & King, 1998). CBT is similarly promising for depressed youth, and was classified as “probably efficacious” for depressed adolescents (Kazdin & Weisz, 1998). Given this evidence for efficacy, CBT represents a logical treatment approach in which to investigate key constructs relevant to clinical severity and clinical improvement, such as behavioral engagement. This study proposes to evaluate therapeutic behavioral changes within the context of CBT, namely, increases in engagement with the environment that represent a reduction in avoidance.

The treatment literature provides support for the critical nature of behavioral engagement in CBT. Some of this evidence comes from dismantling studies examining the relative contributions of the different components of CBT, such as that conducted by Eisen and Silverman (1993). In this study, cognitive restructuring, relaxation, and a combination of the two were added to exposure therapy for children with overanxious disorder (a diagnostic precursor to generalized anxiety disorder). These three conditions produced equivalent changes at the pre, post and 6-month follow-up assessments on self-report, parent report, and clinician-rated measures of anxiety, suggesting no difference between these treatments. Kendall and colleagues conducted a study in which they measured clinical changes occurring 1) after only cognitive components of CBT had been

completed, and then 2) after behavioral components were added to these cognitive components later in each person's treatment. In this study, according to self-report measures, significant change did not occur until after completion of the exposure task component of treatment (Kendall, Flannery-Schroeder, Panichelli-Mindell, Southam-Gerow, Henin & Warman, 1997). Thus, while cognitive and relaxation training components may have clinical and theoretical importance, the child anxiety literature is congruent with the adult literature in suggesting that the behavioral component of treatment may be the most critical (Bryant, Sackville, Dang, Moulds & Guthrie, 1999; Emmelkamp, Brilman, Kuiper & Mersch, 1986). In meta-analyses of the adult literature, effect sizes for combined cognitive behavioral therapies and for exposure-only therapies have been equivalent in the treatment of anxiety disorders, specifically (Feske & Chambless, 1995). These results suggest the utility of identifying the behaviors that are most relevant to change across individuals with anxiety and depression, with the ultimate goal of developing a measurement tool to better understand the behavioral processes of change in CBT. The intervention used in this study is ideally suited to this purpose because it takes a transdiagnostic approach and emphasizes exposure/behavioral activation.

Intervention: The Unified Protocol for the Treatment of Emotional Disorders in Youth

The current study will be conducted with adolescents enrolled in an ongoing study investigating the feasibility and preliminary efficacy of the Unified Protocol for the Treatment of Emotional Disorders in Youth (UP-Y; Ehrenreich, Buzzella, Trooper, Bennett, Wright & Barlow, 2008). The UP-Y is a transdiagnostic formulation of CBT components for adolescents with emotional disorders. Treatment skills are presented in

the general context of emotion, rather than by disorder. The protocol is comprised of a core set of eight sessions appropriate to any emotional disorder, as well as up to 13 additional sessions that are used flexibly to expand on core concepts, or introduce additional modules addressing topics such as treatment motivation and parenting issues. The required modules are: 1) Psychoeducation about emotions and their functions; 2) Awareness of emotions; 3) Cognitive flexibility; 4) Emotion exposure; and 5) Maintaining therapeutic gains. The UP-Y is designed to be a flexible treatment that can be tailored to individual adolescents' diagnoses, developmental levels, and other characteristics, such as family dynamics.

The UP-Y was recently tested in an open trial, in which 14 adolescents, ages 12-17, completed a 16-session version of the treatment (Ehrenreich, Buzzella, Laird & Barlow, under review). Adolescents all had principal anxiety and/or depressive disorders. Results of this initial trial indicated that the treatment was feasible, with 12 adolescents completing all 16 sessions. The treatment was also shown to be effective, with changes in negative affect, symptoms, and diagnostic severity observed at post-treatment and at the 3 and 6-month follow-ups. Preliminary analyses also suggested that the treatment affected some secondary outcomes, such as family communication (Snell, Laird & Ehrenreich, 2009). As such, the UP-Y represents a promising, theoretically-grounded approach to CBT, and therefore a logical context in which to measure behavioral change processes.

As part of the exposure module of the UP-Y, adolescents spend two or more sessions completing emotion exposures. The first portion of this module is devoted to interoceptive, or “sensational” exposures to the physical sensations associated with anxiety. Following these exercises, adolescents are asked to track their mood and activity

levels. During this process, the therapist encourages the teen to conduct experiments to see if their activity levels affect their moods. Following this, adolescents complete individualized exposure exercises designed to help them enter previously avoided situations. As such, adolescents with anxiety complete exposures to feared situations and adolescents with depression complete pleasant emotion exposures. These pleasant emotion exposures are behavioral activation activities divided into five categories: 1) Service activities, which involve doing something directly for others; 2) Fun activities, which involve time spent doing something the teen enjoys; 3) Social activities, with other people; 4) Mastery activities, which involve learning or working on a skill; and 5) Physical activities, which are active. Currently, little is known about whether adolescents perform these exposures, and what is known is based on informal self-report. As part of the UP-Y study, adolescents also complete mood ratings that reflect their average mood over the course of the previous week on a 0-8 scale.

The aim of the current study is to develop and validate a measure of adolescents' engagement in activities, as well as their mood, at several points during the course of treatment in the UP-Y, and explore how these changes relate to therapeutic improvement. These changes will be measured by assessing adolescents' daily activities.

Daily Context of Adolescent Anxiety and Depression

A relatively neglected area of research on the treatment of anxiety and depression in youth is how experiences in therapy create changes the everyday behaviors (Weersing & Weisz, 2002). We know little about how adolescents apply the skills learned in therapy within their daily interactions and experiences and this is a potentially critical part of the picture. In their chapter on the use of CBT with adolescent populations, Holmbeck and

colleagues (2006) argued that the primary developmental changes of adolescence have an impact via changes in the interpersonal contexts in which adolescents develop. For example, adolescents develop the complex ability to take another's perspective in social situations, leading to deeper friendships, which in turn lead adolescents to define themselves in terms of their peer relationships, as well as their family roles (Holmbeck, O'Mahar, Abad, Colder & Updegrave, 2006). Because interpersonal contexts are so critical to adolescent development, it is logical that a developmentally appropriate intervention would also need to generalize to adolescents' everyday, interpersonal contexts in order to effect change. In other words, interventions need to facilitate implementation of behavioral changes into everyday situations in order to be effective for this population. By extension, measures of critical behavioral changes should also take adolescents' daily contexts into account.

To date, only one study (Lewinsohn, Clarke, Hops & Andrews, 1990) has examined the frequency and perceived enjoyment of pleasant activities in daily life before and after CBT for youth. In this study, CBT led to increased pleasant activities in depressed youth, if pleasant activities were selected by the adolescent and his/her therapist from a list of some suggested activities (e.g. athletic activities outside, social activities with peers). Furthermore, low levels of pleasant activities at intake predicted later depressive symptoms, suggesting that this variable may play an important role in treatment outcome.

Although important, the Lewinsohn et al. (1990) study, like the majority of studies of mood and behavior, had high face validity because adolescents were asked to rate how much they engaged in 49 common, pleasant activities and then to rate how much they

enjoyed them. One way to counteract this face validity is by using a more indirect method of assessment, which can minimize socially desirable responding and recall biases. These measurement factors are considered below and addressed in the current study with the use of an unobtrusive measurement technique, the Daily Phone Diary. Given the benefits of examining daily behaviors, an established approach to this, ecological momentary assessment (EMA) will be reviewed.

Assessment of Daily Mood and Behavior

In a majority of studies examining self-reported mood and behavior, participants have rated their mood states on a daily, weekly, or other fairly long-term basis. However, interest in methods that allow assessments to occur closer to “real time” has been growing. One such method is Ecological Momentary Assessment, a group of methods, developed by personality and social psychologists, which permit the research participant to report on symptoms, affect and behavior close in time to their experience, sampling many events and/or time periods (Moskowitz & Young, 2006). This method has the advantage of minimizing recall biases in subjects’ responses. Such biases may be a particular problem for those participants whose moods fluctuate frequently, thus invalidating reports by traditional daily or weekly recall methods (Moskowitz & Young, 2006).

EMA assessments are often conducted electronically (e.g. PDA or cellular phone), and their formats vary in terms of whether an interviewer is probing for more information or the participant is responding to set prompts. EMA techniques have the advantage of permitting more sensitive assessments and enabling more wide-ranging and

detailed measurements of mood and behavior than are possible with traditional weekly recall measures. With regard to specific events, results of EMA converged with reports by individuals interacting with the participant (Moskowitz & Zuroff, 2005). EMA has been used in studies of depression in adults, and in this context, has been responsive to daily events and psychopharmacological interventions (Peeters, Nicholson & Berkhof, 2003). EMA has also been used successfully to study change in social interactions in response to psychopharmacologic interventions (Moskowitz & Young, 2006), and has been used in populations with borderline personality disorder (Stein, 1996) and ADHD (Whalen, Jamner, Henker, Delfino & Lozano, 2002).

To date, EMA techniques are just beginning to be used to assess mood in children and adolescents with affective disorders. In one study, researchers piloted the use of EMA in 16 children and adolescents with affective disorders and 5 controls (Axelson, Bertocci, Lewin, Trubnick, Birmaher, Williamson, Ryan & Dahl, 2003). Brief interviews were conducted on cellular phone calls with study staff, while adolescents performed daily activities in their natural environments as they normally would. Participants were asked to describe their activities, rate their moods, and describe significant events over the last 24 hours. This study demonstrated the feasibility of such an approach; after an eight-week protocol consisting of multiple daily assessments, 17 of the 21 initial subjects remained enrolled, and only 10% of calls were missed (due in part to a standardized procedure for retrying phone calls). This retention rate is impressive given that the sample had severe mood disorders and included (among others) youth with bipolar disorder, long histories of psychopathology, as well as histories of psychiatric hospitalizations.

In addition to its feasibility, the Axelson et al. (2003) study was able, even with a small sample, to discern differences between youth with and without psychopathology on EMA measures. They also found that those with an internalizing diagnosis spent more time alone, had lower positive affect, higher negative affect, and engaged in fewer planned activities, as measured by the adolescents' responses to cell phone prompts. Further, these variables changed with psychopharmacological treatment. In addition, adolescents gave responses that indicated they were being truthful, rather than providing socially desirable answers. For example, they told interviewers about their sexual activities and substance use. Because of EMA's promise in assessing the daily contexts of adolescents with internalizing disorders, an EMA technique, the Daily Phone Diary (DPD), will be utilized to assess behavioral engagement in the current study.

