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# The Development of a Depression Preventive Intervention for Adolescents with Attention-Deficit/Hyperactivity Disorder

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FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

THE DEVELOPMENT OF A DEPRESSION PREVENTIVE INTERVENTION FOR  
ADOLESCENTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER

Dissertation submitted in partial fulfillment of the

requirements for the degree of

DOCTOR OF PHILOSOPHY

in

PSYCHOLOGY

by

Michael Christopher Meinzer

2015

To: Dean Michael R. Heithaus  
College of Arts and Sciences

This dissertation, written by Michael Christopher Meinzer, and entitled The Development of a Depression Preventive Intervention for Adolescents with Attention-Deficit/Hyperactivity Disorder, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Stacy Frazier

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Jeremy Pettit, Major Professor

Date of Defense: June 22, 2015

The dissertation of Michael Christopher Meinzer is approved.

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Dean Michael R. Heithaus  
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Dean Lakshmi N. Reddi  
University Graduate School

Florida International University, 2015

## DEDICATION

I dedicate this dissertation to my parents, brother, Bryan, Chelsey, and all of my friends and family whose love and support made the completion of this project possible.

## ACKNOWLEDGMENTS

First and foremost, I would like to express my utmost gratitude to Dr. Jeremy Pettit. The excellent research and clinical training he provided me during the last five years at Florida International University has allowed me to develop and publish within a niche of research. His guidance throughout graduate school has been invaluable and I couldn't have completed this dissertation without him. I would like to also thank my committee members, Drs. Stacy Frazier, Paulo Graziano, and Mark Padilla, whose helpful feedback, training, and support on my project allowed me to put forth the best quality dissertation possible. I am grateful for the diligent efforts of my stellar team of research assistants and fellow doctoral student, Chelsey Hartley. Their assistance on the open trial of BEAM ensured the project was completed efficiently and with the highest degree of fidelity.

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ABSTRACT OF THE DISSERTATION

THE DEVELOPMENT OF A DEPRESSION PREVENTIVE INTERVENTION FOR  
ADOLESCENTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER

by

Michael Christopher Meinzer

Florida International University, 2015

Miami, Florida

Professor Jeremy Pettit, Major Professor

Despite the considerable progress made identifying attention-deficit/hyperactivity disorder (ADHD) as a risk for depressive outcomes in adolescence and adulthood as well as potential explanations for the co-occurrence of ADHD and unipolar depression (i.e., emotion regulation, family support, and reward responsivity), targeted depression prevention efforts have not yet been implemented for adolescents with ADHD. Thus, the specific aims were as follows: (1) develop a behaviorally oriented, tailored, depression preventive intervention for adolescents with ADHD targeting variables empirically supported to account for the covariation between ADHD and depression (Behaviorally Enhancing Adolescents' Mood; BEAM), (2) pilot BEAM in a small sample of adolescents with ADHD and their parents, (3) evaluate the feasibility and acceptability of BEAM, and (4) examine preliminary results regarding changes in depressive symptoms, emotion regulation, reward responsivity, and family support after BEAM.

The sample consisted of 8 parent-adolescent dyads with adolescents ranging in age from 12 to 16 years old. Research questions were tested using both quantitative and qualitative methods. Outcome trends were evaluated using paired samples t-tests and

reliable change indices. Semi-structured interviews were coded and analyzed qualitatively using NVivo10.

Group-level analyses indicated that there were significant differences in depressive symptoms, emotion regulation, and reward responsivity after BEAM. Findings on family support after BEAM were equivocal. According to reliable change indices used to analyze individual results, majority of participants saw improvements in depressive symptoms and emotion regulation. In addition to improvements in outcome variables, both parents and adolescents were highly satisfied with the BEAM program and used BEAM skills following the completion of the program. Though staff supervision notes suggested that several barriers for delivery of the program arose, the BEAM program was easy to implement and was done so with high integrity.

The study's main findings and their clinical implications are further discussed, including suggested revisions to the BEAM program. Future directions for research are presented with a focus on moving towards a large, randomized control trial.

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## CHAPTER I.

### INTRODUCTION

Attention-deficit/hyperactivity Disorder (ADHD) is a commonly occurring childhood disorder present in up to 9% of pre-adolescent children (Centers for Disease Control, 2010). Attention-deficit/hyperactivity disorder continues to impact individuals into adolescence and adulthood (Barkley, Murphy, & Kwasnik, 1996; Klassen, Katzman, & Chokka, 2010). Unipolar mood disorders are highly comorbid with ADHD (e.g., Meinzer et al., 2014.) Numerous cross-sectional (e.g., Biederman et al., 1999; Blackman, Ostrander, & Herman, 2005; Busch et al., 2002; Hinshaw, 2002; Kessler, Chiu, Demler, Merikangas, & Walters, 2005) and longitudinal (Biederman et al., 2008; Biederman et al., 1996; Biederman, Mick, & Faraone, 1998; Biederman et al., 2006; Bussing, Mason, Bell, Porter, & Garvan, 2010; Chronis-Tuscano et al., 2010; Fischer, Barkley, Smallish, & Fletcher, 2002; Meinzer et al., 2013) studies of the association between ADHD and depression have been conducted. Results have demonstrated that individuals with a positive history of ADHD display significantly higher levels of depressive symptoms and higher rates of depressive disorders in childhood, adolescence, and adulthood than individuals without a history of ADHD. The co-occurrence of ADHD and depression represents a pressing concern given the higher impairment seen among youth who experience both disorders than youth who experience either disorder in isolation (Biederman et al., 2008; Biederman et al., 1998; Biederman, Newcorn, & Sprich, 1991; Chronis-Tuscano et al., 2010; Daviss, 2008).

The current study developed and conducted an open trial of a depression preventive intervention (Behaviorally Enhancing Adolescents' Mood; BEAM) to reduce

levels of depressive symptoms in adolescents with ADHD. The BEAM program was tailored to the developmental levels of adolescents with ADHD and targeted constructs that have been shown to account for ADHD-depression covariation. Three areas have been empirically identified as potential explanations for the comorbidity between ADHD and depression: family support (Humphreys et al., 2013; Meinzer, Pettit, & Viswesvaran, 2014; Ostrander & Herman, 2006), reward responsivity (Meinzer et al., Unpublished manuscript; Meinzer, Pettit, Leventhal, & Hill, 2012), and emotion regulation (Seymour et al., 2012; Seymour, Chronis-Tuscano, Iwamoto, Kurdziel, & Macpherson, 2014). As such, modules were developed to target family support, reward responsivity, and emotion regulation within the BEAM program.

Traditional depression interventions heavily emphasize cognitive strategies such as cognitive restructuring and thought replacement. Complex cognitive strategies typically have not been effective among youth with ADHD (Smith, Barkley, & Shapiro, 2006). Thus, the BEAM program used behavioral strategies rather than cognitive strategies. Behavioral models of depression posit that a combination of social skills deficits and minimal availability of and restricted range of positively reinforcing events lead to low rates of positive reinforcement, which in turn lead to dysphoria and somatic symptoms of depression (Lewinsohn, 1974). Further, feelings of dysphoria are then exacerbated by avoidance behavior (e.g., interpersonal situations, occupational or daily life demands and depressing thoughts or feelings; Ferster, 1973). To address depressive symptoms in the context of a behavioral, developmentally tailored approach, behavioral activation (BA) was employed. More specifically, pleasant activity scheduling and mood monitoring was posited as a primary mechanism for change to help adolescents identify

connections between engagement in activities and affective states (Dimidjian, Barrera, Martell, Munoz, & Lewinsohn, 2011; Mazzuchelli, Kane, & Rees, 2009). Through working with parents and adolescents in a behavioral framework and targeting constructs that have been empirically identified to account for depression and ADHD covariation (i.e., family support, reward responsivity, and emotion regulation), the BEAM program was expected to produce reductions in depression symptoms.

The following questions were investigated in the current project using both quantitative and qualitative methods: (1) Is the BEAM program well-received by both parents and adolescents? (2) Does the BEAM program lead to reductions in depressive symptoms and parent-child conflict? (3) Does the BEAM program lead to increases in emotion regulation, family support, and reward responsivity? Answering the preceding questions constituted the main objectives of the current study.

A review of the prevalence and diagnosis of ADHD and depression as well as empirical research investigating ADHD-depression comorbidity will be provided in the following literature review. Additionally, explanations of the theoretical and empirical explanations that led to the development of the BEAM program will be detailed. The current study represents the first development, implementation, and evaluation of a tailored depression prevention program for adolescents with ADHD.

## **CHAPTER II.**

### **LITERATURE REVIEW**

In this chapter, ADHD and unipolar depression are discussed. The focus is first on the prevalence of and impairment associated with each disorder in isolation. Next is a review of the empirical literature on the cross-sectional and longitudinal investigations that examined the co-occurrence of ADHD and unipolar depression. Potential explanations for the co-occurrence of ADHD and depression are then discussed with a focus on explanations that influenced the development of the depression preventive intervention, Behaviorally Enhancing Adolescents' Mood (BEAM). Behavioral treatments for depression, a seemingly good match for youth with ADHD, and the approach taken in BEAM are reviewed next. The general framework for the prevention of mental health disorders and the public health significance of addressing ADHD and depression in youth are also briefly summarized. This chapter concludes with a summary of the present study's research questions and hypotheses.

#### **Attention-Deficit/Hyperactivity Disorder**

Attention-deficit/hyperactivity Disorder (ADHD) has traditionally been considered a childhood disorder, present in up to 9% of pre-adolescent children (Centers for Disease Control, 2010). However, research indicates that ADHD persists into adolescence in 50-80% of cases and into adulthood in 10-50% of cases (Barkley et al., 1996; Klassen et al., 2010). The impairment associated with persistent ADHD is evident in high rates of academic failure, delinquency, substance abuse, automobile accidents, and risky behavior (Barkley, 2006a, 2006b; Barkley et al., 1996; Klassen, et al., 2010). Additionally, children with ADHD display higher rates of comorbid psychiatric disorders



than would be expected by chance, including externalizing, anxiety and learning disorders (Bagwell, Molina, Pelham, & Hoza, 2001; Flory, Molina, Pelham, Gnagy, & Smith, 2006; Hoza, Pelham, Waschbusch, Kipp, & Owens, 2001; P. S. Jensen et al., 2001).

According to the Diagnostic and Statistical Manual for Mental Disorders (*DSM5*) (American Psychiatric Association, 2013), ADHD symptoms are divided into two clusters: inattention (nine symptoms) and hyperactivity-impulsivity (nine symptoms). At least six symptoms in a given cluster (inattention or hyperactivity-impulsivity) must be present for at least six months and cause impairment in functioning to meet the criteria for the Predominantly-Inattentive Presentation or the Predominantly Hyperactive-Impulsive Presentation, respectively. If six or more symptoms are present in both categories, a diagnosis of Combined Presentation is given. Additionally, symptoms must be present and causing impairment in at least two settings before the age of 12 years. For older adolescents and adults, only five or more symptoms in each cluster of ADHD symptoms are needed for a diagnosis.

### **ADHD in Adolescence**

Though diagnostic criteria require symptoms of ADHD be present prior to age 12 (American Psychiatric Association, 2013), it is estimated that 50% to 80% of childhood cases of ADHD continue to experience ADHD-related impairment into adolescence and adulthood (Barkley et al., 1996). Research suggests ADHD is likely under-identified in adolescents (Sibley et al., 2012). Sibley and colleagues (2012) reviewed explanations for the under-identification of ADHD in adolescents: (1) teachers not having an adequate opportunity to assess students' behavior given that middle and high school students take

courses with numerous different teachers, (2) the symptom criteria for ADHD was formed through observation of children in elementary school and therefore may not be developmentally appropriate for adolescents (e.g., the hyperactive symptom “often climbs about or runs excessively could manifest as not being able to maintain sedentary activities), and (3) retrospective report of ADHD may be unreliable in that impairment associated with ADHD may not manifest in some youth until adolescence causing families to fail to identify symptoms occurring many years prior.

There are numerous detrimental outcomes in adolescence and young adulthood associated with a diagnosis of ADHD, the first being co-occurring externalizing behaviors. Individuals with ADHD are more likely to engage in risky externalizing behaviors including sexual behaviors such as earlier initiation of sexual activity and intercourse, more sexual partners, more casual sex, and more unplanned pregnancies (Flory et al., 2006), as well as intimate partner violence (verbally aggressive and violent behavior with romantic partners; Wymbs et al., 2012). A history of ADHD also has been associated with high levels external behaviors such as alcohol use, tobacco use, illicit drug use (Molina & Pelham, 2003), and delinquent behaviors (e.g., lying or cheating, hanging around with others who get into trouble, truancy; Walther et al., 2012).

Co-occurring internalizing behaviors are an additional set of detrimental outcomes faced by adolescents and young adults with ADHD. A review by Jarret and Ollendick (2008) suggested multiple pathways by which ADHD and anxiety disorders co-occur. In addition to anxiety disorders, unipolar depression has been studied in the relation to a diagnosis of depression (Meinzer, Pettit et al., 2014).

## **Unipolar Depressive Disorders**

The *DSM5* includes three unipolar depressive disorders: major depressive disorder (MDD) and persistent depressive disorder (previously referred to as dysthymia in earlier versions of the *DSM*), and disruptive mood dysregulation disorder (DMD). As a result of the scarcity of empirical literature on the new diagnosis of DMD it will not be reviewed in the current dissertation project.

The *DSM5* criteria for MDD require the presence of at least five of nine criteria symptoms most of the day, more days than not, for at least 2 weeks. One of the symptoms present must be either depressed mood or loss of interest. The symptoms must cause clinically significant distress or impairment in social, occupational, or other important areas of functioning (American Psychiatric Association, 2000).

Persistent Depressive Disorder is characterized as a chronic form of unipolar depression wherein individuals experience depressed mood (or irritable mood in children and adolescents) more days than not, for at least two years (one year in children). During the one or two year period, there must also be no more than 2 months without experiencing at least 2 of the following symptoms: poor appetite or overeating, insomnia or hypersomnia, low energy or fatigue, low self-esteem, poor concentration or difficulty making decisions, and feelings of hopelessness. According to *DSM5*, individuals who continuously meet criteria for a major depressive disorder for two years (one year in children) would receive a diagnosis of Persistent Depressive Disorder.

The *DSM5* makes no requirements regarding onset age for MDD or Persistent Depressive Disorder. Epidemiological studies indicate that the respective mean onset ages for MDD and dysthymia (the DSM-IV precursor to Persistent Depressive Disorder)

for males and females are 13.9 (SD=2.7) versus 14.2 (SD=2.5) for MDD and 10.9 (SD=3.0) and 11.3 (SD=2.7) for dysthymia (Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993).

### **Depression in Adolescence**

As described above, the mean onset age of unipolar depressive disorders tends to be in late childhood and early adolescence. Rates of depressive disorders and normative levels of depressive symptoms tend to increase from childhood through late adolescence (Avenevoli, Knight, Kessler, & Merikangas, 2008; K. D. Stark et al., 2006). Beginning in emerging adulthood, there is a normative decrease in depressive symptoms through at least age 30 years (Galambos, Barker, & Krahn, 2006; Meadows, Brown, & Elder, 2006; Pettit, Lewinsohn, Seeley, Roberts, & Yaroslavsky, 2010; Pettit, Roberts, Lewinsohn, Seeley, & Yaroslavsky, 2011; Radloff, 1977). In children, point prevalence estimates range from 0.4% to 3.8% for MDD (Costello et al., 1988; Kashani, Orvaschel, Rosenberg, & Reid, 1989; Kashani & Ray, 1983; Merikangas et al., 2010) and 0.6% to 6.4% for dysthymic disorder (Costello et al., 1988; Kashani, Allan, Beck, Bledsoe, & Reid, 1997; Merikangas et al., 2010; Polaino-Lorente & Domenech, 1993). In adolescence, point prevalence rates range from 0.4% to 12% for MDD (Andrews, Garrison, Jackson, Addy, & McKeown, 1993; Haarasilta, Marttunen, Kaprio, & Aro, 2001; Kashani et al., 1987; Lewinsohn, et al., 1993; McGee & Williams, 1988; Merikangas, et al., 2010; P. Rohde, Lewinsohn, & Seeley, 1991; Rushton, Forcier, & Schectman, 2002) and 0.09%-1.6% for dysthymic disorder (Lewinsohn, et al., 1993; McGee et al., 1990; McGee & Williams, 1988; Merikangas, et al., 2010). The lifetime prevalence of MDD and dysthymic disorder during adolescence is estimated at 18.48-

24.01% and 2.98-3.22%, respectively (Lewinsohn et al., 1993; Newman et al., 1996). Overall, the prevalence of depression increases six fold from early adolescence to late adolescence (Hankin, 2006).

The increase in prevalence of depression during adolescence suggests that adolescence is an opportune time to screen for and prevent depression. Given the high rates of depression and levels of depressive symptoms that tend to increase through adolescence into adulthood, it is important to identify risk factors that may contribute to the rise in depression. As will be elaborated in the section below, ADHD is one such risk factor.

### **ADHD and Depression**

Major depressive disorder (MDD) is a commonly occurring comorbidity with ADHD (Biederman et al., 2008; Biederman et al., 1998; Biederman et al., 1991; Daviss, 2008; J. B. Jensen, Burke, & Garfinkel, 1988). A substantial number of studies, both cross-sectional and longitudinal, have examined the patterns of co-occurring ADHD and MDD. Findings from these studies will be reviewed in the following paragraphs.

Numerous studies have investigated the cross-sectional co-occurrence of ADHD and MDD. Summaries of cross-sectional studies examining the co-occurrence of ADHD and depression are presented in Table 1. Studies have demonstrated that children and adolescents with a diagnosis of ADHD (or children who screened positive for ADHD; L. A. Rohde et al., 1999) had a significantly higher rate of MDD relative to children and adolescents without ADHD (Biederman et al., 1992; Biederman, Faraone, Mick, & Lelon, 1995; Biederman et al., 1999; Busch et al., 2002; Kessler, Chiu et al., 2005; L. A. Rohde et al., 1999). Prevalence estimates from cross-sectional studies indicate that from

12% to 50% of youth with ADHD experience MDD (Biederman et al., 2008; Biederman et al., 1991; J. B. Jensen et al., 1988), with estimates varying as a function of sample characteristics and assessment procedures. Youth with ADHD also displayed higher subclinical levels of depressive symptoms relative to youth without ADHD (Blackman et al., 2005; Hinshaw, 2002).

Studies have also investigated the longitudinal co-occurrence of ADHD and MDD. Table 2 presents studies that examined the longitudinal relationship between ADHD and MDD. Independent research teams have found that a history of ADHD in childhood significantly predicts MDD in adolescence and young adulthood over follow-up intervals ranging from 1 year to 21 years. The significant prospective relation has been found using diagnoses of MDD in clinic referred samples (Biederman et al., 2008; Biederman et al., 1996; Biederman et al., 1998; Biederman et al., 2006; Biederman et al., 2012; Chronis-Tuscano et al., 2010; Fischer et al., 2002) and community samples (Bussing et al., 2010; Meinzer et al., 2013) and using continuous measures of depressive symptoms (Hinshaw, Owens, Sami, & Fargeon, 2006; Meinzer et al., Under Review). For example, Biederman et al. (2008) followed 140 girls ages 6-18 years with ADHD and 122 matched comparison peers for five years, and concluded that girls with ADHD were at 2.5-fold risk of MDD relative to girls without ADHD. Moreover, girls with ADHD also experienced an earlier age of MDD onset as well as more severe and frequent depressive episodes than matched peers. In a comparison study using a sample of 140 boys with ADHD, Biederman et al. (2006) found that boys with ADHD developed MDD at a higher rate than matched peers over a 10 year follow-up. Additionally, in a mixed sample of 125 4-6 year olds with ADHD and 123 matched control peers, children with

ADHD were at higher risk of MDD through adolescence relative to control peers. Meinzer and colleagues (2013) found similar results using data from the Oregon Adolescent Depression Project, a school based sample of 1222 adolescents: the odds of developing MDD among adolescents with ADHD were 1.83 times higher than among adolescents without ADHD. The association between ADHD and MDD remained statistically significant even after controlling for academic impairment, social impairment, and other psychiatric disorders (i.e., anxiety disorders, conduct disorder, oppositional defiant disorder). Half of those with ADHD who developed MDD experienced an MDD onset before age 20.

In contrast to the large number of studies that have reported significant associations between ADHD and MDD, a smaller number of studies have reported discrepant findings (Bagwell, Molina, Kashdan, Pelham, & Hoza, 2006; Claude & Firestone, 1995; Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1998; Mannuzza et al., 1991). Bagwell and colleagues recruited a group of predominantly male adolescents, ages 12 to 18, with a childhood diagnosis of ADHD and a group of community controls without ADHD and found that the rates of depression were not significantly different between groups. However, within the ADHD group, those with more severe externalizing symptoms in childhood were at a greater risk for developing depression. Mannuzza and colleagues followed a sample of males with and without ADHD through young adulthood and failed to find significant associations between a history of ADHD and affective disorders in late adolescence (Mannuzza et al., 1991) or young adulthood (Mannuzza et al., 1998). Additionally they utilized a “pure” ADHD sample, excluding those with comorbid CD and/or ODD and utilizing only male subjects. Lastly, Claude and Firestone

(1995) followed a sample of males from approximately 14 to 25 years old and also failed to find a significant association between ADHD and depression. Table 1 and Table 2 present descriptions of cross-sectional and longitudinal studies investigating comorbid ADHD and depression, respectively.

In recognition of the mixed findings on the co-occurrence of ADHD and MDD, and with an eye toward bringing clarity to the relevant literature, Meinzer and colleagues (Meinzer, Pettit, et al., 2014) performed a meta-analytic review of 29 studies that reported associations between ADHD and depression and/or rates of MDD in ADHD and control samples of children and adolescents. An overall meta-analysis using all 29 studies indicated a medium sized effect between ADHD and depression, with considerable variability across the studies. Evidence of variability across the studies provided an impetus to conduct subgroup analyses using study design, diagnostic criteria, and sampling strategy as moderators. Results of subgroup analyses indicated a reliable medium sized effect for cross-sectional studies and an unreliable effect for longitudinal studies. Next, analyses were conducted based upon the diagnostic criteria used to measure ADHD, given the large variability in diagnostic criteria across *DSM* editions (American Psychiatric Association, 1968, 1980, 1987, 1994, 2000, 2013). A medium to large sized effect between ADHD and depression was found for studies that diagnosed ADHD using more recent editions of the *DSM* (i.e., *DSM-III*, *DSM-III-R*, *DSM-IV*), whereas a small and unreliable effect was found for studies that used *DSM-II* diagnostic criteria for ADHD or motor hyperactivity as a proxy for ADHD. Lastly, studies were divided into two groups by whether they used clinic-based samples or nonreferred samples. A small and unreliable effect was found for studies using nonreferred samples.



However when a study that used an idiosyncratic diagnostic procedure was removed, a reliable medium effect was found for nonreferred samples. A large effect was found for studies that used clinic based samples. Though the size of the effect between ADHD and depression varied across the subgroup analyses, results from the meta-analysis generally supported a significant association between ADHD and depression.

As demonstrated by the number of empirical papers and the meta-analysis published on their association, the relationship between ADHD and depression has been well-studied. Potential explanations for their relationship have received far less attention. In the following section, the theoretical and empirical literature regarding potential explanations of co-occurring ADHD and depression will be discussed.

### **Explanations for the Co-Occurrence for ADHD and Depression**

Klein & Riso (1993) offer four broad categories to explain co-occurrence of psychiatric disorders: (1) explanations concerning sampling and base rates; (2) explanations concerning artifacts of diagnostic criteria; (3) explanations concerning difficulties in establishing diagnostic boundaries; and (4) explanations concerning etiological relationships. Each of the preceding four explanations will be reviewed in detail below.

**Explanations Concerning Sampling Base Rates.** Many studies investigating ADHD and depression covariation have used clinic referred or treatment seeking samples (see Tables 1 and 2). Use of clinic referred samples inflates estimates of the rate of co-occurrence of psychiatric disorders. The overestimation of the co-occurrence of two disorders can be due to Berksonian bias, that is “a purely mathematical consequence of the fact that an individual with two disorders can obtain treatment for either disorder” (p.

286, Lilienfeld, 2003) and/or clinical selection bias, “the fact that individuals with two disorders may often be especially impaired and therefore more likely to seek treatment than are individuals with only one disorder” (p. 286, Lilienfeld, 2003). Berkson’s bias or clinical selection bias cannot entirely account for the co-occurrence of ADHD and depression given research documenting a significant relationship within nonreferred and representative samples (e.g., Bussing et al., 2010; Meinzer et al., 2013; L. A. Rohde et al., 1999). Meinzer and colleagues’ (2014) meta-analysis reported a positive and reliable effect for studies using nonreferred samples after the exclusion of one study that used an idiosyncratic method of diagnosing ADHD. Therefore, evidence does not support a conclusion that the relationship between ADHD and depression is present solely in clinic referred samples.

Past research has also explored the possibility of epiphenomenal co-occurrence. In epiphenomenal co-occurrence, disorders are all associated with one another but one of the pair-wise associations is merely the mathematical product of the others (Angold, Costello, & Erkanli, 1999). Results from the Great Smoky Mountains Study (Angold et al., 1999) suggested that the co-occurrence of ADHD and MDD was epiphenomenal. In the absence of co-occurring anxiety or conduct disorder, adolescents with MDD were no more likely to meet criteria for ADHD than adolescents without MDD. Conversely, other studies have found a robust association between ADHD and depression even when controlling for other co-occurring psychiatric disorders (e.g., Biederman et al., 2008; Meinzer et al., 2013). Findings suggest that epiphenomenal comorbidity does not entirely explain the co-occurrence of ADHD and depression.

**Explanations Concerning Artifacts of Diagnostic Criteria.** The co-occurrence of ADHD and depression could be due merely to “non-specific” symptoms shared by the diagnoses. Within the *DSM-5*, diagnoses for ADHD and depression contain overlapping diagnostic criteria. For example, psychomotor agitation and diminished ability to think or concentrate (symptoms of major depressive disorder) could be misconstrued for fidgeting and restlessness or difficulty sustaining attention (symptoms of attention-deficit/hyperactivity disorder).

Nevertheless, empirical studies have demonstrated that the association between ADHD and depression cannot be explained entirely by overlapping symptoms. For example, Milberger and colleagues (1995) reported that 79% of participants (children, adolescents, and adults with ADHD) with comorbid ADHD-depression maintained a diagnosis of depression even after any overlapping diagnostic criteria were removed. Similarly, Biederman and colleagues (1995) reported that depression and ADHD comorbidity remained present after overlapping symptoms were subtracted from each disorder. In sum, though the symptom overlap in ADHD and depressive diagnoses may partially account for the co-occurrence ADHD and depression, overlapping diagnostic criteria do not provide an adequate explanation of co-occurring ADHD and depression.

**Explanations Concerning Inaccurate Diagnostic Boundaries.** An additional explanation of ADHD-depression co-occurrence is that the simultaneous presentation of both psychopathologies represents a third disorder independent from ADHD without depression and depression without ADHD. To date and to the best of my knowledge, empirical research has yet to examine whether co-occurring ADHD and depression represents a third disorder. Mick et al. (2003) examined the familial aggregation of

ADHD, MDD, and comorbid ADHD-MDD in a sample of children with ADHD, control children without ADHD, and their parents. Co-occurring ADHD-MDD was more common in parents of girls with co-occurring ADHD-MDD than girls with ADHD alone or MDD alone but not among boys. Though firm conclusions cannot be drawn from a single study, results suggest that co-occurring ADHD and MDD may be an etiologically different phenomenon from ADHD alone or depression alone.

Sluggish cognitive tempo (SCT), a condition characterized by day dreaming, mental confusion, sluggish-lethargic behavior and hypoactivity (Barkley, 2012), may be such an example an etiologically distinct phenomenon. Sluggish cognitive tempo is strongly related to inattentive symptoms and only weakly related to hyperactive ADHD symptoms (Carlson & Mann, 2002; Hartman, Willcutt, Rhee, & Pennington, 2004; Penny, Waschbusch, Klein, Corkum, & Eskes, 2009). Findings have led some researchers to suggest SCT may be a distinct construct from ADHD altogether (Barkley, 2012). Furthermore, the inattentive subtype of ADHD is more strongly associated with internalizing problems like depression and anxiety than the hyperactive/impulsive subtype of ADHD (Hinshaw, 1994; Lahey & Carlson, 1992; Lahey et al., 1988; Lahey, Schaughency, Hynd, Carlson, & Nieves, 1987). In sum, it may be possible that in some cases co-occurring ADHD-MDD represents a third disorder characterized by SCT.

**Explanations Concerning Etiological Relationships.** Though all explanations for comorbid ADHD and depression are important in understanding their presentation in children and adolescents, explanations concerning etiological relationships were of particular relevance to the development of the depression preventive intervention, BEAM. Shared etiology refers to the possibility that overlapping risk processes for both

disorders contribute to the co-occurrence of two disorders. Genetic and neurological mechanisms, with an emphasis on the dopaminergic system, have received theoretical and empirical attention in the etiology of ADHD (see Barkley, 2006c for a review). Depression likely includes a complex combination of genetic, biological, cognitive, interpersonal variables (see K. D. Stark, et al., 2006 for a review). The following sections will describe variables that are believed to contribute to both ADHD and MDD and furthermore the co-occurrence of ADHD and MDD. Reward responsivity, emotion regulation, and family support, as discussed below, served as some of the mechanisms for change in the depression preventive intervention.

***Reward (hedonic) responsivity.*** Reward responsivity, or the individual differences in reactivity to pleasurable stimuli and reward, may be a shared endophenotype common to ADHD and depression. Endophenotypes are constructs that underlie psychopathological symptoms and are believed to be more directly influenced by genes than the manifest symptoms (Rende & Waldman, 2006; Turetsky et al., 2008). Behavioral, genetic, and neurological research has pointed towards reward system functioning as one such construct to account for the covariation between ADHD and depression. Dopamine related circuitry has been linked to low-motivation, inattention, and depression (Beauchaine, Neuhaus, Brenner, & Gatzke-Kopp, 2008; Durston, 2003; J. Epstein et al., 2006; Pizzagalli, Iosifescu, Hallett, Ratner, & Fava, 2008; Scheres, Milham, Knutson, & Castellanos, 2007). Dopaminergic and serotonergic genes have been identified in molecular genetics studies to influence reward functioning in both ADHD (Wood & Neale, 2010) and depression (Kato, 2007).

Within depression research, impaired hedonic responsivity (i.e., the failure to respond to rewarding stimuli) is associated with the severity of anhedonic symptoms (Bogdan & Pizzagalli, 2006; Forbes, 2009; Pizzagalli et al., 2008; Pizzagalli, Jahn, & O'Shea, 2005; Shankman, Klein, Tenke, & Bruder, 2007). Within a neurological framework, research has demonstrated decreased activity in the striatum, specifically within the region associated with the detection of rewards and the representation of reward-related goals, when depressed individuals are presented with rewarding stimuli (Forbes, 2009; Forbes & Dahl, 2005). Furthermore, depressed individuals may have difficulty sustaining positive affect following reward (Heller et al., 2009). Heller and colleagues (2009) demonstrated that individuals with MDD, compared to those without MDD, displayed a decrease in activation over time in the nucleus accumbens, a region associated with motivation and reward processing.

