Patterns of Symptom Improvement among Depressed Adolescents treated with Interpersonal Psychotherapy Adolescent Skills Training (IPT-AST) in School Based Clinics

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ABSTRACT


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Subthreshold symptoms of depression (defined as symptoms that do not meet full criteria for the disorder) are a significant concern, associated with a range of behavioral and emotional problems, raising the risk of adolescents developing more severe depression later. Yet research on subthreshold depression is lacking, and the relationship between affective and somatic symptom improvement has not been adequately studied. Prior research with adult samples lend credence to the hypothesis that symptoms of mood/motivation respond faster to psychotherapy (Rush, Beck, Kovacs, Weissenburger, & Hollon, 1982) than pharmacotherapy with the opposite response for vegetative symptoms such as sleep and appetite (DiMascio, Weissman, Prusoff, & Neu 1979). The current study was built upon prior research that found Interpersonal Psychotherapy Adolescent Skills Training (IPT-AST) to be an efficacious prevention intervention for adolescents with subthreshold depression, as compared to school counseling (Young, Mufson & Gallop, 2010). In this investigation, we sought to compare the trends in symptomatic improvement among 32 participants treated with IPT-AST over eight weeks. Clusters of mood/ motivation and vegetative symptoms were followed from baseline to the end of treatment. The results suggest that mood symptoms improved significantly before vegetative symptoms, within the first four weeks of preventive treatment. Significant improvement in

vegetative symptoms was found to occur later between weeks 6 and 8. Thus adolescents receiving IPT-AST preventive treatment demonstrated faster reduction in mood/motivation symptoms than vegetative symptoms. Analyses revealed that fewer participants were identified as having not improved on the mood/motivation cluster than on the vegetative cluster indicating a better response for adolescents with mood symptoms than vegetative symptoms. Although, no relationships in improvements in mood/motivation and vegetative clusters were found controlling for baseline mood/motivation and vegetative symptoms; positive associations were found between cluster variables (mood, vegetative and total depression) over time. Gender was also not found to moderate the relationship between improvement on mood and vegetative symptoms over time indicating no significant differences in the improvement between males and females. Overall, findings from the current investigation strengthen the results from previous studies regarding the timeline of symptom improvement with IPT-AST.

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ATQ - Automatic Thoughts Questionnaire

BDI - Beck Depression Inventory

CB - Cognitive-Behavioral Program

CBT - Cognitive Behavioral Therapy

CES-D - Center for Epidemiologic Studies Depression Scale

CGAS – Children's Global Assessment Scale

CM - Clinical Monitoring

CRT - Cognitive Response Test

DAS - Dysfunctional Attitudes Scale

ENH - IPT-AST group with parental involvement

FDA - The US Food and Drug Administration

HRSD - Hamilton Rating Scale for Depression

IPT - Interpersonal Psychotherapy

IPT-A - Interpersonal Psychotherapy for Depressed Adolescents

IPT-AG - Interpersonal Psychotherapy Group Adaptation

IPT-AST - Interpersonal Psychotherapy-Adolescent Skills Training

K-SADS - Schedule for Affective Disorders and Schizophrenia for School-Age Children

MDD - Major Depressive Disorder

MMPI - Minnesota Multiphasic Personality Inventory Scale

MMPI D - Minnesota Multiphasic Personality Inventory Depression Scale

PET - Positron Emission Tomography

RDC - Research Diagnostic Criteria

SC - School Counseling

SSRI - Selective Serotonin Reuptake Inhibitors

TADS - Treatment for Adolescents with Depression Study

TAU - Treatment as Usual

TORDIA - Treatment of Resistant Depression in Adolescents

VAS - Visual Analog Scale

WC - wait-list control group

WHO - World Health Organization

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INTRODUCTION

Depression is one of the most commonly diagnosed psychiatric disorders among adolescents. It can be conceptualized as a constellation of several symptoms which include physical, mood, motivation, cognitive and suicidal symptoms. Depression is often characterized by angry or irritable mood, sadness or hopelessness, difficulties concentrating, social withdrawal, changes in sleep and appetite, lack of motivation, restlessness or agitation, fatigue or lack of energy, and thoughts of death or suicide (American Psychiatric Association, 1994a). However, depression in teens can also manifest in atypical ways including unexplained aches and pains, extreme sensitivity to criticism, problems at school, reckless behavior or self-injury, or other unusual changes in behavior (National Institute of Mental Health; NIMH, 2008).

Although it is normal for teenagers to experience emotional highs and lows (Offer, 1969), distinguishing between normal teenage mood swings and actual depression is critical for the welfare of the child and his/her family (Rutter et al, 1976). Rates of depression in adolescents have been on the rise and are comparable to rates of adult depression. This has been demonstrated by both national epidemiological surveys (i.e., The National Comorbidity Study [NCS], Kessler 2006) and in smaller community surveys of adolescents (e.g., Cohen et al., 1993). These disorders have a lifetime prevalence rate of 15 % to 20% during adolescence (Lewinsohn, Rhode, Klien, Seely, & Gotlieb, 2003), while current prevalence rates range from 6% to 28.3 % (Kessler, 2002). Other studies have shown that these rates are higher for Latino adolescents (Roberts, Roberts, & Chen, 1997). A report from the Centers for Disease Control (CDC) identifies Hispanic students (34%) as being more likely than white or black students (28.8% and 26.5% respectively) to report symptoms of depression such as sadness and hopelessness everyday for more than two weeks (Centers for Disease Control, 1992).

Prevalence rates rise dramatically in puberty, particularly for girls. Lifetime prevalence for Major Depression in adolescent females is between 20.8% and 31.6 % (Kessler et al., 1993; Lewinsohn et al., 1993; Lewinshohn, Rhode & Seeley, 1998), and the prevalence of subclinical depression is as high as 59% (Roberts, Andrews, Lewinsohn & Hops, 1990). These differences in gender may be attributed in part to differences in coping styles or due to hormonal changes that occur during puberty (Angold, Costello, Erkanli & Worthman, 1999).

A study by Bennett, Ambrosini, Kudes, Metz, and Rabinovitz (2005) found differences in the symptom presentation of adolescent boys and girls. A sample of 383 adolescents (218 girls and 165 boys) between the ages of 11.9 and 20.0 years, were assessed using the clinician administered Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS-PL; Kaufman, Birmaher, Brent, & Rao, 1997), the 21-item Beck Depression Inventory (BDI; Beck et al., 1961) and the Research Diagnostic Criteria (RDC; Spitzer et al., 1978). Results indicated that depressed adolescent girls tended to endorse more symptoms of self-blame, self dissatisfaction, depressed mood, sleep problems and fatigue than depressed boys, on measures such as and the K-SADS and the BDI (Bennett et al., 2005). Depressed boys on the other hand, were found to have higher levels of anhedonia, depressed morning mood, and morning fatigue, based on clinician ratings (Bennett et al., 2005). These results, with the benefit of a large sample size and the incorporation of clinician ratings, point to the emergence of potentially important differences that sex differences may play in the presentation of depression.