The Daily Phone Diary

A well-established EMA method for measuring daily activities is the Daily Phone Diary, which utilizes a computerized, cued recall procedure in which individuals think back over the past 24 hours and report on all of their activities lasting five minutes or longer. During the DPD, individuals also are asked about who was with them (companions), and their mood during each activity on a scale from 1 (very negative) to 5 (very positive). The DPD has been evaluated as a "well-established" measure of adherence in a recent review (Quittner et al., 2008). It was originally developed to assess activity patterns and mood in parents of children with cystic fibrosis (CF; Quittner & Oipari, 1994) and has since been applied to adolescents with CF (Modi, Marciel, Slater, Drotar & Quittner, 2008; Grosseohme, 2011), adolescents with asthma (Modi & Quittner, 2006), and parents of children with asthma and HIV-AIDS. Previous studies using the

DPD have demonstrated its ability to measure parental differential treatment of children with and without a chronic illness (Quittner & Opiari, 1994), time spent in recreational versus non-recreational activities (Quittner, Espelage, Opiari, Carter, Eid & Eigen, 1998), adherence to dietary enzymes, airway clearance and other components of treatment (Modi, Lim, Yu, Geller, Wagner & Quittner, 2006), and parental supervision of treatment activities (Modi et al., 2008). Preliminary analyses have also found that the DPD can effectively measure who is present with an adolescent during treatment versus other activities (Grimley, Barker, Marciel & Quittner, 2008). A recent review of evidence-based assessments of treatment adherence in pediatric populations evaluated 18 measures utilizing three assessment methods: self-report inventories/structured interviews, diary procedures, and electronic monitors (Quittner, Modi, Lemanek, Ievers-Landis & Rapoff, 2008). This review recommended incorporation of diary methods into multi-method adherence assessments because of the unique information they contribute relative to other forms of self-report (Quittner et al., 2008). The DPD method was also judged to be “well-established” using the Chambless and Ollendick (2001) criteria.

The DPD is designed to measure the types of activities individuals engage in, who they were with, and ratings of their mood over the past 24 hours. Data are collected via a cued recall procedure administered during a phone call lasting about 15 minutes. Data are entered by the interviewer into a computerized program with a prepopulated list of activities. The diary allows for analysis of time spent in each activity, number and type of companions for each activity, and mood during each activity. The participant is prompted to describe all activities over the past 24 hours that lasted five minutes or more. A handout detailing the mood rating scale is provided to respondents ahead of time to

facilitate its use. Activities are categorized according to a hierarchical coding system, with general categories and specific subheadings. Each activity is also coded as either instrumental (i.e. activity is related to completion of a task) or recreational (i.e. engaged in for pleasure).

One of the strengths of the DPD is its unobtrusive nature (Quittner et al., 2008). Participants are not aware of exactly which activities are extracted from the database and the instructions are purposefully vague (“We are interested in learning more about your daily activities and mood”). Thus, the DPD is useful for measuring behaviors that are particularly vulnerable to social desirability responding, such as adherence to therapist recommendations about activities engaged in outside of therapy. In the context of the current study, the unobtrusive quality of the DPD was maintained, in that individuals were not queried about completion of specific activities relevant to their treatment. The rationale for this was that if participants were made aware that a purpose of the DPD interview was to gather information about whether they were completing exposure and behavioral activation activities that were being assigned by their therapists during treatment, they would be more likely to respond in a socially desirable, and potentially less valid, manner.

The Current Study

In the current study, the DPD was adapted to measure behavioral engagement and daily mood in adolescents with anxiety and depressive disorders undergoing a transdiagnostic form of CBT. Critical activities comprising behavioral engagement, previously identified based on the theoretical and empirical literature, will be described

for the current sample. Participant and interviewer ratings of the feasibility and acceptability of this measure, as well as objective markers of feasibility (e.g. rates of call completion) will be assessed. Interrater and test-retest reliability (i.e. stability in the absence of treatment) of behavioral engagement as measured by the DPD will also be evaluated. The validity of behavioral engagement and mood will be measured in terms of convergence with other measures of clinical severity and mood.

This study represents the first application of the DPD to a population of youth with psychological rather than physical diagnoses. The DPD was administered to a sample of adolescents with clinically significant anxiety and depressive disorders in order to measure behavioral engagement and mood throughout the day. The current study addressed a gap in the literature by measuring adolescents' engagement in activities before and while receiving CBT. Specific hypotheses follow, and include both primary and exploratory hypotheses.

Aims and Hypotheses

Aim 1: To assess the DPDs ability to reliably and validly classify adolescents' activities as "behaviorally engaged."

Primary Hypothesis 1: Behavioral engagement as measured by the DPD will show strong interrater reliability based on activity classifications by multiple interviewers.

Exploratory Hypothesis 2: Adolescents' behavioral engagement will remain stable over time prior to receipt of treatment in the UP-Y, for those randomized to the Waitlist condition, demonstrating good stability and test-retest reliability.

Primary Hypothesis 3: Adolescents' reports of behavioral engagement on the DPD will be negatively correlated with their self and parent-reported anxiety and depression severity at Baseline, demonstrating good convergent validity.

Primary Hypothesis 4: Adolescents' mood ratings on the DPD, averaged across a three-day DPD administration, will be positively correlated with their weekly, self-reported mood ratings, also demonstrating good convergent validity.

Aim 2: To evaluate the feasibility and acceptability of the DPD for assessing daily activities and mood in adolescents with anxiety and depressive disorders.

Primary Hypothesis 5: DPD call completion rates will exceed benchmark rates of 80% or greater, established by prior studies employing telephone interview procedures to assess daily activities in clinical populations (Quittner & Oipari, 1994; Axelson et al., 2003), suggesting that the idea of completing these assessments is acceptable to this population and that data collection using the DPD in the context of CBT is feasible.

Primary Hypothesis 6: Participants' evaluations of the DPDs will indicate that the phone interviews were rated as not overly burdensome or intrusive, with ratings of intrusiveness and burden not exceeding 2 ("a little bit") on a 0-8 scale. In addition, participants will rate the DPD as accurately reflecting the activities they engaged in, who they were with during each activity, and their mood, with ratings of accuracy exceeding 6 ("a lot") on a 0-8 scale.

Primary Hypothesis 7: Evaluations by interviewers using the DPD, rated on 0-8 scales will indicate that they perceive the data acquired to be accurate and to provide

valuable, unique information, with ratings of accuracy and usefulness exceeding 6 (“a lot”).

Chapter 2: Methods

Participants

Twenty-four participants were recruited from an ongoing randomized, controlled trial of the Unified Protocol for the Treatment of Emotional Disorders in Youth funded by the National Institute of Mental Health at the University of Miami (UP-Y; Ehrenreich et al., 2008). Adolescents and their parents interested in participating in the UP-Y first underwent an assessment process that included administration of the Anxiety Disorders Interview Schedule for DSM-IV- Child and Parent Versions (ADIS-IV-C/P; Silverman & Albano, 1996), a comprehensive diagnostic interview designed to assess child and adolescent anxiety and mood concerns, and completion of a variety of parent and adolescent questionnaires.

UP-Y inclusion and exclusion criteria. Inclusion and exclusion criteria for this study are the same as those for the UP-Y, and are based on an extensive diagnostic interview, the Anxiety Disorders Interview Schedule for DSM-IV- Child and Parent Versions (ADIS-IV-C/P; Silverman & Albano, 1996; described below). Inclusion criteria are: 1) a principal diagnosis of a DSM-IV anxiety or depressive disorder or a combination of such disorders, 2) age between 12 and 17 years (or 18 years if the participant is still in high school), and 3) adequate cognitive capacity to engage in the treatment program (defined as an estimated IQ above 70-80, according to the intake clinician's judgment based on the best available evidence). Exclusion criteria include autism-spectrum disorders, psychotic symptoms, and severe suicidal ideation. Adolescents with comorbid behavior problems, ADHD/learning problems, or substance abuse were included in the

protocol, provided that those issues are not the primary presenting concerns. Participants were not excluded on the basis of parental psychopathology or high levels of family conflict, but were excluded if barriers to participation in the study, such as transportation problems or childcare concerns, appeared likely to prevent the family from completing the treatment protocol.

Current study participants. In the context of the UP-Y, daily phone diaries were collected from over the course of approximately 21 months. Of the 24 participants, all completed Baseline assessments, 17 completed assessments following eight weeks of treatment, and 12 completed post-treatment assessments. Post-Waitlist data were available from eight participants. Four participants dropped from the study, two after only completing Baseline assessments (of these, one said the diary calls made her “uncomfortable,” and one dropped from the UP-Y as a whole), and two after completing only Baseline and 8-week assessments (one dropped from the UP-Y as a whole, and one was lost to follow-up for the UP-Y as a whole). Finally, two participants were excluded from the UP-Y after only completing Baseline assessments, one for risky behaviors that could not be adequately addressed in the context of the protocol, and the other because of possibly emergent psychotic symptoms. Of the 24 original participants, 11 had been randomized to the Waitlist, and 13 to immediate treatment. The 24 participants completed 154 phone diaries (64 Baseline diaries, 17 post-Waitlist diaries, 39 8-week diaries and 34 post-treatment diaries). Participant data for each time point is summarized in [Figure 1](#).

Demographic information for all participants is summarized in [Table 1](#).

Participants were on average 15.7 years of age (minimum= 12.0, maximum= 17.8; SD= 1.9). In keeping with epidemiological data showing increased prevalence of depression in

females beginning in adolescence, 58% were female. Consistent with the ethnic makeup of the Miami, FL area, 50% were Hispanic, with the remaining 50% evenly distributed among Caucasian, Black and Multiethnic/Other groups. Household incomes averaged approximately \$108,000 per year, with significant variability among participants. Fifty-eight percent of participants came from intact families. The most common Baseline diagnoses according to the ADIS-IV-C/P were Generalized Anxiety Disorder and Social Phobia, although several other anxiety and depressive disorders were also present, both as principal and as secondary diagnoses.

Measures

The Daily Phone Diary (DPD; Quittner & Oipari, 1994). The first step of the current study involved adapting the DPD data collection procedure to the context of adolescent anxiety and depressive disorders. The diary has a user-friendly interface that allows real-time data entry during the course of the phone call (see [Figure 2](#)). It organizes daily activities hierarchically, requiring the interviewer to first select a category and then a more specific activity within it. If it is unclear whether a given activity (e.g. driving) was performed for instrumental or recreational purposes, the interviewer asks the adolescent to make this determination. The modified DPD for adolescent anxiety is shown in Appendix A.

Psychometric properties of the DPD have demonstrated good interrater reliability, at over 90% agreement in some studies (e.g. Quittner & Oipari, 1994). The DPD has also yielded reliable stability coefficients over a 3-week period ($r's = .61-.71$, $p's < .01$; Quittner et al., 1998). In addition, strong convergent validity has been found for parental

differential treatment of children between the DPD and both home interview and nightly rating scale measures for parents of toddlers (Quittner & Oipari, 1994), and between daily routines and the Self Observation Report Technique (77-80%; Quittner, DiGirolamo & Eigen, 1992). In addition to its strong psychometric properties, the DPD was chosen as a measure of daily activities in the current study due to the 24-hour recall window being well-suited to capturing activity patterns throughout the course of a day and due to its structured flexibility, allowing for clarification regarding activities when needed.

Initial modifications of the DPD for this study fell into three categories: First, the Medical Care activities section was removed, with only doctor's visits and an "other" category left in. Second, a "Research/Treatment Activities" section was modified in order to track both activities related to participation in the UP-Y and exposure homework assignments. Within this section, subheadings included "Doing the DPD," "Completing forms," "Doing exposure homework," and "Attending a therapy session." Finally, the diary was updated to reflect contemporary adolescent activities, such as surfing the internet and online chatting.

During the course of the study, a number of additional changes were made to the DPD program to more accurately reflect this clinical population of adolescents. The first of these involved defining which types of technology-related activities were categorized as occurring alone vs. with other people (composing an email was categorized as solitary, whereas talking on the phone and online chatting were categorized as occurring with other people). The second involved the categorization of school activities, with the decision that classroom activities other than tests should be grouped together as

“attending class.” This decision was made in part to minimize the level of detail adolescents were required to provide about activities that were not within their control and not likely to change in response to therapeutic intervention.