Research has also linked ADHD and impaired hedonic responsivity in ADHD. Within a neurological framework, Scheres and colleagues (2007) reported reduced ventral striatal activation among adolescents with ADHD compared to healthy controls during anticipation of reward. Attention-deficit/hyperactivity disorder (ADHD) symptom severity within adolescents with ADHD was negatively correlated with neural activation during dopaminergic-driven reward tasks (R. Stark et al., 2011). Children with ADHD have shown less psychophysiological response to both positive and negative reinforcement as relative to controls (Luman, Oosterlaan, & Sergeant, 2005).

Dysfunctional reward responsivity may be associated with the inattentive subtype of ADHD given its relationship with sluggish cognitive tempo (Derefinko et al., 2008). Automatically attending to reward-related stimuli is crucial for appraising the incentive

saliency of cues (Berridge, Robinson, & Aldridge, 2009). Therefore, inattention symptoms within ADHD may disrupt the ability to process the incentive properties of reward-related stimuli, which could in turn affect reward responsiveness.

Two studies have empirically examined the influence of hedonic responsiveness on ADHD and depressive symptoms. In the first, 198 college students were recruited at a large public university (Meinzer et al., 2012). Participants ranged from age 18 to 46 years old ( $M=21.3$ ;  $SD=4.6$ ) with 59.6% female and 74.2% identifying as Hispanic. Using a variety of psychosocial rating scales the relationships between ADHD symptoms, depressive symptoms, and hedonic responsivity were measured. Depressive symptoms were measured using the Center for Epidemiological Studies Depression Scale (Radloff, 1977) where participants were asked to rate the frequency to which they experience depressive symptoms. Attention-deficit/hyperactivity disorder (ADHD) symptoms were measured using the 18-item Adult ADHD Self-Report Scale (ASRS; Kessler et al., 2005). The ASRS asks how often the participant has experienced each symptom of ADHD. Subsequently questions are dichotomized. Hedonic responsivity was measured using the responsivity subscale of the Tripartite Pleasure Inventory (TPI; Leventhal, 2012) where participants are presented with 12 experiences to rate (e.g., romantic or sexual activities, learning new information or skills, physical activity). The TPI consists of 3 subscales where participants are asked how much pleasure or enjoyment they feel in response to experiences (hedonic responsivity), how much they usually engage in experiences (hedonic engagement), and how much desire they feel to engage in experiences (hedonic desire). Results indicated that total ADHD symptoms, inattentive ADHD symptoms, and hyperactive/impulsive ADHD symptoms were significantly and positively correlated with

depressive symptoms. Hedonic responsivity was significantly correlated with depressive symptoms, inattentive ADHD symptoms, and total ADHD symptoms but not hyperactive/impulsive ADHD symptoms. Next, a model of indirect effects was tested. Hedonic responsivity significantly accounted for the covariation between total ADHD symptoms and depressive symptoms. A second model of indirect effects was tested where inattentive ADHD symptoms became the independent variable instead of total ADHD symptoms. Results were consistent with first model in that hedonic responsivity significantly accounted for the covariation between inattentive ADHD symptoms and depressive symptoms. Conversely, when ADHD symptoms of hyperactivity and impulsivity were substituted for the independent variable, the model of indirect effects was not significant; hedonic responsivity did not account for the covariation between hyperactive/impulsive symptoms of ADHD and depressive symptoms. In sum, hedonic responsivity accounted for the relationship between ADHD and depression. Further, the co-occurrence between ADHD and depression relationship may be specific to the inattentive subtype.

Findings from the Meinzer and colleagues (2012) study were partially replicated in a sample of adolescents (Meinzer et al., unpublished manuscript). Sixty adolescents were recruited from a variety of settings. Parent and self-report measures were completed. Parents rated their children's ADHD symptoms using the Disruptive Behavior Disorders Rating Scale (DBD; Pelham, Gnagy, Greenslade, & Milich, 1992). Depressive symptoms were measured using the Reynolds Adolescent Depression Scale 2<sup>nd</sup> Edition (RADS-2; Reynolds, 2002) via adolescent self-report. Lastly, hedonic responsivity was assessed using the responsivity subscale of the Tripartite Pleasure Inventory (TPI;



Leventhal, 2012). Results were somewhat consistent with the previous study. Total depressive symptoms were not significantly associated with total ADHD symptoms, inattentive ADHD symptoms, or hyperactive/impulsive ADHD symptoms. However, anhedonic symptoms of depression were significantly associated with inattentive symptoms of depression and reward responsivity. Furthermore, reward responsivity significantly accounted for the association between inattentive ADHD symptoms and anhedonic depressive symptoms.

The accumulation of literature investigating ADHD and reward responsivity, depression and reward responsivity, as well as research examining the role of reward responsivity in the covariation of ADHD and depression indicates reward responsivity is a potentially promising variable of interest in preventing depression in youth with ADHD.

***Emotion Regulation.*** Emotion regulation has also been shown to be associated with both ADHD and depression. Emotion regulation can be defined as the:

“(a) awareness and understanding of emotions, (b) accepting of emotions, (c) ability to control impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions, and (d) ability to use situationally appropriate emotional regulation strategies flexibly to modulate emotional responses as desired in order to meet individual goals and situational demands”

(p. 42, Gratz & Roemer, 2004).

Competent emotion regulation involves numerous information processing skills. Garber and colleagues define emotional abilities to be:

“(1) Recognition that an affect has been aroused and needs to be regulated (2) interpretation of what is causing the emotional arousal, (3) deciding what needs to be done about the affect, (4) generating possible responses, (5) evaluating the potential efficacy of these responses, and (6) effectively enacting the chosen response” (p. 107, Garber, Braafladt, & Weiss, 1995).”

Like reward responsivity, deficits in emotion regulation represent a possible shared etiological variable for depression and ADHD. Deficits in emotion regulation have been included in theoretical models of ADHD (Barkley, 1997; Martel, 2009; Martel & Nigg, 2006) and depression (Compas, Jaser, & Benson, 2009; Durbin & Shafir, 2008). The following paragraphs describe research conducted on emotion regulation and its relation with ADHD and depression, in the context of the information processing skills described by Garber and colleagues (1995).

Within the ADHD literature, research has linked ADHD with emotion regulation through deficits in effortful control seen in individuals with ADHD (Barkley, 1997). Though hyperactivity, impulsivity, and inattention tend to be the major features of ADHD, research has demonstrated the inclination of youth with ADHD to seek immediate reinforcement and difficulties in controlling their arousal to meet situational demands (Douglas, 1980, 1983). Further, difficulties in emotion regulation seen within children with ADHD may be because of their inability to notice or process contextual information. Research using frustration tasks, one method of assessing emotion regulation, indicated that youth with ADHD used less adaptive emotion regulation strategies and experienced more signs of negative or frustrated emotions and higher levels of negative affect than youth without ADHD (Maedgen & Carlson, 2000; Melnick

& Hinshaw, 2000; Walcott & Landau, 2004). One example of research using frustration tasks to measure emotion regulation can be found in Walcott & Landau (2004), who used a competitive puzzle task with a confederate. Participants were told the video of a child completing the puzzle task was a live feed and that the camera recording the participant was being shown live to the child they were competing with next door. Participants were told to race their peer in completing the puzzle and the winner would receive a prize. The puzzle, unbeknownst to the participant, was unsolvable and the video they were shown was prerecorded with a child repeating phrases such as “the puzzle is really easy” or “I’m going to win that prize.” Half of participants (half of the ADHD group and half of the control group) were told to mask any frustration and to pretend the task was really easy to solve. Results of the study demonstrated that children with ADHD were significantly more disinhibited and less effective at regulating their emotions during the puzzle task. Furthermore, children with ADHD were significantly less successful at masking their emotions than control children in the emotional control condition.

Youth with ADHD also displayed difficulties recognizing and characterizing negative emotions (Norvilitis, Casey, Brooklier, & Bonello, 2000). Norvilitis and colleagues (2000) found that ADHD symptoms and poor performance on emotional identification tasks were positively related. In other words, the ability to identify emotion in themselves and others decreased as ADHD symptoms increased. In sum, research suggests that youth with ADHD have difficulties not only identifying emotions in themselves and others but also in masking their own emotions and regulating frustration.

Difficulties in regulating emotions in youth also have been shown to be significantly and concurrently associated with depression (Durbin & Shafir, 2008;

Tortella-Feliu, Balle, & Sese, 2010) and predictive of future depression (Feng et al., 2009). For instance, low effortful control, a component of emotion regulation, has been associated with the severity of depressive symptoms (Compas et al., 2004; Rothbart & Posner, 2006). Silk and colleagues (2003) investigated the link between depression and emotion regulation in a nonreferred sample of middle and high school students. Using self-report psychosocial measures, results indicated that adolescents who reported experiencing more intense and labile emotions as well as less effective regulation of negative emotions reported more depressive symptoms (Silk, Steinberg, & Morris, 2003). Children who were depressed reported using more maladaptive strategies for regulating emotions as well as poorer self-efficacy regarding their emotion regulation abilities as compared to their non-depressed counterparts (Zeman, Cassano, Perry-Parrish, & Stegall, 2006). If depressed children feel less effective at resolving stressful situations than nondepressed children (Zeman et al., 2006), it may be that depressed children feel ineffective in altering their negative mood or incapable of making themselves feel better (Garber, et al., 1995). An empirical study conducted by Garber and colleagues (1995) demonstrated that children who endorsed higher levels of depressive symptoms reported (a) utilizing affect regulation strategies significantly less frequently than nondepressed children and (b) that affect regulation strategies were significantly less effective as compared to nondepressed children. Further, depressed individuals also tend to generate more irrelevant emotion regulation strategies as compared to nondepressed individuals (Doerfler, Mullins, Griffin, Siegel, & Richards, 1984; Mullins, Siegel, & Hodges, 1985).

In addition to showing significant associations with ADHD and depression, emotion regulation has been found to mediate the association between ADHD and

depression. In one study (Anastopolous et al., 2011) parents provided ratings of their child's self-regulation of emotions and their child's depressive symptoms. Children with ADHD were shown to have a six-fold increased risk for emotional lability in comparison to those without a diagnosis of ADHD. Furthermore, children's emotion regulation mediated the association between a diagnosis of ADHD and depression (Anastopoulos et al., 2011). More than half of the total effect between ADHD and depressive symptoms was mediated by emotional lability.

Seymour and colleagues (2012, 2014) investigated the mediational role of emotional regulation in ADHD and depression in older children and adolescents using both parent and self-report. Using a cross-sectional design, results indicated that parent rated emotion regulation mediated the relationship between a diagnosis of ADHD and youth-reported ratings of depressive symptoms (Seymour, et al., 2012). Findings from their 2012 study subsequently were replicated using a longitudinal design (Seymour, et al., 2014). Youth between 9 and 12 years old were followed prospectively for 3 years, undergoing annual assessments. Results were consistent with previous work in that parent-reported emotion regulation at time 2 significantly mediated the relationship between parent-reported ADHD symptoms at time 1 and youth-reported depressive symptoms at time 3.

In sum, research provides substantial evidence that not only is emotion regulation a correlate of both ADHD and depression but that it may help explain the association between both disorders.

***Parent management, parent support, and locus of control.*** Lastly, low levels of parent social support may also partially explain the association between ADHD

symptoms and depressive symptoms. Attention-deficit/hyperactivity disorder has been linked to high levels of discord and disharmony within the parent-child interaction (Wells et al., 2006). The negative-reactive response pattern theory (Johnston, 1996) posits that children with ADHD display higher rates of disruptive behavior within the family context compared to their non-ADHD peers, including less compliance to parent's directions, more hyperactive behavior, and less on-task behavior (Cunningham & Barkley, 1979; Johnston, 1996). Children's disruptive behavior elicits commanding and disapproving behavior from parents (Wells, et al., 2006), which further contributes to the child's behavior difficulties (Cunningham & Barkley, 1979), exacerbating the negative parent-child relationship.

Significant associations also have been found between parental support and depressive symptoms in adolescents and young adults (i.e., Holahan, Valentiner, & Moos, 1995; Pettit et al., 2011; Stice, Ragan, & Randall, 2004). Maternal and paternal emotional support are significantly associated with adolescent depressive symptoms (Houlberg, Henry, Merten, & Robinson, 2011) and lower levels of positive parental behaviors have prospectively predicted adolescent depressive symptoms at a 2.5 year follow-up (Schwartz et al., 2012). Low levels of parental support have been found to correlate amongst adolescents and young adults experiencing high levels of depressive symptoms (i.e., Holahan et al., 1995; Pettit et al., 2011; Stice et al., 2004). Research has also demonstrated that depressive symptoms in adolescence are significantly and negatively associated with parental emotional support. Lower levels of positive parental behaviors also prospectively predicted adolescent depressive symptoms (Schwartz et al., 2012).

Empirical evidence thus indicates that poor parental support is associated with both ADHD symptoms and depressive symptoms. In the context of the negative-reactive response pattern theory described above (Cunningham & Barkley, 1979; Johnston, 1996), disruptive behaviors displayed by individuals with ADHD symptoms may contribute to the negative parent-offspring relationship patterns (i.e., poor parental support), which in turn may lead to depressive symptoms (Stice et al., 2004).

Several studies have investigated the role of family support in the covariation between ADHD and depression. For example, Ostrander and Herman (2006) found that parent management and child locus of control mediated the relationship between ADHD and depressive symptoms. Meinzer and colleagues (2014) investigated the role of family support among emerging adults. Two latent variables of maternal and paternal support (each with factor loadings on warmth, autonomy granting, and involvement) partially accounted for the covariation between ADHD symptoms and depressive symptoms (Meinzer, Hill, Pettit, & Nichols-Lopez, 2014). Lastly, Humphreys et al. (2013), presented two complementary studies investigating the role of parent-child difficulties on the association between ADHD and depression. In their first study, parents of 230 children between 5 and 10 years old with and without ADHD were evaluated cross-sectionally. Results indicated that parent-child difficulties (i.e., the extent to which parents perceive their child did not meet expectations and that their interactions with their child were not reinforcing) significantly mediated ADHD symptoms and depressive symptoms. Their second study sampled youth who were followed prospectively from birth to age 20. Behavioral problems were measured at age 5, parent-child problems (i.e., a latent variable assessing mothers' report chronic stress in mother-child relationships,

youth's report of chronic stress in the family domain, and youth's report of their mother's controlling behaviors) were measured at age 15, and depressive symptoms were measured using self-report at age 20. Mediation analyses revealed that parent-child problems significantly mediated the relationship between child attention problems and emerging adult depressive symptoms.

Collectively, studies indicate that dysfunctional parent-child relationships partially account for the covariation between ADHD and depressive symptoms in childhood, adolescence, and emerging adulthood. Like reward responsivity and emotion regulation, family support represents a variable that may be promising target to prevent depressive outcomes in youth with ADHD.

### **Behavioral Approaches to Understanding and Treating Depression**

Lewinsohn's Integrative Model of Depression (1974) posits that social skills deficits, minimal availability of and restricted range of positively reinforcing events lead to low rates of positive reinforcement, which in turn leads to dysphoria and somatic symptoms of depression. Even when potentially reinforcing events occur, adolescents who are low in reward responsivity may be unlikely to experience positive affect following such events. Ferster's depressive model (1973) suggests that feelings of dysphoria are then exacerbated by avoidance behavior (e.g., interpersonal situations, occupational or daily life demands and depressing thoughts or feelings). Lewinsohn's model also posits that impairment in social interactions, including parent-child relationships, may contribute to depression.

Behavioral Activation (BA) interventions for depression address maladaptive depressive behaviors by utilizing pleasant activity scheduling and mood monitoring to



help patients identify connections between engagement in activities and affective states (Dimidjian et al., 2011; Mazzuchelli et al., 2009). Particular emphasis is placed on increasing engagement in positively reinforcing activities as well as decreasing engagement in activities that maintain depression (e.g., passive rumination; Beck, Rush, Shaw, & Emery, 1979; Lewinsohn, Antonuccio, Steinmetz, & Teri, 1984), partially via social skills training. Behavioral interventions for depression also utilize problem-solving as an emotion regulation strategy to help patients access potentially rewarding events and exert control over aversive events (Dimidjian et al., 2011). The basic tenets of behavioral models and treatments for depression have received considerable empirical support (Dimidjian et al., 2011).

### **Adapting Behavioral Approaches to Prevent Depression in Adolescents with ADHD**

Existing depression prevention programs, while efficacious for adolescents in general (Garber, Webb, & Horowitz, 2009) do not explicitly target the potential mediators of ADHD and depression and have not been implemented in a format that meets the needs of adolescents with ADHD. Many current depression prevention programs focus primarily on cognitive strategies such as thought monitoring and cognitive restructuring. Cognitive approaches typically are not effective for youth with ADHD (Smith et al., 2006), perhaps because of the difficulties youth with ADHD have in maintaining attention and thinking in higher order abstractions (Bailey, 2001).

Research has demonstrated that behavioral activation components are as effective as cognitive therapy in treating and preventing depression, are easy to understand, and do not require difficult or complex cognitive skills from the patient or therapist (Cuijpers, van Straten, & Warmerdam, 2007; McCauley, Schloredt, Gudmendsen, Martell, &

Dimidjian, 2011). Furthermore, the action-oriented nature of BA is likely to be a strong match for the developmental characteristics of adolescents (McCauley et al., 2011), especially adolescents with ADHD (e.g., who tend to lack mastery in emotional and coping strategies).

In an effort to meet the needs of adolescents with ADHD who are at risk for depression, the proposed preventive intervention program utilized a behavioral approach to maximize skill building through active exercises and behavioral learning principles that require minimal didactic instruction. In addition, the BEAM program directly targeted empirically identified mediators of ADHD-MDD co-occurrence (i.e., emotion regulation, poor reward responsivity, and low parental support). Before describing the depression prevention program in detail, I first review different approaches to prevention in mental health care and the reasons for using a hybrid selective-indicated prevention framework.

### **Prevention of Mental, Emotional, and Behavioral Disorders**

Prevention of mental disorders can be defined as efforts aimed at “reducing the incidence, prevalence, recurrence of mental disorders, the time spent with symptoms, or the risk condition for a mental illness, preventing or delaying recurrences and also decreasing the impact of illness in the affected person, their families, and the society” (Mrazek & Haggerty, 1994). Preventive interventive efforts focus on reducing risk factors and enhancing factors that protect against mental-ill-health (WHO, 2004). The Institute of Medicine (IOM) provides definitions by which prevention efforts are separated into three categories: universal, selective, or indicated (O'Connell, Boat, & Warner, 2009).

As described by Mrazek & Haggerty (1994), universal prevention programs can be defined as preventive interventive efforts that are provided to the general public or a whole population group who have not been identified as having an increased risk. Selective prevention programs target individuals or subgroups that have been identified on the basis of increased risk. Lastly, indicated prevention programs target individuals who are displaying early signs, symptoms, or problematic behaviors or have identifiable biomarkers that foreshadow a mental disorder that is currently only present at minimal levels (i.e., does not yet meet criteria for a diagnosable disorder).

As described in more detail in the Methods section below, the proposed study piloted a tailored depression prevention program for adolescents with ADHD who were already experiencing depressive symptoms but not yet reaching a diagnosis of Major Depressive Disorder. A presence of elevated levels of depressive symptoms was deemed necessary so that strategies in the treatment program could be taught and practiced in the contexts of current depressive symptoms. The current dissertation study represented a hybrid selective-indicated prevention program, in that participants were selected if they had an established risk factor (ADHD) for depression (selective) as well as the presence of moderate symptoms of depression (indicated).

### **Public Health Significance**

The annual societal cost in the U.S. has been estimated at over 80 billion dollars for depression (Greenberg et al., 2003) and over 40 billion dollars for ADHD (Pelham, Foster, & Robb, 2007). The development and implementation of prevention and intervention strategies for ADHD and depression are therefore pressing public health needs. The current study represents a novel step toward addressing the needs of youth

with co-occurring ADHD and depression. Developing a tailored depression preventive intervention for youth with ADHD fits closely with The National Advisory Mental Health Council's Workgroup's report "From Discovery to Cure: Accelerating the Development of New and Personalized Interventions for Mental Illnesses." The report calls for "...adaptations of interventions for subgroups" at high risk of mental illness.

### **Summary, Research Overview, and Hypotheses**

Youth with ADHD are at risk for developing depression and three factors, namely, emotion regulation, altered reward responsivity, and low parental support, at least partially mediate that risk. Reward responsivity and emotion regulation may be distal variables that predict both ADHD and depression (Anastopoulos et al., 2011; Meinzer et al., Unpublished manuscript; Meinzer et al., 2012; Seymour et al., 2012; Seymour et al., 2014), and thus focusing on reward responsivity and emotion regulation may reduce risk processes common to both disorders. Lack of family support may develop as a consequence of the turmoil (i.e., oppositional behavior, substance abuse, and academic failure) that many parents with a child with ADHD experience. In turn, family dysfunction may lead to the development of depressive symptom increases in adolescents with ADHD. Thus, focusing on family dysfunction may reduce the risk of depression in adolescents with ADHD.

Given the elevated risk for depression seen in youth with ADHD, The BEAM (Behaviorally Enhancing Adolescents' Mood) preventive intervention was designed to treat adolescents with ADHD who experience subthreshold depressive symptoms, defined as an episode of depressed mood or loss of interest or pleasure lasting at least one week, plus at least two of the seven other symptoms of MDD (Lewinsohn, Shankman,

Gau, & Klein, 2004). Because many adolescents with ADHD do not develop MDD, a selective prevention program for all adolescents with ADHD would not be an efficient use of resources. Thus, a hybrid selective-indicated prevention program for adolescents with ADHD who are already experiencing subthreshold levels of depression (a strong predictor of subsequent MDD onset; Shankman et al., 2009) was proposed.

Given the empirical evidence discussed above, it was hypothesized that BEAM would: (a) be well received by both parents and adolescents, (b) produce reductions in depressive symptoms and parent-child conflict, and (c) improve emotion regulation, family support, and reward responsivity.

## CHAPTER III.

### METHODOLOGY

#### **Participants**

As is typical in treatment development research (Bagner, Rodriguez, Blake, & Rosa-Olivares, 2013; Chu, Colognori, Weissman, & Bannon, 2009), a sample of 6-10 adolescents (ages 12-17) as well as their parents or guardians was the projected sample size for the open trial. To be invited to a pre-treatment assessment, families were required to meet the following eligibility criteria: (a) adolescent had a lifetime history of ADHD or at least 4 symptoms endorsed by parent report on the Disruptive Behavior Disorders Rating Scale (Pelham et al., 1992), (b) adolescent displayed current subthreshold depressive symptoms as indicated by either parent-report or adolescent self-report (i.e., a T-score of 65 or greater on the Children's Depression Inventory- 2<sup>nd</sup> Edition; Kovacs, 2011), (c) families had received psychosocial/behavioral treatment for ADHD, and (d) the adolescent was currently enrolled in middle school or high school. Criterion b was included so as to target adolescents with ADHD who were at the greatest risk for depression. The presence of depressive symptoms allowed participants to practice intervention skills in the context of current depressed mood. Criterion c was made to ensure services for the existing mental health problem (i.e., ADHD) had been provided prior to working toward preventing a secondary mental health problem (i.e., future MDD). Thus, BEAM was developed as an adjuvant to behavioral treatments for ADHD.

The exclusion criteria were: (a) a history of seizures, neurological problems, pervasive developmental disorder, schizophrenia and/or any other psychotic or organic mental disorders, (b) inability to understand or communicate in English, (c) a lifetime

history of major depressive disorder (MDD) or bipolar disorder, and (d) an IQ below 80. If an IQ assessment was not previously completed at the Center for Children and Families, a brief IQ screen (Matrix reasoning, vocabulary) was completed at the pre-treatment assessment. Additionally, the presence of a lifetime history of MDD or bipolar disorder was evaluated at the pre-treatment assessment.

A consort diagram is displayed in Figure 1. Calls were made to 276 families listed in the FIU Center for Children and Families' database of families who have sought services at the center. Of those called, 134 families were unable to be contacted (i.e., left messages, no answer). Sixty-six families indicated they were not interested in participating. Seventy-six families agreed to be screened. Screening measures consisted of the Children's Depression Inventory-2 (parent and child report), demographic information (i.e., child's age, grade, past history of a diagnosis of ADHD), and the Disruptive Behavior Disorder Checklist (if a formal diagnosis of ADHD had not been received in the past). Of the 76 families screened, 65 were not eligible for participation (i.e., child was not in the required age range, child did not meet subthreshold depression criteria). Eligible families (n=11) were invited in for a pre-treatment assessment at the Center for Children and Families. Further eligibility criteria were assessed during the in-person assessment. If adolescents did not have documentation of a diagnosis of ADHD, parents were administered the Kiddie Schedule for Affective Disorders (KSADS; all adolescents who enrolled in the program had been previously diagnosed with ADHD). In all cases, both parents and adolescents were administered the KSADS mood modules to ensure adolescents did not meet full criteria for a depressive disorder.

Given that there may be differences in informant perspectives which cause parent and child self-report to be weakly to moderately correlated (Achenbach, Dumenci, & Rescorla, 2003) and that the focus of the proposed study is depression prevention, a sensitive approach was used such that adolescents were included in the open trial if either the parent or adolescent report elevated adolescent depressive symptoms.

Participants enrolled in BEAM were asked to refrain from additional psychosocial treatment services during the course of the study. Families were also asked to maintain ADHD medication status at a stable dose during the course of the study and to inform the research team if they desired to alter or begin medication during the course of the study. Medication requirements were made to ensure symptom changes and behavior changes in the open trial were not due to other psychosocial interventions or changes in pharmacological interventions.

Of the 11 parent-child dyads who completed the pre-treatment evaluation, 3 families (27.3%) did not enroll in the BEAM program. Family 2 and Family 6 contacted study staff and indicated that they were unable to participate because of conflicts with the treatment session dates and Family 11 could not be reached after they did not attend the first treatment session. Eight families (72.7%) who completed the pre-treatment evaluation enrolled in the treatment program. All families (100%) who enrolled in the first session of BEAM completed all 4 sessions of the treatment.

Demographic information on participants is summarized in Table 5. Six of eight participants (75%) were boys. Adolescents ranged in age from 12 to 16 years old ( $M=13.00$ ,  $SD=1.31$ ). The sample was primarily Hispanic (75% of adolescent participants;  $n=6$ ). Seven adolescents were White (87.5%) and one adolescent was African American



(12.5%). The majority of adolescents were born in the United States (n=7; 87.5%). In terms of past treatment, 5 adolescents (62.5%) had taken medication for ADHD in the past and 3 (37.5%) were currently taking medication for ADHD. All parents reported that they previously participated in behavioral treatment of ADHD, as per the study's inclusion criteria. Participation in behavioral treatments for ADHD ranged from approximately 3.5 years to 0.5 years prior to enrollment in the BEAM program, with 37.5% of families having participated in a behavioral treatment for ADHD in the year prior to BEAM. The specific behavioral interventions for ADHD ranged from an intensive 8-week intervention for children's and adolescent's behavioral, emotional, and learning problems combined with parent management training (The Summer Treatment Program; 62.5% of families), an less intensive version of the Summer Treatment Program focusing on social skills training for children with ADHD combined with parent management training (Saturday Treatment Program; 12.5%), a family-based intervention teaching parents and adolescents to work together to develop academic skills as well as a comprehensive home privilege program (Supporting Teens' Academic Needs Daily; 25.0%), a cognitive behavioral therapy program for affective regulation combined with parent management training for children with ADHD and Severe Mood Dysregulation (ADHD and Impaired Mood Program; 12.5%) and behavioral services outside of the Center for Children and Families (12.5% of families). Percentages total to over 100% as some families participated in multiple programs.

Parents who were active participants in the treatment program were 75% mothers and 25% fathers. Seventy-five percent (n=6) parents were Hispanic and 37.5% (n=3) of parents were born in the United States. Among the five parents not born in the United

States, the average number of years since the parent participant immigrated to the United States was 16.67 years (SD=6.62).

### **Design and Methods**

**Recruitment, Phone Screening, and Pre-treatment Assessment.** Participants for the open trial were recruited in January and February of 2014. Participants were recruited through the Florida International University Center for Children and Families (CCF) database of families. A search was conducted within the CCF database to locate all families that received services in the past for ADHD and had a child within the eligible age range (12-17 years old). The aforementioned families were called. If families did not answer, voice messages were left for families to contact the project team if interested in completing a screening or hearing more about the treatment program. Additionally, a mass email was sent to all aforementioned families with a functioning email address on file notifying families that they could contact the project team for more information or to complete a phone screen. Interested families were given a brief overview of the study and encouraged to contact the principal investigator for additional information regarding the study.

Upon speaking with parents on the phone, parents were administered a brief screen by study staff where parents were asked about the presence of ADHD and depressive symptoms in their child and whether the child or parent had received behavioral treatment for their child's ADHD in the past. Parents were administered the Disruptive Behavior Disorder Rating Scale (DBD; Pelham, et al., 1992) to determine whether ADHD symptoms were present (i.e., a score of 2 or 3 on four or more DSM-IV-TR ADHD symptoms) if their child had not been previously diagnosed with ADHD.

However, all families eligible for a phone screen (n=11) had already received a diagnosis of ADHD. The Children's Depression Inventory-2 (CDI-2) was administered separately to parents and adolescents to examine the presence of depressive symptoms. If a parent or adolescent endorsed elevated adolescent depressive symptoms on the CDI-2 (i.e., a T score of 65 or above; Kovacs, 2011), the presence of ADHD, and having received behavioral services for ADHD in the past, they were invited to the CCF to participate in assessment pre-treatment evaluation to determine study eligibility. If children indicated suicidal ideation or self-harm behaviors, a suicide risk assessment was completed by trained research assistants. Any cases of suicidal ideation were documented and discussed with project supervisors.

### **Intervention.**

Behaviorally Enhancing Adolescents' Mood (BEAM) is a group-based preventive intervention for adolescents with ADHD who are experiencing subthreshold depressive symptoms. The preventive intervention included both an adolescent component and a parent component. Parents and adolescents met for 2.5 hours on Saturday mornings for 4 weeks. The brief nature of the preventive intervention, BEAM, was designed as an adjuvant to behavioral treatments for ADHD. Parents and adolescents met in separate groups for the first 2 hours, then met in a combined group for 30 minutes to wrap-up and work on problem-solving skills through the use of role play activities and group discussions.

Sessions were run on four consecutive Saturdays in February and March 2014. A verbal commitment to attend all four sessions was required for participation in the BEAM program. Though the preventive intervention separated parents and adolescents into

different groups, the principles covered in each session coincided so that parents and children could practice material together during the week. The Saturday program approach has been used by past ADHD research studies at the CCF and has been well received and efficacious in treating ADHD (Fabiano et al., 2009; Fabiano et al., 2012). Additionally, to accommodate families who have multiple children, childcare was provided for siblings of adolescent participants. Sessions were led by graduate-level therapists and facilitated by undergraduate research assistants. While graduate-level students served as the main treatment providers, BEAM utilized a relatively simple, easy to understand design which did not require complex skills from the patient or the therapist.

**Parental Component.** Given the high heritability of ADHD (Faraone et al., 2005), it was expected that some parents would also experience ADHD symptoms. The possibility of parental ADHD symptoms was accommodated by steering away from the traditional didactic model for parent training and instead using a facilitator approach which involved role playing activities, eliciting participation from parents throughout sessions, and being especially attuned to keeping parents engaged.