Impairment and Comorbidity

Depression in adolescence is associated with significant impairment (Puig-Antich et al., 1993) and an increased risk for developing a future major depressive episode (Lewinsohn,

Rhode, Klein & Seeley, 1999). Adolescents may suffer debilitating symptoms during their most productive years leading to academic, career, and family problems (Kessler, Avenevoli & Merikangas, 2001). Even subclinical symptoms of depression are a substantial concern in youth, and are associated with a range of problems, including drug and alcohol use, academic failure, school dropout, and teen pregnancy (Gillham, Shatté, & Freres, 2000). Moderate levels of depression can persist for years in some children (Twenge & Nolen-Hoeksema, 2002), and subthreshold levels of depressive symptoms are one of the most significant risk factors for the onset of later depressive disorders (Clarke et al., 1995; Pine, Cohen, Cohen, & Brook, 1999). A recent study by Rhode, Beevers, Stice and O'Neil (2009) also found that adolescent girls with minor depression were approximately five times more likely to experience major depressive disorder (MDD) than adolescents without minor depression.

In terms of education and occupational functioning, several key symptoms of depression, such as impaired ability to concentrate, loss of interest, poor initiative, psychomotor retardation, low self-esteem, sense of worthlessness as well as social withdrawal may significantly disturb cognitive performance and diminish initiative in learning (Beck, 1967; Hammen, 1998; Kirkcaldy & Siefen, 1998; Kovacs & Goldston, 1991). Self-reported symptoms of depression are associated with impaired academic performance (Reinherz et al., 1991), and dissatisfaction with grades has in turn been predictive of subsequent major depressive disorder (Lewinsohn et al., 1994). It is likely that cognitive functioning becomes impaired as the depressed adolescent concentrates on depressive thoughts and interpretations instead of the actual tasks, and/or because depression directly blocks cognitive resources (Hartlage, Alloy, Vázquez, & Dykman, 1993). In addition, failures and negative feedback received from parents, teachers or peers may further exacerbate the depressive cognitive style which is typical of depression (Beck, 1967;

Birmaher et al., 1996; Kendall & Lochman, 1994) or strengthen depressive thought(s) promoting learned helplessness, passivity, and avoidance (Seligman,1975).

Evidence from community studies of children and adolescents show that depression is associated with a significantly high risk of anxiety disorders (Kovacs et al., 1989; Alessi et al, 1987; Bernstein & Garfinkle, 1986) conduct disorders (Alessi & Robbins, 1984; Marriage et al. 1986; Kovacs et al., 1986) eating disorders (Swift et al., 1986) and substance use disorders (e.g., Lewinsohn et al., 1993; Simonoff et al., 1997).

The most severe consequence of depression in adolescents is suicide. Major depressive disorder is identified as the leading cause of suicidal behavior and suicide in youth (Kann, Kinchen, Williams, Ross, Lowry, Grunbaum, et al., 2000; Brent, 2001). According to the World Health Organization (WHO, 2002), adolescent suicide accounts for at least 100,000 annual deaths worldwide. Suicide ranked as the third leading cause of death among 10- to 14- year-old and 15- to-19- year-old age groups in the United States in 2000, with more than 2000 youth dying by suicide per year (Anderson, 2002). Depression in youth continues to increase risk attempts (lethal and non-lethal) into adulthood (Weissman et al., 1999) which is indicative of the robust and pertinent relationship between depression in youth and suicide.

<div align="center">Access to Mental Health Services</div>

Despite the large numbers of teenagers that struggle with clinical depression, adolescents are a largely underserved population that continues to be under-identified and/or under-referred. Studies show that less than 50% of adolescents and young adults aged 15 to 24 years use mental health services, and more disturbingly that 50% of depressed adolescents are not diagnosed prior to adulthood (Kessler, Avenevoli, & Merikangas, 2001). Community studies also indicate that

many adolescents who meet criteria for a depressive disorder do not receive an adequate course of treatment (e.g., Lewinsohn & Clarke, 1999).

<div align="center">Treatment</div>

Depression in adolescence is most commonly treated with medication or psychotherapy (Birmaher, Ryan, Williamson, Brent, Kaufman, 1996). With regards to medications, selective serotonin reuptake inhibitors (SSRIs) such as fluoxetine, citalopram and sertraline are recommended for the treatment of depression, with fluoxetine having the strongest evidence in efficacy trials (Emslie et al., 1997; Emslie, et al., 2002). The US Food and Drug Administration (FDA) approve the use of fluoxetine and more recently, escitalopram for treating depression in youth. In terms of psychotherapy, cognitive behavioral therapy (CBT) is considered an established treatment for depression, supported by substantial evidence in both efficacy and effectiveness trials (Weersing & Brent, 2006; David-Fedron & Kaslow, 2008). Although CBT has enough support to be considered as a monotherapy, recent studies have underscored the value of combination treatment which includes CBT and medication. Results from the Treatment for Adolescents with Depression Study (TADS) indicated that after 12 weeks of acute treatment, the CBT plus medication group had the highest response rate followed by medication alone. Similarly, the Treatment of Resistant Depression in Adolescents (TORDIA) study found that adolescents who received combined CBT and a change in medications were more likely to show an adequate clinical response as compared to adolescents who received a change in medication alone.

Despite potential positive outcomes, there are certain barriers to receiving treatment. These may include the stigma associated with traditional mental health treatment and the fear of

being labeled with a diagnosis of mental illness. Parental perceptions of a child's mental health service needs may also be associated with receiving professional help (Wu et al., 1999) and psychiatric issues in children and adolescents may often be minimized or incorrectly identified (Clauss-Ehlers & Weist, 2002).

It is for some of these reasons that offering services in a familiar setting such as schools may make treatment more acceptable (Catron & Weiss, 1994; Weist, 1999) since children may already receive school-based services for non-mental health concerns. Schools have been designated as a key setting by the Surgeon General and present a crucial avenue for identifying and addressing mental health needs in youth (U.S. Department of Health and Human Services, 1999) and making appropriate referrals for treatment when required. Treatments and services delivered in schools or other community settings may be crucial for the well-being of adolescents and other school-aged children (Hoagwood, Burns, Kiser, Ringeisen, & Schoenwald, 2001; Hoagwood & Olin, 2002; Weisz & Jensen, 2001).

## Interpersonal Psychotherapy for Adolescents (IPT-A)

In 2004, Mufson, Dorta, Moreau, and Weissman formulated Interpersonal Psychotherapy for Adolescents (IPT-A) based on Interpersonal Psychotherapy for adults (IPT; Weissman, Markowitz & Klerman, 2001). Since its formulation, IPT-A has proven to be an efficacious treatment modality for adolescent depression (Mufson, Weissman, Moreau & Garfinkle, 1999 Mufson et al., 2004; Rosello & Bernal, 1999). IPT-A was adapted by Young and Mufson in 2003 into Interpersonal Psychotherapy-Adolescent Skills Training (IPT-AST). IPT-AST is an adaptation of the group IPT-A manual (Mufson, Gallagher, Dorta & Young, 2004). It is a group intervention that focuses on psychoeducation and interpersonal skill-building. It has shown

efficacy when compared to School Counseling (SC) in adolescents ages 11 to 16 years in school based clinics in New York City (Young, Mufson & Davies, 2006).