The Anxiety Disorders Interview Schedule for DSM-IV- Child and Parent Versions (ADIS-IV-C/P; Silverman & Albano, 1996). The ADIS-IV-C/P is a downward extension of the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV). These interviews permit the diagnosis of all DSM-IV anxiety disorders, mood disorders, and externalizing disorders of childhood and adolescence, and also provide screening questions for selected other disorders (e.g. psychotic disorders, eating disorders, and somatization disorders). The ADIS-IV-C/P utilizes visual prompts in the form of thermometers, where needed, to obtain adolescent ratings of fear, worry, distress/interference, avoidance, and occurrence of physical sensations. Parents and adolescents are asked to provide ratings, ranging from 0 to 8, of the severity and degree of interference for each symptom and symptom cluster. In addition, parents and adolescents are asked to rate, from 0 to 8, how much each feared situation is avoided. Within the current study, clinical severity ratings for each diagnosis met on the ADIS-IV-C/P were determined in discussion with the Principal Investigator, using the child and parent severity ratings to inform this decision. Inter-rater reliability for all clinical diagnoses was assessed.

Psychometric properties of the updated DSM-IV version of the ADIS-C/P have shown good to excellent test-retest reliability within a test-retest interval of 7-14 days, with kappa coefficients ranging between 0.7 and 1.0 (Silverman, Saaverda and Pina 2001). Across two administrations of the ADIS-IV-C/P with 62 children, ages 7-16,

results also indicated that the ADIS-IV-C/P also showed excellent interrater reliability for primary diagnoses and anxiety disorder diagnoses ($\kappa = .72-.91$), across demographic groups (Lyneham, Abbott & Rapee, 2007). The concurrent validity of the ADIS-IV-C/P has also been supported, with significant correlations between the anxiety disorders sections of the ADIS and the corresponding subscales of the Multidimensional Anxiety Scale for Children (MASC; March, 1998) for all diagnoses except GAD (Wood, Piacentini, Bergman, McCracken & Barrios, 2002). The ADIS-IV-C/P is well-suited to the purposes of the current study because of the ability it affords clinicians to combine parent and child reports and gain clarification about symptoms as needed to complete the diagnostic picture for an individual.

The Revised Child Anxiety and Depression Scales (RCADS; Chorpita, Yim, Moffitt, Umemoto & Francis, 2000). The RCADS is a 47-item self- and parent-report measure of anxiety and depressive symptoms. For each symptom, response choices are Always, Often, Sometimes, and Never, and items correspond very closely to the symptoms of their corresponding subscale's diagnosis in DSM-IV. Subscales correspond to the DSM-IV categories of Separation Anxiety Disorder, Social Phobia, Generalized Anxiety Disorder, Panic Disorder, Obsessive-Compulsive Disorder, and Major Depressive Disorder (Ebesutani, Bernstein, Nakamura, Chorpita & Weisz, 2010). There is strong support for the structural validity, reliability and convergent and discriminant validity of the RCADS (Chorpita, Yim, Moffitt, Umemoto & Francis, 2000). More specifically, the aforementioned study found internal consistency coefficients between .73 and .82 for RCADS subscales, and one-week test-retest reliabilities ranged from .65 to .80. In addition, the RCADS and its subscales showed moderate to strong convergent

validity with two other established self-report measures of anxiety and depression used in the same study: the Children's Depression Inventory (CDI; Kovacs, 1980) and the Reynolds Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978).

The RCADS has good factorial validity according to internal consistency and factor analyses (Chorpita, Moffitt & Gray, 2005). Convergent validity tests conducted against clinical interview and self-report data have also been favorable, with most correlations to clinical interview data for anxiety ranging from 0.30 to 0.60 and correlations to other self-report measures ranging from 0.59 to 0.72 (Chorpita, Moffitt & Gray, 2005). Discriminant validity was established with nonsignificant correlation to child behavior problems (Chorpita, Moffitt & Gray, 2005). Furthermore, in comparison with other measures of anxiety and depression, the RCADS has shown greater correspondence to specific diagnostic syndromes, and has shown strong discriminant validity between disorders, successfully discriminating between youth with various anxiety subtypes, youth with depression, and youth without these diagnoses (Chorpita, Moffitt & Gray, 2005; Ebesutani, Bernstein, Nakamura, Chorpita & Weisz, 2010). The RCADS was also selected as a measure of anxiety and depression severity for the current study because of its inherent sensitivity to change in both the number and magnitude of a variety of symptoms of anxiety and depression. The RCADS is included in full in Appendix B).

Participant and Interviewer DPD Feedback Forms. Feedback forms assessing participants' and interviewers' perceptions of the DPD's accuracy and the burden associated with completing the DPD were developed for the current study. These questions were modeled after questions assessing the feasibility of an intervention

targeting adolescent depression (DeMaso, Marcus, Kinnamon & Gonzalez-Heydrich, 2006). They assessed perceptions of the DPD's utility, accuracy, and intrusiveness on 0-8 scales.

Procedures

At Baseline, during the same visit as they completed the ADIS-IV-C/P interview, each adolescent completed a Emotional Distress and Avoidance Hierarchy with the ADIS interviewer. The adolescent was prompted to list situations that cause them anxiety or emotional distress, and rate each situation on a scale of 0-8 in terms of how emotional it is for them. Then, for each item, the adolescent is prompted to rate, on that same scale, the degree to which they avoid that situation. In addition, in order to evaluate avoidance related to depression, adolescents were also asked to list activities that it has been difficult to engage in lately and rate them on the same scales for how emotional each is and how much they avoid it.

The DPDs were completed on three consecutive days for each assessment point, sampling the participant's behavior on two weekdays and one weekend day. Thus, diaries began either on a Thursday (capturing Thursday, Friday and Saturday), or a Sunday (capturing Sunday, Monday and Tuesday). In early studies using the DPD, two weekdays and two weekend days were utilized, but it was determined that the second weekend day was unnecessary. Adolescents randomized to the immediate treatment condition completed diaries at the following points: 1) following their initial disposition to the UP-Y study, 2) following completion of eight sessions of therapy, and 3) following completion of the treatment as a whole, which lasts between 8 and 24 weeks. Adolescents

in the Waitlist condition completed diaries at these same assessment points, and also completed an additional set of diaries after they had completed the eight-week Waitlist and were about to begin treatment (see [Figure 3](#)). Thus, participants received either three or four sets of diaries, depending on their treatment condition.

Adolescents in the immediate treatment condition received \$25 compensation for completing two thirds of the diaries if they completed six diaries, and \$50 compensation for completing all of them if they completed nine, whereas those on the Waitlist received the same compensation for completing eight and twelve diaries, respectively. The eight-week mid-treatment assessment point was chosen for two reasons. First, eight weeks represents the shortest possible treatment length within the UP-Y. Second, completing the diaries at this point allows for direct comparisons of treated adolescents with those who have been on the Waitlist for eight weeks.

During the informed consent process for the UP-Y, the adolescent and his/her parent(s) were provided with a summary of what was involved in the phone interviews, when they would take place, and how much they would be compensated and the clinician obtaining the consent answered any questions. Adolescents were given a packet with information about the study and the mood rating scale that would be used during the phone calls (see Appendix C). The adolescent was then called by a member of the research team to schedule the first set of Baseline diaries. All adolescents completed the DPD at a consistent time of day of their choosing. During these calls, a member of the study staff asked them to go through their day and list all activities they engaged in for five minutes or longer (see phone script in Appendix D). A subset of 10% of all DPDs were independently coded by two trained raters, and percentage agreement and Cohen's

kappa were calculated on these ratings to assess interrater reliability. All raters were trained to reliability prior to administering any DPDs.

Following each set of diaries, adolescents were asked during their next therapy session to rate their average mood during the week on a 0-8 scale (see Appendix E). Following completion of the final DPD, adolescents were asked a series of questions assessing the DPDs acceptability and accuracy (see Appendix F). Interviewers administering the daily phone diaries also completed an evaluation of the DPDs completeness and accuracy (see Appendix G).

Data Analyses

Behavioral Engagement. Analyses of DPD pilot data focused on time spent on three categories of activities of interest: 1) Time spent socially engaged with others, defined as engaging in specific activities such as talking for pleasure or attending a social event; 2) Time spent on any type of physical activity, whether alone or with others; and 3) Time doing homework (Snell, Ehrenreich-May, Guttman & Quittner, 2010). These activities were selected based on the literature relating goal-directed activities to positive mood states in non-clinical populations (e.g. Csikszentmihalyi, 1997), and on the most common diagnoses of study participants (e.g. social activities for those with social phobia). Finally, they were selected for their relevance to the content of the UP-Y itself. As part of the behavioral activation module of the UP-Y protocol, participants are introduced to a list of different categories of pleasurable activities, including Success Activities (working on a skill to build mastery, e.g. schoolwork, practicing a musical instrument etc.), Social Activities (activities engaged in with another person), and

Physical Activities (organized or unstructured). Participants are then asked to generate examples of activities in these categories that they are willing to try during treatment, and their engagement in these activities is planned and monitored by their therapist.

In order to derive an estimate of the total amount of time participants spent in engaged versus unengaged activities, a composite variable was created adding time spent in social activities with others (e.g. talking on the phone for pleasure, talking for pleasure, attending a party, going on a date), physical activities (e.g. soccer, exercise at home) and time spent on homework/tutoring. Behavioral engagement was calculated in this way for each Daily Phone Diary participants completed, and then averaged across diaries for each time point (Baseline, post-Waitlist, 8-week and post-treatment).

Participant fear hierarchies, completed with the clinician conducting their Baseline ADIS diagnostic interview, were also reviewed in order to explore inclusion of individually-identified feared and avoided situations for each participant in the overall behavioral engagement variable. This review revealed an average of 0.75 of 8.0 hierarchy items per participant that were able to be linked to specific activity codes identified by the daily phone diary. Nine of the 24 participants had at least one hierarchy item that could be linked to a DPD activity code. According to the activities they reported on the DPD at Baseline, those nine people spent an average of 22 minutes engaged in activities on their fear and avoidance hierarchy per day. The most common hierarchy item codeable in terms of the DPD was homework completion. Because of the low number of participants with hierarchy items codeable in terms of the DPD, these items were not included in the overall behavioral engagement variable.

In keeping with prior studies, DPD data were averaged across each three-day assessment period to provide information on behavioral engagement on the “average” day. For all descriptive statistics and correlations, all DPDs, including those completed by participants who subsequently withdrew from the UP-Y, were included in analyses. As detailed in the Aims and Hypotheses section, and in keeping with the pilot design of the current study, many of the analyses are descriptive or correlational in nature. Analyses are described by aim and hypothesis.

Aim 1: To assess the DPDs ability to reliably and validly classify adolescents’ activities as “behaviorally engaged.”

Primary Hypothesis 1: Kappa coefficients and percent agreement between two independent raters’ classifications of activities comprising behavioral engagement from DPD interviews will exceed 0.70 and 80%, respectively, indicating strong interrater reliability.