The parenting component of BEAM addressed parental social support (i.e., parental warmth, involvement, and autonomy granting) because prior research indicates those constructs partially mediate the relationship between ADHD and depression (Meinzer, Hill et al., 2014). Warmth and involvement were targeted by refining problem-solving skills, improving communication skills, learning active listening techniques, and increasing the frequency of positive reinforcement (e.g., increasing praise for positive behaviors, increasing frequency of rewards for utilization of skills to reduce mood

problems). These skills were expected to lead to an increase in positive parent-child interactions. Parents also learned techniques to properly monitor their child while still allowing their child to be independent and autonomous. Autonomy granting was targeted by discussing strategies for parents to supervise their adolescent while still allowing their adolescent the opportunity to experience independence. In addition, parents and adolescents engaged in a problem-solving skills exercise to determine a plan of action to implement autonomy granting.

Tailored material for parents was incorporated on assisting their child with reward responsivity and emotion regulation deficits. Parents played a key role in reinforcing adolescents' engagement in BEAM. Parents were taught how to properly reward their child for positive activity engagement and other tasks assigned by the BEAM preventive intervention with the short term goal of elevating the adolescent's mood and the long term goal of preventing MDD. Adolescents with depressive symptoms often lack motivation and optimism and withdraw from activities that previously gave them pleasure or enjoyment (Diamond, Siqueland, & Diamond, 2003). Therefore, it is important that parents provide external reinforcement for their child's participation in activities until they regain their natural reinforcement qualities. Lastly, to parallel the training adolescents received in emotion regulation strategies, parents were trained in ways to help their adolescent complete pleasant activities and utilize the stress management techniques which were then reviewed at the subsequent treatment session. Once parents and adolescents began to acquire skills targeted in each session of the preventive intervention, they joined together at the end of each session to practice skills learned and review assignments.

**Adolescent Component.** The preventive intervention consisted of multiple modules tailored toward the specific needs of adolescents with ADHD and included mediators of the link between ADHD and depression symptoms (i.e., emotion regulation, reward responsivity, and parental support). Lewinsohn's Behavioral Model of Depression (1974) indicates that dysphoria and somatic symptoms of depression are consequences of a low rate of positive reinforcement. Low rates of positive reinforcement can result from social skills deficits, minimal availability of potentially reinforcing events, and restricted range of reinforcing events. BEAM targeted the first contributor to low rates of positive reinforcement by fostering participation in a higher frequency of positively reinforcing events.

Adolescents created an inventory of feasible activities that bring them pleasure. These activities came from a broad range of areas. For example, adolescents selected social activities (e.g., hanging out with friends), physical activities (e.g., going for a bike ride), creative activities (e.g., drawing), and relaxing activities (e.g., reading a book) so that they had the opportunity to participate in a positively reinforcing activity regardless of the situation or setting (e.g., at home, after school). Adolescents created a rewards inventory that parents used to reinforce their child for participating in these engaging activities.

Also, the preventive intervention used in-vivo social skills reinforcement through group-based activities such as sports and problem-solving. Adolescents were rewarded with points for displaying positive behaviors to other adolescents during sporting activities (e.g., helping a fellow adolescent, complimenting or praising other adolescents). Staff awarded these points to adolescents throughout session when they exhibited

positive reinforcing behavior towards other adolescents in group discussions and towards parents during combined parent-child sessions. Accumulated points were used towards a weekly prize (e.g., candy). In-vivo training where adolescents practiced problem-solving and interacting with their parents and other adolescents with guidance and feedback from staff was expected to generalize to child-parent interactions and thereby contribute to improving the parent-child relationship. In addition to providing in-vivo social skills reinforcement, the recreational activities served as a way to engage adolescents, a group that is often difficult to engage in treatment (Liddle, 1995). The expectation was that providing an active, less-traditional component in treatment would help adolescents “buy into” treatment and look forward to sessions.

Lastly, the adolescent component of BEAM incorporated emotion regulation strategies. Pleasant events scheduling is an emotion regulation strategy (Linehan, 1993) common to behavioral interventions for depression and was incorporated in BEAM. Adolescents learned skills through practice with frustration tasks during session and subsequent evaluation of their performance on the tasks. Problem-solving strategies were also taught through practice alone and with their parents using real life examples. A general synopsis of all sessions is provided in Table 3. An overview of session one is provided below as an example of how parent and adolescent sessions were conducted in BEAM.

***Adolescent session 1.*** After all adolescents arrived, an icebreaker activity was introduced. Adolescents were divided into pairs or groups of three and were told to interview their partners and then introduce their partners to the group (e.g., where are you from, what are your hobbies, do you have any pets). After the adolescents were

acquainted, a brief introduction to the program was provided. The rules for the program were explained to adolescents and included being respectful of others, staying on task, and staying in your assigned seat or area. The adolescents were then prompted to express any other rules that they felt should be included. The contingency management system was then introduced. Adolescents received a ticket for each activity where they received two or less rule violations. Adolescents also received a ticket for each contribution made during activities, each homework assignment completed, and each positive activity engaged in during the week. These tickets were then collected at the end of each Saturday session for their pick of a prize (candy).

Following an explanation of the program structure, adolescents were provided a psychoeducational overview of mood problems and depression. Troubles with anger and sadness were normalized and adolescents shared things that typically cause anger or sadness. Staff described the downward and upward emotional spirals (see figure 2; Clarke, Lewinsohn, & Hops, 1990). The downward spiral indicates that feelings of unhappiness often lead to spending more time alone which leads to feelings of depression. Depressed mood leads to less involvement and activity which causes more feelings of depression which then exacerbates the lack of activity. The upward spiral was discussed as a method for breaking the downward spiral by doing an activity that will make one feel successful and happy. Positive feelings contribute to being more social which in turn boosts one's mood even more. Positive mood can increase success with school work which then can increase feelings of happiness even more. Vignettes were used to help illustrate these principles. Adolescents then gave personal examples of when they had experienced both downward and upward spirals.



The next portion of session 1 consisted of an introduction to mood journaling. A seven point Likert scale was shown to adolescents ranging from 1 to 7. The scale was compared to a thermometer in that 1 represented the lowest end of the spectrum and 7 represented the highest end of the spectrum. Mood anchors were then created for each adolescent. In their workbook, adolescents wrote down the best they have ever felt in their life to represent a 7 and the worst they have ever felt in their life to represent a 1. Adolescents were then tasked with filling out the mood scale (circling a number 1-7) each day of the week. Additionally, adolescents were asked to fill out their mood diaries at the same time every day. Each adolescent indicated when they would fill it out and where they would keep their mood journal so that they would remember to complete it daily.

Adolescents then had a break from the classroom when the recreational activity was introduced. A pre-activity discussion occurred wherein staff facilitated a discussion as to what the rules of the sports were and what specific skill players should focus on during the game. Adolescents warmed-up and practiced the skill discussed during the pre-activity discussion. Following a 5 minute warm-up, a structured sports activity was played. After 30 minutes, the game ended and a post-activity discussion took place covering progress made during the game as well as problems that occurred and skills to be worked on in the future.

The last component of session 1 for adolescents was an introduction to pleasant activity scheduling. Participating in activities that are enjoyable is one method for preventing a downward spiral and initiating an upward spiral. Adolescents were tasked with creating lists of activities in several categories (i.e., social activities-engaging in enjoyable activities with other individuals, productive activities-engaging in activities

where something can be accomplished or involve exercising). Additionally, adolescents generated a list of rewarding experiences valued at \$5 or less, or ideally free (e.g., having their favorite meal for dinner, getting ice cream, half an hour of electronics time), that could be used as reinforcers.

*Parent session 1.* After all parents arrived, parents were divided into pairs where parents interviewed one another and introduced their partner to the group. After parents were acquainted, the facilitator for the parent group explained to parents that she would not be lecturing but rather facilitating discussion with the families.

The facilitator provided psychoeducation to parents about the high rates of co-occurring ADHD and mood problems, as well as the varying presentations of depression. Parents were queried as to what comes to mind when they hear the word depression. While parents indicated sadness, withdrawn, bouts of crying, most parents did not recognize that feelings of irritability and anger also can be features of depression. The last portion of the psychoeducational discussion was highlighting the variables that have been found to account for ADHD and depression covariation (i.e., family support, emotion regulation, and reward responsivity). The parent group facilitator explained that the purpose of the parenting group was to help their adolescent use the strategies that they would learn in the program as well as to help improve the parent-child relationship.

Though parents had received behavioral treatments for ADHD in the past, a brief overview of parent management training was provided. Topics included positive and negative consequences for their adolescent's behavior, reinforcement, praise, consistency, and clear commands. The parent management training component was designed to serve

as a refresher for the principles that they should have heard in the behavioral treatment programs for ADHD.

The last portion of parent session 1 consisted of discussions on the behavioral principles of depression. The downward and upward emotional spirals were explained (see Figure 2 and adolescent session 1 for more information) and parents offered examples of how the behavioral theory related to their child's life. Like in adolescent session 1, parents discussed different types of activities (i.e., social and productive) that can be completed to boost mood and prevent a downward spiral. Parents also discussed the importance of reinforcement of positive behaviors including engaging in pleasant activities during periods of low mood or downward spirals. Parents then created a list of pleasant activities they believed their child would enjoy, as well as a list of small rewards they believed would be effective reinforcers of their child's positive behaviors.

**Combined Adolescent and Parent Component, Session 1.** Before the combined activity, adolescents reviewed the session content by explaining to parents what they had learned during the session. After having adolescents explain the concept of pleasant activity scheduling, adolescents and parents played a short game in which they received points for each activity that appeared on each of their lists of activities and reinforcements (i.e., points for each matching activity). Parents and adolescents discussed differences in activities on their respective lists and the team with the highest points was announced to the group. Lastly, the tickets adolescents earned for homework completion, good behavior, and contributions within sessions were drawn for the candy raffle.

## Measures

### **Patient Oriented Outcomes.**

*Depressive symptoms.* Depressive symptoms were measured via child and parent report using the Children's Depression Inventory self-report (CDI-2) and parent-report (CDI-2:P) versions (Kovacs, 2011).

The CDI-2 is a 28 item self-rating scale used to assess depressive symptoms in 8-17 year olds. The CDI-2 asks informants to rate the presence of depressive symptoms on a 4 point Likert scale from 0 (absence of the symptom) to 3 (presence of symptom at a severe level); total summed scores can range from 0 to 54. For each of the 28 items, the participants are asked to choose one of three sentences that best describes them in the past two weeks. Example items include participants picking from "I am sad once in a while," "I am sad many times," and "I am sad all the time," and "I feel cranky all the time," "I feel cranky many times," and "I am almost never cranky." T-scores above 65 are considered elevated in the clinical range.

The Children's Depressive Inventory: Parent Version (CDI-P) is a corresponding parent-report version of the CDI-2. Parents are asked to evaluate the presence of mood disturbances in their child in the last 2 weeks. The CDI-P consists of 17 items that are answered on a 4 point Likert scale (not at all, some of the time, often, much or most of the time). Sample items include "My child looks sad," "My child is cranky or irritable," and "My child seems lonely." The 17-item questionnaire yields a total score. As with the CDI-2 self-report version, T-scores above 65 are considered clinically elevated.

According to (Bae, 2012), the CDI-2 child and parent versions show high or acceptable levels of internal consistency with Cronbach's alpha ranging from .67 to .91

for both sexes and all age groups. The CDI-2 shows excellent short-term stability over 2- to 4- week time intervals. Convergent validity has been demonstrated via significant correlations with several other measures of depression symptoms (i.e., Conners Comprehensive Behavior Rating Scales, Beck Depression Inventory-Youth Version).

***Reward responsivity.*** Adolescents' engagement in pleasurable activities was measured using the Tripartite Pleasure Inventory (Leventhal, 2012). The TPI describes 12 types of experiences that span interest/pastimes, social interaction, sensory, and goals/mastery (e.g., learning new information or skills, romantic or sexual activities). For each experience, participants are asked to rate how much pleasure/happiness/enjoyment they usually feel in response to these experiences (hedonic responsivity), how often they usually engage in these experiences (hedonic engagement), and how strongly they usually want to engage in these experiences (hedonic desire). Individuals base their responses on their usual perceptions and behaviors. For each subscale, items are ranked on a 5-point Likert scale ranging from 0 (no pleasure) to 4 (extreme pleasure), with higher scores indicating greater pleasure. A mean score is then computed for the subscale, resulting in averages ranging from 0 to 4. The hedonic responsivity subscale was used to measure reward responsivity in the current study as scores on this subscale accounted for the covariation between ADHD and depressive symptoms in prior research (Meinzer, et al., Unpublished manuscript; Meinzer, et al., 2012). The TPI-hedonic responsivity subscale has demonstrated adequate internal consistency ( $\alpha$ s ranging .77 - .87). Concurrent and convergent validity have been demonstrated via significant correlations between depressive symptoms and other measures of hedonic capacity in college student and adult general population samples (Leventhal, 2012; Leventhal et al., 2012).

***Emotion regulation.*** Adolescent self-report of emotion regulation was measured using the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS is a 36-item measure that covers six domains of emotion regulation (ER): nonacceptance of negative emotions, inability to engage in goal-directed behaviors when distressed, difficulties controlling impulsive behaviors when distressed, limited access to ER strategies perceived as effective, lack of emotional awareness, and a lack of emotional clarity. Adolescents are asked to respond to statements on a 5 point Likert Scale ranging from 1 (almost never; 0-10%) to 5 (almost always; 91-100%). Sample items include, “I am always clear about my feelings,” “When I’m upset, I acknowledge my emotions,” and “When I’m upset, I lose control over my behaviors.” Internal consistency has been shown to be high ( $\alpha=.93$ ). The DERS also demonstrates high test-retest reliability over a period ranging from 4 to 8 weeks (Gratz & Roemer, 2004).

Parent-report of emotion regulation was evaluated using the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997). The ERC is a 24-item measure completed by caregivers rating their adolescent’s ability to regulate emotions. Items are rated on a 4 point Likert scale from 1 (rarely/never) to 4 (almost always). Sample items include, “Is prone to angry outbursts/tantrums easily,” “Can modulate excitement in emotionally arousing situations (for example, may speak in an angry tone of voice or respond fearfully),” and “Can recover quickly from episodes of upset or distress (for example, does not pout or remain sullen, anxious, or sad after distressing events).” The ERC contains two factors: a lability/negativity factor which assesses emotional intensity and mood swings, and an emotion regulation factor which assesses the ability for one to regulate and understand emotion. The lability/negativity factor will be used in the current

study as scores on this subscale mediated the association between ADHD and depressive symptoms in past research (Seymour et al., 2012). The internal consistency for the lability/negativity subscale has been found to be excellent at  $\alpha=.96$  (Shields & Cicchetti, 1997).

A behavioral task was used to obtain a measure of adolescents' stress reactivity and ability to regulate emotions during a stressful situation. The Trier Social Stress Test for Children (TSST-C; Buske-Kirschbaum et al., 1997) is a psychosocial stress protocol adapted from the standardized stress paradigm designed for use in adults in laboratory studies (Kirschbaum, Pirke, & Hellhammer, 1993). The TSST-C is comprised of a public speaking and arithmetic tasks performed in front of an audience of confederates. Participants provided a rating of how much they feel stressed/nervous/insecure using a visual analog scale (VAS) prior to completing any task. Next, adolescents were read the beginning of a story and told that they had 5 minutes to prepare a telling of the rest of the story that had to last 5 minutes. After their 5 minutes of preparation time and 5 minutes of storytelling, participants provided another rating of stress/anxiety/insecurity using a VAS. Participants were then given an oral arithmetic task for 5 minutes. Following, the completion of the arithmetic task, participants provided one final rating on the VAS. VAS scores ranged from 0 to 100 depending on where respondents placed their marking on the 10.0 cm line. VASs have been routinely used to measure child anxiety (Chen, Craske, Katz, Schwartz, & Zeltzer, 2000; Noel, Chambers, McGrath, Klein, & Stewart, 2012).

***Family support.*** The Family Assessment Device (FAD; N. B. Epstein, Baldwin, & Bishop, 1983) is used to assess the organization of the family and the transactions

among family members. The FAD is comprised of seven subscales (general functioning, problem-solving, communication, roles, affective responsiveness, affective involvement, and behavior control). The problem-solving, communication, affective responsiveness, and affective involvement subscales will be the focus in the current study. Parents are asked to rate statements on a 4 point Likert scale from strongly agree (4) to strongly disagree (1). Sample items include, “Making decisions is a problem for our family,” “We confront problems involving feelings,” and “We confide in each other.” Support for the subscales’ internal consistencies, test-retest reliabilities, and concurrent validities has been demonstrated (Miller, Bishop, Epstein, & Keitner, 1985).

The Perceptions of Parents Scale (POPS) is a 42-item scale assessing adolescents’ perceptions of their parents’ warmth, involvement, and autonomy granting. Adolescents rated 21 items for mothers and an identical 21 items for fathers. Each item is rated on a 7-point Likert scale ranging from 1 (not at all true) to 7 (very true). Sample items for the POPS include, “My mother accepts me and likes me as I am,” “My mother tries to tell me how to run my life,” and “My mother often seems too busy to attend to me.” The POPS measure originates from an unpublished dissertation study (Robbins, 1994) but is adapted from the child version of the scale described in Grolnick et al. (1991). It has been used in numerous research studies with adolescent and college student samples (e.g., Niemiec et al., 2006; Padilla-Walker & Nelson, 2012). Internal consistency from these previous studies ranges from  $\alpha = 0.80$  to  $\alpha = 0.90$  for all subscales of the POPS for both mothers and fathers. Convergent validity has been demonstrated via correlations with parent reported measures of the same construct (Kins, Beyers, Soenens, & Vansteenkiste, 2009).



If an adolescent did not have contact with one parent, they denoted their lack of contact on the questionnaire and left the items for that parent blank.

The Conflict Behavior Questionnaire-20 (CBQ-20; Robin & Foster, 1989) assesses the parent-teen relationship through both parent and adolescent versions. For the adolescent version, respondents were asked 20 questions about their relationship with their mother and the identical 20 questions about their relationship with their father. If adolescents have not had contact with their mother or in the last month they indicated so and left these questions blank. Respondents were asked to rate statements about the parent-teen relationship on a 1 to 5 Likert scale (from strongly agree to strongly disagree) pertaining to their interactions in the last month. Sample items include, “The talks we have are frustrating,” “At least three times a week, we get angry at each other,” and “We almost never seem to agree.” If an adolescent did not have contact with one parent, they denoted their lack of contact on the questionnaire and left the items for that parent blank. Similar to the adolescent version of the CBQ, the parent-version consists of 20 questions evaluating conflict in the parent-adolescent relationship in the past month. Parents were asked to rate statements on a 1 to 5 Likert scale (from strongly agree to strongly disagree). Sample items include, “My son or daughter is easy to get along with,” “My son or daughter often seems angry at me,” and “My son or daughter and I compromise during arguments. Higher scores indicate more parent-adolescent conflict. Higher scores indicate more parent-adolescent conflict. The CBQ has been demonstrated to be internally consistent, reliable, and able to discriminate between levels of distress present in families. Additionally, the CBQ measure has been moderately correlated with direct observation of

family interactions and is sensitive to changes after treatment (Prinz, Foster, Kent, & O'Leary, 1979; Robin, 1981; Robin & Weiss, 1980).

A series of behavioral intervention tasks were also included to measure family support and problem-solving skills. These tasks were adapted from the Family Check-Up (Dishion & Kavanaugh, 2003). All tasks were video recorded and coded by trained observers. In the first task, the parent and teenager were informed that they should relax together and have fun playing cards which were provided. In the second task, the parent was informed that the teen would have five minutes to study for a vocabulary quiz, and that the parent should supervise study time. The dyad was given the vocabulary list, a pen, and flash cards. After five minutes, the student was given the quiz, which was untimed. In the last task, the parent-teen dyad recalled an argument or problem that occurred within the last week. The dyad was informed that they should spend 10 minutes trying to resolve the argument.

**Satisfaction.** The Client Satisfaction Questionnaire (CSQ-8; Larsen, Attkisson, Hargreaves, & Nguyen, 1979) is an 8-item self-report scale designed to evaluate participant satisfaction with an intervention and likelihood of recommending it to others. The scale was administered to both parents and adolescents. It has demonstrated excellent internal consistency and good convergent validity, correlating with measures of drop out, number of sessions attended, and self-reported global improvement.

Families also participated in post-assessment and follow-up semi-structured interviews. Interviews were conducted with the parent and adolescent independently and followed a specified protocol consisting of questions and probes. Post-assessments covered material about the format and presentation of the BEAM program, skills families

found helpful, and what changes, if any, have been noticed. The follow-up assessments gathered information regarding the skills parents did or did not continue to use and what changes, if any, parents had noticed since the previous assessment. All interviews were audio recorded and transcribed.

***Treatment compliance.*** Family attendance at weekly sessions was used to evaluate treatment compliance. Parents' and adolescents' adherence to BEAM were also measured by the number of weekly homework assignments completed.

### **Provider Oriented Outcomes.**

***Adherence.*** Parent and child treatment sessions were either audio or video recorded each week. A trained research assistant viewed (or listened to) all recordings and completed a check to evaluate the extent to which staff members adhered to the treatment manual for each manualized session. The trained research assistant evaluated the extent to which key concepts (described in the beginning of each manualized BEAM session) were covered by treatment providers in both the parent and adolescent sessions.

***Feasibility.*** Feasibility was assessed through clinician contact notes following each manualized session. Supervision notes were collected from staff members that contained information regarding the staff's perception of whether all material was covered adequately, what components went well, what barriers were present, solutions to these barriers, actions planned for the next session, what barriers may arise, and potential solutions to those barriers.

### **Data Analysis**

**Quantitative Data Analyses.** There were few missing data (6.2%). Missing value analyses were conducted within the Statistical Package for the Social Sciences (SPSS).

Separate missing value analyses were conducted on follow-up data as some values were missing deliberately (i.e., family did not complete follow-up assessment). Following nonsignificant results of Little's Missing Completely at Random (MCAR) on data from post-treatment and follow-ups, data were assumed to be missing at random. Missing data were accommodated using multiple imputation averaging across 10 imputation sets (Little & Rubin, 1989). In SPSS, paired-samples T-tests were conducted on outcome variables (i.e., depressive symptoms, reward responsivity, emotion regulation, and family support) to evaluate whether scores were significantly different at post-treatment and follow-ups as compared to pre-treatment scores. Effect sizes (Cohen's *d*) were calculated to determine the strength of observed effects.

Given the small sample used in the current open trial, reliable change indices (RCI; Jacobson & Truax, 1991) were used to examine individual clinically significant changes in outcome measures (i.e., depressive symptoms, emotion regulation, family support, and reward responsivity), as has been done in previous pilot work with small sample sizes (Bagner et al., 2013; Chu et al., 2009). Reliable change indices is calculated using pre-treatment scores, post-intervention scores, and standard deviations of the normal population and reliabilities of the measures. Specifically,  $RCI = \frac{x_1 - x_2}{S_{diff}}$  where pre-treatment and post treatment scores are represented by  $x_1$  and  $x_2$ , respectively. The standard error of the difference between the two scores is equivalent to  $S_{diff}$ . In other words,  $S_{diff} = \sqrt{2(SE)^2}$ . Further, the standard error (SE) is calculated using the reliability of the measure ( $r_{xx}$ ) and the standard deviation of the normal population ( $s_1$ ) in that  $SE = s_1\sqrt{1 - r_{xx}}$ . An RCI greater than or equal to 1.96 indicates reliable change at

$\alpha = 0.05$ . Though test-retest is the preferred reliability statistic (Jacobson & Truax, 1991), Cronbach's  $\alpha$  has also been used in RCI analyses (e.g., Parabiaghi, Barbato, D'Avanzo, Erlicher, & Lora, 2005). Therefore in the current study, Cronbach's alpha was only used when test-retest reliability was not available.

In the current study,  $s_1 = 10$  and  $r_{xx} = .89$  for CDI-2 and  $s_1 = 10$  and  $r_{xx} = .87$  for CDI-P (Kovacs, 2011). For reward responsivity (TPI),  $s_1 = 0.5$  and  $r_{xx} = 0.77$  (Leventhal, 2012). In analyses for emotion regulation,  $s_1 = 4.8$  and  $r_{xx} = 0.96$  for the ERC (Shields & Cicchetti, 1997) and  $s_1 = 18.79$  and  $r_{xx} = 0.96$  for the DERS (Gratz & Roemer, 2004). Numerous measures were used to measure various facets of family support. For the 3 versions of the CBQ,  $s_1$  ranged from 5.0 to 6.0 and  $r_{xx}$  ranged from 0.37 to 0.84. Test-retest reliability from the long form of the CBQ was used because there is no published reliability data for the CBQ-20. The CBQ-20 scores correlate 0.96 or more with scores from the long form (Robin & Foster, 1989). For the four scales used from the FAD,  $s_1$  ranged from 0.43 to 0.55 and the  $r_{xx}$  ranged from 0.66 to 0.76 (Miller, et al., 1985). For the POPS maternal and paternal warmth subscales,  $s_1$  ranged from 0.86 to 0.99 and the  $r_{xx}$  ranged from 0.88 to 0.90 (Niemic, et al., 2006). Lastly, seven scales were gathered from the disagreement resolution Task using the Interaction Behavior Code and used in RCI analyses. The  $s_1$  ranged from .047 to 0.83 and .825 to 0.933 for  $r_{xx}$ .

Additionally, case descriptions including demographics, compliance to BEAM, and within-subject changes for outcome variables (i.e., depressive symptoms, emotion regulation, family support, and reward responsivity) of each family were developed in the order that the families are enrolled in the study.

Descriptive statistics were used to examine parent and adolescent satisfaction with BEAM. Additionally, the number of sessions attended and number of completed homework sheets were used to evaluate parent and adolescent compliance to the BEAM preventive intervention. Fidelity (accuracy) was evaluated through descriptive statistics of staff adherence to BEAM protocol.

Parent-child interaction tasks were coded using two coding schemes. The card playing was coded globally using an adaptation of the Early Parenting Coding System (EPCS; Winslow, Shaw, Brums, & Kiebler, 1995). The EPCS can be used to generate positive and negative codes for both parental and child behavior. Parental behavior received codes for hostility, warmth/positive affect, strictness/punitiveness, involvement, intrusiveness, permissiveness, and sensitivity/responsiveness. The child coding system was similar to the parental coding system, providing the following positive and negative codes for behavior: hostility/aggression, positive affect, involvement, responsiveness. A score from a 4 point Likert scale was provided to each of the codes. The academic interaction task was coded using an abbreviated version of the EPCS coding scheme to code only behaviors that were relevant to the academic study task. Scores were totaled across the card and academic tasks. In the current study, global codes were generated. Reliability for the coding ranged from fair to good. The kappa values for the global codes were .73, .54, .70, and .49 for adolescent hostility, adolescent positive behaviors, parental control, and parent positive behaviors.

The disagreement resolution task was coded using the Interaction Behavior Code (IBC; Prinz & Kent, 1978). The IBC consists of 22 items that are evaluated on the presence or absence of behaviors using a 0 or 1 for a no or a yes, respectively. An

additional 10 items are rated on a scale of 0 (no), .5 (little), and 1 (yes). Ratings are completed separately for the parent and the adolescent. Summary scores are computed for positive and negative mother and adolescent behavior by summing items for each rater, dividing by the number of items, and then averaging across all of the raters. The final 4 items of the IBC evaluate the dyad's overall effectiveness, resolution of the problem, friendliness, and hostility. These items are averaged individually among raters. Eight trained undergraduate research assistants received extensive training before beginning any coding. Coders were required to memorize all operational definitions of codes verbatim. After having passed the first portion of training, coders completed two training videos and compared their answers to a master key with the principal investigator to resolve any discrepancies. Coders then reviewed each of the training videos one final time. Inter-rater reliability fell within good to excellent levels for three of four scales. Kappa values were .73, .86, .82, and .42 for parent negative behaviors, parent positive behaviors, teen negative behaviors, and teen positive behaviors, respectively. Global ratings were also included for the dyad's overall effectiveness at problem-solving, friendliness during the interaction, and criticism during the interaction. Kappa values for these measures were .78, .51, .76, and .77 for effectiveness, friendliness, criticism, and degree of outcome, respectively.

**Qualitative Analyses.** All post-treatment and follow-up interviews were transcribed by undergraduate research assistants and verified by undergraduate or doctoral level students. A doctoral level graduate student created two codebooks (one for parent interviews and one for child interviews) through hierarchical open coding after having surveyed all transcripts. An independent doctoral level graduate student reviewed

the codebook and provided feedback that resulted in revisions to both BEAM codebooks. A case study approach (Yin, 2003), using exploratory and descriptive procedures was followed. A Ph.D. level graduate student and a trained post-baccalaureate research assistant coded each transcript independently using the NVivo platform to rigorously analyze interview data. A selection of interviews was reviewed to ensure codes were applied consistently across coders.



## CHAPTER IV.

### RESULTS

#### **Intervention Feasibility and Satisfaction**

**Attendance.** For the 8 families that enrolled in the BEAM program, pre-assessments ranged from 3 days to 21 days before the start of treatment ( $M=10.13$ ,  $SD=6.40$ ). Consistent with a per protocol approach to data analysis, a threshold level of attendance was established a priori to ensure families received a majority of the treatment for their data to be included in analyses. Given the brief nature of the program, only families that attend three or more sessions (75%) were used to evaluate outcome data. A per protocol approach rather than an intent to treat approach is recommended for initial intervention development (Feinman, 2009; "ICH Harmonised Tripartite Guideline. Statistical principles for clinical trials. International Conference on Harmonisation E9 Expert Working Group," 1999).

All eight adolescents attended the 4 BEAM sessions. Six of the parents attended all 4 of the BEAM sessions. One parent completed 3 of the BEAM sessions and their spouse attend in their absence. One parent completed 2 of the BEAM sessions but their spouse attended all 4 sessions.

All families ( $n=8$ ) completed a post treatment assessment. Though post-assessments were designed to occur within one week following the end of treatment, they occurred 4 to 60 days after the final treatment session ( $M= 19.25$ ,  $SD= 19.26$ ). A majority (62.5%) of families completed the post assessment within 2 weeks of the last treatment session.

Seven (87.5%) families completed the first follow-up assessment. The first follow up assessment was designed to occur 6 weeks (42 days) after the post-treatment assessment. These assessments occurred 43 to 84 days after the post treatment assessment (M= 60.29, SD= 13.39).

Five (62.5%) families completed the second follow-up assessment. The second follow-up was designed to occur 6 weeks (42 days) after the first follow-up assessment. The second follow-up assessment occurred between 49 to 98 days following the first follow-up assessment (M= 64.40, SD= 19.42).

Every effort was made to abide by the assessment schedule and to retain all participants for each assessment. However, three families were lost to attrition by the second follow-up assessment and conflicts with families' schedules hampered abilities to schedule assessments within the intended time frames.

**Satisfaction.** The CSQ-8 measures patient satisfaction on a scale of 8-32. Adolescents and parents reported high satisfaction with the BEAM program with scores ranging from 17 to 32. Adolescents reported an average score of 26.13 (SD=5.22) and parents reported an average score of 26.63 (SD=5.31). Additional information relevant to patient satisfaction will be presented later in the dissertation in qualitative analyses of semi-structured interviews with parents and adolescents.