Prevention programs fall into three categories on the basis of the populations to whom the interventions are directed, according to an Institute of Medicine Report (Mrazek & Haggerty, 1994). *Universal* preventive interventions are administered to all members of a particular population. *Selective* prevention programs are provided to a subsample whose risk is deemed to be above average. *Indicated* preventive interventions are given to individuals who manifest subclinical signs or symptoms of a given disorder.

This study builds upon an indicated preventive study, based upon a randomized clinical trial conducted by Young, Mufson, and Gallop (2010) which tested the efficacy of IPT-AST and school counseling (SC) in adolescents, ages 12 -16 years, with elevated symptoms of depression. Results from the original study indicated that there was a significant difference in depressive symptoms and functioning between adolescents in the AST condition and those that received school counseling (SC), maintained at post-intervention and six-month follow-up.

The aim of this study is to reanalyze the data from the IPT-AST study to evaluate differential patterns of symptom improvement within the treatment condition. The results of this study will explore the process of change when adolescents with subthreshold depression are treated with IPT-AST treatments. In order to do this, changes in mood/motivation and physical symptoms of participants who received preventive IPT-AST treatment will be traced across the eight weeks of treatment.

Chapter I

BACKGROUND

Research suggests that early intervention for depression in adolescents can improve long-term outcomes (Duffy, 2000). Treatment choices for adolescent depression usually center on medications alone or in conjunction with psychotherapy. Medications, specifically selective serotonin reuptake inhibitors (SSRI's) have been shown to be efficacious in treating adolescent depression (Emslie et al., 2002; Emslie et al., 1997; Keller et al., 2001; Wagner et al., 2003). In terms of psychosocial treatments, both cognitive behavioral therapy (CBT) and Interpersonal Psychotherapy for Adolescents (IPT-A) have shown to be efficacious in the treatment of adolescent depression (Clarke et al., 1999; Lewinsohn, Clarke, Hops & Andrews, 1990; Mufson, Weissman, Moreau and Garfinkle (1999); Rosello & Bernal (1999). Group therapy is also believed to be an effective treatment for adolescents with depression (IPT-AG; Mufson, Gallagher, Dorta & Young, 2004). Because IPT-A is cost-effective and feasible, it can be delivered in a variety of settings including school, community and primary care clinics (Mufson, Dorta, Wickramaratne, et al., 2004).

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Interpersonal Psychotherapy (IPT)

IPT is an evidence-based treatment for the prevention and treatment of depression in both adults and adolescents. It is a time-limited therapy based on the idea that depression can be treated by focusing on the patient's depressive symptomatology within a current interpersonal context regardless of the etiology of the disorder (Weissman, Markowitz, & Klerman, 2000). Its theoretical roots can be found in the interpersonal schools of thought and in the work of Adolf Meyer and Harry Stack Sullivan, who argued that one's personality is entrenched in recurrent

patterns of interpersonal interactions (Sullivan, 1953). IPT focuses on the relationship between the depressive episode and current interpersonal stressors, encouraging individuals to find links between depressive symptoms and their social environment, and helps them make changes in their social and emotional interactions (Weissman, Markowitz, & Klerman, 2000). A key step in using IPT involves identifying a primary interpersonal problem area. The four main interpersonal areas are grief, interpersonal disputes, role transitions, and interpersonal deficits. Over the course of 16 sessions, the therapist and the patient work on one or two problem areas as part of the treatment. In recent years, IPT has garnered strong empirical support for its effectiveness in the treatment of adult depression (de Mello, de Jesus, Bacaltchuk, Verdeli, & Neugebauer, 2005; O'Hara, Stuart, Gorman, & Wenzel, 2000; Talbot et al., 2005; Weissman, 2007; Weissman, Klerman, Prusoff, Sholomskas, & Padian, 1981).

Interpersonal Psychotherapy for Depressed Adolescents (IPT-A)

Interpersonal psychotherapy for adolescents (IPT-A) is an adaptation of IPT developed by Moreau, Mufson, Weissman, & Klerman, (1991). It is considered to be a good match for depressed adolescents due to its brief duration, as well as focus on the present. IPT-A also addresses interpersonal relationships and conflicts that adolescents are likely to be concerned about, and that are important to them. We know from research that affect regulation deficits in children and adolescents are associated with higher levels of depression (Garber et al, 1995) and improvement in communication skills may have a protective effect against the development of depression (Carbonell et al, 1998). IPT-A addresses several issues important to the developmental context of adolescents, such as major life choices in education, work, establishment of intimate relationships by modifying maladaptive communication, and teaching

the art of negotiation. The psychoeducation component of IPT-A which aims at building competencies and skills in the adolescent, addresses some of these issues. Finally, IPT-A is a treatment approach that can be easily disseminated to a variety of settings as it is manualized and brief. Treatment typically lasts 12 weeks in duration, focuses on one particular interpersonal problem area, recommends parental involvement and plays a liaison role between schools and families (Moreau, Mufson, Weissman, & Klerman, 1991). These aspects are particularly appealing to adolescents who may be reluctant to seek or stay in treatment.

The delivery of IPT-A is very similar to that of IPT, however there are some key differences between the two. Modifications have been made to the IPT-A format to include an evaluation of drug abuse and suicidal behavior during the initial sessions. Additionally, parents can play an important role in the treatment, and receive psychoeducation about depression, along with the adolescent. Issues regarding termination are continually addressed during therapy to remind the adolescent of the time-limited nature of the treatment. Skills gained during the treatment are frequently reviewed and the importance of an external support system for the adolescent is stressed. Lastly, adolescents are reminded of the early signs and symptoms of depression so that they may recognize them and learn how to cope or seek help (Moreau et al., 1991).

## Efficacy and Effectiveness of IPT-A

IPT-A has been demonstrated to be an effective treatment modality for adolescent depression. One of the first efficacy studies on IPT-A (Mufson, Weissman, Moreau & Garfinkle, 1999) was a randomized clinical trial with 48 clinic-referred adolescents (ages 12-18 years) randomly assigned to either weekly one-hour IPT-A sessions ($n = 24$) or biweekly clinical

monitoring (CM; $n = 24$) with  therapist for twelve weeks.  Eligibility criteria for the study

included meeting DSM-III-R criteria for a current depressive disorder and having a score of 15

or higher on the HRSD (Hamilton, 1969).  Participants were administered an assessment battery

bi-weekly by a blind independent evaluator to monitor their progress through the course of the

study.  No significant differences were reported between the two groups at baseline in terms of

either demographic or outcome measures.  Rates of recovery were defined as a score of less than

or equal to six on the HRSD, and less than or equal to a score of nine on the Beck Depression

Inventory (BDI).  The authors found that 75% of IPT-A patients met recovery criteria on the

HRSD as compared to 46% of the control patients, a result that was significant at $p= .04$ level.