Exploratory Hypothesis 2: Pearson correlations between adolescents’ behavioral engagement prior to beginning treatment in the UP-Y or randomization to the Waitlist condition will be stable prior to and after completion of the Waitlist, with correlations exceeding 0.70.

Primary Hypothesis 3: In order to evaluate whether the classification of activities as “behaviorally engaged” is valid, Pearson correlations were computed to determine whether behavioral engagement on the DPD was related to self- and parent-reported total score and depression subscale score on the Revised Child Anxiety and Depression Scales, given prior to the adolescent’s enrollment in the UP-Y.

Primary Hypothesis 4: In order to evaluate convergent validity for mood ratings on the DPD, Pearson correlations will be calculated between the following: 1) mood ratings on the DPD at Baseline, averaged across the three days the diary was complete that week, and 2) weekly, self-reported mood ratings, completed after the weekly therapy session immediately following their completion of Baseline diaries.

Aim 2: To evaluate the feasibility and acceptability of the DPD for assessing daily activities and mood in adolescents with anxiety and depressive disorders.

Primary Hypothesis 5: In order to explore whether participation in the current study was sufficiently high to support the DPDs feasibility and acceptability within this population, the percentage of DPD calls participants completed was calculated and compared to benchmark call completion rates from prior studies employing telephone interview procedures to assess daily activities in clinical populations (80%; see Hypotheses section).

Primary Hypothesis 6: To further assess feasibility, mean participant ratings of the DPD's accuracy and intrusiveness were computed based on their responses on the Feedback Form, following completion of the final set of diaries.

Primary Hypothesis 7: Mean interviewer ratings of the DPD's usefulness and accuracy on the Interviewer DPD Feedback Form were calculated.

Chapter 3: Results

Qualitatively, adolescents in this study reported a wide range of activities on the DPD, including schoolwork, after-school activities, leisure activities such as TV watching, conversations with others, and time spent with family and friends. The activities they reported indicated that they were responding honestly, rather than giving socially desirable responses. Rather than presenting a polished image of their lives to interviewers, participants described fights with family members, days spent procrastinating on homework assignments, and crying over social problems. These adolescents often demonstrated self-awareness in reporting on their activities. For example, one participant commented, “You know, it seems like homework is what makes my mood the worst. But I guess obsessing over my homework is my problem” at the end of one of his phone diaries.

Descriptive statistics for behavioral engagement (BE) and mood by time point are presented in [Table 2](#). On average, adolescents reported spending 137.4 minutes behaviorally engaged at Baseline (N=24; SD= 83.2), 85.8 minutes behaviorally engaged following the two-month Waitlist (N=8; SD= 56.2), and 142.1 minutes behaviorally engaged after 8 weeks of treatment (N=17; SD= 117.9). This same general pattern was also followed for the physical activity, social activity and homework categories of BE individually ([Table 2](#)). Descriptive statistics of time spent alone and time spent on TV/video/computer for pleasure were also calculated on an exploratory basis. On average, participants spent an average of 829.3 minutes alone at Baseline (SD= 214.3) and an average of 197.4 minutes on TV/video/computer at the same timepoint (SD= 129.7). Mood ratings on the DPD were generally in the positive range, with mean scores

of 4.3 (SD= 1.9) at Baseline, 4.3 (SD= 0.6) Post-Waitlist, and 4.5 (SD= 2.8) 8-weeks into treatment. Mood ratings on the DPD and on weekly self-reports were evenly distributed, without major outliers.

Reliability and Validity of the DPD

Interrater reliability for BE, calculated based on proportion of total reported activities classified as behaviorally engaged vs. behaviorally unengaged for 10% of the total diaries, was strong, with 98.3% agreement between the two independent raters and a Cohen's kappa of 0.895. Exploratory analyses of the stability of BE over time approached but failed to reach the benchmark value of 0.7 in the smaller Waitlist group (N= 8), with a bivariate Pearson correlation of 0.55 ($p= 0.13$) between Baseline and Post-Waitlist diaries.

In order to assess convergence between BE and reports of anxiety and depression, Pearson correlations between behavioral engagement and both self- and parent-reported RCADS scores were calculated for Baseline data (N=24). Results are displayed in [Table 3](#). These results reveal a marginally significant association between behavioral engagement and parent-reported total RCADS score, as well as between behavioral engagement and parent-reported RCADS Total Anxiety score such that the *more* anxious participants were at Baseline, the *more* behaviorally engaged they were. Neither child nor parent RCADS Depression score was correlated with behavioral engagement for the sample as a whole. However, when the sample was divided by participant age greater than vs. less than 15, child-reported RCADS Depression was marginally correlated with BE in the younger group, such that the more depressed participants were at Baseline, the more behaviorally engaged they were ($r= 0.75$, $p<0.1$). Exploratory analyses of the

correlations between BE and self- and parent-reported RCADS scores at the Post-Waitlist, 8-week and Post-treatment time points did not reveal statistically significant relationships between these variables. Exploratory analyses examining Baseline correlations between RCADS subscales and BE activity subcategories were generally nonsignificant, with the one exception of parent-reported panic symptoms being related to time spent doing homework, such that more panic symptoms were associated with less time spent on homework ($r = -0.47, p < 0.05$).

Exploratory analyses were then conducted in order to further examine the relationships between behavioral engagement at Baseline, by activity subcategory (i.e. physical activity, homework, social activities) and by presence of depressive disorder diagnosis vs. no depressive disorder diagnosis (see [Tables 3a and 3b](#)). Results indicate that for those with anxiety alone ($N=9$), a significant relationship exists between *more* time spent on homework and *more* child-reported anxiety, as well as between *more* time spent on physical activity and *more* parent-reported anxiety. However, for those youth with depressive as well as anxiety diagnoses ($N=15$), more time spent on homework was associated with *less* child-reported depression and parent-reported anxiety, and more time spent on physical activity was associated with *less* child-reported anxiety. Thus, the hypothesized relationship between behavioral engagement and internalizing symptom severity received some support, but only for those participants with depression.

In order to evaluate the convergence between the DPD mood ratings, weighted by activity duration, and the weekly self-reported mood, completed by participants retrospectively on a 0-8 scale, correlations were calculated by time point (see [Table 2](#)). Participants' average mood ratings by time point on the DPD ranged from 4.3 to 4.5 on a

1 to 5 scale, while their average retrospective recalled mood over the course of the week ranged from 4 to 6.33 on a 0-8 scale. Thus, they reported generally more positive moods over the shorter recall interval of the DPD than they did on a weekly recall. Overall, the correlation between the two types of mood ratings at Baseline was 0.33 (N=24), which, while not statistically significant ($p = .32$), was promising. This relationship between DPD mood ratings and weekly self-reported mood did not appear to differ by participant age.

Feasibility and Acceptability of the DPD

Of all of the DPD calls that were available to be made, 86% were completed successfully, suggesting that completing the diaries was acceptable to this population and that data collection using the DPD in the context of CBT is feasible. DPD calls were typically completed in 10 to 20 minutes each, with almost no calls exceeding 25 minutes, and thus did not represent an undue time burden for the participants or investigators. In cases in which the participant was not available for the call, DPD's were almost always completed by the third attempt, which was set as the limit for number of calls to a given participant. In a small minority of cases, participants' study clinicians were contacted in order to assist in scheduling diary calls that had not been completed.

Participants completing the DPD were asked a series of questions following completion of their last diary, assessing the degree to which they found the DPD's to accurately reflect their activities and mood, and the burden associated with completing the interviews (see [Table 4](#)). The ten participants who completed post-treatment assessments completed these questions via telephone at the end of their last diary call.

Participants generally reported that their responses on the DPD were accurate reflections of their activities (mean rating = 6.5 on a 0-8 scale), companions (mean = 6.8) and mood (mean = 5.7). They did not report that the DPD was too intrusive (mean = 1.0) or took too much time (mean = 1.8), and they perceived completing the DPD to be moderately important (mean = 5.2).

Interviewers who used the DPD were asked to evaluate the degree to which they found the DPD calls to be feasible and accurate. The two trained interviewers generally reported that the information would be helpful (mean rating = 6.5 on a 0-8 scale), comprehensive (mean rating = 5.5 on a 0-8 scale) and worth the time spent making calls (mean rating = 7.5). They did not report that the calls took too much time (mean rating for too much time = 0.5 on a 0-8 scale), and generally reported that the information fell between “somewhat” and “very accurate” with regard to the activities participants’ endorsed (mean = 5.5 on a 0-8 scale), their companions (mean = 5.5) and participants’ moods (mean = 5). Qualitatively, one rater gave lower ratings to the mood scores, noting that she believed participants’ found it challenging to recall their moods during all daily activities, and she thought that accuracy of reporting was also reflective of the adolescent’s effort.

Chapter 4: Discussion

The current study represents a unique attempt to develop, validate and utilize a measure of daily, contextual therapeutic change in the treatment of anxiety and depressive disorders using an unobtrusive EMA measure. Qualitatively, similar to Axelson et al.'s 2003 study, adolescents reported engaging in a wide range of activities and gave responses suggesting that they were reporting on these activities honestly. They discussed engaging in a variety of common adolescent activities, and also reported frankly about times when they were experiencing distress, having conflict with others, and engaging in avoidant behaviors (e.g. by describing engaging in activities “to procrastinate.”)

The first hypothesis of the current study received strong support, with interviewers achieving high interrater agreement for classification of activities as behaviorally engaged vs. unengaged. This supports the reliability of the DPD as a measure of behavioral engagement. The second hypothesis, that behavioral engagement on the DPD would be stable over time in the absence of intervention, received moderate support. On the one hand, the benchmark correlation of 0.7 was not met in the small sample with post-Waitlist data available. However, a moderate correlation that may approach significance in a larger sample was found between BE at Baseline and BE post-Waitlist, suggesting the possibility of stability in behavioral engagement in the absence of an intervention. However, it also appears qualitatively that behavioral engagement decreased quite a bit between the Baseline and post-Waitlist assessment points for participants in the Waitlist condition, with mean minutes spent behaviorally engaged decreasing from 137.4 to 85.8. This suggests that participants on the Waitlist may also be

becoming less engaged, perhaps representing an area of deterioration relevant to their clinical symptoms. If this is the case, it would provide support for the usefulness of the UP-Y in not only promoting clinical improvements but forestalling worsening of symptoms that may occur without such intervention.

The third hypothesis, that the DPD will be a valid measure of behavioral engagement, was not fully supported by the current data on the relationship between the DPD and self and parent-reported RCADS Total Score and RCADS Depression Score. However, some highly informative results were obtained in this area, with important differences by both participant diagnosis and BE activity sub-category. For those participants with anxiety but no depression, more engagement in some sub-categories of BE was associated with more internalizing symptoms at Baseline. This may be because, for those with a more anxious presentation, youth were avoiding the specific situations associated with their fear, but were *not* anhedonic and withdrawn in terms of other activities (Alloy, Kelly, Mineka & Clements, 1990). In fact, they may have been engaging in some activities (e.g. homework) to a greater degree because of anxiety. For those youth in the sample with depression, however, they may be withdrawing from activities more globally (Alloy, Kelly, Mineka & Clements, 1990), as evidenced by associations between greater levels of internalizing symptoms and less time spent on physical activity and homework. Of interest, time spent on social activities was not associated with internalizing symptoms in either diagnostic group, in either direction. This may be because interactions with other people can serve a variety of functions for individuals with internalizing disorders, from seeking reassurance from one or two highly trusted close friends to larger-group interactions that could provoke anxiety.