**Integrity.** Adolescent and parent sessions were video or audio recorded, with the exception of one adolescent session not recorded due to equipment malfunction. An undergraduate research assistant conducted a check of integrity. All parent and adolescent sessions were coded for each treatment week. Accuracy in the current study was defined as the percent to which key concepts (described in the beginning of each manualized

BEAM session) were covered by treatment providers. Accuracy for the BEAM adolescent sessions and BEAM parent sessions was 94% and 100%, respectively.

**Feasibility.** Supervision notes were collected from staff. Staff noted that children were especially engaged during the recreational activities and that adolescents were generally on task. As sessions progressed, staff noted that adolescents more frequently and spontaneously shared information about their mood and personal struggles. Several barriers to completing sessions, as well as potential resolutions to those barriers, were recorded in notes. Examples included time management (e.g., sessions not starting on time due to waiting for families to arrive), classroom control over general off-task behavior interruptions (e.g., ignoring certain behaviors, better enforcement of classroom rules, better assignment or description of staff duties), and incentives and motivation for adolescent participation (e.g., providing ways to involve less motivated/engaged adolescents, more reinforcement for cooperation during sporting activities).

The doctoral student who served as the parent group facilitator noted that parents were generally engaged and participated in discussions. For example, in group discussions parents routinely shared their experiences during the week prior, their successes or difficulties using the skills taught in BEAM, and potential solutions to barriers to using the skills. Families also seemed to understand concepts presented in BEAM as evidenced by parents describing their use of specific skills taught in BEAM and in the influence of their behaviors on their child's mood and behaviors. Specifically, parents often commented on how their behavior contributed to their child's downward mood spiral. For more discussion of the skills parents reported using after the BEAM

program, see Theme 5 in the “Qualitative Analysis of Semi-Structured Interviews” section of the results.

Barriers to using skills taught in BEAM and to efficiently running the BEAM sessions arose during the parent group sessions. First, the concept of rewarding adolescents for engaging in a pleasant activity to boost mood was difficult for parents to understand and implement. The rewards were often the same as the pleasant activity. Rather than having parents reward their adolescent for pleasant activity scheduling, the group facilitator suggested encouraging adolescents to engage in pleasant activities and leave out the rewarding component. Second, parent role plays during group sessions were not well received. A lack of structure for the role play tasks resulted in parents often talking in general terms about their children and problems, not practicing delivery of the targeted skills. A potential solution to the lack of engagement in role plays would be to provide parents with more concrete instructions and a more specific scenario to role play during session. Lastly, the parent group facilitator noted that occasionally parents discussed problems secondary to ADHD (e.g., oppositional behavior, academic concerns). Though having completed behavioral treatment for ADHD, it seemed as though some parents needed a more thorough ADHD skills refresher than the one provided in the BEAM program. The parent group facilitator suggested having an explicit discussion prior to starting the BEAM program with all parents reiterating the purpose of the group is for enhancing mood, and then reminding parents of the purpose of BEAM if and when discussions veer off track. Alternatively, the parent group facilitator suggested BEAM be implemented concurrently with parent training classes for ADHD to address ADHD and mood concerns simultaneously.

In spite of these barriers, the parents seemed to grasp and implement the mood enhancing concepts including encouraging pleasant activity scheduling, problem-solving skills, granting autonomy, communication skills, active listening, and how to continue to use these skills as their children transition from adolescence into adulthood.

### **Outcome Trends for Depressive Symptoms**

Adolescent depressive symptoms were measured using adolescent and parent versions of the CDI-2 at pre-, post-, and both follow-up assessments. Results from paired samples T-tests, effect sizes, and RCI are shown in Table 6. Mean depressive symptom levels at each assessment wave are displayed in Figure 3.

**Parent rating of adolescent depressive symptoms.** In regard to parent rated adolescent depressive symptoms, a significant large effect was found for depressive symptoms at post-treatment as compared to pre-treatment ( $d=1.46$ ,  $p<.05$ ). Adolescents continued to display significantly lower depressive symptoms at the first follow-up as compared to pre-treatment ( $d=1.02$ ,  $p<.05$ ). Parent rated adolescent depressive symptoms at the second follow-up did not significantly differ as compared to pre-treatment, although the mean score at the second follow-up was lower than the mean score at pre-treatment ( $d= 1.07$ ,  $p= .323$ ).

**Adolescent self-rating of depressive symptoms.** In regard to adolescent self-rated depressive symptoms, a nonsignificant trend level medium effect was found for depressive symptoms at post-treatment as compared to pre-treatment ( $d=0.61$ ,  $p=.07$ ). Mean scores at the first follow-up ( $d= .29$ ,  $p= .15$ ) and second follow-up ( $d= .32$ ,  $p= .16$ ) assessments were lower than the mean score at pre-treatment but were not significantly different.

### **Outcome Trends for Reward Responsivity**

The TPI was used to measure adolescents' reward responsivity. Results from paired samples T-tests, effect sizes, and RCI are depicted in Table 7. Mean reward responsivity levels at each assessment wave are displayed in Figure 4. A significant large effect was found for adolescent self-reported reward responsivity at post-treatment as compared to pre-treatment ( $d= 1.39$ ,  $p<.05$ ). At the first follow-up assessment, a nonsignificant trend level large effect was found for reward responsivity at the first follow-up compared to pre-treatment ( $d= .97$ ,  $p=.08$ ). At the second follow-up assessment, the mean score was lower than the mean score at pre-treatment but was not significantly different ( $d= 0.72$ ,  $p=.11$ ).

### **Outcome Trends for Emotion Regulation**

Adolescents' emotion regulation was measured using adolescent and parent report on the DERS and ERC, respectively. Results from paired samples T-tests, effect sizes, and RCI are depicted in Table 8. Mean emotion regulation levels at each assessment wave are displayed in Figure 5. Additionally, the TSST-C was used a behavioral measure of emotion regulation.

**Parent rating of adolescent emotion regulation.** In regard to parent rated adolescent emotion regulation levels, a significant large effect was found for emotion regulation levels at post-treatment as compared to pre-treatment ( $d=0.86$ ,  $p<.05$ ). Adolescents continued to display significantly more emotion regulation at the first follow-up as compared to pre-treatment ( $d=0.89$ ,  $p<.05$ ). The mean score for emotion regulation was higher at the second follow-up as compared to pre-treatment ( $d= 0.30$ ,  $p=.25$ ) but mean scores did not significantly differ.

**Adolescent self-rating of emotion regulation.** In regard to self-rated emotion regulation levels, adolescents did not show significant differences at post-treatment ( $d=0.07$ ,  $p=.55$ ) or the first follow-up ( $d=0.37$ ,  $p=.14$ ) scores as compared to pre-treatment though mean scores at post-treatment and follow-up were lower than the mean at pre-treatment. At the second follow-up assessment, a nonsignificant trend level large effect was found for emotion regulation as compared to pre-treatment ( $d=1.17$ ,  $p=.07$ ).

**Behavioral measure of emotion regulation.** No significant differences were found on TSST-C scores at post-treatment or either follow-up as compared to pre-treatment. As described in more detail in the qualitative results section, adolescent participants disliked the stress task. Adolescents were often not engaged in the activity and it did not seem to produce an adequate stress response. Many adolescents seemed to be oppositional toward completing the task properly (e.g., did not want to take the five minutes to prepare a story) or would argue about having to do it. The observed avoidance seemed to be oppositional behavior. By the post-treatment and follow-up assessments, all of the adolescents had become familiar with the staff. They felt comfortable expressing their dislike of the task and would openly argue with staff about having to complete it given how tedious it was. Additionally, the priority for post-treatment and follow-up assessments was to retain families and be as flexible as possible for scheduling at their earliest convenience (e.g., scheduled on short notice, weekends and evening hours). Therefore, in majority of cases, multiple staff members were not available to serve as the audience. Only the staff member administering the task was observing their performance on the story and arithmetic tasks. Thus, the TSST-C appeared inadequate to produce the intended stress response in the current study.

## **Outcome Trends for Family Support**

Family support was measured using psychosocial rating scales (i.e., FAD, POPS, and CBQ) and behavioral interaction tasks.

**Parent rating of family support.** Parents completed the FAD communication, problem-solving, affective responsiveness, and affective involvement subscales. Results from paired samples T-tests, effect sizes, and RCI are depicted in Tables 9 and 10 for communication/problem-solving and affective responsiveness/affective involvement, respectively. Mean FAD subscale levels at each assessment wave are displayed in Figure 6.

In regard to affective involvement, there were no significant effects at post-treatment ( $d = -0.83$ ,  $p = .13$ ), the first follow-up ( $d = -0.02$ ,  $p = .74$ ) or the second follow-up ( $d = -0.07$ ,  $p = .55$ ), compared to pre-treatment. In regard to affective responsiveness, there was no significant effect at post-treatment compared to pre-treatment ( $d = -0.25$ ,  $p = .58$ ). Parents rated family members as significantly more affectively responsive at the first follow-up as compared to pre-treatment ( $d = 0.46$ ,  $p < .05$ ). The mean score for affective responsiveness at the second follow-up was greater than the mean score at pre-treatment but mean scores were not significantly different ( $d = 0.33$ ,  $p = .47$ ). In regard to problem-solving, there were no significant effects at post-treatment ( $d = 0.38$ ,  $p = .29$ ), the first follow-up ( $d = 0.58$ ,  $p = .17$ ) or the second follow-up ( $d = 0.20$ ,  $p = .19$ ), compared to pre-treatment though mean scores at post-treatment and both follow-ups were lower than the mean score at pre-treatment. In regard to communication, there were no significant effects at post-treatment ( $d = -0.12$ ,  $p = .26$ ), the first follow-up ( $d = 0.06$ ,  $p = .60$ ) or the second follow-up ( $d = 0.20$ ,  $p = .74$ ), compared to pre-treatment.



**Adolescent rating of family support.** Adolescents completed the POPS to rate their perceptions of maternal and paternal warmth and autonomy granting. Results from paired samples T-tests, effect sizes, and RCI are depicted in Tables 11 and 12 for autonomy granting and warmth, respectively. Mean levels for the POPS subscales at each assessment wave are displayed in Figure 7.

In regard to maternal autonomy granting, there were no significant effects at post-treatment ( $d= 0.31$ ,  $p= .19$ ) or the first follow-up ( $d= 0.12$ ,  $p= .94$ ). A significant medium effect was found for maternal autonomy granting at the second follow-up as compared to pre-treatment ( $d= -0.50$ ,  $p<.05$ ). In regard to paternal autonomy granting, there were no significant effects at post-treatment ( $d= 0.14$ ,  $p=.55$ ), the first follow-up ( $d= 0.24$ ,  $p= .77$ ) or the second follow-up ( $d= 0.68$ ,  $p= .65$ ), compared to pre-treatment. In regard to maternal warmth, mean scores at post-treatment ( $d= -0.04$ ,  $p= .79$ ), the first follow-up ( $d= -0.23$ ,  $p= .21$ ) and the second follow-up ( $d=-0.28$ ,  $p= .15$ ), were higher compared to the mean score pre-treatment but mean scores at post-treatment and both follow-ups were not significantly different from pre-treatment. In regard to paternal warmth, there were no significant effects at post-treatment ( $d= 0.05$ ,  $p= .18$ ), the first follow-up ( $d= 0.13$ ,  $p= .16$ ), or the second follow-up ( $d= 0.06$ ,  $p=.45$ ), compared to pre-treatment.

**Combined report of family support.** Adolescents and parents completed respective versions of the CBQ to measure conflict behavior. Results from paired samples T-tests, effect sizes, and RCI are depicted in Tables 13 and 14, for adolescent-reported conflict and parent reported conflict, respectively. Mean conflict levels at each assessment wave are displayed in Figure 8.

In regard to adolescent reported conflict with their mother, there was no significant effect at post-treatment as compared to pre-treatment ( $d= 0.04$ ,  $p= .66$ ) or at the second follow up as compared to pre-treatment ( $d= -.17$ ,  $p= .15$ ). A significant medium effect was found for conflict with mother at the first follow-up compared to pre-treatment ( $d= -0.40$ ,  $p<.05$ ). In regard to adolescent reported conflict with their father, there was no significant effect at post-treatment compared with pre-treatment ( $d= .17$ ,  $p= .25$ ) or at the second follow up as compared to pre-treatment ( $d=0.64$   $p=.76$ ) though mean scores at post-treatment and second follow-up were lower than the mean at pre-treatment. At the first follow-up, a nonsignificant trend level medium effect was found for adolescent reported conflict with their father as compared to pre-treatment ( $d=0.52$ ,  $p=.06$ ).

The participating parent completed the parent version of the CBQ. In regard to parent reported conflict with their adolescent, there were no significant effects at post-treatment ( $d= -0.42$ ,  $p= .12$ ), the first follow-up ( $d= -0.32$ ,  $p= .43$ ) or the second follow-up ( $d= -0.08$ ,  $p= .75$ ), compared to pre-treatment.

**Behavior interaction tasks.** Two coding schemes (i.e., EPCS, IBC) were used to analyze parent-adolescent interaction tasks. First, four behavior codes using the adapted EPCS were derived from the free play (card) and academic study task: parental control, adolescent hostility, positive parental behaviors, and positive adolescent behaviors. Results from paired samples T-tests are depicted in Table 15. Mean levels of parent and adolescent behavior during the card and academic interaction tasks at each assessment wave are displayed in Figure 9.

In regard to parent control, mean scores at post-treatment ( $d= 0.37$ ,  $p= .14$ ), the first follow-up ( $d= 0.46$ ,  $p= .60$ ) or the second follow-up ( $d= 0.46$ ,  $p= .23$ ) were lower compared to pre-treatment mean score but not significantly different. In regard to adolescent hostility, a nonsignificant trend level large effect was found at post-treatment ( $d=0.71$   $p=.08$ ). At the first follow-up, the mean score for adolescent hostility was lower than the mean at pre-treatment ( $d=0.75$ ,  $p=.33$ ) but was not significantly different. At the second follow-up, a medium significant effect was found for adolescent hostility compared to pre-treatment ( $d= .37$ ,  $p<.05$ ). In regard to positive parent behavior, a nonsignificant trend level large effect was found for positive parental behaviors at post-treatment ( $d= -1.04$ ,  $p=.08$ ) and the first follow-up ( $d= -1.04$ ,  $p= .09$ ), as compared to pre-treatment. At the second follow-up, a significant large effect was found for positive parental behaviors as compared to pre-treatment ( $d= -1.55$ ,  $p<.05$ ). In regard to adolescent positive behaviors, mean scores at post-treatment ( $d= -0.41$ ,  $p=.30$ ), the first follow-up ( $d= -0.90$ ,  $p=.13$ ) and the second follow-up ( $d= -0.87$ ,  $p=.11$ ) were higher than the mean at pre-treatment but were not significantly different from pre-treatment.

The disagreement resolution task produced five behavior codes using the IBC (i.e., positive parent behaviors, positive adolescent behaviors, negative parent behaviors, negative adolescent behaviors, friendliness, criticism, and effectiveness). Results from paired samples T-tests, effect sizes, and RCI are depicted in Tables 16-19 for positive behaviors, negative behaviors, friendliness and criticism, and problem-solving effectiveness, respectively. Mean levels of parent and adolescent positive and negative behaviors at each assessment wave are displayed in Figure 10. Mean levels of the dyad's friendliness, criticism, and problem-solving effectiveness are displayed in Figure 11.

In regard to parent positive behaviors, there were no significant effects at post-treatment ( $d= 0.67$ ,  $p= .26$ ), the first follow-up ( $d= 0.28$ ,  $p=.42$ ) or the second follow-up ( $d= 0.43$ ,  $p=.64$ ), compared to pre-treatment. In regard to adolescent positive behaviors, there were no significant effects at post-treatment ( $d= -0.12$ ,  $p= .62$ ), the first follow-up ( $d= -0.90$ ,  $p=.20$ ) or the second follow-up ( $d= 0.00$ ,  $p=.25$ ), compared to pre-treatment though mean scores at post-treatment and the first follow-up were greater than the mean at pre-treatment.

In regard to parent negative behaviors, there was not a significant effect at post-treatment, compared to pre-treatment ( $d= 0.00$ ,  $p=.94$ ). At the first follow-up, parents displayed significantly lower negative behaviors as compared to pre-treatment ( $d= 1.96$ ,  $p<.05$ ). At the second follow-up, there was a nonsignificant trend level large decrease in negative parent behaviors as compared to pre-treatment ( $d=1.66$   $p=.06$ ). In regard to adolescent negative behaviors, there were no significant effects at post-treatment ( $d= -0.08$ ,  $p= .72$ ), the first follow-up ( $d= 0.17$ ,  $p= .41$ ) or the second follow-up ( $d= 0.43$ ,  $p=.12$ ), compared to pre-treatment though mean scores at both follow-ups were lower than the mean score at pre-treatment.

In regard to global levels of dyads' friendliness, there were no significant effects at post-treatment ( $d= 0.21$ ,  $p= .60$ ), the first follow-up ( $d= 0.11$ ,  $p= .29$ ) or the second follow-up ( $d= 0.21$ ,  $p= .70$ ), compared to pre-treatment. In regard to global levels of dyads' criticism, there were no significant effects at post-treatment ( $d= 0.26$ ,  $p= .39$ ), the first follow-up ( $d= 0.32$ ,  $p= .44$ ) or the second follow-up ( $d= 0.64$ ,  $p= .37$ ), compared to pre-treatment though mean scores at post-treatment and both follow-ups were lower than the mean score at pre-treatment.

In regard to levels of dyads' problem-solving effectiveness, there was not a significant effect at post-treatment as compared to pre-treatment ( $d=0.47$ ,  $p=.43$ ) though the score at post-treatment indicated more effectiveness than the score at pre-treatment. At the first follow-up, a nonsignificant trend level large effect was found as compared to pre-treatment ( $d=1.12$   $p=.06$ ). At the second follow-up assessment, the mean score indicated families were more effective at pre-treatment though not significantly different ( $d=0.98$ ,  $p= .15$ ).

### **Summary of Reliable Change Indices**

**Depressive Symptoms.** Majority of parents reported significant decreases in their adolescents' depressive symptoms at post-treatment (62.5%) and the first follow-up (57.1%). Majority of adolescents did not report significant changes in depressive symptoms at any post-treatment assessment point (62.5%, 71.4%, and 80.0%, respectively).

**Reward Responsivity.** A majority of adolescents did not report a significant change in reward responsivity from pre-treatment to the post-treatment, first follow-up, and second follow-up assessments (62.5%, 71.4%, and 60%, respectively).

**Emotion Regulation.** A majority of parents reported a significant decrease, compared to pre-treatment, in emotional lability at post-treatment (62.5%) and both follow-ups (87.5%, 60.0%). Though a majority of adolescents showed no change in emotion regulation at post-treatment (87.5%) and the second follow-up (80.0%), a majority of the adolescents at the first follow-up reported a significant increase in emotion regulation (57.1%).

**Family Support.** Regarding the Family Assessment Device, no families showed an increase in any of the subscales at post-treatment, the first follow-up, or the second follow-up compared to pre-treatment.

Reliable Change Indices for the Perceptions of Parenting Scale indicated that though majority of adolescents reported no significant change in their mother's autonomy granting at post treatment (100%) or the first follow-up assessment (83.33%), majority of adolescents (60%) did report a significant change in autonomy granting at the second-follow-up compared to pre-treatment. Majority of adolescents reported no change from pre-treatment to post-treatment, the first follow-up, or the second follow-up on paternal autonomy granting (100%, 66.67%, and 100%, respectively), maternal warmth (87.5%, 83.33%, and 60%, respectively), and paternal warmth (100% at all time points after BEAM).

Regarding the Conflict Behavior Questionnaire, 100% of adolescents reported no change in maternal conflict from pre-treatment to post-treatment, the first follow-up, and the second follow-up. Though majority of adolescents did not report a significant change in paternal conflict at post-treatment compared to pre-treatment (57.14%), half of adolescents reported a significant decrease in paternal conflict with at the first and second follow-ups compared to pre-treatment.

During the disagreement resolution task, a majority of parents showed a decrease in negative behaviors at both follow-ups compared to pre-treatment (71.4%, 80.0%). A majority of adolescents showed a decrease in negative behaviors at the second follow-up compared to pre-treatment (60.0%). Global levels of criticism were significantly lower at the second follow-up compared to pre-treatment (60.0%).

## Case Examples and Individual Results

Below are descriptions of demographic information and significant improvements made by each of the families enrolled in the BEAM program. Statistically significant changes described in each of the case studies represent RCI values at or above 1.96. Families 2, 6, and 11 dropped out of the study prior to enrolling in the BEAM program and were therefore not included in case studies and individual results analyses. Scores used for RCI analyses as well as significant improvements are displayed in Tables 6 through 20 and denoted by a superscript “R.”

**Family 1.** The first parent-adolescent dyad consisted of a 13-year-old, Hispanic female in 8<sup>th</sup> grade and her 48 year-old, Hispanic mother. The adolescent and her mother were born in the United States. The mother indicated that her daughter’s “massive mood swings” prompted their participation in the BEAM program. During the phone screen the mother reported clinically elevated levels of adolescent depressive symptoms (T=71) on the CDI-P. The daughter self-reported average levels of depressive symptoms (T=55). The mother and adolescent participated in all 4 sessions of BEAM and the child completed 100% of the weekly homework assignments. The father did not attend any sessions. Following the BEAM program, the family completed the post-treatment and both follow-up assessments.

The mother reported that her daughter’s depressive symptoms decreased significantly from pre-treatment by the first follow-up. There were no statistically significant changes in adolescent reported depression symptoms though levels of depressive symptoms as rated by parent and adolescent remained below the clinical cutoff at the post-treatment and both follow-up assessments.

The adolescent also reported increases in reward responsivity at post-treatment that reached statistically significant levels at both follow-ups as well as statistically significant increases in emotion regulation by parent report at both follow-up assessments, compared to pre-treatment. Of note regarding family support, levels of criticism decreased significantly and levels of effectiveness improved significantly at post-treatment and the first follow-up assessment and the adolescent's and parent's negative behaviors significantly decreased at post-treatment and both follow-ups, compared to scores at pre-treatment.

Both the parent and the adolescent were highly satisfied with the program as evidenced by the mother stating, "You guys did a great job and I'm happy with overall everything that I've gotten out of the FIU children and families programs. So this is one more kind of validation point that you guys have a good program." The adolescent noted being especially engaged with the sports activities and feeling the program helped improve her relationship with her mother as she was not getting as angry with her and they were able to resolve their problems in a healthier manner.

**Family 3.** Family 3 consisted of a mother-daughter dyad who both identified as Hispanic. Both the mother and her daughter were born in Puerto Rico and immigrated to the United States eight years prior to enrolling in the BEAM program. The daughter was 12-years-old and enrolled in 6<sup>th</sup> grade. Though both the adolescent and mother spoke English, the mother's primary language was Spanish and it was difficult to ascertain whether she fully comprehended all the material presented during the assessments and treatment sessions as the material was presented in English. During the telephone screen, both the mother and the daughter reported elevated T-Scores for depressive symptoms



(74 and 73, respectively). The mother indicated that her reasons for enrollment were a combination of her daughter's problems with concentration, academic concerns, and peer relationships (i.e., being bullied). All 4 sessions and 100% of the homework assignments were completed by the dyad. The adolescent's father also attended one of the BEAM sessions. Following the BEAM program, the family completed the post-treatment and both follow-up assessments.

The adolescent reported clinically significant improvements in depressive symptoms at post-treatment and the first follow-up assessment, compared to her pre-treatment scores. All of her depression scores post-treatment fell below clinical severity levels. Her mother also reported significant decreases in depressive symptoms at post-treatment, compared to pre-treatment.

The adolescent reported clinically significant increases in reward responsivity at post-treatment and both follow-up assessments and improvements in emotion regulation at both follow-up assessments, compared to pre-treatment scores. Regarding family support variables, the adolescent reported clinically significant decreases in conflict with her father at post-treatment and the second follow-up and paternal autonomy granting at the first follow-up assessment compared to pre-treatment scores. Results from the behavioral interaction task indicated there was a significant increase in positive adolescent behaviors at the first follow-up, a significant decrease in their negative behaviors at the first follow-up, and significant improvements in problem-solving effectiveness at the first follow-up compared to scores at their pre-treatment assessment.

The mother and daughter reported that they thoroughly enjoyed the BEAM program and felt they learned an abundance of new skills. In her post-treatment interview

the mother stated “I liked the program...everything was very natural ...it was very interesting and helpful, and I like it. [Daughter’s name], she liked it because she never told me she didn’t want to go.”

**Family 4.** Family 4 consisted of a father-son dyad who both identified as Hispanic. The adolescent was a 13-year-old in 7<sup>th</sup> grade. His father was born in Cuba but had been living in the United States for 26 years. The father and the adolescent’s biological mother were divorced and the adolescent lived with his father and his father’s long-term girlfriend. At the phone screening, both the father and adolescent reported elevated depressive symptom T-scores (90+ and 67, respectively). The father’s interest in BEAM came from his son’s issues with “anger management, not paying attention, not listening sometimes” and his aggressive behavior. The adolescent and the father’s girlfriend attended all four sessions and the father attended 50% of sessions. The adolescent completed a third of homework assigned.

Following the BEAM program, the adolescent’s report of depressive symptoms fell below the clinical cutoff at the post-treatment and the first follow-up assessment, although they did not differ significantly from the pre-treatment score. There was a significant decrease in parent-reported adolescent depressive symptoms at post-treatment and the follow-up assessment.

There were no significant changes in the adolescent’s report of reward responsivity. Emotion regulation significantly improved at post-treatment and the first-follow-up assessment. In regard to family support, the adolescent reported increases in paternal autonomy granting that reached statistical significance at follow-up.

Lastly, there were several changes in family support observed via behavioral interaction tasks. Results from the behavioral interaction task demonstrated a significant increase in effectiveness at post-treatment and follow-up as well as decreases in criticism at post-treatment that reached statistical significance at follow-up.

The adolescent, his father, and his “step-mother” all seemed to enjoy the program and found it helpful. Specifically, across both the parent and adolescent interviews, they reported that the adolescent was less depressed and aggressive, more open to communication, and that there was generally better communication and problem-solving within the family unit. In their final interview the father and his girlfriend asked eagerly asked, “When is the next program?”

**Family 5.** Family 5 consisted of a mother-son dyad. Both were born in the United States and identified as Hispanic. The adolescent was 12-years-old and was enrolled in 6<sup>th</sup> grade. The mother reported elevated depressive symptoms for her son during the phone screen (T= 87) while the adolescent reported symptom levels just below the clinical cutoff (T=63). The mother stated that her interest in the program was that she “was concerned about [adolescent’s name]. He was in a downward spiral and I was concerned about his well-being.” The parent and adolescent attended all four sessions of BEAM but the adolescent did not complete any of the assigned homework. His mother suggested making the assignments (e.g., the mood diary) computerized to help keep her son engaged. Following treatment, the family completed the post-treatment assessment and the first follow-up. At the first follow-up the mother indicated that the adolescent was currently working with an applied behavior analyst at their home to “help him find ways or navigate him to help him find ways to resolve problems.”

The RCI analyses indicated that depressive symptoms significantly decreased at post-treatment, compared to pre-treatment, by parent report. The adolescent did not report significant changes in depressive symptoms or reward responsivity across any assessment wave. Though parent report indicated significant decreases in emotional lability at the post-assessment and follow-up, the adolescent reported more difficulties in regulating emotion regulation at follow-up, compared to pre-treatment.

There were significant decreases in adolescent reported conflict with his father at post-treatment and follow-up and significant increases in maternal warmth at post-treatment and in maternal autonomy granting at the first follow-up, compared to pre-treatment. RCI analyses from the behavioral interaction task indicated that positive adolescent behaviors significantly increased at post-treatment, adolescent negative behaviors significantly decreased at follow-up, parent negative behaviors significantly decreased at post-treatment and follow-up, compared to pre-treatment. Parent-adolescent friendliness significantly increased at post-treatment and the dyad's criticism significantly decreased at follow-up, compared to pre-treatment.

Overall, though there were moments that the adolescent seemed engaged in the treatment, he did not complete any homework assignments and often appeared disconnected from the rest of the adolescents and the BEAM activities. He reported using the strategies minimally but that there were some improvements. For example, he noted an improved relationship with his sibling (“my brother and me changed a lot because we would always get into a fight, but now we’re bros again”). The mom found the BEAM program helpful, stating: “I feel that I’m not so fearful in dealing with [adolescent’s name] and his feelings and his depression and stuff like that. I was getting to a point

where...to communicate...was getting very difficult so I felt like this helped open a new door for us to communicate and that we can be, you know, happy together.”

**Family 7.** Family 7 consisted of a father-son dyad. Both identified as non-Hispanic White and were born in the United States. The son was 16 years old and in 11<sup>th</sup> grade. The adolescent’s biological mother completed the phone screen and reported elevated depressive symptoms (T=68) while the adolescent reported subclinical depressive symptoms (T=60). The adolescent’s mother, however, was not the primary parent in attendance of the BEAM program. At the pre-treatment assessment the father also reported elevated adolescent depressive symptoms (T=66). The adolescent’s father indicated that a program that focused on his child’s issues was of interest to him. The adolescent attended all BEAM sessions. The adolescent’s father attended 3 of 4 BEAM sessions and the adolescent’s mother attended the session that her husband was unable to attend. Throughout the parenting sessions and semi-structured interviews the dad indicated he was the “wrong” parent to attend the BEAM program by stating, “I mean that’s why I always said that the best person to probably come to these things would be my wife because... my wife is on top of everything with her kids and her kids’ issues and I’m not.” The adolescent completed two thirds of the homework assignments. The dyad completed a post-treatment assessment but no follow up assessment.

There were no changes in adolescent reported depressive symptoms but parent report indicated a significant decrease in adolescent depressive symptoms at post-treatment compared to pre-treatment. The father reported a significant increase in emotion regulation from pre-treatment to post-treatment. Results from pre-treatment to

post-treatment for the disagreement resolution task indicated that parent negative behaviors and levels of criticism significantly decreased.

Though family 7 generally found the program unhelpful (e.g., “I mean I’m grasping at straws to see how it is that you’ve given me advice to help me with my child”), there were a few positive statements: “I found helpful...the ‘give a little bit of this to get that’ compromising strategies.”

**Family 8.** Family 8 consisted of a mother and her 12-year-old African-American adolescent enrolled in the 7<sup>th</sup> grade. His mother was born in Jamaica and had been living in the United States for the past 13 years. The adolescent was born in the United States. Screening data on family 8 indicated clinically significant levels of depressive symptoms reported by the adolescent (T=66) and by his mother (T=71). The mother indicated that “focus, behavior, tools that I could use to help him, [and] just being able to cope” were among the reasons she chose to participate in BEAM. The teen completed two thirds of the homework assignments and the dyad attended all 4 sessions of the BEAM program as well as the post-treatment and both follow-up assessments.

The parent did not report significant changes in depressive symptoms across any assessment wave. The adolescent, however, reported a significant reduction in depressive symptoms from pre-treatment to post-treatment. The adolescent’s mother reported a significant increase in her son’s emotion regulation at post-treatment and the first follow-up assessment.

In regard to family support, the adolescent reported a significant decrease in conflict behavior with his father at the first follow-up and the adolescent’s mother reported a decrease in conflict behavior with her son at the first follow-up, compared to

pre-treatment. The adolescent also reported an increase in maternal warmth at both follow-ups and an increase in autonomy granting at follow-up 2, compared to his pre-treatment score.