Limitations of the study included using a small sample size ($n = 24$) comprised of predominantly

Hispanic females.  Hence, this study was not representative of the general population, and given

the stringent inclusion and exclusion criteria (as with all efficacy trials), the results may not be

generalizable.  There was also a large drop-out rate in the clinical monitoring group which may

have skewed the results obtained by the authors.

In examining whether research therapy can be extended to the community setting, an

effectiveness trial was conducted which compared IPT-A with treatment as usual (TAU) in

school based mental health clinics in New York City (Mufson, Dorta, Wickamaratne, Olfson, &

Weissman, 2004).  This 16-week randomized clinical trial included 63 adolescents aged 12 to 18

years (mean age of 15) who were referred for mental health intake visits and met DSM-IV

criteria for major depressive disorder, dysthymia, depressive disorder not otherwise specified, or

adjustment disorder with depressed mood.  Participants were randomized to 12 sessions of either

the IPT-A ($n = 34$) condition or the TAU condition ($n = 29$), which was defined as psychological

treatment available to the adolescents if the study had not been in place.  Results showed that

adolescents who received IPT-A had significantly greater decreases in depressive symptoms on a clinician report measure (HRSD) and a self-report measure (BDI). The IPT-A group also had greater overall functioning and social functioning at week 12 compared to the TAU group. The study also used a predominantly Hispanic female sample which renders the results limited in generalizability.

Rosello and Bernal (1999) also examined the effectiveness of IPT-A, comparing it to Cognitive Behavioral Therapy (CBT) and a wait-list control group (WC). Their sample contained 71 adolescents ranging in age between 13 and 17 years of age who were randomly assigned to one of the three conditions (IPT-A, CBT or WC), where subjects received 12 weekly sessions conducted over 12 weeks. The researchers found that both IPT-A and CBT treatment conditions were more effective than the control condition in reducing the depressive symptoms reported by adolescents. IPT-A was found to be more effective in increasing self-esteem and social adaptability when compared to CBT, and participants in the IPT-A group benefited in their self-concept and social adaptation significantly more than participants in the wait-list control condition.

The impact of comorbid anxiety on the effectiveness of IPT-A on depressed adolescents in the Mufson, Dorta, Wickamaratne, Olfson, and Weissman (2004) sample, was examined by Young, Mufson and Davies in 2006. In this study, adolescents with and without probable comorbid anxiety disorders were compared on depression and overall functioning. The authors found that comorbid anxiety was often indicative of a more severe depression, as indicated by higher depression scores at baseline. Results indicated that regardless of the treatment group, depressed adolescents with comorbid anxiety had higher depression scores at the end of the study than adolescents without comorbid anxiety. IPT-A was found to be more effective in treating the

depression of adolescents with comorbid anxiety, however the results were nonsignificant (*p* =.07) indicating that IPT-A shows some promise as an effective treatment for this hard- to- treat combination of anxiety and depression.

<div align="center">Group Adaptation (IPT-AG)</div>

IPT-A has been adapted to a group setting (IPT-AG) as group therapy is also believed to be an effective treatment for adolescents with depression (Mufson, Gallagher, Dorta, & Young, 2004). Working in a group format is advantageous because it enables members to perceive others who may be struggling like themselves and allow them to provide support for each other. It helps generate alternative solutions to conflicts and helps the individual learn more effective social skills by raising awareness of the needs and feelings of others (Corey, 1981 as cited in Mufson, Gallagher, Dorta, & Young, 2004). Adolescents may find it particularly helpful to have others validate their feelings and experiences and receive advice from peers on what to do or how to handle a situation. Additionally, IPT-AG is cost-effective (requires less staff for the treatment of more patients) and feasible in settings including school, community, and primary care clinics (Mufson, Dorta, Wickramaratne, et al., 2004).

IPT-Adolescent Skills Training (IPT-AST; Young & Mufson 2003), based on IPT-A is also a group intervention that includes psychoeducation and interpersonal skill-building. The treatment involves two individual pre-group sessions and eight weekly 90-minute group meetings. Similar to traditional IPT, IPT-AST follows three stages (initial, middle, and termination). It uses the interpersonal inventory to identify interpersonal problems that might be contributing to or exacerbated by their depressive symptoms, teaches interpersonal problem-solving and communication skills, and educates youth about depressive symptoms and warning

signs of depression. IPT-AST differs from traditional IPT-A in that it does not focus on one particular interpersonal problem area for each adolescent to work on. Rather, IPT-AST focuses on psychoeducation and general skill-building that can be applied to different relationships within the framework of 3 interpersonal problem areas: interpersonal role disputes, role transitions, and interpersonal deficits.

The psychoeducation component focuses on defining prevention, identifying feelings, educating members about the symptoms of depression, and discussing the relationship between feelings and interpersonal interactions. The interpersonal skill-building component comprises the teaching of communication and interpersonal strategies through games, role-plays, communication analysis, and didactics and later applying these skills to different people in their lives.

A randomized trial by Young, Mufson, and Davies (2006) compared IPT-AST to school counseling (SC) as provided by school guidance counselors and social workers. In their indicated prevention study, 41 adolescents, ranging between 11 to 16 years in age, with subthreshold levels of depression were assigned to the two conditions (IPT-AST, $n = 27$; SC, $n = 14$) and compared on depressive symptoms, overall functioning and depression diagnoses post intervention and at follow-up. Participants in the IPT-AST condition received two individual sessions and eight weekly group sessions. Participants in the SC group were seen individually at a frequency determined by the student and the counselor.

Results indicated that IPT-AST proved to be very successful in treating adolescents with subthreshold depressive symptoms. Although children in both groups showed improvement in depression scores, adolescents in the IPT-AST group reported significantly fewer symptoms at post-intervention on the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff,

1977) as compared to the SC group, which continued until the three-month and six-month follow-up. The effect sizes for the main outcomes were large at post- intervention (ES = 1.52), at three-month follow-up (ES = 1.10) and at six-month follow-up (ES = 1.09). Similar results were found for overall functioning as measured by the Children's Global Assessment Scale (CGAS; Schaffer, Gould, Brasic, et al. 1983). There was a significant difference between the two groups on the CGAS at post-treatment (ES = -.96), at three-month follow-up (ES = -.82) and at six-month follow-up (ES = -1.21; Young et al., 2006).