With regard to fourth hypothesis that the DPD would prove a reliable measure of mood, results were promising. Correlations between mood on the DPD and weekly self-reported mood did not achieve statistical significance in this small sample at Baseline, but the two variables were moderately correlated in the expected direction. Interestingly, mean self-reported mood on the DPD was consistently higher than weekly self-reported mood. This may be due to cognitive and memory biases associated with depression skewing weekly self-reports to a greater extent than reports gathered using EMA. More global mood-congruent negative recall biases have been well documented in the literature (Bower, 1981; Watkins, Vache, Vernay & Muller, 1996), and may argue for lower validity for reporting mood after a lengthy interval (e.g., on a weekly basis). If this is the case, it would support the use of the DPD to measure mood in adolescent internalizing populations, as the DPD minimizes these recall biases by asking about mood closer to the time period of interest. It may also be the case that being asked about mood by an interviewer interested in learning more about one's daily life led to higher self-reported mood than recording one's mood on paper in the context of a therapy appointment in which one is seeking help for an identified problem, a discrepancy that could in part be attributed to the Hawthorne Effect, in which an investigator asking about an individual's wellbeing leads to improvements in self-reported wellbeing (McCarney, Warner, Iliffe, van Haselen, Griffin & Fisher, 2007).

In contrast to some of the mixed findings with respect to validity, much stronger support was found for the feasibility and acceptability hypotheses. Overall, results indicate that this measurement strategy is feasible with an adolescent, clinical population. With respect to completion rates, adolescents completed the diaries at rates comparable to

or greater than those in previous studies employing phone interview techniques with youth with mood disorders and chronic medical conditions (Quittner & Oipari, 1994; Axelson et al., 2003). The calls were generally completed within the brief 15-minute timeframe established in previous DPD studies, and, relevant to hypotheses 5 and 6, neither participants nor interviewers rated the calls as overly burdensome. In addition, both adolescents and interviewers rated the DPD as generally accurate and useful. These feasibility data are particularly noteworthy in the context of an adolescent sample with clinically significant levels of anxiety and depression. In addition, the fact that adolescents completed nearly all of these calls despite social anxiety being one of the most common diagnoses in the sample attests to the benign and unobtrusive nature of the DPD instrument.

Limitations

Despite the strengths of the current study, which include its linkages to an ongoing randomized controlled trial, the availability of diagnostic information derived using a gold-standard measure, and the richness of the data collected during the daily phone diaries, the current study has some important limitations. The clearest of these is that the sample size of 24 is relatively small, decreasing power to detect associations between behavioral engagement, mood and other related constructs. In addition, the sample available at the Post-Waitlist and 8-week assessment points was much smaller, decreasing power to detect stability (in the absence of treatment) in behavioral engagement. This is a limitation may be inherent to research occurring within the context of an ongoing randomized controlled trial which began prior to initiation of data collection on behavioral engagement using the DPD. In other words, since only

participants with DPD data could be included in this study's sample, over half of the current UP-Y sample that entered the study prior to this investigation's onset could not be included.

One of the strengths of the UP-Y treatment protocol is that it is designed to be transdiagnostic, thus targeting the mixed anxiety and depressive symptoms that many adolescents present with in real-world clinical settings. However, this diagnostic heterogeneity leads to some complexity in terms of the questions set forth in the current study. In the current study, support was found for the idea that many anxious youth may avoid very particular situations associated with their specific fears, but generally remain engaged in other activities at a high rate, whereas depressed youth are withdrawing from activities globally. As a result, engagement in some BE sub-categories was positively associated with anxiety, and negatively associated with depression.

Another limitation of the present study was the difficulty associated with operationalizing fear and avoidance hierarchy items in terms of the DPD. These items were omitted from the BE variable for this study due to the difficulty translating many fear hierarchy items in terms of activities ratable on the DPD. There appeared to be several reasons this operationalization was challenging. First, this is a diagnostically diverse sample that includes participants with diagnoses such as GAD, for whom worry and rumination predominate, and the DPD is designed to capture behaviors rather than thoughts. Second, many participants' fear hierarchy items were vague (e.g. "Feeling vulnerable") at Baseline. This is not surprising given that emotion identification and the ability to break emotions into their physical, cognitive and behavioral components is a goal of treatment in the UP-Y, and these youth may not have yet acquired that skill, but it

presents difficulties in relation to operationalizing hierarchy items for the DPD at this timepoint. Finally, because DPD calls were conducted using a standard script, interviewers did not selectively tailor call procedures to assess for completion of hierarchy items. For example, many participants listed taking tests on their fear hierarchies, but may not have reported any tests taken because they reported being “in class” but not the specific activities they were doing in class.

This third point is perhaps the most important, as it highlights an important trade-off. On the one hand, the DPD is a tool that has previously been used for a variety of purposes including assessing treatment adherence for youth with medical illnesses. As such, it was developed with a particular eye towards unobtrusive measurement of readily identifiable behaviors (e.g. doing chest physical therapy for youth with cystic fibrosis). It will be important to assess to what degree, if at all, this unobtrusiveness should be reduced in order to probe for engagement in individuals’ hierarchy items in the current population of youth with internalizing disorders.

Future Directions

Given the unique information provided by the DPD, and the promising results of the current study in the areas of feasibility and reliability, there are many potentially worthwhile future directions for this line of research that could address and build upon the limitations of the current study. First, given the results relating the higher levels of some sub-categories of BE to lower internalizing symptoms only in those youth with depression, the BE construct should be reassessed with regard to whether, as it is currently defined in terms of general categories of behaviors, it would be best applied to

youth with depression only. Particularly for those with anxiety, absent an approach tailored to fear hierarchy as described above, an alternative ideographic approach of assessing baseline levels of engagement in each category of BE, and only classifying increased engagement in that activity category as characteristic of clinical improvement if the baseline level was determined to be low, relative to healthy youth, could be more useful. However, this approach would require assessment of BE in a nonclinical sample. In addition, refinement of the BE construct should take into consideration the current study's findings that engagement in social activities was unrelated to internalizing symptoms for both those with depression and those without. Given the complex role that social interactions can play with regard to anxiety and depressive symptoms, another potential future direction would be to either refine the definition of social engagement to target more specific types of social interactions or to remove the social activities category from the BE construct.

Following this process of construct refinement, the DPD should be administered to a greater number of adolescents receiving CBT, and these participants should all continue to be followed so that they can complete DPDs at their post-treatment assessment. In addition to increasing power, this would allow for assessment of whether more significant changes in behavioral engagement occur after participants have completed the exposure module of the UP-Y, which is likely to lead to the greatest changes in daily activities. Furthermore, it is likely that correlations between BE and self- and parent-reported anxiety and depression may prove to be statistically significant at Post-Waitlist, 8-week and Post-treatment timepoints in a larger sample, despite not having been so in the small sample of participants with data available for these timepoints

currently. Given that this process will necessarily follow that of construct refinement, it represents a goal best addressed in a future treatment study.

One issue of particular relevance in relation to administering the DPD to participants after treatment completion will be assessment of how changes in behavioral engagement relate to changes in clinical symptoms. This represents a significantly different question from that of how, prior to treatment, behavioral engagement relates to level of clinical symptoms. It could be the case, for example, that improvements in general (not hierarchy-specific) behavioral engagement, particularly for youth with depression, are associated with improvements in clinical symptoms, even though they might not be associated with the level of these symptoms at baseline. Along these lines, the potential role of behavioral engagement as a mediator of clinical change should be investigated.

In sum, the current study suggests that the DPD is a feasible, acceptable, and promising tool for the assessment of behavioral engagement in youth with anxiety and depressive disorders. The current study highlights a number of ways in which the measurement of behavioral engagement could be refined in future studies, ranging from interview procedures to construct definition. Future studies should employ these changes in order to best capture the adolescent daily behaviors most relevant to clinical change in the context of internalizing disorders and their treatment.