The RCI analyses from the disagreement resolution task indicated a significant increase in the dyad's problem-solving effectiveness and significant decreases in negative adolescent behaviors and levels of the dyad's criticism at the second follow-up, compared to pre-treatment. There was a significant decrease in negative parental behaviors at both follow-ups, compared to pre-treatment.

Family 8 seemed to find the BEAM program very helpful. In regard to how often he was using the pleasant activity scheduling, the adolescent stated "I did that all the time, literally every time I got upset, I tried to do that." The mother also reported finding BEAM a useful experience. In her post-treatment interview she described her time in BEAM: "I learned a lot. I think for me the best thing I learned from it was the spiraling. I know how to stop it. I think since I learned that I haven't had any real major outburst from him because I knew [how to] stop the spiraling, that was like life-changing for me."

**Family 9.** Family 9 consisted of a mother and adolescent dyad who both identified as Hispanic. The mother was born in Honduras and had been living in the United States for the past 22 years. The adolescent, who was born in the United States, was a 13-year-old in 7<sup>th</sup> grade. Though both the adolescent and mother spoke English, the mother's primary language was Spanish and it was difficult to ascertain whether she fully comprehended all the material presented during the assessments and treatment sessions as the material was presented in English. Though the adolescent did not complete the phone screening, by parent report the adolescent was experiencing clinical levels of depressive

symptoms ( $T=75$ ). The mother stated, in reference to her reasons for participating, “when I was [phone screened]...I realized uh oh this is a mood problem that my son is having and then that’s why I [said] yeah I will like to participate.”

The adolescent, his mother, and his father attended all four sessions of BEAM. The adolescent completed one third of BEAM homework assignments and following the BEAM program the adolescent and his mother completed the post-treatment and both follow-up assessments. At the last follow-up assessment, the mother disclosed that her husband and she were separating and that the family was currently in therapy to help with the transition.

Both the adolescent and his mother reported significant reductions in depressive symptoms. Specifically, depressive symptoms by parent-report significantly decreased from pre-treatment to the first follow-up assessment. Furthermore, adolescent reported depressive symptoms decreased significantly at post-assessment and remained significantly lower at both follow-up assessments, compared to pre-treatment.

The adolescent also reported an increase in reward responsivity at post-treatment compared to pre-treatment as well as improvements in emotion regulation at post-treatment and follow-ups, compared to pre-treatment. In regard to family support, there were significant decreases in adolescent-reported conflict with his father at the first follow-up assessment and in mother-reported conflict with her son at the second follow-up assessment, compared to pre-treatment scores. At the second follow-up assessment, the adolescent reported a significant increase in maternal warmth and autonomy granting, compared to pre-treatment scores. RCI analyses from the disagreement resolution task indicated that there were significant decreases in criticism at



both follow-up assessments and significant decreases in negative parent behaviors at the second follow-up assessment.

The mother and adolescent both commented on the strengths of the BEAM program. The adolescent reported using pleasant activity scheduling frequently, “The pleasant activity has really helped me because it helps keep off the pressure that I get every week.” The mother also reported that the strategies in BEAM have been helpful: “I [think] the most that I learned was the spiral going down... I was thinking I’m going to pull you out from this but I learned that that’s not the correct way to make a change in certain behaviors because you know if my son is doing something that is extracurricular...he’s socializing, he’s participating in something different and maybe a little bit productive and that helps him with his moods.

**Family 10.** Family 10 consisted of a mother and son dyad. The adolescent was 13-years-old and enrolled in 7<sup>th</sup> grade. He was born in the United States and had a Hispanic ethnic background. His mother was born in Venezuela and had been living in the United States for the past 18 years. The adolescent’s father was incarcerated during the family’s time in the BEAM program and the adolescent had no contact with him. During the phone screen, both mother and adolescent reported depressive symptoms in the clinical range (i.e., adolescent T= 67, parent T=69). The mother indicated that her son’s behavior was often destructive, so much so that he had been psychiatrically hospitalized twice. She hoped that the BEAM program would be helpful in learning how to prevent that from happening again. The parent and adolescent dyad attended all sessions of BEAM. The adolescent completed two thirds of homework assigned. Though their assessments often fell well beyond the anticipated window, they completed the post-

treatment and both follow-up assessments. Video equipment for the interaction tasks malfunctioned at family 10's first follow-up assessment.

Though the adolescent did not report significant changes in depressive symptoms from pre-treatment to post-treatment, the adolescent's mother reported a significant decrease in depressive symptoms at post-treatment as well as both follow-up assessments, compared to pre-treatment. Compared to his score at pre-treatment, the adolescent reported a significant increase in reward responsivity at post-treatment. The adolescent demonstrated significantly greater levels of emotion regulation at post-treatment and both follow-ups, compared to pre-treatment.

The adolescent reported a significant increase in maternal autonomy granting at the second follow-up assessment, compared to pre-treatment. The RCI analyses from the disagreement resolution task demonstrated a significant decrease in negative adolescent behaviors at post-treatment and the second follow-up. There were also significant decreases in the adolescent's negative behaviors and a significant decrease in levels of the dyad's criticism at the second follow-up assessments, compared to pre-treatment. Problem-solving effectiveness and positive parent and adolescent behaviors significantly increased from pre-treatment to post-treatment.

The mother and adolescent in family 10 seemed to find the program helpful. In the first follow-up interview she explained, "He hasn't gotten angry. Or he hasn't gotten depressed... it's mostly the negotiating we do a lot of... he actually said, 'Let's set up a contract' ... it was interesting that it was his idea, 'let's set up a contract, let's figure it out, let's negotiate' ... I think that what he's doing is that he's setting himself some goals

that can't set on his own. It's like, 'I can't set them up on my own, you help me set them up.' And I think that's a valid thing."

### **Qualitative Analysis of Semi-Structured Interviews**

The use of qualitative methodology to analyze the semi-structured interviews at post-treatment and both follow-up assessments was designed to complement the quantitative data measuring outcome variables as well as parent and adolescent satisfaction with the BEAM program. The following qualitative results provide a rich narrative including a more thorough description of the skills families found most helpful and what specific elements of the BEAM program (e.g., format, content) families liked and disliked. A more detailed account of families' experiences with the BEAM program is crucial for the purpose of revising the BEAM program prior to the implementation of a larger randomized control trial. The parent and adolescent qualitative results discussed below are presented in Tables 20 and 21, respectively.

**Theme 1: Reasons for participating in BEAM.** Parents cited several reasons for their interest in enrolling in the BEAM program. Information regarding reasons for participation was gathered from parents only at the post-treatment assessment interview.

*Theme 1.1. Concerns regarding their adolescent's mood* was the primary presenting concern. Parents often reported their adolescent having "massive mood swings" and having difficulties coping with their emotions or managing their anger. One parent said, "I was concerned about [her son's name]. He was in a downward spiral and I was concerned about his well-being." Given that BEAM was designed to treat subclinical

depressive symptoms and prevent future depression, having mood issues as the primary reason for participating in BEAM is in line with the aims of the program.

*Theme 1.2. Disruptive and destructive behavior* was another reason parents gave for participating in the BEAM program. Parents noted concerns regarding inattention, aggression, and noncompliance. In one extreme instance, a mother noted “He’s been Baker acted now twice, so it’s just like one of those things that... I mean he’s got the potential to be very destructive, so, learning how not to make that happen is important.”

*Theme 1.3. Academic problems* were another concern identified. Two parents noted that their child had problems with learning. Academic problems were listed in conjunction with other concerns such as interpersonal problems, mood issues, and disruptive or destructive behavior. Academic problems were not listed as a sole presenting problem by any family.

*Theme 1.4. Interpersonal relationship problems* was the last presenting concern and was the least cited issue. One parent indicated that the bullying that her daughter endured at school contributed to her decision to enroll in the BEAM program.

**Theme 2: Assessment.** Parents’ and adolescents’ remarks regarding the assessment could be differentiated into two themes (i.e., positive appraisal of assessment process and negative appraisal of the assessment process). Parents and adolescents were questioned about their feelings regarding the length of the assessment, type of assessment measures, and the extent to which the assessment adequately captured problems occurring at home. Information about the assessment process was by gathered during the post-treatment semi-structured interview.

*Theme 2.1. Positive appraisal of the assessment process* occurred frequently across the parent semi-structured interviews. Parents found the assessment process very accommodating, especially given that staff were available on Saturday to complete assessments. One parent felt that the staff were “very flexible with the hours and dates” and another stated in regard to the pre-assessment, “we did it right there and then, it was the next day.” Adolescents also agreed that the assessment “was not too time consuming.” In addition to feeling the assessment scheduling was satisfactory, parents also felt that the assessment brought up some of their own deficits in parenting. One father stated, “I get an idea answering the questions I’m seeing some of my own deficiencies, if you will, my own flaws. Just by answering those questions I can see that I myself have probably have issues.” Lastly, parents’ responses suggested that the assessment adequately captured the issues families were facing at home. For example, one parent stated, “Yeah I mean I felt from the very beginning up to the questionnaires that I completed a few minutes ago all this stuff is relevant and resonates with what we’re doing. I don’t know if I remember exactly what the questionnaires were for that first session, but I never throughout the process felt that this was not appropriate to our situation.” Similarly, adolescents stated that the types of questions asked within the assessment “seemed very accurate” and questions asked and issues parents and adolescents were facing “matched.”

*Theme 2.2 Negative appraisal of the assessment process* was also present in parent interviews. Though parents generally were satisfied with the assessment process, they did express several complaints. Parents’ chief complaints were regarding the number measures in the battery and the length of time the assessment battery took to complete.

Some parents mentioned the assessment was “a lot” and that it is often discouraging to see the stack of questionnaires and how long it takes to complete each one. Though the number of questionnaires adolescents had to complete at each assessment point was less than what parents had to complete, several adolescents indicated that the assessment was “too long” and “time consuming.” One adolescent suggested breaking each assessment into multiple appointments to decrease the tediousness of having to complete all of them in one sitting. Though having multiple sessions for each assessment is would not be feasible for parents or staff, it speaks to the lengthiness of the current assessment battery. Paring down the assessment protocol, especially in the area of family support questionnaires, might help alleviate the perceived assessment burden.

The different instructions and anchors across measures also made questionnaires difficult for parents. For example one mother indicated, “the different gauges are different in everyone so some are “strongly disagree” some are “agree” “somewhat” “not at all” and I think that kind of variance is hard for me to stay with sometimes.” Being attuned to the anchors on each questionnaire and making efforts to be consistent may also help alleviate difficulties completing the assessment battery efficiently.

One father felt that assessments do not adequately capture a family’s difficulties. He stated, “I mean it’s hard to say, because you’re assuming that each person’s home environment is the same, so to say that you can’t really catch my home environment... it’s just that there are so many things that are personally going on in my home, in the dynamics of my home.” It may be important to stress to families that it is never the case that we can ascertain everything about a family through an assessment but rather it is our best effort of taking a snapshot of what is happening at the moment.

As mentioned previously, adolescents disliked completing the TSST-C. Their complaints were not only vocalized in the moment when told they had to complete the task but also when asked about the BEAM assessment during the semi-structured post-assessment. Their comments did not make mention that the reason for their avoidance was anxiety but rather more anger about having to complete the task at multiple time points. Examples of adolescent's feelings on the task are "they were pissing me off because they kept asking me to subtract" and "I hate the number 13. It used to be my favorite number, you guys ruined that for me."

**Theme 3: BEAM format.** The post-assessment semi-structured interview was used to gather information regarding parents' and adolescents' perceptions of the BEAM program's format. Parents and adolescents reported their feelings about the timing and number of sessions, the group format, the type of instruction given, the staff and cost of treatment, and the barriers they faced for attending BEAM.

**Theme 3.1.** Parents and adolescents generally expressed a *positive appraisal of the BEAM session schedule*. Parents reported that having BEAM sessions on Saturday morning was "perfect" and worked "extremely well" for their schedules. A majority of parents in attendance was working mothers and fathers so having sessions after parents and adolescents arrived home from work and school would have been difficult for them. For example one mother stated in regard to BEAM sessions, "You know that's the only way I can fit it, it's in Saturday mornings I cannot do it another day." Adolescents also felt the weekend sessions to be "pretty good."

In addition to holding sessions on Saturday mornings, parents were enthusiastic about the brief, four session format, and 2.5 hour format. Parents felt that having only

four sessions kept the material “structured” and “tight.” Having only four sessions made the BEAM program seem like less of an obligation for parents. One mother said, “Four seems so reasonable. Five, six, seven, or eight would have probably in my mind been a bigger commitment and I don’t know that I would have [enrolled].” Adolescents also liked the four session format saying it was “just right” Lastly, parents liked that a four session format meant less trips to the FIU CCF. Given that it could take families 30 to 40 minutes to commute to the clinic, parents were appreciative of having sessions on Saturdays when there was less traffic and minimizing the number of trips they had to make to the clinic.

*Theme 3.2. A negative appraisal of BEAM session schedule* was present in several parent interviews. Within Theme 3.2, the most common response was a suggested increase in the number or length of sessions. Families felt that often times there was great dialogue occurring between parents that was cut short due to sessions ending after 2.5 hours. However, families often have other weekend obligations. Though extending sessions may have allowed for more fruitful dialogue, it may not have been feasible for all families. One mother articulated her thoughts on the matter:

“I think every one of these sessions could have gotten longer because there was so much great dialogue that is going on in that room. There is so much energy that you build from and the sharing and the practice like “What do I do? What do you do?” So I think they could have gone on longer and I think everybody in the room probably would have been ok with it going on longer, but the reality is that we only have x amount of time in our weekends right and our lives and there is



always the next thing we have to get to so whether they should be longer, I don't know. I mean everybody has got something else going on, but they were so good that many times they could have gone longer and few people would have complained about it. Yeah we were meeting out in the parking lot going on talking about other things going on. So there was good substance there.”

Other families suggested an increase in the number of sessions. Several parents felt the program was too short and that seven sessions may have been a more adequate number. Building in individual family sessions following the four group sessions was also suggested. One mother expressed an interest in the BEAM program consisting of more than four sessions but highlighted one of the dilemmas she could foresee, “I mean for me I would go the rest of the year but my son starts skipping antsy.” The four session format seemed to be effective in keeping adolescents engaged and prevented any attrition. Perhaps, offering additional classes for parents following the four adolescent-parent group sessions would provide a good compromise. However, three of the adolescents suggested that the program was “a bit short” and that sessions “could have been longer.” Half of the adolescents expressed interest in a longer “sports time.”

Several parents wanted “more” or an additional program after BEAM. One mother stated “we did 101, now we need 102” in that she felt like BEAM was an introductory class but another class was needed.

Converse to suggesting longer and more sessions, one father thought that sessions were too long. It is important to note that the father felt that he was the wrong parent

to attend (i.e., he believed his wife should have been the participating parent). He was disengaged during sessions and did not find the BEAM program helpful. The aforementioned thoughts may be associated with his opinion that sessions were too long.

Only one adolescent expressed negative feelings regarding the BEAM schedule in that he would have preferred to have sessions on Sundays rather than Saturdays.

***Theme 3.3.*** *The group format of BEAM was well-received by all eight families.*

Parents found that the group format created a sense of community among parents much like a support group. Discussing their issues with their adolescent's mood and receiving feedback from other parents was extremely validating. One mother enjoyed "the sharing opportunities, the learning opportunities, the feeling of community. We're not alone, none of us has... our kids have different types of issues, but we're all kind of in the same boat, trying to figure them out. I get a lot out of that personally... Whenever I'm in a room with people that understand me, it just reenergizes me." Adolescents also liked having a group format for BEAM in that being in a group setting made it "easier to make friends" and "helped... know how the teens felt like... how they were doing at home and school."

Not only was the group format validating but having more of a dialogue between parents and the facilitator rather than a lecture format kept parents engaged. One mother indicated, "Sometimes PowerPoint makes you feel bored... but in this one anyway we didn't have any opportunity to get bored." Parents also reported feeling at ease discussing their family issues in front of other families: "I felt comfortable because they were experiencing either worse or better situations than me and basically it was just learning

from them.” One mother suggested an increase in the number of families enrolled in group sessions to have more families to discuss strategies with. The same was true for adolescents in that they reported being “pretty comfortable” and “didn’t mind” discussing their mood issues with other adolescents.

**Theme 3.4.** Though parents found the group format helpful, *more didactic instruction* was requested by some parents. The father who was dissatisfied with the program felt that because the group facilitator directed the dialogue between parents instead of providing direct instruction, the program was not effective. He reported, “I’m grasping at straws to see how it is that you’ve given me advice to help me with my child.” Perhaps a small portion of each session could be didactic so that parents perceive that they are directly learning tactics.

**Theme 3.5.** *The BEAM program staff were well-liked* via parent report on semi-structured interviews. Parents indicated the parent group facilitator was “great prompting parents,” “directing everybody,” and creating “an atmosphere that everybody was able to participate and feel comfortable.” The adolescent group facilitator (i.e., principal investigator) was also well liked by the parents and adolescents. One mother stated, “I think you’ve had a really good way to manage the kids and also kind of interface with the parents and you didn’t come in here preaching [or] dictating the way things should be. I think you’ve been very good about trying glean you know insights without being too directing...you’ve let me kind of speak and get it off my chest... And you get along great with my daughter, all smiling.”

**Theme 3.6.** *Four barriers for attending the BEAM program* emerged during semi-structured interviews with parents. One mother mentioned the commute from home to the

clinic made it more difficult to attend sessions. One father was scheduled to work Saturdays and was unable to switch his shift for two of the BEAM sessions. One mother expressed difficulty in getting her son out of bed for sessions Saturday morning. Through the use of “negotiating” and promising a fun activity to do after session, the mother was able to get her son to attend all four sessions. BEAM staff providing more incentives for adolescents attending sessions may decrease the burden placed on parents for getting their child to attend. Parking at the clinic proved to be the most cited burden or complaint raised by parents. Parents were annoyed that they had to pay for parking at the university on a weekend and went as far as to call the policy “ridiculous.” Several parents were upset that on top of having to pay for parking, front desk staff did not always have quarters to make change for the parents to pay the meter. Parking concerns made sitting through session stressful in that they worried whether there would be a ticket on their windshield when they walked out to their car. Two parents received parking tickets while enrolled in the BEAM study because their meter ran out while they were still in session. Conversely, cost of sessions did not prove to be a barrier given that the BEAM program was offered free of charge. One mother noted she appreciated that the BEAM program was free of charge.

**Theme 4: BEAM content.**

*Theme 4.1.* The *BEAM* material was helpful and presented clearly. Parents expressed a positive response in regard to the type of material covered in the BEAM program. One mother stated that the program was “was amazing because I can... deal with her condition a little more or easier...[I learned] strategies to help her be through her issues and I think it was good, it helped me and helped her another mother “liked that

we list different ideas and tasks that we can do with our kids because sometimes you just get in a rut and you just you know just go to that one, that one task and that one routine and that's it." Not only was the type of material helpful to parents but they felt that there was not too much of it. Parents noted that it was "not too much and not too little" and it "hit the basics" through a program where "the language was clear and easy," and "the expectations were clear." Parents also found the workbooks very user friendly and liked how session content in the parent group overlapped with the content in the adolescent group: "she's getting the same instructions that I'm getting so when I say to her that we've got to do this, it's easier to get going because we're both playing by the same rules. So I think the materials were spot on."

Parents liked that not only the content and workbooks overlapped for the parent and adolescent sessions but that there were joint modules to practice skills like the Lego activity which one mom liked because it was designed "to help us understand on how to listen better." Lastly, parents found that the candy raffle at the end of sessions helped keep their adolescent engaged in session and helped with getting them to the clinic. One mom indicated, "felt that, that helped so much because if that didn't come along at that particular time I felt that it was going to be even more of a struggle and I would have to cancel a session, it was getting to that point...it didn't have to be candy it could be anything, but that something oh my God that shot up his good side quickly because it was getting really hard to get him out."

Adolescents overwhelmingly commented positively on the content of the BEAM program. They reported liking learning the skills through "real life problems...or situations" and through fun sports activities where "there was a lot of communication and

everybody would help each other.” Furthermore, the material was presented clearly and it was explained well.

**Theme 4.2.** Though a majority of parents found BEAM to be clear, understandable, and helpful, one mother thought the *pace was too fast*. She was unable to grasp the pleasant activity scheduling and behavior contracting until the third or fourth session because the material was presented too fast. She stated, “I didn’t feel like I had to use the skills because I didn’t understand for instance the idea about the contract until the last week” and “I didn’t understand the contract I didn’t understand what was the idea about it.” Though she indicated she was fluent in English and Spanish, it is important to note that there may have been a language barrier present with the aforementioned mother that contributed to her not fully understanding all of the concepts presented. It may be important to present information slower to families who are primarily Spanish-speaking. There were several other families in which the parent in attendance was born outside of the United States and Spanish-speaking and they did not mention difficulties with understanding material. Perhaps a one-on-one check in with parents before they leave each session will ensure parents that they understood what was covered that day.

**Theme 5: BEAM skills used.** Parents and adolescents routinely expressed using BEAM skill, each to varying degrees. The proceeding sections will discuss the strategies that parent found themselves using at post-treatment and both follow-up assessments. Parents even disclosed using the skills outside the relationship with their adolescent including their spouses, individuals at work, and even with themselves. One adolescent

reported sharing some of the material with a friend: “I did quote some of the things there [to] one of my friends [who] I think does have [depression]... that was nice.”

Only two parents reported not remembering strategies but after refreshing their memory with the names of the modules we covered in BEAM, they could recall instances of using BEAM skills. One adolescent claimed he “forgot about [the strategies] and just didn’t really want to [use them].”

**Theme 5.1.** Though an inclusion criterion for the BEAM program was having received behavioral treatment for ADHD in the past, parents found the *ADHD skills review and behavior contracting* helpful. Parents cited using the “ABC” model where they evaluated the antecedent, behavior, and consequence to reestablish a daily report card, set rules around the house, and reward positive behavior. Using behavioral contracting to outline behaviors and consequences was a commonly used skill for ADHD and mood issues. “Like the negotiating, I like when we sit down and we figure it out...it’s like the same thing you were saying at the beginning, if you have clear expectations, if there’s a breach in that expectation, then you’re gonna be upset, but if there’s a contract and we abide by it, then we can amend it... he and I can work together a little bit better.” One adolescent commented that she liked that behavior contracting helped motivate her: “Like if I did a good job I could use the computer and I did a lot of good jobs so I used the computer a lot.”

**Theme 5.2.** *Active listening techniques and communication skills* were helpful to parents of the BEAM program. Active listening (i.e., repeating what one said back to the speaker to show that an individual has understood the speaker) was reported to be used by parents: “This morning...he was arguing with his grandma. So I used the skills of you

know just reiterating back to him how he was feeling and just like you know getting him to open up and that worked.” It was also reported that there were efforts to keep arguments or discussions in more positive terms rather than negative ones and just trying to create an environment that fostered open communication but allowing the adolescent to choose when they want to talk rather than forcing them to do so.

*Theme 5.3. Problem-solving skills* were frequently cited as a helpful skill. Some parents indicated that they had tried using a strategic method for solving problems or compromising but that it was difficult to get their children on board in the past, prior to the BEAM program. For example, one mother stated, “I think I did it before this program. Maybe I didn’t do it the same way and...she didn’t understand it was a strategy. She was just thinking that I talk too much. But it’s like ok ‘here’s, we’ve got this. Here are the options. Here is the most bizarre option.’ And I ask her, I say, ‘tell me what you think we should do?’ right... ‘Here’s what I think and let’s find a place in the middle.’” Once their adolescent was on board with using a compromising type strategy, they found the process to be extremely helpful. Adolescents reported finding the problem-solving skills strategy helpful as well and that it was used “a lot.” One adolescent recalled an instance where he used the problem-solving strategies with his sister, “Well I had one problem this week. We were in the store and I wanted to go somewhere and my sister wanted to stay there so we basically were getting angry but we solved the problem... We talked about how long we could stay at each place and how much we wanted to go there and got to go to each of our places but had to sacrifice a little something but in the end it was worth it.” This adolescent also described how the role plays were helpful in



practicing problem-solving skills: “Since they showed real problems, it showed you ways you could cope with these problems.”

Lastly, one mother noted that problem-solving skills helped her and her son determine the root of the problem: defining the problem is great because sometimes I’m not really sure what’s bothering him and I’m like you know can you please tell me or sometimes I go remember back in the session when they asked you what was you know what’s the problem can you please tell me I kind of use that in reference because then he kind of remembers what he learned as well.”

**Theme 5.4.** *The downward and upward spiral discussion* was cited as the most widely used BEAM skill by parents. For example, one mother indicated “I’m able to discern faster where the point of no return is.” Another mother illustrated the usefulness of the spirals further: “What I never had learned was to stop. If I see her going into a really dark place and I keep just [makes pounding noise]. You guys taught me there is a moment that you have to just stop and walk away because if not you force them into a darker place or a darker kind of mindset. And now that’s really deliberate. I either stop or I find a way to just shift focus really fast.”

**Theme 5.5.** *Pleasant activity scheduling* was another skill that was prevalent throughout semi-structured interviews. In regard to her son, one mother noticed that, “when he feels sad, he says I’m going to walk the dog.” Parents also encouraged their adolescent to engage in pleasant activities when they were experiencing negative mood. For example, one mother recalled a recent example of her use of pleasant activity scheduling: “Well last week I took him to the park, I took him to two parks, because he was still acting really stressed and I didn’t want to take him back home until he got that

energy out. So even when we left the first park, he was still angry and very irritable, so I took him to another park to let him, you know, let him release the energy.”

Pleasant activity scheduling was the most widely used skilled reported by adolescents. Adolescents described using pleasant activity scheduling frequently. For example, one adolescent said “I did that all the time, literally every time I got upset, I tried to do that.” Adolescents reported using a variety of activities such as drawing, playing sports, reading a book, building Legos, playing with pets, listening to music, and cooking. Adolescents also reported feeling “more active,” “doing sports a lot.” Though using electronics as a pleasant activity in lieu of a more productive or social activity, many adolescents reported using electronics in addition to the above mentioned examples.

***Theme 5.6.** Emotion regulation techniques* were used by adolescents. Adolescents reported being better able to ignore or remove oneself from annoyances and being more aware of a need to be calm or “cool down.” Though teaching adolescents thought replacement (e.g., “I start telling myself to think of something good like pizza or sushi, going to the mall, getting new shoes) wasn’t part of the BEAM program, several adolescents reported using thought replacement to regulate emotions.

**Theme 6: Effectiveness.** The following section will describe the improvements parents noted following the BEAM program. Though there were lingering mood issues and problems with interpersonal relationships, parents noted enhancements in several domains (described below). Improvements seen in these domains may be a result of families using BEAM skills in their everyday lives. Only one parent, who reported little to no use of BEAM skills, found no benefit from the BEAM program.

**Theme 6.1.** *A reduction in mood issues* was the most commonly cited improvements noticed by parents cited among semi-structured interviews. More specifically, parents reported that the adolescent is less nervous, “less stressed,” less depressed, less angry, “not as irritable,” less aggressive, “less moody,” “happier,” “more emotionally steady,” “more of a cheerful chap,” “laughing more,” and “a little more flexible.” After BEAM, one parent felt comfortable taking her son off of his mood medication.

Adolescents also reported fewer issues regarding their mood during interviews. For example when asked about their mood and stress level, their responses included “I haven’t been really getting angry,” “I don’t get mad as much,” “I haven’t had that much stress like I used to,” “I’m happier,” “a lot less depression,” and “I’m a lot less stressed.”

**Theme 6.2.** Though parents and adolescents, in general, reported decreases in mood-related issues, *adolescents were experiencing residual mood problems*. “There’s just a lot of inconsistency” and “mood swings.” Though the “meltdowns” are less frequent, parents reported that they still happen occasionally. Several adolescents commented that aspects of their mood had gone unchanged or that little things got them “ticked off very easily.” One adolescent felt that he was more depressed after the program. It may be important to note that the adolescent who reported an increase in depression was the oldest participant in the BEAM group he was unsatisfied with the program given that he was the oldest one and found the other adolescent participants immature: “Everyone was annoying and I thought it was joke. These kids. Little kids.” Perhaps ensuring that there are same-aged peers in the group, older adolescents would be more satisfied with the BEAM program.

**Theme 6.3.** *Less disruptive or destructive behavior* was also reported by parents and adolescents. For example, parents described that their adolescent “is not as destructive.” Two adolescents reported getting into trouble less often. One explained: “I mainly use the strategies they teach me in conjunction with the strategies I already know, i.e. trying to leave the area in a way that doesn’t get me suspended...I haven’t been suspended this year.”

**Theme 6.4.** *Adolescents and parents learned more about their mental health* through the BEAM program. Parents reported having a greater understanding of what their adolescent struggles and figuring out ways to support them. Parents also reported that through the BEAM program adolescents were able to better understand more about their mood issues and what to do when they are upset.

**Theme 6.5.** *Improvements in communication and interpersonal relationships* were reported in the semi-structured interviews. Following the BEAM program, parents reported that their adolescents are “more open to feedback” and that there is a more open communication rule in the household. These changes in turn have allowed for better communication regarding each other’s feelings and fewer arguments between parents and adolescents. In regard to her relationship with her daughter, one mother noted that “I’m more mindful of her feelings and I think that has had an impact on my relationships” and that her relationship with her daughter is “much healthier because I’m not riding her to get something done.” Another mother indicated that granting more autonomy has helped improve her relationship with her son: “ Letting him earn more time on his own going out, whatever, and I think allowing him to do that made me feel more comfortable and

made him...feel like he is growing up and more confident and I think that was good... [he loves] to do things on his own and every time he does it, I feel more relaxed.”

Adolescents also reported improvements with their parents. For example, in regard to their relationship with their parents, adolescents reported: “We’re talking more now. She doesn’t get mad that often,” “we’re very close now,” and “she’s more likely to listen to my side of the story.”

Some parents indicated improvements in adolescents’ interaction with siblings and peers. For example, parents commented: “I have seen him...fighting less with his sister his week,” and “most of the time, there’s not as much fighting in my house.” Adolescent report was consistent, expressing things like: “My sister, I don’t get as mad with her as often,” “people stopped bothering me a little,” “my brother and me changed a lot because we would always get into a fight, but now we’re bros again,” and “I’ve had a lot less...social problems...I made a whole lot more new friends.”

**Theme 6.6.** Though adolescents showed improvements in their relationships with parents, siblings, and peers, some parents noted *no significant changes in interpersonal relationships*. For example parents made statements such as, “she still rides her sister like crazy,” indicating that interpersonal relationships with peers are still strained following the BEAM program. Many parents and adolescents did not report changes in parent-child relationships, not because the program was unhelpful but because families “never had a difficult relationship” to begin with. Other adolescents stated that while they noticed changes with one parent, relationships with other family members remained unchanged.

**Theme 7: Areas for BEAM program improvement.** There were several suggestions mentioned by parents and adolescents that could help inform revisions prior to a randomized control trial of the BEAM program.

*Theme 7.1. More incentives for adolescents* was one idea that two parents suggested so that adolescents want to continue attending sessions and parents do not have to negotiate with their children to get them out of bed and to the clinic. One mother reported, “I would say find other opportunities during the course of the sessions that you could reward them with whatever. Candy or whatever or a sticker or something where it kind of lifts their self-esteem.”