A later study compared the efficacy of IPT-AST to a cognitive-behavioral program (CB) for preventing depressive symptoms in adolescents (Horowitz, Garber, Ciesla, Young & Mufson, 2007). The study also included a no-intervention control group. Three hundred and eighty participants were randomly assigned to one of the three conditions: cognitive-behavioral program (CB; *n* = 112), interpersonal psychotherapy–adolescent skills training (IPT–AST; *n* = 99), or the assessment-only control condition (*n* = 169). Both intervention programs involved eight 90-min sessions delivered once a week during students' regular wellness class period. The authors found a significant but small short-term effect for both CB (*d* = 0.37) and IPT–AST (*d* = 0.26) compared with controls for the entire sample at post-intervention. However, the two active intervention conditions were not found to be significantly different from each other at post-intervention or at follow-up (Horowitz, Garber, Ciesla, Young & Mufson, 2007).

The relationship between psychological symptoms and physical symptoms in depression has not been adequately understood. Although somatic symptoms such as sleep disturbances, and appetite/weight change accompany most types of depression (Nelson & Charney, 1981), few investigators have attempted to assess differences in the alleviation of physical and mood symptoms during the treatment of a depressive disorder, and those that have, used mostly adult

samples (Simons, Garfield & Murphy, 1983; Rush, Kovacs, Beck, Weissenburger & Hollon, 1981; DiMascio, Weissman, Prusoff, & Neu, 1979).

Despite IPT-A and its adaptations having demonstrated efficacy and effectiveness in randomized controlled trials in clinical settings (Mufson et al., 1999) and in school based clinics (Mufson et al., 2004; Rosello & Bernal, 1999; Young, Mufson, & Davies, 2006), the literature review presented above demonstrates that the nature and evolution of symptom change in IPT- A or its adaptations are virtually unknown, making it clear that further, more targeted analyses of change are necessary. The current study was conceptualized to answer some of these questions and designed to analyze the timing and pattern of changes in mood symptoms in relation to the physical symptoms reported by patients with depression during preventive treatment with IPT-AST.

*Review of Symptomatic Improvement Patterns in Psychotherapy and Pharmacotherapy through Clinical Trials*

In a seminal paper titled "Modulation of Cortical-Limbic Pathways in Major Depression; treatment specific effects of Cognitive Behavior Therapy", Goldapple et al., (2004) looked at changes in regional glucose metabolism measured with post-hoc positron emission tomography (PET) to contrast neural mechanisms associated with cognitive behavioral therapy (CBT) with those of a previous study of paroxetine treatment. The authors posited that disparate treatments have different primary targets of action—cortical "top-down" mechanism affiliated with response to CBT vs. subcortical "bottom-up" mechanisms associated with response to anti-depressant pharmacotherapy. The paper suggested that the time course of symptom changes with CBT supports an initial cortical site of action, wherein improvement in hopelessness and

views of self and mood precede changes in vegetative and motivational symptoms, and that this timeline is not typically seen in patients treated with medications.

Results of the Goldapple (2004) study indicated that regional changes following successful treatment with CBT and paroxetine treatment, involve cortical sites similar (and in some cases identical) to those seen with paroxetine and other medications, but as hypothesized, the changes were in the opposite direction. Frontal and parietal decreases and hippocampal increases were seen with CBT response, whereas the reverse pattern was seen with paroxetine treatment. Hence, these results provide evidence that CBT and paroxetine have treatment specific change patterns and that each treatment targets different primary sites with CBT showing a cortical "top-down" target of mechanism and paroxetine treatment showing a subcortical "bottom-up" mechanism.

The literature on the process of change during treatment for depression using psychotherapy is fairly limited. Although research has focused on the comparison of treatments and attempted to gain an understanding of which patients may benefit from a given treatment and measured improvement over time, it has seldom qualified improvement by comparing specific symptoms or closely monitoring symptom change as it occurs during treatment. This analysis of literature will include symptom pattern trends identified by cognitive behavioral therapy (CBT), interpersonal therapy (IPT) and psychopharmacotherapy using amytryptiline (a tricyclic medication) and fluoxetine (a selective serotonin reuptake inhibitor; SSRI).

Trials with Cognitive Behavioral Therapy

There is a growing body of evidence pertaining to adult symptom improvement specific to cognitive behavioral therapy (CBT). In fact, more studies have looked at symptom pattern

changes using CBT than with any other form of therapy. One of the earliest studies to look at mechanisms of change in therapy was by Zeiss, Lewinsohn, and Munoz in 1979. Although the researchers were not interested in sequential improvement of symptoms, they examined the degree to which three treatment modalities (interpersonal modality, cognitive modality, and pleasant events schedule modality) would have specific effects on the behaviors directly addressed in the therapy modality (i.e assertiveness, social interaction, mood-related pleasant activities, irrational beliefs, and cognitions). They defined interpersonal behavior modality as including three aspects of interpersonal behavior: assertion, interpersonal style of expressive behavior, and social activity. The pleasant events schedule modality was designed to increase patients' frequency of pleasant activities by monitoring their enjoyment of potentially pleasant activities. The cognitive treatment module included teaching participants about positive and negative thoughts, teaching strategies such as thought-stopping, increasing positive self-talking and disrupting irrational beliefs.

Sixty-six depressed participants were first screened using the Minnesota Multiphasic Personality Inventory Scale (MMPI; Grinker, Miller, Sabshin, Nunn, & Nunnally, 1961), and then classified as depressed and non-depressed based on the MMPI Depression Scale (MMPI D). Forty-four participants completed treatment and follow-up assessments. In each treatment modality, half the participants received immediate treatment and the other half received delayed treatment. Each of these treatments had been previously included in studies and had demonstrated improvement in depression levels (Graf, 1977; Lewinsohn, 1975; Youngren & Lewinsohn,1978; Libet, Lewinsohn & Javorek, 1973, & Beck, 1972). Assessments included the Interpersonal Events Schedule (IES; Youngren, Lewinsohn & Zeiss, 1975), the Pleasant Events Schedule (PES; MacPhillamy & Lewinsohn, 1971), the Cognitive Events Schedule (CES;

Munoz, 1977), the Personal Belief Inventory (PBI, Hartman, 1968; Munoz, 1977), the Subjective

Probability Questionnaire (SBQ; Munoz, 1977), the MMPI D scale, as well as observer ratings

of social and cognitive skills and peer ratings of social and cognitive skills based on group

interactions.

The researchers found that while all three treatments led to improvement, no treatment

modality had a specific impact on the variables most relevant to its treatment format.  In fact, all

patients improved on interpersonal, cognitive and daily functioning variables.  It is possible that

non-significant findings were the result of the fact that all three treatments contained components

of CBT (i.e cognition, behavior activation, assertiveness training), which may have reduced

differences between conditions.  Also, not all of the assessments used in the study were

standardized and were possibly not sensitive to differences that existed between the groups.

Lastly, it is likely that since the same therapists carried patients in each treatment modality, there

may have been contamination of treatments leading to non-specific findings.