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Tables and Figures

Figure 1. Participant Data by Time point

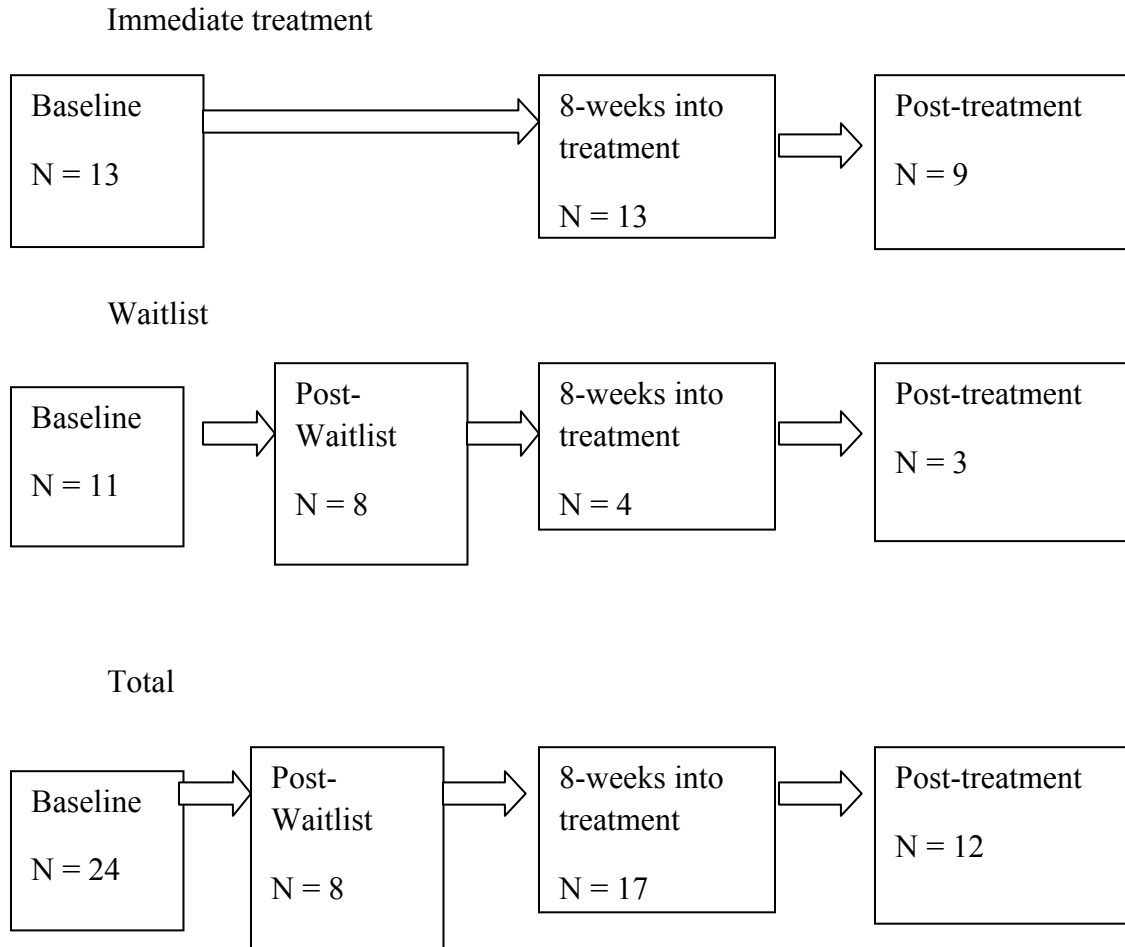


Figure 2. Daily Phone Diary Interface

DAILY PHONE DIARY
DPD
DEPARTMENT OF PSYCHOLOGY
UNIVERSITY OF MIAMI

<p>5 <input type="text"/> 0029-8 <input type="text"/></p> <p style="text-align: center;"><small>group participant id</small></p> <p>miami <input type="text"/> Andre <input type="text"/></p> <p style="text-align: center;"><small>site participant name</small></p> <p><input type="text"/> Andre <input type="text"/></p> <p style="text-align: center;"><small>interviewer</small></p> <p>treatment 3 <input type="text"/></p> <p style="text-align: center;"><small>assessment point</small></p> <p><input type="text"/></p> <p style="text-align: center;"><small>diary number</small></p>	<p><input type="text"/> <input type="text"/> 4:10 PM <input type="text"/></p> <p style="text-align: center;"><small>activity date start time</small></p> <p><input type="text"/> 4:10 PM <input type="text"/></p> <p style="text-align: center;"><small>activity day activity start time</small></p> <p>2 <input type="text"/> 5:50 PM <input type="text"/></p> <p style="text-align: center;"><small>activity number activity end time</small></p> <p><input type="text"/> 100 <input type="text"/></p> <p style="text-align: center;"><small>activity duration</small></p> <p>[start now]</p>															
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Basic Child Care</td></tr> <tr><td>Medical Care</td></tr> <tr><td>Household Tasks</td></tr> <tr><td>Meals</td></tr> <tr><td>Recreation - Home</td></tr> <tr><td>Medical Care</td></tr> <tr><td>Preparing/Giving Enzymes</td></tr> <tr><td>Preparing/Giving Medications</td></tr> <tr><td>Doing Airway Clearance</td></tr> <tr><td>Picking up Prescriptions</td></tr> <tr><td>Preparing/Giving Enzymes</td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> </table>	Basic Child Care	Medical Care	Household Tasks	Meals	Recreation - Home	Medical Care	Preparing/Giving Enzymes	Preparing/Giving Medications	Doing Airway Clearance	Picking up Prescriptions	Preparing/Giving Enzymes				<p>Preparing/Giving Enzymes</p> <p><small>selected activity - or enter other activity</small></p> <p><input checked="" type="checkbox"/> Adult Friends <input type="checkbox"/> Relatives</p> <p><input type="checkbox"/> Alone <input type="checkbox"/> Spouse/Partner</p> <p><input type="checkbox"/> Co-Workers <input type="checkbox"/> Younger Sib 1</p> <p><input checked="" type="checkbox"/> Entire Family <input type="checkbox"/> Younger Sib 2</p> <p><input type="checkbox"/> Older Sib 1 <input type="checkbox"/> Younger Sib 3</p> <p><input type="checkbox"/> Older Sib 2</p> <p><input checked="" type="checkbox"/> Older Sib 3</p> <p><input checked="" type="checkbox"/> Other Kids</p> <p><input type="text"/> 4 <input type="text"/></p> <p style="text-align: center;"><small>companion count</small></p>	<p><input type="text"/> <input type="text"/></p> <p style="text-align: center;"><small>mood purpose</small></p>
Basic Child Care																
Medical Care																
Household Tasks																
Meals																
Recreation - Home																
Medical Care																
Preparing/Giving Enzymes																
Preparing/Giving Medications																
Doing Airway Clearance																
Picking up Prescriptions																
Preparing/Giving Enzymes																
Administrator																

Table 1. Demographic Characteristics (N=24)

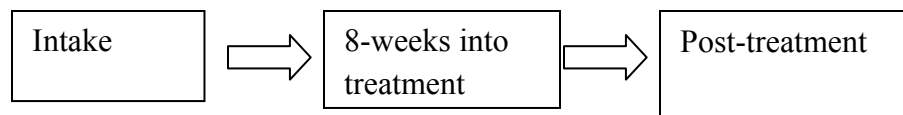
	Mean	SD	%
Age (years)	15.7	1.9	
Gender			
Male			42
Female			58
Ethnicity			
Hispanic			50
Caucasian			25
Black			9
Other			16
Income	108,321	44,800	
Parents currently married			
Yes			58
No			42
Principal diagnoses*			
GAD			38
Social phobia			29
Major depression			13
OCD			8
PTSD			8
Anxiety disorder NOS			4

Panic disorder	4
Dysthymia	4

* Totals exceed 100% due to some participants carrying a co-principal diagnosis.

Figure 3. Assessment Schedule for Participants in Immediate Treatment and Waitlist Conditions

Immediate treatment



Waitlist

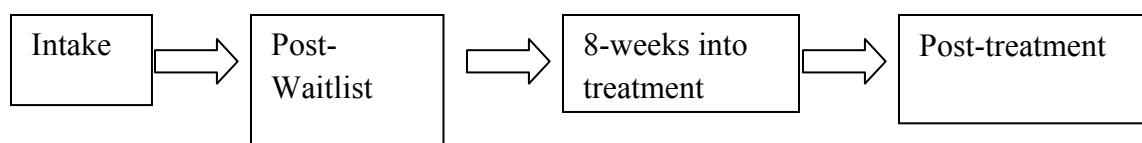


Table 2. Descriptive statistics for Behavioral Engagement (BE), Revised Child Anxiety and Depression Scales (RCADS), and Mood by Time-point

	Baseline Mean (SD)	Post-WL Mean (SD)	8-week Mean (SD)
	N= 24	N= 8	N= 17
BE (mins)	137.4 (83.2)	85.8 (56.2)	142.1 (117.9)
Physical	22.0 (54.9)	16.3 (20.2)	29.8 (62.5)
Homework	50.8 (46.7)	27.5 (44.7)	66.8 (77.5)
Social	64.6 (97.2)	42.0 (73.6)	44.1 (64.5)
RCADS-A	47.2 (23.3)	19.3 (7.6)	44.9 (19.9)
RCADS-A (Anx)	36.6 (19.4)	15.0 (5.6)	31.5 (15.4)
RCADS-A (Dep)	10.5 (5.5)	4.3 (2.5)	10.7 (7.5)
RCADS-P	47.2 (19.3)	31.7 (9.1)	46.7 (20.6)
RCADS-P (Anx)	36.9 (16.9)	25.3 (9.2)	35.4 (17.1)
RCADS-P (Dep)	10.3 (5.1)	6.3 (1.5)	11.4 (4.3)
Average Mood (DPD*; 1-5)	4.3 (1.9)	4.3 (0.6)	4.5 (2.8)
Average Mood (SR**; 0-8)	4.0 (1.5)	6.3 (1.5)	4.3 (1.5)

* Daily Phone Diary

** Self Report

Table 3. Correlations Between Behavioral Engagement (BE) and Revised Child Anxiety and Depression Scales (RCADS) Scores at Baseline (N=24)

	BE	RCADS-A	RCADS-A (Anx)	RCADS-A (Dep)	RCADS-P	RCADS-A (Anx)	RCADS-A (Dep)
BE	1.0	0.33	0.32	0.27	0.34*	0.36*	0.09
RCADS-A†		1.0	0.98**	0.77**	0.36*	0.40*	0.07
RCADS-A (Anx)			1.0	0.64**	0.31	0.36*	-0.01
RCADS-A (Dep)				1.0	0.44**	0.39*	0.36*
RCADS-P ‡					1.0	0.97**	0.58**
RCADS-P (Anx)						1.0	0.67*
RCADS-P (Dep)							1.0

* p< 0.1

** p< 0.05

† Revised Child Anxiety and Depression Scales, Adolescent Report

‡ Revised Child Anxiety and Depression Scales, Parent Report

Table 3a. Correlations Between Behavioral Engagement (BE) and Revised Child Anxiety and Depression Scales (RCADS) Scores at Baseline for Participants with Anxiety Only (N=9)

	RCADS-A	RCADS-A	RCADS-A	RCADS-P	RCADS-P	RCADS-P
			(Anx)	(Dep)	(Anx)	(Dep)
BE	0.61	0.60	0.42	0.60	0.61	-0.15
BE (Physical)	0.20	0.19	0.16	0.68*	0.66*	-0.07
BE (Homework)	0.86**	0.92**	0.42	0.08	0.02	0.16
BE (Social)	-0.27	-0.36	0.08	0.34	0.19	0.35

* $p < 0.1$

** $p < 0.05$

† Revised Child Anxiety and Depression Scales, Adolescent Report

‡ Revised Child Anxiety and Depression Scales, Parent Report

Table 3b. Correlations Between Behavioral Engagement (BE) and Revised Child Anxiety and Depression Scales (RCADS) Scores at Baseline for Participants with Anxiety and Depression (N=15)

	RCADS-A	RCADS-A	RCADS-A	RCADS-P	RCADS-P	RCADS-P
			(Anx)	(Dep)	(Anx)	(Dep)
BE	-0.04	-0.01	-0.17	-0.03	-0.09	0.20
BE (Physical)	-0.64**	-0.61**	-0.39	-0.32	-0.40	0.12
BE (Homework)	-0.23	-0.12	-0.54*	-0.51*	-0.50*	-0.30
BE (Social)	0.44	0.38	0.46	0.44	0.46	0.18

* $p < 0.1$

** $p < 0.05$

† Revised Child Anxiety and Depression Scales, Adolescent Report

‡ Revised Child Anxiety and Depression Scales, Parent Report

Table 4. Participant ratings of the Feasibility and Acceptability of the DPD (N=10)

Question	Mean	SD	Range
(0-8 scale)			
1. Do you think that the phone diaries accurately captured what activities you were doing on the days we interviewed you?	6.5	1.1	5-8
2. Did you find the interviews to be intrusive?	1.0	1.1	0-3
3. Do you think that the phone diaries accurately captured who you were with during the activities you described?	6.8	1.0	5-8
4. Did you feel that the interviews took too much time?	1.8	1.1	0-4
5. Do you think that the phone diaries accurately captured what your mood was like during the days that we interviewed you?	5.7	1.2	4-8
6. Did you feel that doing the phone diaries was too much of a burden?	1.5	1.0	0-3
7. Did you feel that it was important to complete the phone diaries?	5.2	1.4	3-7

Appendix A: DPD Activity Codes for Adolescent Anxiety and Depression

01	00	00	Self Care
01	01	00	Basic Self Care
01	01	01	Getting Ready for Bed
01	01	02	Bathing/Showering
01	01	03	Getting Ready for Day/Activity (dressing, etc.)
01	01	04	Getting a Haircut
01	01	05	Going to Beautician (getting nails done, etc.)
01	01	06	Getting a Massage
01	01	07	Napping/Resting
01	01	08	Other
01	02	00	Facilitating Own Activities
01	02	01	Talking to Teacher, Babysitter, Coach
01	02	02	Arranging Transportation
01	02	03	Planning own Activities
01	02	04	Using the Internet not for Recreation
01	02	05	Arranging Finances/Doing Bills
01	02	06	Other
01	03	00	Self-Focused Activities (Non-Play)
01	03	01	Talking with Parent
01	03	02	Taking a Lesson (e.g., driving or music lesson)
01	03	03	Practicing for a Lesson
01	03	04	Church/Sunday School
01	03	05	Praying/Reading the Bible/Other Religious Rituals
01	03	06	Youth Group