*Theme 7.2.* Parents suggested that after BEAM, *treatment reports, referrals, and review sheets should be provided.* As mentioned above in Theme 3.2, parents often requested more services, so it is not surprising that parents requested referrals. One mother felt a bit “abandoned” after the program and another wanted a referral to a psychologist: “because if you are in a bad situation, it would be nice to have that resource you know those numbers there just in case you find yourself in a difficult situation. Who do I call? You know because you don’t want to Baker act your son just because he is in a bad situation. You want to be able to you know meet with the psychologist and work it out you know.” With an eye toward preventing families from having to seek additional services, following parent suggestions of providing review sheets may be useful. For example, one mother suggested sending out “bullet points of everything you’ve done, like all the strategies.” Perhaps alongside review sheets, a treatment summary could be provided. One mother requested a report regarding “what the program was. You know

just an overview kind of thing or at least that they participated...these were things we taught.”

**Theme 7.3.** *An increase in the amount of homework or skills practice* was suggested by parents. Three parents requested BEAM staff assign more homework or be more explicit about recording experiences using BEAM skills during the week. One mother suggested, “If you say for instance, ‘parents and kids could you please say how you’re going to use this technique this week.’” Instead of parents just discussing the issues that arose during the previous week have the discussion focus more on how the techniques were used.

**Theme 7.4.** *The inclusion of academic or organization skills components* in the BEAM program was suggested among semi-structured interview with parents. For example, it was suggested that BEAM “tackle how to get [adolescent’s name] organized with school and how to work with the teacher.” Therefore, BEAM may be more appropriate for families that have reached a threshold level of improvement in ADHD symptoms or if provided as an adjunct intervention to ADHD behavioral treatments or academic skills interventions.

**Theme 7.5.** Three parents requested *more interaction and networking with other parents and adolescents* during session but primarily following the BEAM program. For example, one parent expressed wanting a system by which parents could exchange names and phone numbers so that their adolescents could continue spending time together after the program. One mother said in regard to the adolescents in the BEAM program, “they build a relationship with the other kids and then it’s like they are yanked away from each other. And I think these kids already have difficulties bonding with other peers and when

they actually make a bond to have it yanked away like that it's a little traumatic." Though BEAM sessions consisted of dialogue between parents directed by a facilitator, one mom wished for more opportunities to learn what other parents are doing successfully. Discussion regarding successful tactics could occur during BEAM sessions but also continue to transpire outside of session and after the BEAM program has ended.

Adolescents also reported wanting more time to socialize and talk with the other adolescents. One adolescent stated wanting the BEAM program to focus more on "bringing out people's emotions and what is going on...talk about how they are doing, why they are here and stuff like that." Another adolescent suggested having a lunch time with the adolescents to increase time available to socialize and talk more amongst each other.

**Theme 7.6.** *Computerizing homework* was suggested by one mother. Her son completed no homework assignments (i.e., mood tracking or filling out the pleasant activity questionnaire). In response to asking her about what could be done to help make it easier for him to complete assignments, she proposed, "something on the computer." Her proposal may help adolescents complete their homework easier and would allow for more frequent and convenient tracking by researchers.

**Theme 7.7.** Several adolescents wanted staff to *improve off task behavior*. Half of the adolescents reported being annoyed or distracted by other adolescents which interfered with role plays and recreational and classroom activities: "Sometimes the kids would get really annoying, saying random stuff that has nothing to do with it."



## CHAPTER IV.

### DISCUSSION

The present dissertation reports on the development of a depression preventive intervention tailored for adolescents with ADHD, Behaviorally Enhancing Adolescents' Mood (BEAM), and findings from an open trial of the BEAM program among eight families. The purpose of the BEAM program was to reduce current levels of depressive symptoms and prevent future depression by leveraging variables that have been shown to account for the covariation between ADHD and depression. Specifically, the BEAM program was developed to target adolescent reward responsivity and emotion regulation and family support as mechanisms of reducing existing depressive symptoms and preventing future depressive symptoms. In the following sections, I summarize the main findings with regards to intervention feasibility and satisfaction and preliminary outcome trends. Lessons learned from the open trial that could inform revisions of the BEAM program, limitations, and future directions are also discussed.

#### **Summary of Dissertation Findings on Feasibility and Satisfaction**

**Patient oriented outcomes.** The BEAM program is a brief preventive intervention consisting of four three-hour sessions. The strategy of recruiting through the CCF database of families who had previously participated in services for ADHD was largely successful. Of the eligible families, 73% enrolled in the BEAM program. Furthermore, no families dropped out of the study after attending the first BEAM session. Findings from a meta-analysis on parent training for externalizing disorders suggests dropout rates ranged from 28 to 50% (Reyno & McGrath, 2006). Results from the Coping with Depression group treatment indicated 9.5% of participants dropped out of the

parent-adolescent intervention (Lewinsohn, Clarke, Hops, & Andrews, 1990). Dropout rates for BEAM are below rates for both parent training groups for externalizing disorders as well as parent-adolescent treatment groups for depression. The positive reviews of parents' and adolescents' experiences in the BEAM program, gathered through semi-structured interviews, combined with a 0% dropout rate, indicate participants found BEAM to be an engaging, palatable treatment.

**Provider oriented outcomes.** BEAM staff found the program easy to implement. Though both parent-group and adolescent-group facilitators identified several challenges present in BEAM sessions and solutions for said challenges, staff supervision notes indicated that sessions were typically completed smoothly and with high fidelity.

### **Summary of Dissertation Findings on Outcome Variables**

In addition to parents' and adolescents' acceptability of the BEAM program and fidelity to which it was delivered, families demonstrated statistically significant improvement on several outcome variables. However, given the open trial design with only eight participating families, hypothesis testing and statistical significance should not be the primary criteria for drawing conclusions about the BEAM program. Instead the focus of the current study is on whether initial findings support investigating each intervention target in a larger trial.

**Main outcome on target variables.** Mean scores of depressive symptoms were lower at post-treatment and both follow-up assessments by parent and adolescent report. Mean scores of emotion regulation difficulties were lower at post-treatment and both follow-ups by parent and adolescent report. In regard to reward responsivity, adolescents' reported greater mean scores at post treatment and both follow-up assessments. Findings

from family support variables were equivocal. There were minimal to no improvements on parent-adolescent conflict, maternal warmth, paternal autonomy granting, paternal warmth, problem-solving, communication, and affective involvement. Behavior observation tasks indicated that mean levels of positive parental and adolescent behavior were greater and mean levels of parental control, adolescent hostility and the dyads criticism were lower at post-treatment and both follow-up assessments. Parents and adolescents were more effective at resolving problems at post-treatment and both follow-up assessments. These changes in mean scores of outcome variables shifted in the hypothesized direction and many reached statistical significance.

**Individual case outcomes.** The RCI analyses demonstrated that a majority of parents reported significant decreases in their adolescents' depressive symptoms at post-treatment and the first follow-up compared to pre-treatment whereas a majority of adolescents reported no significant changes in depressive symptoms at any assessment point. The discrepancy in parent- and adolescent- report of depressive symptoms may be due to the potentially invalid self-report from adolescents with ADHD. Children and adolescents with ADHD are poor informants in that they often underestimate their symptoms and impairment (Sibley et al., 2010; Wolraich et al., 2005). In regard to depressive symptoms, it is unclear whether parents or adolescents are more accurate informants in general (see Klein, Dougherty, & Olino, 2005), although in the sample of adolescents with ADHD used in the current study, parent report likely provides a more valid measurement than adolescent self-report.

A majority of adolescents also reported no change in reward responsivity from pre-treatment to any assessment point. A majority of parents reported a significant

decrease, compared to pre-treatment, in emotional lability at post-treatment and both follow-ups. Though a majority of adolescents showed no change in emotion regulation at post-treatment and the second follow-up, a majority of the adolescents at the first follow-up reported a significant increase in emotion regulation. On most family support variables, a majority of participants reported no change from pre-treatment at any assessment after the BEAM program (i.e., adolescent conflict behavior with their mother, maternal warmth, paternal warmth, problem-solving, communication, affective involvement, affective responsiveness, levels of friendliness and positive parent and adolescent behaviors during the disagreement resolution task). On the other family support measures, there were mixed findings (e.g., a majority participants reported significant improvements at one time point but no change at another time point). Of note, however, a majority of RCI analyses showed that negative parental behaviors, negative adolescent behaviors, and global levels of criticism were significantly lower at both follow-ups compared to pre-treatment. In summary, majority of participants reported significant individual improvements in adolescents' depressive symptoms and emotion regulation. Improvements in family support were more equivocal across variables.

### **Summary of Qualitative Results**

**Parent Interviews.** Coding of semi-structured interviews with parents indicated that all parents reported liking the group format of the BEAM program as well as the session schedule. A large majority also reported that the material was presented clearly or that the material was helpful. The most commonly discussed skill that parents used was the downward and upward spiral strategy. A majority of parents also reported a reduction

in their adolescent's mood issues, though most commented that there were still residual mood related concerns to varying degrees.

**Adolescent Interviews.** Seven of eight adolescents reported feeling positively about the BEAM session schedule and the group format, though many adolescents also reported criticisms or deficiencies with the BEAM session schedule. The most commonly cited strategy, which all adolescents reported using following the BEAM program, was pleasant activity scheduling. A majority of adolescents also reported reduced concerns with negative mood.

### **Lessons Learned and Implications for the BEAM Program**

The BEAM program was generally well-received by parents and adolescents as illustrated by their responses on the client satisfaction questionnaire and semi-structured interviews. The program also led to meaningful changes in the primary outcome and some of the intervention targets by post-treatment. Several lessons were learned from the BEAM open trial that can inform revisions to the program prior to a pilot randomized controlled trial. Specifically, revisions to the BEAM program should focus on maintenance of treatment gains, completion of homework assignments, managing disruptive behaviors in session, improvement of family support, and facilitation of unstructured social interactions between families.

Identifying strategies to maintain treatment gains represents an important step for future work on the BEAM program. Several strategies could be used in the future with an eye toward maintaining treatment gains. First, providing regular reminders such as emails or text alerts to check in with families and prompt them to use BEAM strategies could be one strategy to maintain gains after treatment. Second, providing review sheets upon

completion of BEAM to recap skills for families and allow them to quickly reference BEAM strategies could be another strategy to maintain gains. Providing a review sheet was an idea suggested by parents (e.g., “give me something that I can take and put it in my pocket and carry it with me everywhere I go...that’s valuable”). Third, though BEAM was designed to be a brief preventive intervention, booster sessions may also be helpful in reminding families about the skills learned and maintain gains. As discussed in Theme 3.2, some families believed BEAM was too short and they were left wanting more (i.e., more group sessions, individual sessions following BEAM, or additional treatment programs). BEAM booster sessions might help satisfy parents’ need for more sessions as well as maintain improvements seen after the BEAM program.

Homework completion is another area that could be enhanced in future work on the BEAM program. A majority of adolescent participants completed two thirds or less of assigned homework. This rate of homework completion is not unique to the BEAM program, but nonetheless efforts should be made to increase homework completion in the future. In the present study, homework completion was incentivized with a raffle ticket towards a candy prize. Stronger incentives may be necessary in the future to increase adolescents’ completion of homework assignments. Prizes for the current study were limited to candy due to restrictions in the Institutional Review Board (IRB) policies but other rewards (e.g., an assortment of gift cards) may be more salient. Alternatively, adolescents may have been partially completing homework assignments (i.e., pleasant activities) but may not have been tracking their mood in their mood journal. An internet or cell phone application based mood tracker may make completing mood journals easier and keep adolescents more engaged. Internet based applications are gaining traction in

the field of mental health (Luxton, June, & Kinn, 2011) and represent one strategy to make the BEAM program and homework assignments more palatable to adolescents. Computerizing homework was also recommended by a parent in her post-assessment interview.

Parents requested more homework assignments to practice skills outside of session (e.g., “I need an assignment to do things. [Because] I didn’t feel like I [had] an assignment, then I didn’t have to apply it”). More homework and more structured practice of skills and role plays may help increase the gains seen after the BEAM program. Additionally, though parents generally liked the facilitator approach (e.g., “I think it was very good because we also had the opportunity to know other parents that have been through the same problems [and get] their feedback and [parent group facilitator’s name]’s”), several parents suggested a slightly more didactic format (e.g., “I needed more tactics on what to work on”). Perhaps the parent group could consist of a more directive approach for a brief portion of each parent session to ensure that parents receive the instruction they felt was missing.

In addition to providing a larger incentive for homework completion, incentives could be used to encourage adolescents’ on-task behavior within sessions. Several adolescents reported being distracted or even annoyed by other adolescents’ off-task behavior during classroom and recreational activities. BEAM staff’s supervision notes also indicated that greater enforcement of classroom rules was needed to better manage adolescents’ off-task behaviors. An increased use of incentives could potentially decrease disruptive behaviors. For example, if there are stronger rewards tied to positive behavior,

there may be less disruptive behavior. Staff could also be trained more thoroughly to enforce classroom rules and to praise adolescents' on task behavior. Additionally, staff in future implementations of the BEAM program should instruct adolescents to use BEAM skills during session as in vivo practice to regulate emotions when annoyed or distressed.

There was meager evidence of an impact of the BEAM program on levels of family support. Nonsignificant findings could be attributed to BEAM lacking the necessary components to sufficiently make changes in family support. Problem-solving skills, communication skills, and autonomy granting were three areas that were targeted within modules of BEAM. It may be that different modules or activities need to be added or the intensity by which these modules were delivered needs to be increased. For example, it may be that longer time spent on behavior contracting and joint parent-adolescent practice of communication and problem-solving skills with more direction from staff is necessary to make more of an impact on improving levels of family support. The joint activities typically took place for the last 10-15 minutes of session with the two group facilitators floating from family to family to provide quick feedback as parents and adolescents completed tasks. Perhaps more staff members could be trained to assist families during the joint activities or more time could be allocated to the joint activities so that each families received more feedback. Alternatively, parents and adolescents could take turns practicing the skills (e.g., completing a problem-solving task) and receive feedback from other families and staff members following each dyad's completion.

Lastly, both adolescents and parents requested more opportunities to interact and talk with other families to build stronger relationships with one another. Parents reported



wanting more opportunities to talk with other families about the strategies they used that were helpful. They also reported that their adolescents struggled in the past with making friendships and that there was a missed opportunity for families to continue to get together after BEAM sessions. Similarly, adolescents had hoped that there would be more time to talk personally with other adolescents. One adolescent suggested having a lunch time for adolescents to be able to talk outside of learning and practicing strategies. Perhaps families could be informed of an optional lunch time after sessions where parents and adolescents could talk personally and get to know one another to foster relationships that will last after the BEAM program has ended.

### **Limitations**

There are several limitations that should be considered when interpreting results from the current dissertation study. Given the study design, an open trial, there was no control group. Therefore, it is unknown the extent to which significant changes seen at post-treatment and follow-ups were the result of participation in the BEAM program or to other factors such as regression to the mean, maturation, testing effects, and so on. In addition to a lack of control group, the sample size offered inadequate statistical power for hypothesis tests. The small sample and low statistical power was intentional in this intervention development and open trial study. Conclusions about the efficacy of the BEAM program must await a larger scale trial.

The remaining limitations of the current dissertation study concern the assessment battery. The first assessment limitation was the heavy reliance on psychosocial rating scales for many of the outcome variables. Parent-adolescent behavioral interaction tasks

were used to measure family support and a stress-task was used to measure emotion regulation. The stress task, however, did not produce the intended level of stress in adolescent participants and compliance on the task was poor. Adolescents repeatedly complained about having to complete the TSST-C at each assessment point as well as in their semi-structured treatment interviews. Though adolescents may have experienced distress during the task at the pre-assessment, there seemed to be a waning of their distress and interest in the task as they completed it at subsequent assessment points. Future trials should consider using alternative measures to assess emotion regulation. For example, a more appropriate task to distress adolescents might be the “Cyberball” task (Williams, Cheung, & Choi, 2000) where adolescents would participate in a virtual ball tossing game on the computer. In this task participants are led to believe they are playing a virtual game of catch on the computer with two other people who they cannot see. Through a manipulation of inclusion (i.e., the other two “cyberball players” throwing the ball to each other but not the participant), participants experience negative psychological and physiological reactions (Williams et al., 2000).

The second assessment based limitation was the lag experienced between the pre-treatment assessment and the beginning of the BEAM program. The pre-treatment assessment ranged from 3 days to 21 days prior to the start of treatment ( $M=10.5$ ;  $SD=6.14$ ). Reports of depressive symptoms may have fluctuated in the time between the pre-treatment assessment and the beginning of the BEAM program.

The last assessment based limitation concerns the lack of thorough diagnostic information on each families. Only mood modules were administered during diagnostic

interviews and therefore there was not data on other comorbidities (e.g., anxiety disorders, conduct disorder, oppositional defiant disorder).

### **Future Research Directions**

Results from the current dissertation study gave rise to several directions for future research that focus around several themes: (a) conducting a randomized control trial of BEAM, (b) moderation and mediation of treatment outcomes, (c) alternative methods for implementing BEAM, and (d) revisions surrounding the family support construct.

One logical next step for research would be to design and carry out a large-scale, randomized control trial of the BEAM program. Prior to implementation of a randomized trial, the BEAM program should be revised, taking into account the feedback provided by staff in supervision notes and by parents and adolescents during their post-intervention interviews.

A large, randomized trial would also allow for analyses using ethnicity, gender, ADHD subtype, and ADHD medication status as moderators. The sample of the current study was primarily male and Hispanic. Given that ADHD is more prevalent in boys (Smith, Barkley, & Shapiro, 2006) and in adolescence depression is more prevalent in girls (Avenevoli, Knight, Kessler, & Merikangas, 2008), it would be interesting to see the degree to which gender has an effect on outcomes following the BEAM program. Similarly, given the small sample in the open trial design, analyses by ADHD medication status and ADHD subtype were unable to be conducted. Past research has suggested stronger links between internalizing disorders and the inattentive subtype (e.g., Weiss, Worling, & Wasell, 2003). Correspondingly, there may be stronger or weaker

improvements associated with the inattentive subtype following the BEAM program which warrants future investigation. The persistence of ADHD into adolescence and adulthood has been suggested to account for the increased levels of depressive symptoms in emerging adults (Meinzer et al., under review). Investigating the impact of continued use of ADHD medication into adolescence on the improvement demonstrated adolescents following the BEAM program represents another important direction for future research. In sum, there may be differential effects by gender, ADHD subtype, ADHD medication status, or other comorbidity (e.g., anxiety disorders, conduct disorder, oppositional defiant disorder) diagnostic status that we were unable to detect in the open trial that could be investigated in a larger trial of the BEAM program. Additionally, the sample of the current study was primarily Hispanic. Whether the BEAM program would be received similarly cross-culturally is an open question to also be examined in a future trial.

In addition to moderation analyses, the prospective association between ADHD and depression as well as the mediators responsible for their covariation could be tested within such a research design. For example, a future, larger-scale investigation of the BEAM program could include the measurement of the mediators of the association between ADHD and depression such as reward responsivity (Meinzer et al., 2012), emotion regulation (Seymour et al., 2012, 2014), and family support (Humphreys et al., 2013; Meinzer et al., 2014, Ostrander & Herman, 2006). Routine evaluation for potential mediators during and following the BEAM program would allow for an evaluation of whether the BEAM program directly leads to reductions in depressive symptoms or indirectly via mediator variables. Evaluation of mediators would allow for the BEAM

program to be streamlined to focus on components that are most likely to contribute to reductions in depressive symptoms.

In addition to implementing a randomized trial of the BEAM program, future research should evaluate the optimal ways for implementing BEAM, such as a standalone program, concurrently with parent training for ADHD, or sequentially following parent training for ADHD. Supervision notes from the parent-group facilitator of BEAM indicated that concerns regarding ADHD tended to arise during BEAM sessions. Though one inclusionary criterion for the BEAM program was having received behavioral services for ADHD in the past, parents may have not received adequate behavioral services for ADHD or may not have adequately remembered skills (i.e., the services they received occurred too long before their entry into the BEAM program).

Results across family support variables were somewhat equivocal. Family support is a broad construct which can likely be defined in a multitude of ways by parents and adolescents. Future research should investigate how families define the construct in order to refine modules targeting family support within the BEAM program. For example, qualitative data could be collected on how both parents and adolescents perceive family support and what members of their family members could do to show said support. Learning how families interpret family support could inform what aspects of family support to target within the BEAM program.

Lastly, future research should employ the use of a different emotion regulation task. More specifically, a task that relies on psychophysiological data rather than participant self-report of heightened emotions may prove useful when assessing emotion regulation in adolescents with ADHD. In addition to the use of psychophysiological data

with observation or stress tasks, computer-based neuropsychological tasks alone or in combination with psychophysiological data may represent an effective method for measuring both emotion regulation (see Lewis et al., 2006) and reward responsivity (see Iaboni, Douglas, & Ditto, 2007; Huang-Pollock, Mikami, Pffner, & McBurnett, 2007). Future examinations of the BEAM program should consider using such methodologies.

### **Conclusions**

In summary, families were generally highly satisfied with the BEAM program and staff felt the program was easy to implement. Furthermore, there were decreases in depressive symptoms and increases in emotion regulation, reward responsivity, and family support at group and/or individual levels. Findings from the current study are promising with respect to reducing depressive symptoms and suggest that BEAM program moved the needle on intervention targets (reward responsivity, emotion regulation, and family support). The positive parent, adolescent, and staff reviews of the BEAM program combined with the improvements demonstrated by hypothesized shifts in mean scores indicates that a randomized control trial of the BEAM program would be a promising endeavor for preventing depressive outcomes in adolescents with ADHD.

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## APPENDICES

Table 1

*Cross-Sectional ADHD-Depression Studies*

Study	Sample	Follow-Up	ADHD measure	Depression Measure	Main Finding
Biederman et al., 1992,	140 ADHD probands, 120 controls (males, 6-17 years old) and their first degree relatives (454 and 368, respectively)	Cross-sectional	Referred with a diagnosis of ADHD and passed <i>DSM-III</i> screener criteria	Diagnosis by <i>DSM-III-R</i> criteria by parent report and self-report (for children 12 years and older)	At both sites (pediatric and psychiatric referral) individuals with ADHD were significantly more likely to have MDD, more mood disorders were found among relatives of probands with ADHD. ADHD and MDD may share common familial vulnerabilities
Biederman et al., 1995	424 children and adolescents referred to a pediatric psychopharmacology clinic and normal controls	Cross-sectional	<i>DSM-III-R</i> diagnosis of ADHD by parent report	<i>DSM-III-R</i> diagnosis of MDD by parent report	Children with mild or severe depression had significantly higher rates of ADHD than normal controls even after controlling for overlapping diagnostic criteria.

					Additionally, ADHD had a significantly earlier age of onset than major depressive disorder.
Biederman et al., 1999	140 girls with ADHD and 122 comparison girls without ADHD	Cross-sectional	Referred with a diagnosis of <i>DSM-III-R</i> ADHD (with <i>DSM-IV</i> questions added in) by parent report	Diagnosis of <i>DSM-III-R</i> ADHD by parent report and self-report (for children 12 and older)	Females with ADHD were more likely to have mood disorders than control females
Blackman, Ostrander, & Herman, 2005	309 problem, 144 nonproblem community children	cross-sectional	Symptoms on Revised Conners Rating Scale, hyperactivity index by parent and teacher ratings	Symptoms by parent (DICA-R-P) and child (CDI) report	Rate of depression in ADHD children much higher than the controls. Youth with ADHD and depression did not show more extreme levels of ADHD or aggression than ADHD only. Depressed-ADHD youth showed the greatest impairment in social and academic functioning followed by

					ADHD-only followed by controls. The comorbidity of ADHD and depression is real and is not epiphenomenal
Busch et al., 2002	522 children and adolescents 6-18 years old (220 with and 242 without ADHD) recruited from pediatric and psychiatric clinics	Cross sectional	Diagnosis by <i>DSM III-R</i> criteria for ADHD by parent-report and self-report if the child was 12 years or older	Diagnosis by <i>DSM III-R</i> or <i>DSM IV</i> criteria by parent-report and self-report if the child was 12 years or older	Children with ADHD from both ascertainment sources were significantly more likely than controls to have depression
Connor et al., 2003	300 children and adolescents with ADHD (under 18 years old)	Cross sectional	CBCL (Inattent./Hyperactivity Scale) by parent and teacher report	CBCL (Anxious/Depressed Scale) by parent and teacher report	Severity of ADHD symptoms in ADHD youth was significantly with anxious/depressive psychopathology by both parent and teacher report
Hinshaw, 2002	228 girls 6-12 years old (93 combined, 47 inattentive, and 88 matched controls)	Cross sectional	Diagnosis of ADHD by <i>DSM-IV</i> by parent report	CBCL (Internalizing Scale) and DBR anxious/depressed subscale and withdrawn subscale for parent	Girls with ADHD reported higher depressive symptoms via self- and parent-report

					report and CDI for child self- report
Jensen, Burke, & Garfinkle, 1988	35 boys from outpatient clinic (12 MDD, 12 ADDH, 11 normal) ages 8-18	Cross sectional	Diagnosis of ADHD by <i>DSM- III</i> criteria;	Diagnosis by <i>DSM-III</i> criteria; Symptoms by Child Depression Rating Scale	Boys with MDD did not have features of ADDH but may have ODD, whereas boys with ADDH may have dysthymia.
Kessler, Chtu, Demler, & Walters, 2005	19,282 individuals 18 years and older	12 month prevalen ce rates	Diagnosis of MDE and dysthymia by <i>DSM- IV</i> criteria	Diagnosis by <i>DSM-IV</i> criteria	Significant relation between ADHD and Major Depression and Dysthymia
Meinzer et al., in 2014	350 undergraduate students who have contact with both mothers and fathers	Cross sectional	ASRS	CESD symptoms by self- report	Significant association between depressive symptoms and ADHD symptoms
Meinzer et al., 2013	1507 adolescents (mean age= 16.6) from a school-based sample who completed a time 1 assessment and at least 1 follow-up assessment	Cross sectional	Diagnoses by <i>DSM- III-R</i> criteria by self-report	Diagnoses by <i>DSM-III- R</i> criteria by self-report	The association between lifetime ADHD and lifetime MDD was not significant.
Meinzer et	198	Cross	Adult	CESD by	Significant



al., 2012	undergraduates	sectional	ADHD Self-Report Scale (ASRS)	self-report	association between depressive symptoms and total ADHD symptoms, inattentive ADHD symptoms, and hyperactive-impulsive ADHD symptoms
Mick et al., 2003	140 ADHD males, 120 non-ADHD males, 140 ADHD females, 122 non-ADHD females all between the ages of 6-17. 1,584 first-degree relatives of probands were also studied	Cross-sectional	Referred with a diagnosis of ADHD and passed <i>DSM-III</i> screener criteria	Diagnosis by <i>DSM-IV</i> by parent or self-report at item level	The results indicate that there may be two mechanisms underlying MD in ADHD families: 1) an etiologically distinct familial subtype of ADHD and MD that is more evident in females, and 2) a familial, gender-specific susceptibility to nonfamilial risk factors that mediate the onset of either ADHD or MD in males and females.
Murphy, Barkley, Bush, 2002	160 young adults from 17-28 (60 ADHD)	Cross-sectional	Diagnosis by <i>DSM-IV</i> criteria for ADHD	Diagnosis by <i>DSM-IV</i> criteria by self-report	Both ADHD groups presented a greater

	combined type; 36 ADHD inattentive type; 64 controls)		by self-, retrospective-		likelihood of dysthymia but did not significantly differ than controls on rates of Major Depressive Disorder
Rohde et al., 1999	99 12-14 year olds who screened positive for ADHD , 92 random controls	Cross-sectional	<i>DSM-IV</i> symptoms of ADHD rated on a 5 point likert scale	CBCL anxious depression subscale	Adolescents who screened positive for ADHD had significantly higher levels of anxious depressive symptoms than non-ADHD adolescents

Table 2

*Longitudinal ADHD-Depression Studies*

Study	Sample	Follow-Up	ADHD measure	Depression Measure	Main Finding
Bagwell, Molina, Kashdan, Pelham, & Hoza, 2006	142 clinic ADHD adolescents, 100 community controls	5 years	Diagnosis by <i>DSM-III-R</i> or <i>DSM-IV</i> ADHD by parent or teacher report	Diagnosis by <i>DSM-III-R</i> depression by parent or self report at item level	Children diagnosed with ADHD are not at higher risk y to have of depression (at T1 or follow-ups). Children with ADHD who had more externalizing behaviors or social problems were more likely to have anxiety

					or depressive disorders
Biederman et al., 2008	140 females with ADHD, 122 controls (psychiatric & pediatric settings)	5 years	Referral by psychiatrist or pediatrician, and passed <i>DSM-III-R</i> (with <i>DSM-IV</i> questions added in) by parent report	Diagnosis by <i>DSM-IV</i> by parent or self-report (for children 12 and older) at item level	ADHD in females significantly increased the risk for MD relative to controls. They are also at risk for earlier onset, greater duration, and more severe impairment associated with MD
Biederman, Mick, & Faraone, 1998	76 depressed ADHD children (psychiatric and pediatric settings)	4 years	Diagnosis by <i>DSM-III-R</i> criteria by parent report and self-report (for children 12 and older)	Diagnosis by <i>DSM-III-R</i> criteria by parent report and self-report (for children 12 and older)	School difficulty and ADHD-associated measures of severity were not associated with persistent MD. Remission from ADHD was also not statistically significantly associated with remission from MD. ADHD and MD had independent and distinct courses, indicating that ADHD-associated MD reflects a depressive disorder and not merely demoralization
Biederman	140 ADHD probands,	1, 4 years	Referred with a	Diagnosis by <i>DSM-</i>	At both year 1 and year 4

et al., 1996	120 controls (males, 6-17 years old) and their first degree relatives (454 and 368, respectively)		diagnosis of ADHD and passed <i>DSM-III</i> screener criteria	<i>III-R</i> criteria by parent report and self-report (for children 12 years and older)	follow-ups individuals with ADHD differed significantly from the control group on rates of MDD suggesting are at high risk for developing MDD.
Biederman, et al. 2006	140 male ADHD children and adolescents, 120 matched controls (psychiatric & pediatric settings)	10 years	Referred with a diagnosis of ADHD and passed <i>DSM-III</i> screener criteria	Diagnosis by <i>DSM-IV</i> by parent or self report at item level	Youth with ADHD have an increased lifetime risk for MD
Bussing, Mason, Bell, Porter, & Garvan, 2010	94 full syndrome ADHD, 75 subthreshold ADHD, and 163 controls from a school based sample	retrospective	Diagnosis by <i>DSM-IV</i> by parent report	Symptoms by parent report (Vanderbilt ADHD Parent Rating Scale)	Children with full syndrome ADHD had significantly increased odds of depression/anxiety
Chronis-Tuscano et al., 2010	125 clinic children with ADHD and 123 community controls	5-13 years	Diagnosis by <i>DSM-IV</i> ADHD by parent or teacher report	Diagnosis <i>DSM-IV</i> MDD or dysthymia via parent or adolescent report at item level	All subtypes of ADHD in young children predict adolescent depression
Claude & Firestone,	60 ADHD children and 52	12 years	Diagnosis by <i>DSM-III</i> criteria by	Diagnosis by <i>DSM-III-R</i>	The ADHD and control groups did not differ in