A later study by Rush, Beck, Kovacs, Weissenburger and Hollon (1981) compared

symptom improvement among depressed adults treated with either cognitive therapy or

imipramine to evaluate whether there were any differences in how the two treatments affected

measures of hopelessness and self-concept in depression.  Their randomized controlled trial

included 35 depressed outpatient subjects who were assessed on the BDI (Beck et al., 1961) and

the HRSD (Hamilton, 1969). Subjects with a score of 20 or higher on the BDI and 14 or higher

on the HRSD (Hamilton, 1969) were accepted to participate.  Participants were randomly

assigned to 11 weeks of treatment with either cognitive therapy ($n = 18$) or imipramine

hydrochloride ($n = 17$).  The imipramine group received weekly 15-20 minute supportive

sessions with the clinician ($n = 17$).  Measures used to assess the effects of treatment included the

BDI, the Hopelessness Scale (Heimberg, 1961), and the Miskimins Self-Goal-Other II (a measure of self-concept), where items were combined to specifically evaluate social and emotional aspects. As a basis for analysis, treatment was grouped into two periods: weeks 1-5 (early), and weeks 6-10 (late). Two analyses of covariance were conducted. The first analysis of covariance was conducted to assess changes in pre-treatment hopelessness between treatment groups and a second analysis of covariance was conducted to assess changes in hopelessness with each treatment condition during the first weeks of therapy.

The authors found that cognitive therapy exceeded imipramine in its impact on both hopelessness and general aspects of self-concept, and that cognitive therapy was especially more effective in reducing hopelessness within the first five weeks of treatment. However, similar results were not found for the self-concept measure and this was explained by conferring that hopelessness was positively correlated with overall depressive symptomatology whereas self-concept was not, leading to a difference in findings. One of the major drawbacks of the study was that it did not include a control group or another therapy group, which would have provided more information as to whether the effects obtained were specific to cognitive therapy. However these findings underscore the clinical implications related to the difference in effects of the two treatments. Since hopelessness has been implicated in suicidal intent and attempts, and cognitive therapy produces a greater reduction in hopelessness, it is possible that it may have similar effects on symptoms of suicidality.

In a follow-up paper based on the same study, Rush, Kovacs, Beck, Weissenburger and Hollon (1981) addressed whether there were different patterns of symptom change associated with the two treatment modalities for depression that they investigated earlier (Rush et al., 1981). Using cross-lagged panel analysis, they evaluated the relationships among changes in views of

the self, hopelessness, mood, motivation and vegetative symptoms during the first four weeks of

treatment (weeks 1-2, 2-3 and 3-4) for 35 depressed subjects, for each treatment condition.

These time periods were selected since the fastest reduction in symptoms had occurred between

weeks 1-4 in both treatment groups. Their findings suggested that for the cognitive therapy

group, improvements in hopelessness, views of the self and mood generally preceded changes in

vegetative and motivation symptoms. Further, although the researchers hypothesized that

vegetative symptoms would improve with medications; no consistent patterns of symptom

change were reported. This finding was explained as a variation in response to pharmacotherapy

between subjects and the possibility that the week-long interval was too long to detect any

significant changes, since drugs were taken on a daily basis. Their recommendations included

obtaining measures of different symptoms (e.g. cognitive, vegetative, mood) more frequently

during treatment in order to help understand the mechanisms of change.

Continuing this line of research, Simons, Garfield and Murphy (1983) analyzed the

process of change for depressed patients treated with cognitive therapy as compared to those

treated through psychopharmacology (nortrypline hydrochloride). Although subjects in their

study were randomly assigned to four treatment conditions-- cognitive therapy, medication,

cognitive therapy and medication, cognitive therapy and placebo, their paper compared only the

two main treatment groups: cognitive therapy alone and pharmacotherapy alone for 12 weeks.

The study included 28 participants, 14 in each group who scored 20 or above on the BDI, and 14

or above on the HRSD. Outcome measures were categorized as mood measurements (the

HRSD, BDI and the Visual Analog Scale (VAS) and cognitive measurements (the Automatic

Thoughts Questionnaire (ATQ), Dysfunctional Attitudes Scale (DAS), and the irrational –

depressed category of the Cognitive Response Test (CRT). These measures were evaluated at

four time points which included pre-treatment, week 4, week 8, and termination. Results were analyzed using a repeated measures multivariate analysis of variance (MANCOVA) design to test for the differential effects of treatment. Although it was expected that both groups would improve on measures of mood, the authors hypothesized that there would be specific differences between the groups on the cognitive measures, since cognitive therapy and pharmacotherapy are two different forms of treatment and would likely impact cognitive symptoms differentially. However, their results did not support this hypothesis and indicated that both treatments did equally well in alleviating mood and cognitive symptoms (i.e. improvement in both groups was found to be similar in time course and magnitude, and both groups were found to have identical improvement on cognitive measures). The authors justified their findings by stating that cognitive change should be seen as *part* of improvement and not a *cause* of improvement and that it was perhaps reasonable to infer that symptoms mutually influence one another and that cognitive symptoms most directly affect mood symptoms and vice versa.

The findings from the Simons, Garfield and Murphy (1983) study were surprising and have implications for considering the ways in which cognitive therapy impacts cognitions and mood and leads to improvement in symptoms. However the study's liberal use of self-report measures (BDI, DAS, VAS, and CRT) and lack of a control group may have impeded its ability to tap into differential changes in cognitive symptoms between the groups, leading to inconclusive results.

<u>Trials with Interpersonal Psychotherapy</u>

Research on trends in symptom improvement in IPT is a nascent field and although there have been studies on the pattern of change in IPT for adults, there is currently a paucity of data

trends in symptom reduction for children, and adolescents treated with IPT or its adaptations. To the best of our knowledge, the temporal dynamics of remission of subthreshold symptoms of depression in adolescents has not been investigated yet. Therefore, the importance of the current study lies in its ability to fill this gap in research while also maintaining relevance through the clinical implications it stands to provide. Since research has demonstrated the similarities between adolescent and adult depressive symptoms (Ryan et al., 1987), we turn to the research on trends using IPT with adults as a starting point to the current study.

Perhaps the only study to discuss differential symptom reduction using short-term IPT with adults was a randomized controlled trial by DiMascio, Weissman, Prusoff, and Neu (1979) which compared the effect of tricyclic anti-depressant medication (amitriptyline hydrochloride) and IPT, conducted over 16 weeks, each alone and in combination, in acutely depressed patients. A nonscheduled treatment control group was also included in this study which allowed patients to receive periodic supportive psychotherapy on demand. Eighty-one depressed outpatient adults were assessed using the Schedule for Affective Disorders and Schizophrenia (SADS; Endicott & Spitzer, 1978), the Research Diagnostic Criteria (RDC; Spitzer, Endicott & Robbins, 1975), the HRSD (Hamilton, 1969), with scores of seven or higher on the Raskin Three Area Depression Scale. Participants were randomly assigned to one of four treatment groups: psychotherapy alone ($n = 25$), pharmacotherapy alone ($n = 24$), psychotherapy plus pharmacotherapy ($n = 24$) and nonscheduled treatment ($n = 23$). Separate analyses were carried out at weeks 1, 4, 8, 12 and 16 and the study was analyzed by a three-way analysis of covariance, using a fixed-model least square analysis. The authors found that both amitryptyline and psychotherapy lead to overall symptom reduction and that the effects of both treatments in combination were additive (i.e. results pointed towards a differential symptom pattern improvement in treatments, with

amitryptyline affecting vegetative symptoms such as sleep and appetite disturbance within the first week in the treatment and IPT affecting mood, suicidal ideation, work, and interests later at four to eight weeks compared to the control group). Interestingly, the effect of pharmacotherapy on mood and on interest occurred much later at 12 weeks. Both individual treatments were found to be equally efficacious and better than the non-scheduled treatment. These findings indicate that symptoms of mood and motivation (interest) may be more amenable to changes with IPT, with differences occurring as early as four weeks, whereas physical symptoms may be more amenable to medication treatment with improvements occurring within the first week. It would be interesting to know whether IPT was found to impact vegetative symptoms in the group and if so, at what time period, as this data was not reported by the authors.