01	03	07	Meditation/Yoga
01	03	08	Thinking about own Interests or Problems
01	03	09	Talking about own Interests or Problems (not in therapy)
01	03	10	Other
02	00	00	Medical Care
02	01	00	Clinic/Doctor Visit
02	02	00	Other
03	00	00	Household Tasks
03	01	00	Chores
03	01	01	Cleaning
03	01	02	Laundry
03	01	03	Yard Work
03	01	04	Dishes
03	01	05	Repairs
03	01	06	Pet Care
03	01	07	Washing Car
03	01	08	Putting Groceries Away
03	01	09	Shopping (e.g. for school supplies)
03	01	10	Babysitting
03	01	11	Other
03	02	00	Errands
03	02	01	Banking
03	02	02	Grocery Shopping
03	02	03	Transporting Siblings/Family
03	02	04	Errands for Parents/Family (not driving)

03	02	05	Buying Gifts
03	02	06	Other
03	03	00	Preparing Meals
03	03	01	Cooking
03	03	02	Ordering Food
03	03	03	Picking Up Food at Restaurant/Drive-Thru
03	04	00	Eating Meals
03	04	01	With TV or Videos
03	04	02	Snack
03	04	03	Eating at Drive-Thru or in Car
03	05	00	Driving for Errands or TO/FROM Instrumental Activities (teen driving)
03	05	01	Driving for Errands or TO/FROM Instrumental Activities (teen a passenger)
03	06	00	Talking and Discussing Household Plans
03	07	00	Facilitating Activities of Others
03	08	00	Other
04	00	00	Recreation - Indoors
04	01	00	TV or Videos
04	02	00	Reading for Pleasure
04	02	01	Books
04	02	02	Newspaper
04	02	03	Magazines
04	02	04	Comics
04	02	05	Other

04	03	00	Writing for Pleasure
04	03	01	Creative Writing (stories, poems, etc.)
04	03	02	Writing in a Journal/Diary
04	03	03	Writing a Letter for Pleasure
04	04	00	Arts & Crafts (painting/drawing/sewing, photography, etc.)
04	05	00	Baking for Pleasure
04	06	00	Listening to Music
04	07	00	Playing/Creating Music
04	08	00	Chatting Online for Pleasure
04	09	00	Texting for Pleasure
04	10	00	Talking on Phone for Pleasure
04	11	00	Talking & Discussing for Pleasure
04	12	00	Computer/Internet/Video Games
04	13	00	Card/Board Games/Other Indoor Games (ping pong, pool, darts, etc.)
04	14	00	Having People Over
04	14	01	Indoor Party
04	14	02	Friend(s) for Dinner
04	14	03	Sleep Over
04	14	04	Other
04	15	00	Gardening
04	16	00	Exercising at Home
04	17	00	Playing Sports at Home
04	18	00	Dancing
04	19	00	Playing with Pet

04	20	00	Eating for Pleasure Inside
04	21	00	Making Out/Sexual Activities
04	22	00	Other
05	00	00	Recreation - Outside
05	01	00	Shopping
05	02	00	Party/Picnic
05	03	00	Attending a Wedding, Baptism, or Confirmation
05	04	00	Attending a Funeral or Visiting a Graveyard
05	05	00	Eating at a Restaurant
05	06	00	Going to the Movies
05	07	00	Going to a Concert/Play
05	08	00	Going to a Museum, Exhibit, or Library
05	09	00	Going to a Park
05	10	00	Going to the Beach
05	11	00	Going to a Carnival, Circus, Fair, Zoo, or Amusement Park
05	12	00	Attending a Sporting Event
05	12	01	Basketball
05	12	02	Football
05	12	03	Baseball
05	12	04	Other
05	13	00	Playing a Sport
05	13	01	Individual
05	13	02	Team
05	14	00	Hiking, Hunting, Fishing, Camping, or Other Outdoor

Games/Activities

05	15	00	Boating, Swimming, Other Water Sports
05	16	00	Exercise
05	16	01	Going to the Gym
05	16	02	Lifting Weights
05	16	03	Jogging
05	16	04	Aerobics
05	16	05	Walking
05	16	06	Skateboarding
05	16	07	Biking
05	16	08	Skating/Rollerblading
05	16	09	Attending a Group Exercise Class
05	16	09	Other
05	17	00	Competitive Racing
05	18	00	Walking or Playing with Pet
05	19	00	Hobby or Club Meetings
05	20	00	Volunteer Work in the Community
05	21	00	Making Out/Sexual Activities Outside Home
05	22	00	Driving FOR Recreation (teen driving)
05	22	01	Driving FOR Recreation (teen a passenger)
05	23	00	Driving TO/FROM Recreational Activities (teen driving)
05	23	01	Driving TO/FROM Recreational Activities (teen a passenger)
05	24	00	Traveling TO/FROM Recreational Activities (on bus,

			plane, etc.)
05	25	00	Having Tea/Coffee with Friends
05	26	00	Eating for Pleasure Outside
05	27	00	Going on a Date
05	28	00	Tanning/Appreciating Nature/Relaxing Outside
05	29	00	Going to Lectures/Hearing Speakers for Recreation
05	30	00	Attending a Convention or Revival
05	31	00	Protesting Social, Political, or Environmental Conditions
05	32	00	Being Honored/Attending a Banquet
05	33	00	Other
06	00	00	School
06	01	00	Getting TO/FROM School
06	01	01	Getting TO/FROM School in a Car
06	01	02	Getting TO/FROM School on a Schoolbus
06	01	03	Getting TO/FROM School by Train
06	01	04	Waiting to be Dropped Off/Picked Up TO/FROM School
06	02	00	Attending School
06	02	01	Listening in Class
06	02	02	Doing In-Class Assignments (not homework) Individually
06	02	03	Working in a Group
06	02	04	Gym class
06	02	05	Band/Art Class
06	02	06	Spending Time with Friends
06	02	07	Eating Meal at School
06	02	08	Taking at Test/Quiz

06	02	09	Talking to the Counselor/School Nurse
06	02	10	Giving a Presentation
06	02	11	Going to a Vocational School
06	02	12	Other Activities at School
06	03	00	Doing Homework (at school or home)
06	03	01	Studying
06	04	00	After School Activities
06	04	01	Clubs
06	04	02	Practicing Sports
06	04	03	Competing in Sports
06	04	04	Practicing performing arts
06	04	05	Putting on a Performance
06	04	06	Tutoring
06	04	07	School Function (Dance, etc.)
06	04	08	Internship/Research
06	04	09	Other After School activities
07	00	00	Work
07	01	00	Getting TO/FROM Work
07	02	00	Taking a Break at Work
07	03	00	Eating Meal at Work
08	00	00	Other Interactions/Activities
08	01	00	Being Lectured/Yelled At by Parents or Adults
08	02	00	Being in an Argument/Fight
08	03	00	Resolving an Argument/Fight
08	04	00	Crying/Feeling Sad or Upset

08	05	00	Smoking
08	06	00	Using Alcohol/Drugs
08	07	00	Shoplifting
08	08	00	Gambling
08	09	00	Meeting New People
08	10	00	Military Activities (JROTC, etc.)
08	11	00	Other
09	00	00	Research/Treatment Related Activities
09	01	00	Doing the DPD
09	02	00	Completing Forms
09	02	01	Doing Mood Ratings
09	02	02	Doing Cognitive Reframing Exercises
09	02	03	Doing Other Forms
09	03	00	Doing Exposure Homework
09	03	01	Exposure- At Home
09	03	02	Exposure- At School
09	03	03	Exposure- Elsewhere
09	04	00	Individual Therapy Session
09	05	00	Group Therapy Session
09	06	00	Psychiatrist Visit
09	07	00	Other
10	00	00	Sleep
10	01	00	Trying to Sleep
10	02	00	Hitting the Snooze Button/Going Back to Sleep

10	03	00	Lying in Bed
11	00	00	Other

Appendix B: Revised Child Anxiety and Depression Scales (RCADS; Chorpita, Yim, Moffitt, Umemoto & Francis, 2000)

Date: _____ Name/ID: _____

RCADS

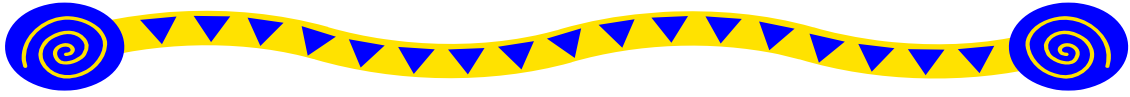
<p>Please put a circle around the word that shows how often each of these things happen to you.</p> <p>There are no right or wrong answers.</p>	
1. I worry about things	Never Sometimes Often Always
2. I feel sad or empty	Never Sometimes Often Always
3. When I have a problem, I get a funny feeling in my stomach	Never Sometimes Often Always
4. I worry when I think I have done poorly at something	Never Sometimes Often Always
5. I would feel afraid of being on my own at home	Never Sometimes Often Always
6. Nothing is much fun anymore	Never Sometimes Often Always
7. I feel scared when I have to take a test	Never Sometimes Often Always
8. I feel worried when I think someone is angry with me	Never Sometimes Often Always
9. I worry about being away from my parents	Never Sometimes Often Always
10. I get bothered by bad or silly thoughts or pictures in my mind	Never Sometimes Often Always
11. I have trouble sleeping	Never Sometimes Often Always
12. I worry that I will do badly at my school work .	Never Sometimes Often Always
13. I worry that something awful will happen to someone in my family	Never Sometimes Often Always
14. I suddenly feel as if I can't breathe when there is no reason for this	Never Sometimes Often Always

15. I have problems with my appetite	Never Sometimes Often Always
16. I have to keep checking that I have done things right (like the switch is off, or the door is locked) .	Never Sometimes Often Always
17. I feel scared if I have to sleep on my own.	Never Sometimes Often Always
18. I have trouble going to school in the mornings because I feel nervous or afraid	Never Sometimes Often Always
19. I have no energy for things	Never Sometimes Often Always
20. I worry I might look foolish	Never Sometimes Often Always
21. I am tired a lot	Never Sometimes Often Always
22. I worry that bad things will happen to me	Never Sometimes Often Always
23. I can't seem to get bad or silly thoughts out of my head.	Never Sometimes Often Always
24. When I have a problem, my heart beats really fast	Never Sometimes Often Always
25. I cannot think clearly	Never Sometimes Often Always
26. I suddenly start to tremble or shake when there is no reason for this	Never Sometimes Often Always
27. I worry that something bad will happen to me .	Never Sometimes Often Always
28. When I have a problem, I feel shaky	Never Sometimes Often Always
29. I feel worthless	Never Sometimes Often Always
30. I worry about making mistakes	Never Sometimes Often Always
31. I have to think of special thoughts (like numbers or words) to stop bad things from happening. . .	Never Sometimes Often Always
32. I worry what other people think of me	Never Sometimes Often Always
33. I am afraid of being in crowded places (like	Never Sometimes Often Always

shopping centers, the movies, buses, busy playgrounds)	
34. All of a sudden I feel really scared for no reason at all	Never Sometimes Often Always
35. I worry about what is going to happen	Never Sometimes Often Always
36. I suddenly become dizzy or faint when there is no reason for this	Never Sometimes Often Always
37. I think about death	Never Sometimes Often Always
38. I feel afraid if I have to talk in front of my class	Never Sometimes Often Always
39. My heart suddenly starts to beat too quickly for no reason	Never Sometimes Often Always
40. I feel like I don't want to move	Never Sometimes Often Always
41. I worry that I will suddenly get a scared feeling when there is nothing to be afraid of	Never Sometimes Often Always
42. I have to do some things over and over again (like washing my hands, cleaning or putting things in a certain order)	Never Sometimes Often Always
43. I feel afraid that I will make a fool of myself in front of people	Never Sometimes Often Always
44. I have to do some things in just the right way to stop bad things from happening	Never Sometimes Often Always
45. I worry when I go to bed at night	Never Sometimes Often Always
46. I would feel scared if I had to stay away from home overnight	Never Sometimes Often Always
47. I feel restless	Never Sometimes Often Always