1995	community controls recruited at follow-up		parent report	<i>criteria</i> by adolescent self-report	their frequency of mood, anxiety or thought disorders
Fischer, Barkley, Smallish, & Fletcher, 2002	147 hyperactive children, 71 control c	13+ years	Symptoms parent report on Hyperactivity Index of the Revised Conners Parent Rating Scale and Werry-Weiss – Peters Activity Rating Scale	Diagnosis by <i>DSM-III-R</i> by self-report	Major depression was significantly greater in the Hyperactive group than the control group at adult follow-up
Hinshaw, Owens, Sami, & Fargeon, 2006	228 girls 6-12 years old (93 combined, 47 inattentive, and 88 matched controls)	5 years	Diagnosis by <i>DSM-IV</i> by parent report (SNAP-IV was also used to determine subtype)	Symptoms by parent, self, and teacher report (TRF, CBCL, & CDI)	Girls with pre-treatment ADHD had more problems at follow-up including internalizing symptoms on some reports (Parent report; self and teacher if covariates aren't included)
Mannuzza et al., 1991	94 hyperactive boys, 78 controls	Approximately 9 years	Diagnosed as having DSM-II hyperkinetic reaction of childhood	Diagnosis by <i>DSM-III</i> criteria	No increased risk for mood disorders in hyperactive children
Mannuzza,	158 (85	15-21	Diagnosed	Diagnosis	Probands did not

Klein, Bessler, Mallory, LaPadula, 1998	probands and 73 controls)	years (M=17; SD= 1.4)	as having DSM-II hyperkinetic reaction of childhood by a psychiatrist	by <i>DSM-III-R</i> criteria	have a higher prevalence of mood disorders at follow-up when compared with comparison peers.
Meinzer et al., 2013	1222 adolescents (mean age= 16.6) from a school-based sample who completed at time1 assessment and at least 1 follow-up assessment and had no lifetime history of MDD.	4 assessments from adolescence to age 30	Diagnoses by <i>DSM-III-R</i> criteria by self-report	Diagnosis by <i>DSM-III-R</i> and <i>DSM-IV</i> criteria by self-report	ADHD in adolescence is associated with elevated risk of MDD through early adulthood and this is not accounted for by psychosocial impairment in adolescence or co-occurring psychiatric disorders
Meinzer et al., under review	205 ADHD probands and 189 non-ADHD controls	Longitudinal 18 to 25 years old	Diagnosis by <i>DSM-III-R</i> or <i>DSM-IV</i> criteria	CESD symptoms by self-report	Individuals followed a higher trajectory of depressive symptoms from 18-25 than their non-ADHD peers even after accounting for comorbid diagnoses

Table 3

*General Overview of BEAM*

	<b>Adolescent Component</b>	<b>Parent Component</b>
1	<ol style="list-style-type: none"> <li>1. General program/ psychoeducational overview</li> <li>2. Mood journal explanation</li> <li>3. Recreational activity</li> <li>4. Pleasant activity discussion</li> <li>5. Pleasant activity review jointly with parents</li> </ol>	<ol style="list-style-type: none"> <li>1. General program/ psychoeducational overview</li> <li>2. Review and practice of ADHD parent training principles</li> <li>3. Discuss role in pleasant activity engagement</li> <li>4. Pleasant activity review jointly with adolescents</li> </ol>
2	<ol style="list-style-type: none"> <li>1. Review previous session's material with parents</li> <li>2. Review previous week's mood journal</li> <li>3. Problem-solving skills</li> <li>4. Recreational activity</li> <li>5. Problem-solving task jointly with parents</li> <li>6. Behavior contracting jointly with parents</li> </ol>	<ol style="list-style-type: none"> <li>1. Review previous session's material with adolescents</li> <li>2. Review importance of parent group</li> <li>3. Problem-solving skills</li> <li>4. Introduction to communication skills</li> <li>5. Practice communication skills</li> <li>6. Problem-solving task jointly with adolescents</li> <li>7. Behavior contracting jointly with adolescents</li> </ol>
3	<ol style="list-style-type: none"> <li>1. Problem solve reasons for not engaging in activities jointly with parents</li> <li>2. Emotion regulation activity</li> <li>3. Recreation activity (social skills)</li> <li>4. Practice problem-solving skills</li> <li>5. Problem-solving activity jointly with parents</li> <li>6. Behavior contracting jointly with parents</li> </ol>	<ol style="list-style-type: none"> <li>1. Problem solve reasons for not engaging in activities jointly with adolescents</li> <li>2. Stating positive/negative feelings</li> <li>3. Problem-solving techniques (role play with staff)</li> <li>4. Autonomy granting and parental monitoring</li> <li>5. Problem-solving activity jointly with adolescents</li> <li>6. Behavior contracting jointly with adolescents</li> </ol>
4	<ol style="list-style-type: none"> <li>1. Review previous session's material jointly with parents</li> <li>2. Review previous week's mood journal</li> <li>3. Practice problem-solving skills</li> <li>4. Recreational activity</li> <li>5. Emotion regulation</li> <li>6. Problem-solving activity jointly with parents</li> <li>7. Behavior contracting jointly with</li> </ol>	<ol style="list-style-type: none"> <li>1. Review previous session's material jointly with adolescents</li> <li>2. Review barriers or problems</li> <li>3. Review/ generalizability</li> <li>4. Problem-solving activity jointly with adolescents</li> <li>5. Behavior contracting jointly with adolescents</li> </ol>

	<b>parents</b>	
<b>Note. BEAM= Behaviorally Enhancing Adolescents' Mood.</b>		

Table 4			
<i>Selection of Variables Assessed within the BEAM Study</i>			
Outcome Variables	Measure	Rater	Measurement Schedule
Depressive Symptoms	Children's Depression Inventory (CDI-2)	Child	Screen, Pre-, Post-, FU1, FU2
	Children's Depression Inventory: Parent Version (CDI-P)	Parent	Screen, Pre-, Post-, FU1, FU2
Emotion Regulation	Difficulties in Emotion Regulation Scale (DERS)	Child	Pre-, Post-, FU1, FU2
	Emotion Regulation Checklist (ERC)	Parent	Pre-, Post-, FU1, FU2
	Trier Social Stress Test for Children (TSST)	Child	Pre-, Post-, FU1, FU2
Reward Responsivity	Tripartite Pleasure Inventory (TPI)	Child	Pre-, Post-, FU1, FU2
Family Support	Perceptions of Parents Scale (POPS)	Child	Pre-, Post-, FU1, FU2
	Conflict Behavior Questionnaire (CBQ-20)	Parent, Child	Pre-, Post-, FU1, FU2
	Family Assessment Device (FAD)	Parent	Pre-, Post-, FU1, FU2
	Behavioral Interaction Task	Parent, Child	Pre-, Post-, FU1, FU2
Treatment Satisfaction	Client Satisfaction Questionnaire (CSQ)	Parent, Child	Post-
	Semi-Structured Interview	Parent, Child	Post-, FU1, FU2
Treatment Adherence	Treatment Integrity and Fidelity Checklist (TIF)	Trained Coders Rate Audiotapes	Treatment Sessions



Treatment Compliance	Child homework completion Session Attendance	Child Parent, Child	Treatment Sessions Treatment Sessions
Feasibility	Contact Notes	Clinicians	Treatment Sessions
<i>Note.</i> FU1= 6 week follow-up, FU2= 3 month follow-up.			

Table 5

*Demographic Information of Adolescent Participants*

	N	%	M	SD
Age (years)	--	--	13.00	1.31
Gender (male)	6	75	--	--
Parent gender (male)	2	25	--	--
Ethnic background				
Hispanic	6	75	--	--
Non-Hispanic	2	25	--	--
Race				
White	7	87.5	--	--
African-American	1	12.5	--	--
Percentage of Parents born outside of the US	5	62.5	--	--
Years since emigration to the US	--	--	16.67	6.62
<i>Note.</i> M= mean; SD= standard deviation.				

Table 6

*Adolescents' Depressive Symptoms at Each Assessment Wave*

Family	Pre		Post		Follow-Up 1		Follow-Up 2	
	CDI-2	CDI-P	CDI-2	CDI-P	CDI-2	CDI-P	CDI-2	CDI-P
1	42	68	40	65	40	51 <sup>R</sup>	40	63
3	67	71	47 <sup>R</sup>	57 <sup>R</sup>	55 <sup>R</sup>	63	58	67
4	64	90	59	69 <sup>R</sup>	60	72 <sup>R</sup>	--	--
5	72	74	76	64 <sup>R</sup>	78.8	73	--	--
7	47	66	47	54 <sup>R</sup>	--	--	--	--
8	64	69	49 <sup>R</sup>	62	60	71	67	65
9	57	66	43 <sup>R</sup>	69	44 <sup>R</sup>	53 <sup>R</sup>	44 <sup>R</sup>	74
10	52	86	51	65 <sup>R</sup>	45	63 <sup>R</sup>	47	63 <sup>R</sup>
Mean	58.2	73.75	51.50 <sup>+</sup>	63.13 <sup>*</sup>	54.69	63.71 <sup>*</sup>	51.20	66.4
SD	10.58	9.24	11.39	5.33	13.61	8.99	11.08	4.56
<i>d</i>	--	--	.61	1.46	.29	1.02	.32	1.07

*Note.* CDI= T-Scores for Children's Depression Inventory (2<sup>nd</sup> Edition); CDI-P= T-Scores Children's Depression Inventory-Parent Version; Higher scores represent higher levels of depressive symptoms; *d*= Cohen's effect size, <sup>R</sup>= Reliable Change Index <.05; <sup>+</sup>= *p*<.10; <sup>\*</sup> *p*<.05; Statistical significance and effect size refer to the contrast with scores at pre-treatment.

Table 7

*Adolescents' Reward Responsivity at Each Assessment Wave*

	Pre	Post	Follow-Up 1	Follow-Up 2
Family	TPI	TPI	TPI	TPI
1	2.17	2.5	3.67 <sup>R</sup>	3.00 <sup>R</sup>
3	2.08	3.17 <sup>R</sup>	3.08 <sup>R</sup>	3.5 <sup>R</sup>
4	2.92	3.5	2.75	--
5	2.17	2.42	2.00	--
7	1.75	2.17	--	--
8	2.50	2.92	3.08	2.83
9	1.71	2.67 <sup>R</sup>	2.25	1.58
10	1.71	2.67 <sup>R</sup>	2.25	1.58
Mean	2.13	2.73 <sup>*</sup>	2.67 <sup>+</sup>	2.58
SD	0.42	0.44	0.67	0.78
<i>d</i>	--	-1.39	-.97	-.72

*Note.* TPI= Reward Responsivity subscale of the Tripartite Pleasure Inventory; Higher scores represent greater reward responsivity; *d*= Cohen's effect size, <sup>R</sup>= Reliable Change Index <.05; <sup>+</sup>= *p*<.10; <sup>\*</sup>*p*<.05; Statistical significance and effect size refer to the contrast with scores at pre-treatment.

Table 8

*Adolescents' Emotion Regulation at Each Assessment Wave*

Family	Pre		Post		Follow-Up 1		Follow-Up 2	
	ERC	DERS	ERC	DERS	ERC	DERS	ERC	DERS
1	37	55	41	63	29 <sup>R</sup>	43	34 <sup>R</sup>	42
3	41	72	39	74	38 <sup>R</sup>	47 <sup>R</sup>	36 <sup>R</sup>	58
4	37	117	30 <sup>R</sup>	115	32 <sup>R</sup>	97 <sup>R</sup>	--	--
5	42	87	37 <sup>R</sup>	103	39 <sup>R</sup>	103	--	--
7	46	62	37 <sup>R</sup>	55	--	--	--	--
8	49	78	37 <sup>R</sup>	72	46 <sup>R</sup>	78	49	74
9	42	62	41	43 <sup>R</sup>	36 <sup>R</sup>	44 <sup>R</sup>	45	44 <sup>R</sup>
10	56	67	48 <sup>R</sup>	63	46 <sup>R</sup>	53 <sup>R</sup>	45 <sup>R</sup>	59
Mean	43.75	75	38.75*	73.5	38*	66.43	41.8	55.4 <sup>+</sup>
SD	6.41	19.74	5.09	24.17	6.45	25.87	6.46	12.99
<i>D</i>	--	--	.86	.07	.89	.37	.30	1.17

*Note.* ERC= Emotion Regulation Checklist Liability Subscale; DERS= Difficulties in Emotion Regulation Total Score; Higher scores represent greater emotion dysregulation; *d*= Cohen's effect size, <sup>R</sup>= Reliable Change Index <.05; <sup>+</sup>= *p*<.10; \**p*<.05; Statistical significance and effect size refer to the contrast with scores at pre-treatment.

Table 9

*Affective Involvement and Responsiveness Levels at Each Assessment Wave*

Family	Pre		Post		Follow-Up 1		Follow-Up 2	
	FAD-AI	FAD-AR	FAD-AI	FAD-AR	FAD-AI	FAD-AR	FAD-AI	FAD-AR
1	2.00	1.50	2.43	2.00	1.43	1.17	1.86	1.50
3	2.29	2.17	2.00	2.00	2.29	2.00	2.29	1.83
4	1.86	1.50	1.86	1.83	1.43	1.17	--	--
5	2.29	2.50	2.43	2.33	2.71	2.17	--	--
7	2.43	2.50	3.00	2.67	--	--	--	--
8	1.86	1.50	2.00	1.33	2.14	1.67	2.00	1.33
9	2.14	2.67	3.29	3.67	2.86	2.67	2.71	3.00
10	2.14	2.50	2.14	1.83	2.14	2.17	2.00	2.17
Mean	2.13	2.11	2.46	2.26	2.14	1.86*	2.17	1.97
SD	0.21	0.52	0.52	0.68	0.56	0.56	0.34	0.66
<i>d</i>	--	--	-.83	-.25	-.02	.46	-.07	.33

*Note.* FAD-AI= Family Assessment Device- Affective Involvement subscale; FAD-AR= Family Assessment Device- Affective Responsiveness subscale; Higher scores represent greater problematic behavior; *d*= Cohen's effect size, <sup>R</sup>= Reliable Change Index <.05; + = *p*<.10; \* *p*<.05; Statistical significance and effect size refer to the contrast with scores at pre-treatment.

Table 10

*Problem-Solving and Communication Levels at Each Assessment Wave*

Family	Pre		Post		Follow-Up 1		Follow-Up 2	
	FAD-PS	FAD-CM	FAD-PS	FAD-CM	FAD-PS	FAD-CM	FAD-PS	FAD-CM
1	2.00	2.00	2.20	2.33	1.60	1.83	2.00	2.17
3	2.20	2.00	1.80	2.17	2.00	2.17	1.80	2.17
4	1.40	1.16	1.20	1.50	1.20	1.00	--	--
5	2.60	2.33	2.00	2.67	2.20	2.17	--	--
7	2.40	2.17	2.00	1.83	--	--	--	--
8	2.20	2.00	2.60	1.83	2.80	2.00	2.20	1.67
9	2.60	2.5	2.80	3.17	2.00	2.83	2.60	2.83
10	2.40	2.33	2.00	2.14	2.00	2.00	1.80	1.67
Mean	2.23	2.06	2.07	2.17	1.97	2.00	2.08	2.10
SD	0.39	0.41	0.46	0.51	0.50	0.54	0.33	0.48
<i>d</i>	--	--	.38	-.12	.58	.06	.20	-.09

*Note.* FAD-PS= Family Assessment Device- Problems-Solving subscale; FAD-CM= Family Assessment Device- Communication subscale; Higher scores represent greater levels of problematic behavior; *d*= Cohen's effect size, <sup>R</sup>= Reliable Change Index <.05; + = *p*<.10; \* *p*<.05; Statistical significance and effect size refer to the contrast with scores at pre-treatment.

Table 11

*Adolescent Reported Parental Autonomy Granting Levels at Each Assessment Wave*

Family	Pre		Post		Follow-Up 1		Follow-Up 2	
	Auto-M	Auto-F	Auto-M	Auto-F	Auto-M	Auto-F	Auto-M	Auto-F
1	6.44	4.78	6.11	3.00	6.11	3.11	6.44	3.56
3	6.00	5.67	6.33	5.67	6.35	6.67 <sup>R</sup>	6.78	5.67
4	5.44	5.22	3.67	6.44	--	6.67 <sup>R</sup>	--	--
5	5.56	6.44	4.89	5.89	6.56 <sup>R</sup>	6.22	--	--
7	6.00	6.78	6.11	5.869	--	--	--	--
8	3.22	2.00	2.00	2.33	2.44	2.00	4.12 <sup>R</sup>	2.11
9	4.61	3.94	4.89	4.00	4.44	2.44	5.44 <sup>R</sup>	4.33
10	5.22	--	5.33	--	5.01	--	6.44 <sup>R</sup>	--
Mean	5.31	4.98	4.92	4.75	5.15	4.52	5.84 <sup>*</sup>	3.92
SD	1.01	1.63	1.47	1.62	1.56	2.23	1.09	1.49
<i>d</i>	--	--	.31	.14	.12	.24	-.50	.68

*Note.* Auto-M= Perception of Parent's Scale- Mother's Autonomy Granting subscale; Auto-F= Perception of Parent's Scale- Father's Autonomy Granting subscale; Higher scores represent greater levels of autonomy granting; *d*= Cohen's effect size, <sup>R</sup>= Reliable Change Index <.05; <sup>+</sup>= *p*<.10; <sup>\*</sup> *p*<.05; Statistical significance and effect size refer to the contrast with scores at pre-treatment.

Table 12

*Adolescent Reported Parental Warmth Levels at Each Assessment Wave*

Family	Pre		Post		Follow-Up 1		Follow-Up 2	
	Warm-M	Warm-F	Warm-M	Warm-F	Warm-M	Warm-F	Warm-M	Warm-F
1	6.83	6.50	7.00	5.33	7.00	6.00	7.00	6.17
3	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
4	5.37	6.67	4.00	7.00	--	6.17	--	--
5	5.33	6.33	6.17 <sup>R</sup>	6.17	5.33	6.83	--	--
7	7.00	7.00	7.00	7.00	--	7.00	--	--
8	2.67	3.06	2.50	2.83	5.83 <sup>R</sup>	2.33	5.17 <sup>R</sup>	3.67
9	4.98	5.00	4.75	4.00	5.50	3.50	6.17 <sup>R</sup>	5.50
10	6.00	--	6.50	--	6.50	--	6.33	--
Mean	5.65	5.76	5.77	5.62	6.19	5.30	6.33	5.59
SD	1.45	1.44	1.64	1.66	0.74	1.93	0.75	1.42
<i>d</i>	--	--	-.04	.05	-.23	.13	-.28	.06

*Note.* Warmth-M= Perception of Parent's Scale- Mother's Warmth subscale; Warmth-F= Perception of Parent's Scale- Father's Warmth subscale; Higher scores represent greater levels of parental warmth; *d*= Cohen's effect size, <sup>R</sup>= Reliable Change Index <.05; <sup>+</sup>= *p*<.10; \**p*<.05; Statistical significance and effect size refer to the contrast with scores at pre-treatment.



Table 13

*Adolescent Reported Family Conflict at Each Assessment Wave*

Family	Pre		Post		Follow-Up 1		Follow-Up 2	
	CBQ-M	CBQ-F	CBQ-M	CBQ-F	CBQ-M	CBQ-F	CBQ-M	CBQ-F
1	77	65	85	56 <sup>R</sup>	90	64	86	52 <sup>R</sup>
3	95	95	91	86 <sup>R</sup>	98	92	99	83 <sup>R</sup>
4	68	87	59	89	--	85	--	--
5	62	87	64	74 <sup>R</sup>	68	64 <sup>R</sup>	--	--
7	90	93	87	93	--	--	--	--
8	39	41	35	44	49	26 <sup>R</sup>	--	36
9	67	55	71	58	77	46 <sup>R</sup>	63	75
10	78	--	94	--	92	--	87	--
Mean	72.00	74.71	71.29	71.43	79.00	62.83 <sup>+</sup>	75.40	61.0
SD	17.50	21.08	20.11	18.00	18.31	24.43	22.77	21.49
<i>d</i>	--	--	.04	.17	-.40	.52	-.17	.64

*Note.* CBQ-M= Conflict Behavior Questionnaire (adolescent report about mother); CBQ-F= Conflict Behavior Questionnaire (adolescent report about father); Higher scores represent greater levels of conflict; *d*= Cohen's effect size, <sup>R</sup>= Reliable Change Index <.05; <sup>+</sup>= *p*<.10; \**p*<.05; Statistical significance and effect size refer to the contrast with scores at pre-treatment.

Table 14

*Parent Reported Family Conflict at Each Assessment Wave*

	Pre	Post	Follow-Up 1	Follow-Up 2
Family	CBQ-P	CBQ-P	CBQ-P	CBQ-P
1	51	53	67	58
3	72	86	83	75
4	76	86	83	--
5	48	60	70	--
7	59	81	--	--
8	56	50	31	47
9	63	62	59	53
10	60	56	68	78
Mean	61.29	66.72	65.86	62.2
SD	10.19	15.15	17.67	13.66
<i>d</i>	--	-.42	-.32	-.08

*Note.* CBQ-P= Conflict Behavior Questionnaire (Parent report); *d*= Cohen's effect size.

Table 16

Table 15

*Means (Standard Deviations) of Global Ratings of Parent and Adolescent Behavior during the Card and Academic Task at Each Assessment Wave*

	Pre-Treatment	Post-Treatment	Follow-Up 1	Follow-Up 2
Parental Control	7.13 (0.99)	5.73 (2.26)	6.58 (1.35)	6.65 (1.11)
Adolescent Hostility	3.09 (1.03)	2.50 (0.58) <sup>+</sup>	2.46 (0.60)	2.75 (0.79) <sup>*</sup>
Positive Parent Behavior	14.59 (0.57)	15.19 (0.58) <sup>+</sup>	15.25 (0.69) <sup>+</sup>	15.45 (0.54) <sup>*</sup>
Positive Adolescent Behavior	14.34 (0.86)	14.75 (1.14)	15.08 (0.79)	15.25 (1.20)
<i>Note.</i> Higher scores represent greater levels of parental control, adolescent hostility or parent/adolescent positive behaviors; <sup>+</sup> = $p < .10$ ; <sup>*</sup> $p < .05$ ; Statistical significance and effect size refer to the contrast with scores at pre-treatment.				

*Positive Behaviors Displayed during the Disagreement Resolution Task at Each Assessment Wave*

Family	Pre		Post		Follow-Up 1		Follow-Up 2	
	Pos-P	Pos-A	Pos-P	Pos-A	Pos-P	Pos-A	Pos-P	Pos-A
1	0.82	0.93	0.86	0.97	0.80	1.02 <sup>R</sup>	0.75	0.98
3	0.50	0.79	0.59	0.86	0.45	0.96 <sup>R</sup>	0.41	0.79
4	0.72	0.86	0.45	0.77	0.57	0.93	--	--
5	0.62	0.95	0.49	1.05 <sup>R</sup>	0.47	0.93	--	--
7	0.66	0.91	0.20	0.84	--	--	--	--
8	0.40	0.97	0.50	0.84	0.43	0.89	0.50	1.00
9	0.40	0.82	0.48	0.89	0.50	0.89	0.43	0.81
10	0.57	0.88	0.41	1.04 <sup>R</sup>	--	--	0.50	0.90
Mean	0.58	0.89	0.46	0.90	0.54	0.94	0.52	0.89
SD	0.15	0.06	0.20	0.10	0.14	0.05	0.13	0.10
<i>d</i>	--	--	.67	-.12	.28	-.90	.43	.00

*Note.* Pos-P= Parent elicited positive behaviors in parent-child problem-solving task; Pos-A= Adolescent elicited positive behaviors in parent-child problem-solving task; Higher scores represent greater levels of positive behaviors; *d*= Cohen's effect size, <sup>R</sup>= Reliable Change Index <.05; <sup>+</sup>= *p*<.10; <sup>\*</sup>*p*<.05; Statistical significance and effect size refer to the contrast with scores at pre-treatment.

Table 17

*Negative Behaviors Displayed during the Disagreement Resolution Task at Each Assessment Wave*

Family	Pre		Post		Follow-Up 1		Follow-Up 2	
	Neg-P	Neg-A	Neg-P	Neg-A	Neg-P	Neg-A	Neg-P	Neg-A
1	0.24	0.23 <sup>R</sup>	0.08 <sup>R</sup>	0.09 <sup>R</sup>	0.10 <sup>R</sup>	0.11 <sup>R</sup>	0.16 <sup>R</sup>	0.13 <sup>R</sup>
3	0.13	0.11	0.19	0.18	0.03 <sup>R</sup>	0.00 <sup>R</sup>	0.14	0.16
4	0.14	0.08	0.22	0.12	0.14	0.06	--	--
5	0.21	0.22	0.14 <sup>R</sup>	0.19	0.11 <sup>R</sup>	0.09 <sup>R</sup>	--	--
7	0.33	0.08	0.15 <sup>R</sup>	0.20	--	--	--	--
8	0.23	0.46	0.34	0.51	0.13 <sup>R</sup>	0.56	0.03 <sup>R</sup>	0.15 <sup>R</sup>
9	0.15	0.20	0.26	0.33	0.13	0.28	0.03 <sup>R</sup>	0.06 <sup>R</sup>
10	0.20	0.28	0.29	0.16	--	--	0.14 <sup>R</sup>	0.21
Mean	0.20	0.21	0.20	0.22	0.10 <sup>*</sup>	0.18	0.10 <sup>+</sup>	0.14
SD	0.06	0.13	0.08	0.13	0.04	0.21	0.06	0.05
<i>d</i>	--	--	.00	-.08	1.96	.17	1.66	.71

*Note.* Neg-P= Parent elicited negative behaviors in parent-child problem-solving task; Neg-A= Adolescent elicited negative behaviors in parent-child problem-solving task; Higher scores represent greater levels of negative behavior; *d*= Cohen's effect size, <sup>R</sup>= Reliable Change Index <.05; <sup>+</sup>= *p*<.10; Statistical significance and effect size refer to the contrast with scores at pre-treatment.

Table 18

*Ratings of Friendliness and Criticism during the Disagreement Resolution Task at Each Assessment Wave*

Family	Pre		Post		Follow-Up 1		Follow-Up 2	
	Friend	Criticism	Friend	Criticism	Friend	Criticism	Friend	Criticism
1	3.00	1.50	3.50	1.00 <sup>R</sup>	2.75	1.25 <sup>R</sup>	2.75	1.75
3	4.00	1.00	2.75	1.50	3.50	1.00	3.00	1.25
4	3.50	2.25	2.50	1.75 <sup>R</sup>	3.25	1.25 <sup>R</sup>	--	--
5	1.75	1.50	2.75 <sup>R</sup>	1.50	1.50	1.50	--	--
7	2.50	2.25	1.75	1.25 <sup>R</sup>	--	--	--	--
8	1.75	2.75	1.50	3.00	1.50	3.25	1.75	2.00 <sup>R</sup>
9	2.00	1.75	2.00	1.75	2.50	1.50 <sup>R</sup>	1.75	1.25 <sup>R</sup>
10	2.25	1.75	2.75	1.75	--	--	2.50	1.50 <sup>R</sup>
Mean	2.59	1.84	2.43	1.69	2.50	1.62	2.45	1.55
SD	0.83	0.55	0.65	0.59	0.85	0.82	0.48	0.33
<i>d</i>	--	--	.21	.26	.11	.32	.21	.64

*Note.* Friend= Global coding of amount of friendliness elicited by the parent-adolescent dyad during the problem-solving task; Criticism= Global coding of amount of criticism elicited by parent-adolescent dyad during the problem-solving task; Higher scores for Friend and Criticism represent more friendliness and more criticism, respectively; *d*= Cohen's effect size, <sup>R</sup>= Reliable Change Index <.05; Statistical significance and effect size refer to the contrast with scores at pre-treatment.

Table 19

*Ratings of Effectiveness during Disagreement Resolution Task at Each Assessment Wave*

Family	Pre Effect	Post Effect	Follow-Up 1 Effect	Follow-Up 2 Effect
1	2.75	1.25	1.75	2.00
3	3.25	2.25	1.25	3.5
4	3.00	2.50	2.00	--
5	2.75	2.00	1.25	--
7	2.25	3.50	--	--
8	3.75	3.50	3.75	2.00
9	2.25	3.75	2.50	2.00
10	3.50	2.00	--	3.00
Mean	2.94	2.59	2.08 <sup>+</sup>	2.50
SD	0.55	0.90	0.94	0.32
<i>d</i>	--	.47	1.12	.98

*Note.* Effect= Dyad's Effectiveness during the disagreement resolution task; Higher scores represent lower levels of problem-solving effectiveness. *d*= Cohen's effect size, <sup>R</sup>= Reliable Change Index <.05; <sup>+</sup>= *p*<.10; Statistical significance and effect size refer to the contrast with scores at pre-treatment.

Table 20

*Frequency Counts of Excerpts Per Code for Parent Interviews*

	Parents who cited	Interviews Cited	Number of Excerpts
<b>Reasons for Participating in BEAM</b>			
Concern's regarding their adolescent's mood	5	5	9
Disruptive or destructive behavior	4	4	6
Academic problems	2	2	5
Interpersonal relationship problems	1	1	2
<b>Assessment</b>			
Positive appraisal of the BEAM assessment	7	7	21
Negative appraisal of the BEAM assessment	4	4	12
<b>BEAM Format</b>			
Positive appraisal of the BEAM session schedule	8	10	53
Negative appraisal of the BEAM session schedule	6	9	25
The group format of BEAM was well-received	8	9	46
More didactic instruction recommended	4	4	9
Staff well-liked	6	7	16
Barriers for attending BEAM	6	6	21
<b>BEAM Content</b>			
BEAM material was helpful and presented clearly	7	10	60
Pace of sessions were too fast, material unclear	1	1	12
<b>BEAM Skills Used</b>			
ADHD skills review and behavior contracting	7	13	46
Active listening techniques and communication skills	4	7	31
Problem-solving skills training	6	11	36
Downward and upward spiral discussion	7	14	71
Pleasant activity scheduling	6	10	35
<b>Effectiveness</b>			



Reduction in mood issues	7	14	53
Adolescent experiencing residual mood issues	6	8	26
Less disruptive or destructive behavior	3	4	7
Adolescents and parents learned more about their mental health	5	6	10
Improvements in communication and interpersonal relationships	7	15	57
No significant changes in interpersonal relationships	8	18	50
<b>Areas for BEAM Program Improvement</b>			
More incentives for adolescents	2	2	3
Treatment reports, referrals, and review sheets should be provided	6	10	22
Increase amount of homework or practice	3	3	11
Include academic or organization skills components	1	1	6
More interaction and networking with other parents and adolescents	3	4	7
Computerize homework assignments	1	1	2
<i>Note.</i> Parents who cited= number of parents out of 8 who cited code; Interviews cited= number of interviews out of 20 across the 3 assessment waves in which code was cited; Number of excerpts= number of times a code was cited across all 20 interviews.			