In order to answer some of these questions, a pilot study by Sinh, Chaudhury, Verdeli, Tang and Young (unpublished) explored patterns of improvement in a sample of adolescents with subclinical depression symptoms, treated with IPT-AST in three school-based clinics in New York City (Young, et al., 2006). As reported previously, the original authors Young et al. (2006) had found IPT-AST to be effective in reducing the subthreshold depression symptoms of these adolescents compared to school counseling.

Using the depression symptom checklist (a non-standardized clinical tool), patterns of improvement of mood/motivation and vegetative symptoms were followed from baseline to six (of the original eight) weeks of treatment. The authors categorized three time points (weeks 1, 3, and 6), to classify subjects as "early responders" (those that showed a 50% reduction in symptoms by week 3), "late responders" (those who showed a 50% reduction in symptoms by week 6), and "non-responders" (those who did not show a 50 % reduction in symptoms by week 3 or week 6). It was hypothesized that improvements in mood and motivation would precede

improvements in vegetative symptoms.  Results of the study were in the intended direction, and indicated that symptoms of mood and motivation improved more rapidly than physical symptoms, however the difference in the rate of improvement between the two clusters (i.e., mood/motivation and vegetative) was found to be non significant. These results may be explained by the sample size ($n = 27$) of the study which did not allow for enough power to detect significant differences in improvement, even had they existed.  It is also likely the differences would have been more significant closer to the termination of treatment (i.e., at the end of eight weeks) hence the decision to include six weeks in the analysis may have decreased the likelihood of uncovering true differences in rate of symptom improvement.

## Trials with Psychopharmacotherapy

Recognizing that physical symptom changes in depression are closely linked to changes in depressed mood, a study by Casper et al., (1994), analyzed sequential patterns of physical, mood and cognitive symptom changes in depressed patients who received antidepressant medication (amitriptylin or imipramine) over four weeks.  In order to assess behavioral change and outcome, the researchers used diagnostic instruments including the Schedule for Affective Disorder and Schizophrenia (SADS; Spitzer et al., 1978), the Hamilton Depression Scale (Hamilton, 1960), the Global Assessment Scale (GAS; Endicott et al., 1976), the SADS change form (SADS-C; Endicott & Spitzer, 1978), the Clinical Global Impression scale (CGI; Guy, 1976), the Video Interview Behavior Evaluation Scale (VIBES; Katz & Itil, 1974), the Hopkins Symptom Checklist -90 (HSCL-90; Derogatis et al., 1974) and the nurse- rated Affective Disorder Rating Scale (ADRS; Murphy, Pickar, & Alterman, 1980).  The authors compared symptomatic changes over time in 79 patients, 52 of whom were categorized as "good

responders", and 27 who were categorized as "poor responders". Patients in the good responder group were rated as markedly or completely improved after four weeks of drug treatment versus the poor responders; patients who were rated as having responded minimally to treatment (as measured by a score below 16 on the Hamilton Depression Scale and over 60 on the Global Assessment Scale). Patients who had an intermediate treatment response were excluded from the analysis. Comparing physical symptoms such as sleep impairment, loss of appetite, loss of sexual interest and diurnal mood changes to depressed mood, the authors hypothesized that both physical and mood symptoms would ameliorate around the same time in a related fashion. However results indicated that although changes in appetite, weight, libido and diurnal mood variation paralleled changes in depressed mood, sleep changes (and early alleviation of insomnia in particular) preceded the improvement in depressive feelings by the first week of drug treatment in good responders. Although the authors did not specifically comment upon the time course of amelioration of mood symptoms, their results are partly consistent with Di Mascio et al's (1979) study which also found that amytriptyline lead to reductions in sleep disturbances within the first week of treatment. However, unlike the DiMascio et al (1979) study, this study found changes in mood and other vegetative symptoms to occur at approximately the same time. Limitations to the study include a lack of placebo control group which might have elucidated the specific effects of medication on the groups, as well as the order or time-line of symptom improvement that emerged. Further, although details were not reported in the paper, cognitive symptoms were not found to follow the time-line of mood and vegetative symptom improvement.

An open label trial by Worthington, Fava, Davidson, Alpert, Nierenberg and Rosenbaum (1995) also examined patterns of improvement in depressed outpatients treated with fluoxetine

over eight weeks.  Their study included 62 depressed outpatients between the ages of 16-85

years, diagnosed with major depressive disorder.  Participants were screened using the Structured

Interview for DSM-III-R- Patient Edition (SCID; Spitzer et al. 1989) and had a score of greater

or equal to 16 on the 17- item Hamilton Rating Scale for Depression (HAM-D-17; Hamilton,

1960) at both screen and baseline visit.  Patients who showed "full response" following

fluoxetine treatment were included in the study, where full response was defined as a HAM-D-

17 score of lesser than or equal to seven, for at least two consecutive weeks by the end of the

eight weeks of treatment.  In order to monitor for changes in depressive symptoms, subjects were

administered the 28-item version of the HAM-D (Fava et al., 1993) at screening, baseline, and

every two weeks for eight weeks.  The study classified patterns of improvement as (a) early

complete improvement (defined as greater than or equal to 75% improvement from baseline

score occurring during the first four weeks of treatment and maintained until the end), (b) early

partial improvement (defined as greater than or equal to 50% improvement from baseline score

occurring during the first four weeks of treatment, and (c) late complete improvement (defined as

greater than or equal to 75% improvement from baseline score occurring during the last four

weeks of treatment).  Using chi-square method of analysis, the authors evaluated overall

differences in patterns of improvement and found that suicidal ideation, excessive guilt, and lack

of appetite improved significantly earlier during treatment in comparison to depressed mood.

Depressed mood, reduced interest and hypersomnia tended to improve during the last four weeks

of treatment in about half of the responders.  Drawbacks to the study include that as an open-

label trial, some responses may have been due to non-specific, placebo-like effects. Also, ratings

of depression were completed by physicians not blind to the study; hence investigator bias is a

serious threat.  The study did not include a control group or a comparison group, which would

have helped clarify trends of symptomatic improvement. And lastly, as with any medication trial, certain fluoxetine induced side effects may have confounded the assessment of symptomatic improvement.