Daily Phone Diary



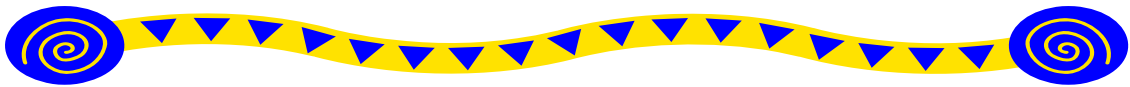


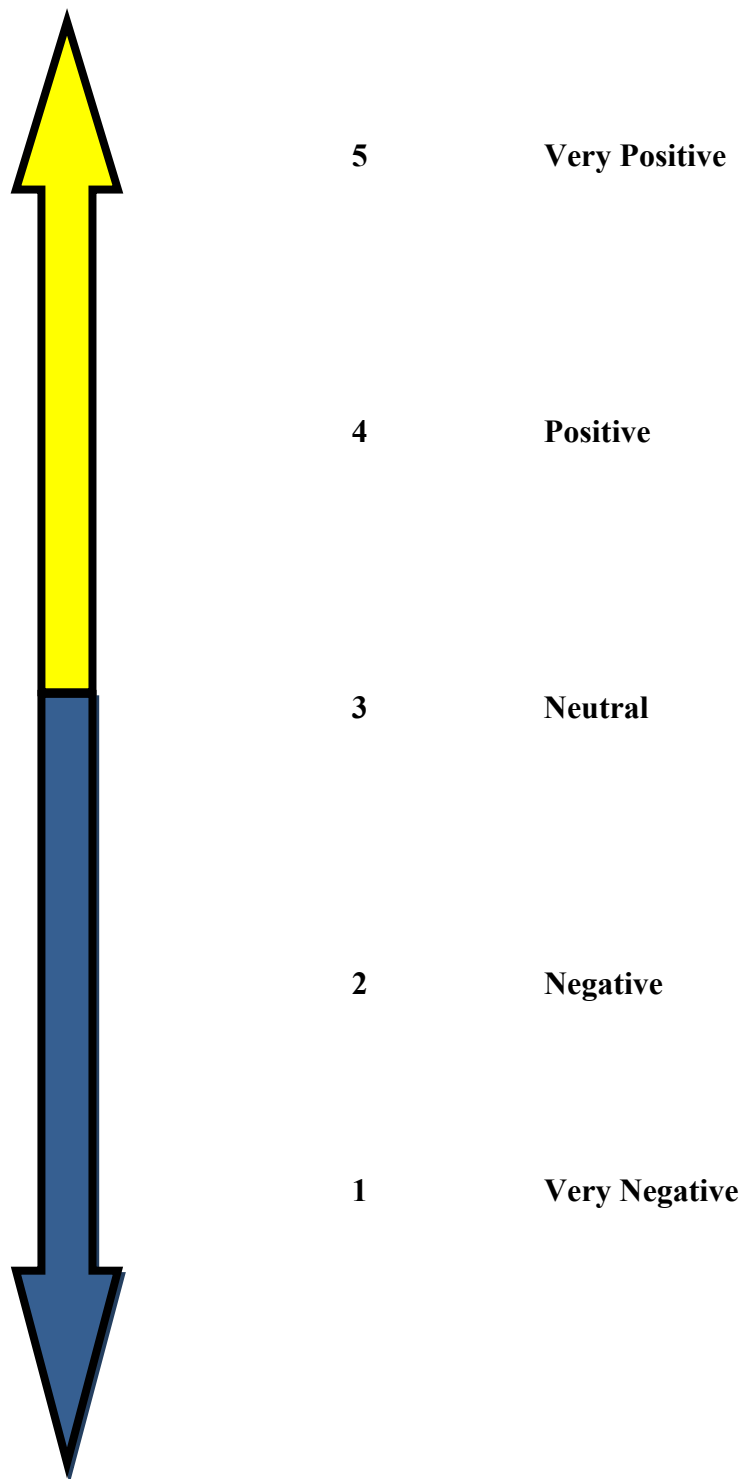
Thank you for participating in the Daily Phone Diary study! We appreciate your willingness to help us understand more about the daily lives of teens with anxiety.

Now that you are in the study, during one week that you are in the CAMAT program, you will be getting a phone call each day from a member of the Daily Phone Diary study team. Your therapist will tell you which week this is going to be, and someone from the study team will call you to find out what time of day would be good for you to receive the phone calls (e.g. right after dinner).

During the phone calls, you will be asked what activities you did during the day, who you were with, and what your mood was like. The calls should each take about 15 minutes, and it is helpful if you can be in a quiet, private place when the call is going on. You will receive a \$20 gift card if you complete at least 5 of the 7 calls, and an extra \$10 gift card if you complete all 7.

During the call, you will be asked several times to rate how positive or negative your mood was at different times of day. We would like you to rate your mood on a scale from 1 (very negative) to 5 (very positive). A picture of this scale is on the next page, for you to use during the calls.





Appendix D: Daily Phone Diary Scripts for Adolescent Anxiety and Depression

1st Night Script

INTRODUCTION - CALL 1

"Hello, can I please speak with _____? This is _____ calling from the Daily Activities and Mood Study. As you know, we scheduled today for our first phone call. Is this still an okay time for you?"

NO: Find out what the problem is and determine whether or not you should continue with the phone call, call back later in the evening, or reschedule for a new day.

YES: "Good." => Continue

"You were given a blue folder after your last therapy session. This folder will help with the call. Do you have it with you?"

NO: "Can you find the folder in a minute or so?" (If it is lost, let the person know that it is not a problem- you will just read the choices over the phone.)

YES: "Good." => Go to Script

SCRIPT - CALL 1

"Today I will be asking you about the types of activities you've done over the past 24 hours and about activities related to your treatment at the University of Miami. So during this phone call I'm going to ask you to think about the period of time from _____ p.m. yesterday to _____ p.m. today."

"Now, to help you remember that whole time better, I'd like you to think back to _____ p.m. yesterday and tell me what you were doing." _____

"How about today right before I called?" _____

"Those activities will mark the period of time I will be asking you about."

"I will track you through all the activities you did during this time period. I'm interested in each activity that lasted about 5 minutes or more. Things like doing homework, talking on the phone, going to the store, or doing therapy homework assignments."

"For each activity, I will ask you to tell me how long it took, who else was with you, and how positive or negative your mood was then."

"Doing an activity with someone means that you and the other person were in the same area doing the same activity for at least half the time."

"In your folder, you will find a scale. I'd like you to use that scale to rate how positive or negative your mood was during that time."

"Do you have any questions? Okay, let's get started."

2nd and 3rd Night Script

INTRODUCTION – CALLS 2-3

"Hello, can I please speak with _____? This is _____ calling from the Daily Activities and Mood Study. As you know, one of your phone calls was scheduled for this evening. Is this still an okay time for you?"

NO: Find out what the problem is and determine whether or not you should continue with the phone call, call back later in the evening, or reschedule for a new day.

YES: "Good." => Continue

"Do you have the blue folder handy?"

NO: "Can you find the folder in a minute or so?" (If it is lost, let the person know that it is not a problem- you will just read the choices over the phone).

YES: "Good." => Go to Script _____

SCRIPT - CALLS 2-3

"We'll be doing the same thing tonight that we've done before. I will be asking you about the types of activities you did over the past 24 hours. So during this phone call I'm going to ask you to think about the period of time from _____ p.m. yesterday, when we finished our phone call, to _____ p.m. today."

"Now, to help you remember that whole time better, I'd like you to think back to _____ p.m. yesterday and tell me what you were doing right after we hung up." _____

"How about today right before I called?" _____

"Those activities will mark out the period of time I will be asking you about."

"Just to remind you, I'm interested in each activity that you did during this time period that lasted 5 minutes or more. For each activity, I'll ask you to tell me how long it took, who you did it with and how positive or negative your mood was during that time."

"Do you have any questions? Okay, if you can open your folder to the scale, we can get started."

"Please be sure to tell me about any therapy homework that was done over the past 24 hours, including filling out questionnaires or doing exposure exercises."

"Do you have any questions? Okay, let's get started."

Ending Call: Nights 1-2

"Okay. Those are all the questions that I have for tonight. Thank you so much for talking with me. Our next call is scheduled for tomorrow at _____. Is that still okay? Do you have any questions? Thank you again, very much! We really appreciate your help."

Ending Call: Night 3

"Okay. Those are all the questions for tonight and this is our last phone call.

Thank you so much for talking with me each evening. We really appreciate your participation in this study. Thank you again!"

Appendix E: Weekly Mood Rating Form

After the following therapy sessions, please ask your client to rate their overall mood for the past week, on a scale from 0 to 8. (0 = Very Negative; 4= Neutral; 8= Very Positive). For example, under “Week 9,” please ask the client to rate his/her mood during the week **prior** to the ninth session.

- Pre-Waitlist meeting
- Session 1
- Session 9
- Final session

Week	Mood Rating									
	Negative			Neutral				Positive		
Pre-Waitlist meeting	0	1	2	3	4	5	6	7	8	
Session 1	0	1	2	3	4	5	6	7	8	
Session 9	0	1	2	3	4	5	6	7	8	
Final session	0	1	2	3	4	5	6	7	8	

Appendix F: Participant DPD Feedback Form

1. Do you think that the phone diaries accurately captured what activities you were doing on the days we interviewed you?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

2. Did you find the interviews to be intrusive?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

3. Do you think that the phone diaries accurately captured who you were with during the activities you described?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

4. Did you feel that the interviews took too much time?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

5. Do you think that the phone diaries accurately captured what your mood was like during the days that we interviewed you?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

6. Did you feel that doing the phone diaries was too much of a burden?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

7. Did you feel that it was important to complete the phone diaries?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

Appendix G: Interviewer DPD Feedback Form

1. Do you think that the information collected during the daily phone diaries will be helpful?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

2. Do you think that the phone interviews took too much time?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

3. How accurate do you think the information was that we got from the daily phone diaries about daily activities?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

4. To what extent did you think that the information collected in the daily phone diaries justified the time spent doing the interviews?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

5. How accurate do you think the information was that we got from the daily phone diaries about whom adolescents were with during the activities they reported?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

6. How complete do you think the information was that was collected using the daily phone diary?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8

7. How accurate do you think the information was that we got from the daily phone diaries about daily mood?

Not at all			Somewhat			Very much		
0	1	2	3	4	5	6	7	8