Table 21

*Frequency Counts of Excerpts Per Code for Adolescent Interviews*

	Adolescents who cited	Interviews cited	Number of Excerpts
<b>Assessment</b>			
Positive appraisal of the assessment process	7	7	11
Negative appraisal of the assessment process	4	4	8
<b>BEAM Format</b>			
Positive appraisal of BEAM session schedule	7	7	13
Negative appraisal of BEAM session schedule	6	6	17
The group format of BEAM was well received	7	7	17
<b>BEAM Content</b>			
Content clear/easily understood	6	6	12
<b>BEAM Skills Used</b>			
Positive activity scheduling	8	20	79
Downward and upward spirals	2	2	3
Behavior contracting	1	1	1
Emotion regulation strategies	6	12	32
Problem-solving skills used	6	12	28
<b>Effectiveness</b>			
Less mood issues	6	14	27
No changes in mood	4	5	7
Less disruptive/destructive behavior	2	2	2
Improved interpersonal relationships	7	16	42
No changes in interpersonal relationships	7	10	13
<b>Areas for BEAM Program Improvement</b>			
Allow more time for personal talk between adolescents	3	3	3
Other adolescents were off task and distracting	4	4	6
<i>Note.</i> Adolescents who cited= number of adolescents out of 8 who cited code; Interviews cited= number of interviews out of 20 across the 3 assessment waves in which code was cited; Number of excerpts= number of times a code was cited across all 20 interviews.			

Figure 1

*BEAM Consort Diagram*

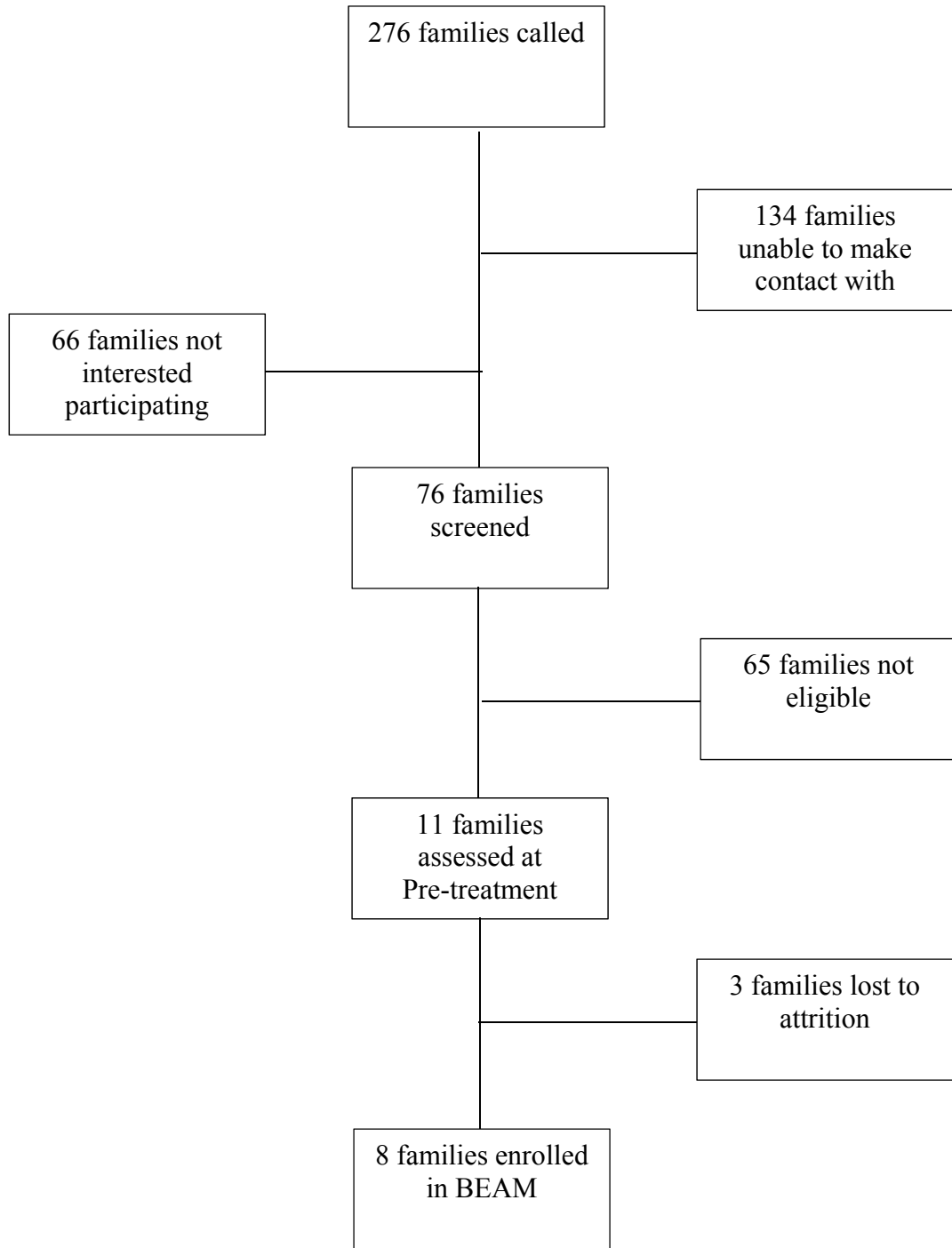


Figure 2

*Emotional Spirals* (Clarke, Lewinsohn, Hops, 1990)

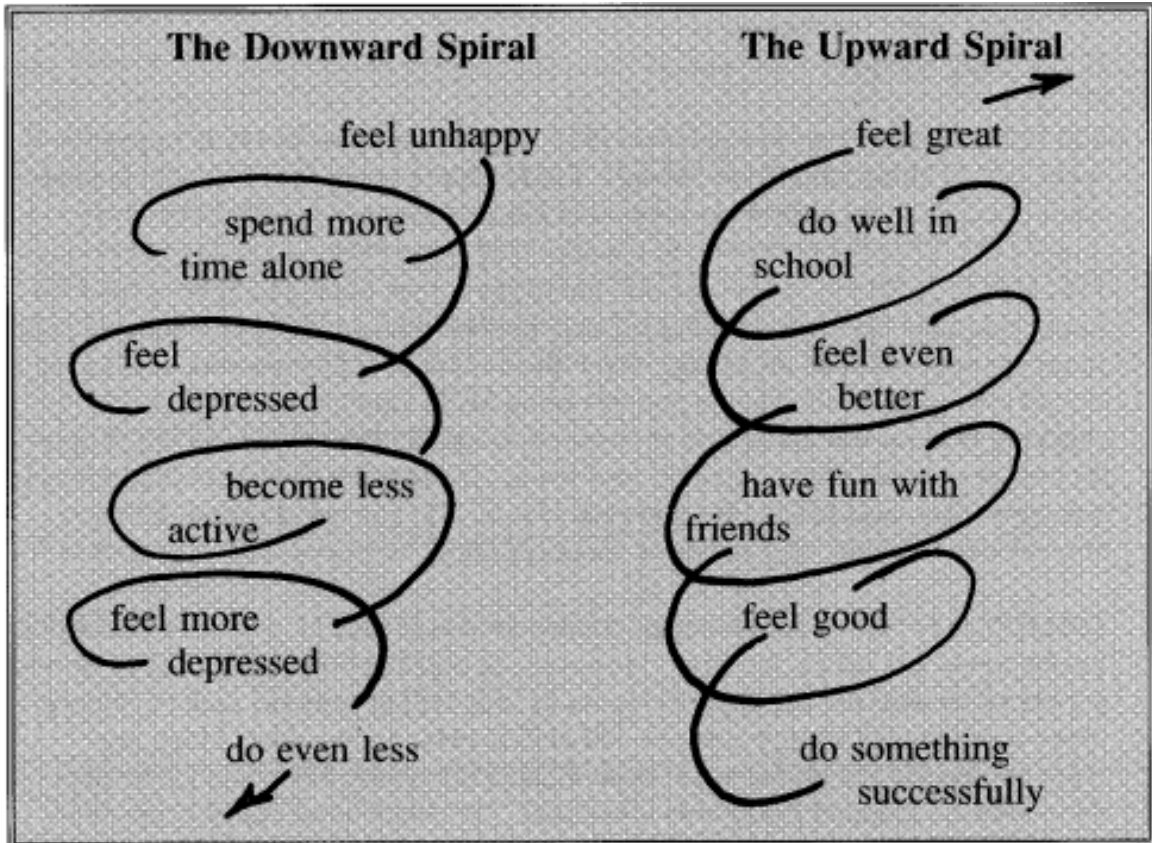


Figure 3

*Adolescents' Depressive Symptoms at Each Assessment Wave*

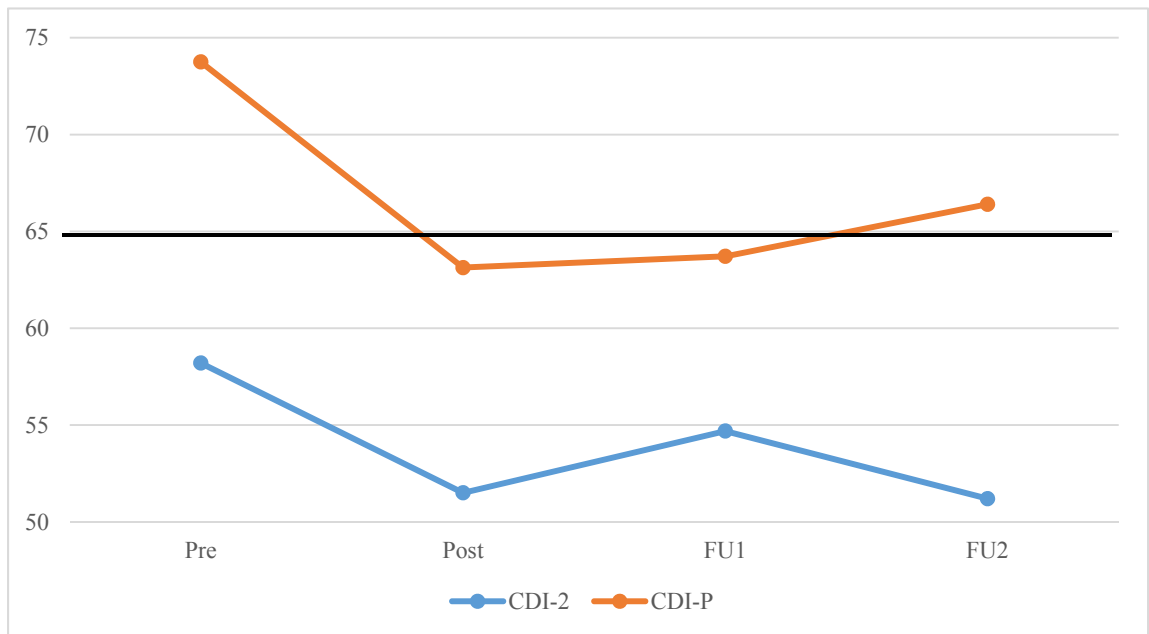


Figure 4

*Adolescents' Reward Responsivity at Each Assessment Wave*

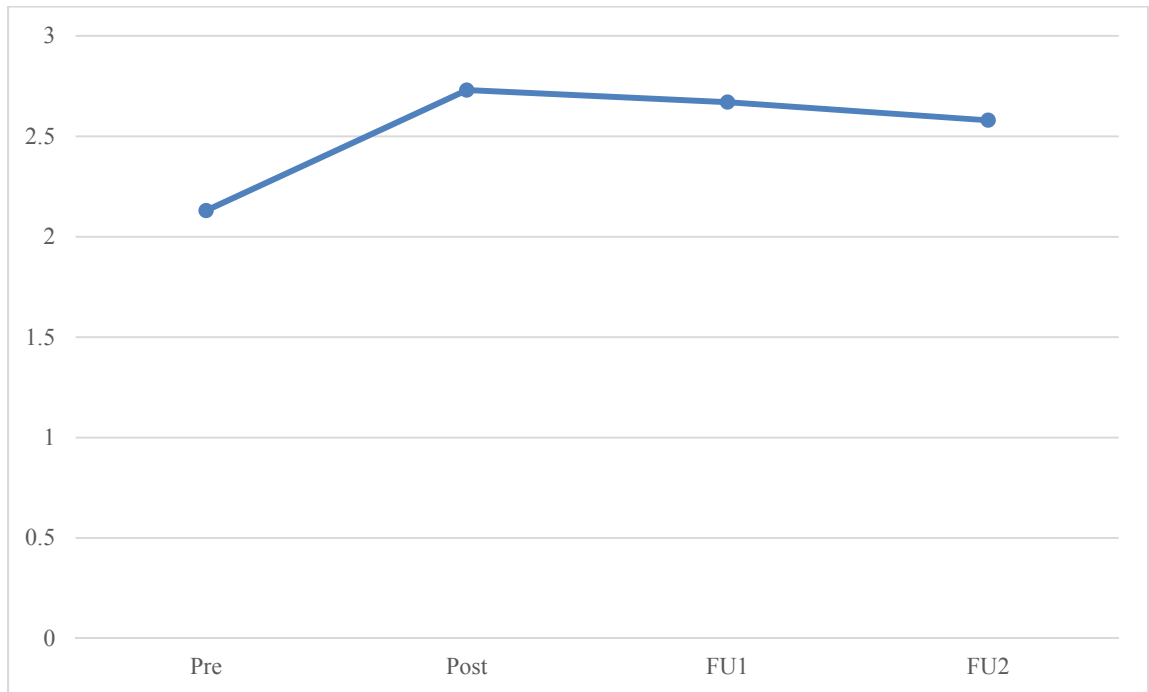


Figure 5

*Adolescents' Emotion Regulation at Each Assessment Wave*

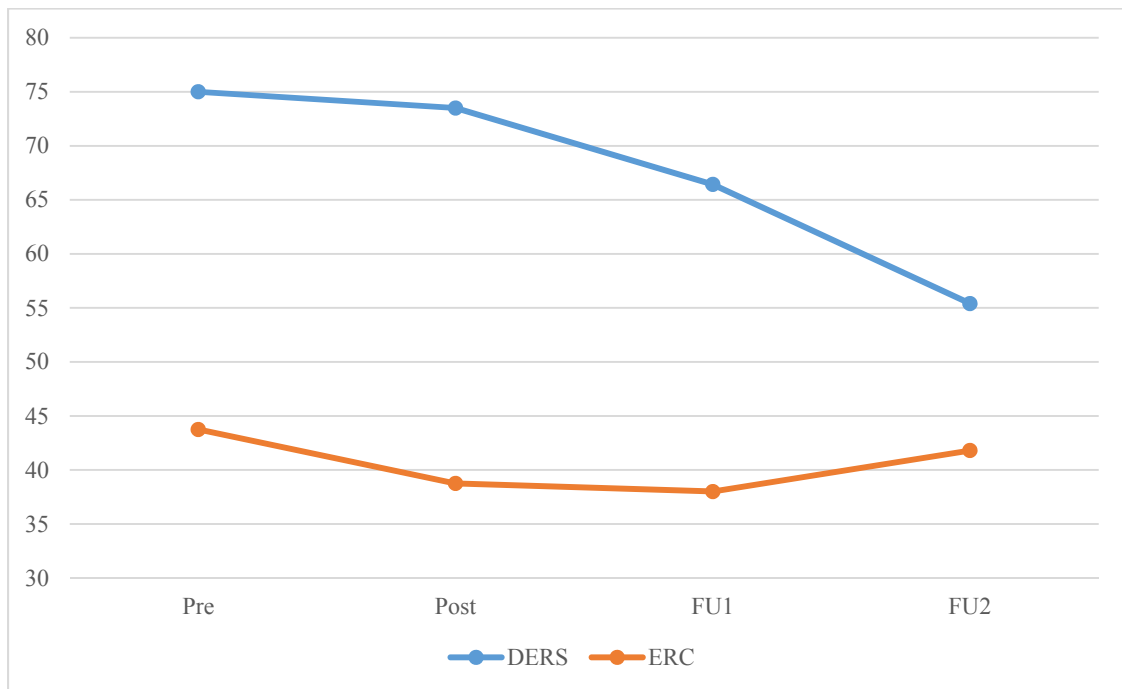


Figure 6

*Levels of FAD Subscales at Each Assessment Wave*

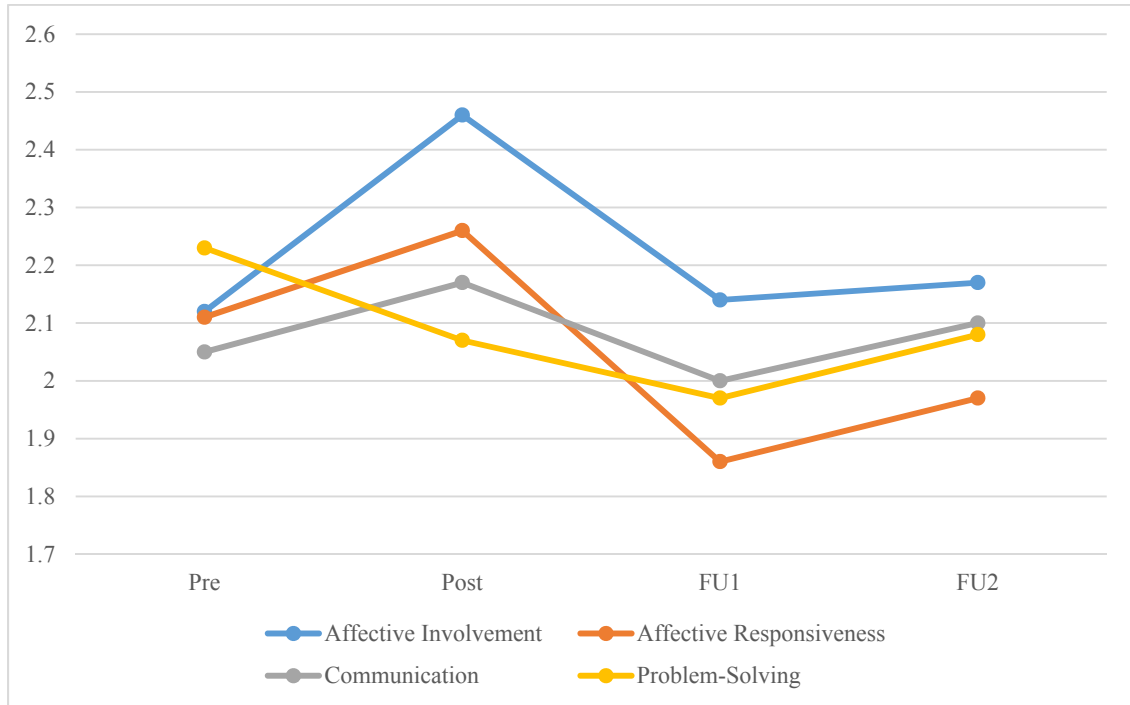




Figure 7

*Levels of Parental Warmth and Autonomy-Granting at Each Assessment Wave*

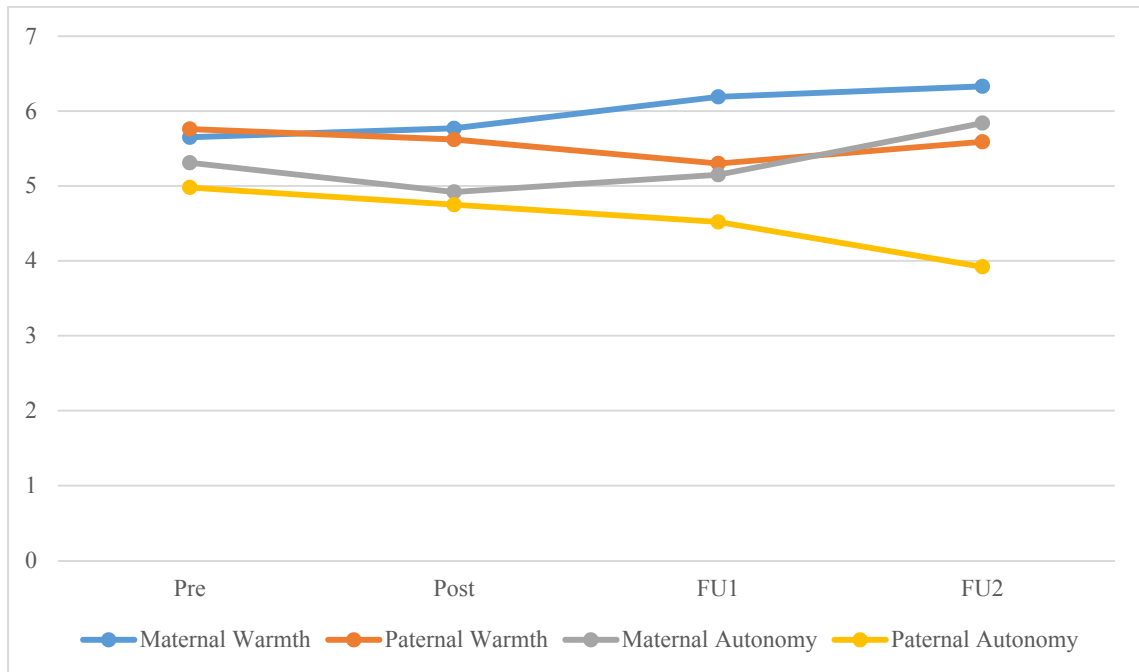


Figure 8

*Conflict Behavior Levels at Each Assessment Wave*

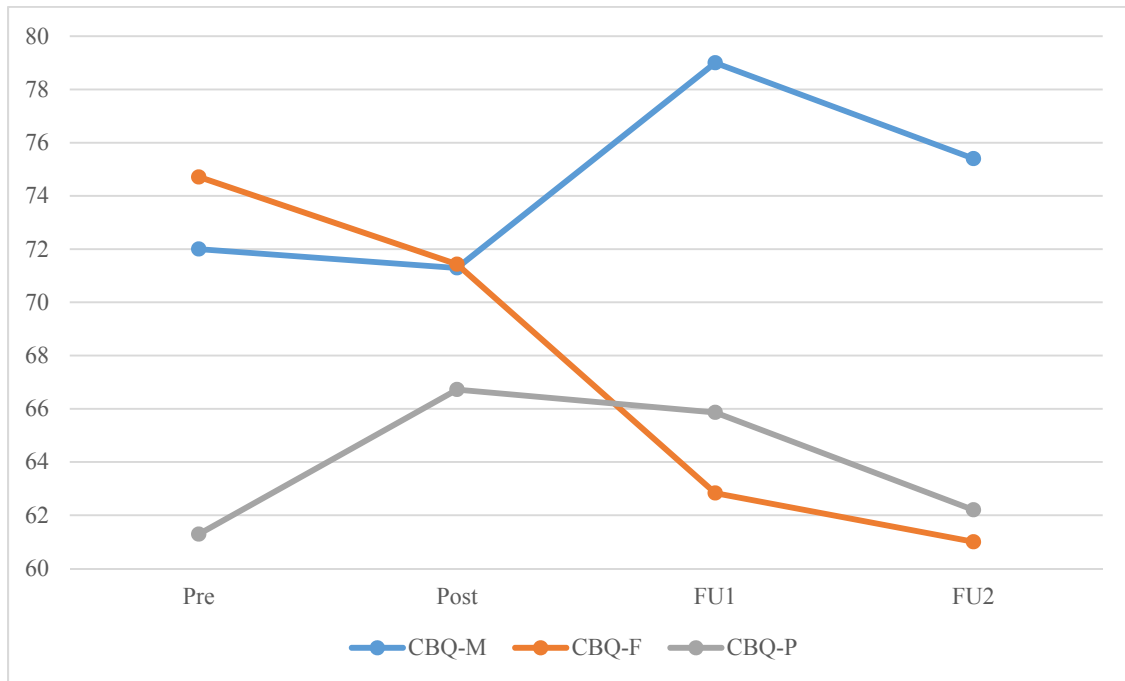


Figure 9

*Global Ratings of Parent and Adolescent Behavior during the Card and Academic Interaction Tasks at Each Assessment Wave*

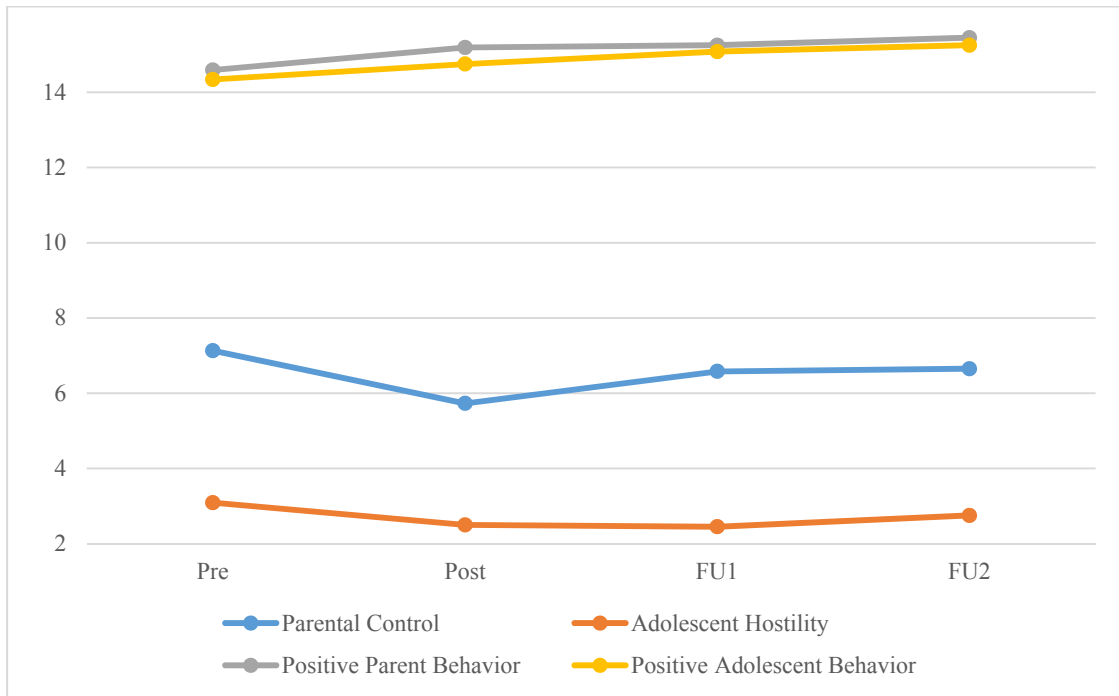


Figure 10

*Positive and Negative Behaviors Displayed during the Disagreement Resolution Task at Each Assessment Wave*

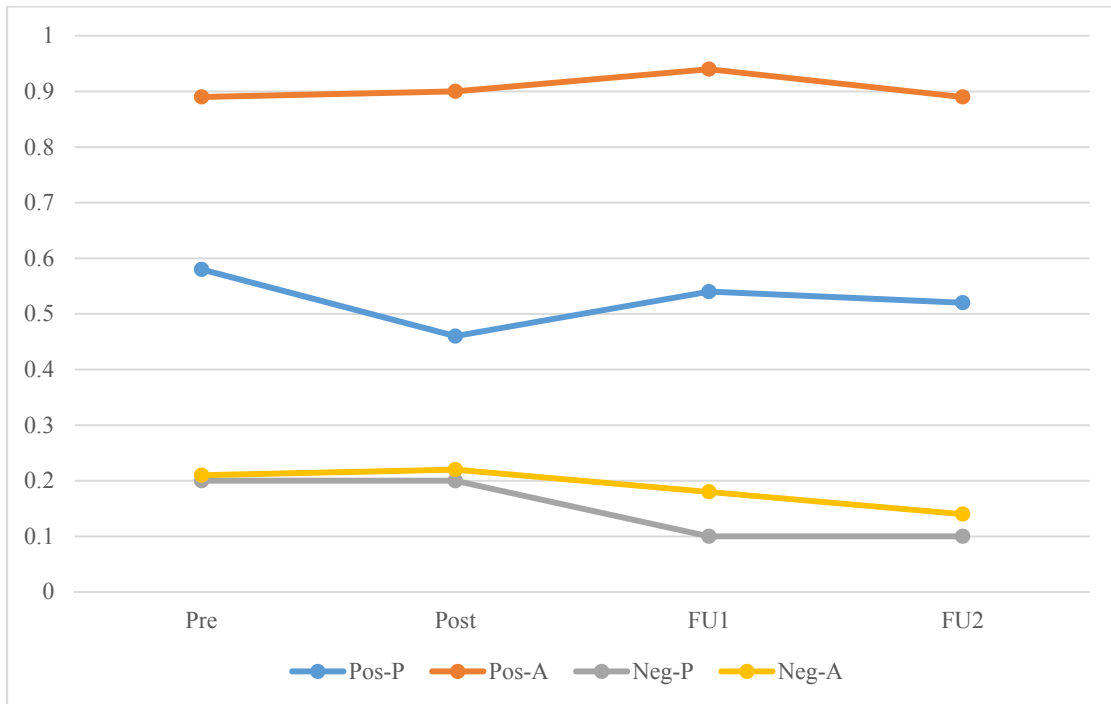
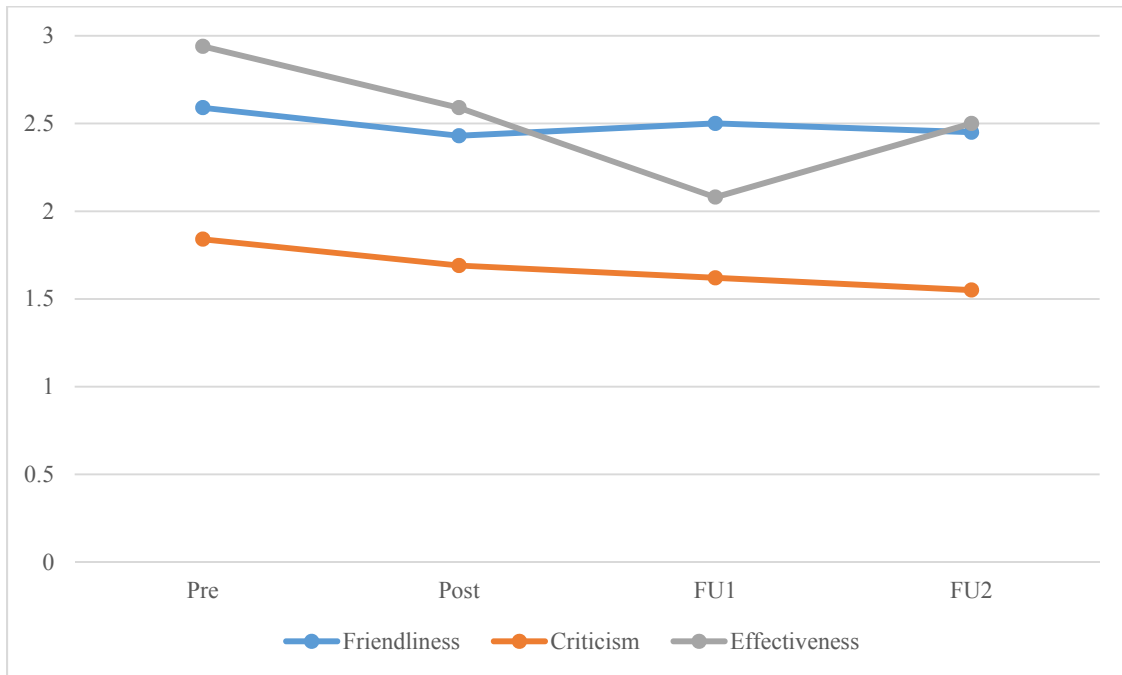


Figure 11

*Ratings of Friendliness, Criticism and Effectiveness during the Disagreement Resolution*

*Task at Each Assessment Wave*



## VITA

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### EDUCATION

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### PUBLICATIONS AND PRESENTATIONS

Boustani, M.B., Frazier, S.L., Hartley, C.M., Meinzer, M.C., Hedemann, E. (2015). Perceived benefits and proposed solutions for teen pregnancy: Qualitative interviews with youth care workers. *American Journal of Orthopsychology*, 85(1), 80-92.

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