*Literature Review Conclusions*

In light of some of the findings discussed above on the process of change involved in CBT treatment, it seems that improvement in hopelessness and views of self and mood generally change before vegetative and motivation symptoms (Goldapple, Segal, Garson, Lau, Bieling, Kennedy & Mayberg, 2004). With one exception (Simon, Garfield & Murphy, 1983), a similar time line was not seen in patients treated with pharmacotherapy. The TADS and TORDIA trials which included medication and psychotherapy using CBT for the treatment for adolescent depression highlight the value of combined medication and psychotherapy.

Although there is some preliminary information with regard to changes in symptoms with adults (DiMascio, Weissman, Prusoff, & Neu, 1979), the picture is still rather unclear for IPT and its adaptations. With regard to IPT-A, it is not known specifically *which* symptoms would improve first or *how soon* they would improve for depressed adolescents. Additionally, research has not consistently classified symptoms as one of mood, physical or cognitive, giving rise to ambiguity about whether a symptom may be included in one cluster or the other.

This study therefore seeks to explore what trends might emerge, utilizing the group receiving IPT-AST in the indicated preventive intervention in Young, Mufson and Gallop's 2010 study. The present analysis explores the patterns of symptom improvement among (predominantly Hispanic) participants in the IPT-AST condition, whose improvements in depressive symptoms were significantly greater than their counterparts in the School Counseling condition.

These divergent paths of recovery in this sample are important to evaluate for several reasons. From a cultural perspective, even though Latinos/as are now the largest minority group in the United States, few treatment studies include participants of this ethnicity and others fail to analyze data based on minority group membership (Hall, 2001; Miranda et al., 2005). The bias in psychological sciences to study white, middle class English-speaking individuals is well documented (Bernal & Scharron-del-Rio, 2001).

IPT is considered a good candidate for cultural adaptation because of the strong body of evidence on its efficacy. Further IPT has several elements that are consonant with Latino culture including: (1) focusing mainly on current interpersonal conflicts which are tied into Latino values (Bernal & Enchautegui, 1994) of *familioso* that is placing the interest of the family over the individual and *personalismo* that is preference for personal contact in social situations, (2) having a problem-solving approach (3) a didactic orientation and format that educates about symptoms and the process of therapy and (4) receiving active intervention from an "expert" (Rosello, Bernal & Rivera-Medina, 2008).

From a theoretical standpoint, mechanisms of symptom improvement over the course of IPT are virtually unknown. Depression as an illness includes symptoms which can be classified on the basis of mood (e.g. depressed mood--feeling sad or empty), somatic or neurovegetative symptoms (e.g. changes in appetite, weight, sleeping pattern, fatigue and psychomotor agitation/retardation), motivation (e.g. diminished interest or pleasure), and cognition (e.g. diminished ability to think or concentrate). These factors jointly impact the ability of an individual to function and may in turn be differentially affected by the intensity of the illness. Some patients may experience more serious mood symptoms, whereas others may find that they are more debilitated in terms of their physical symptoms or ability to attend or concentrate.

Hence, the treatment that produces more rapid changes in a particular cluster of symptoms (i.e. appetite, weight loss, insomnia) may be an indication for patients who are impaired within that cluster.

Third, as clarified by results discussed earlier, physical symptoms can abate as early as within the first week of treatment with psychotropic medication (Casper et al., 1994; DiMascio et al., 1979), whereas mood and motivation symptoms tend to improve later--by four weeks or so (DiMascio et al., 1979; Rush et al., 1981). Given that the risk of completing a suicide is higher for patients who experience relief from physical symptoms but continue to experience sadness and hopelessness, there tends to be a time-lag in treatment which may inadvertently raise a suicidal patient's risk of making or carrying out an attempt. Mental health services are increasingly aiming to individualize treatments by matching patients to interventions based on their symptom profiles. Hence, this study may add to the knowledge base on depression in teens and appropriate clinical interventions that can be made on the basis of presenting problems.

Lastly, as stated earlier, research is lacking information about depression symptom improvement in adolescents and on subclinical depression. Because subclinical depression constitutes as a major risk factor for the subsequent onset of depression (Clarke et al., 1995; Pine, Cohen, Cohen, & Brook, 1999), and has been found to persist for years in some children (Twenge & Nolen-Hoeskema, 2002), this study has significant public health implications. Therefore there are both theoretical and clinical gains in conceptualizing and studying teens with depressive symptoms.

Aims and Hypotheses

The overall aim of this dissertation is to evaluate patterns of symptom improvement within the IPT-AST treatment condition of the original Young, Mufson & Gallop (2010) study. Specifically we wanted to explore whether there would be any differences in mood/motivation symptom improvement and vegetative symptom improvement for teens who received the IPT-AST preventive treatment.

Aim

Measure differences in patterns of mood/motivation and vegetative symptoms in adolescents treated with IPT-AST.

Hypothesis 1

Improvements in mood/ motivation symptoms will precede improvements in vegetative symptoms as measured by the depression symptom checklist.

Hypothesis 2

Controlling for baseline levels of mood/motivation and vegetative symptoms, adolescents who show improvements in mood/motivation symptoms will also show improvements in vegetative symptoms.

Exploratory Analysis

The study also aimed to examine the effect of moderators as well as look more closely at the relationship between mood/motivation, vegetative and total depression symptoms at baseline and termination.

Results from this dissertation analysis have the potential to provide practitioners as well as caregivers information regarding the process of symptom improvement in adolescents with subthreshold depression treated with IPT-AST.  Results from this study would also raise

awareness among the mental health community about the abatement of symptoms as they occur following response to IPT-AST. In terms of clinical treatment, it may provide a means of identifying teenagers who are most likely to experience benefit from this preventive treatment. Knowing about the pattern of improvement following treatment or being aware of a given presentation of symptoms in an adolescent would facilitate treatment individualization by informing clinicians regarding the factors that may increase risk, and the options and choices available to them, and what might work specifically for a person. For an adolescent presenting with, or responding to treatment with more mood/motivation symptoms and less vegetative symptoms may prompt a different referral than for an adolescent presenting with, or responding to treatment with more vegetative and less mood/motivation symptoms. Hence, the study will help to provide a more thorough understanding of the nature and the timing of response to IPT-AST preventive treatment.

Chapter II

METHOD

This study is a secondary analysis of an existing dataset from a randomized trial that evaluated the efficacy of an indicated prevention program for adolescent depression.  The description of the preventive intervention, the trial, and its termination and 6-month follow-up results were reported previously (Young, Mufson & Gallop, 2010) and will be briefly summarized here.

Participants

Participants in the original IPT-AST preventive study were chosen from three single-sex high schools (two girls' schools and one boys' school) in New York City. Eligible participants were male and female students, in the 9th and 10th grades who met the study criteria for subsyndromal depressive episode (defined as at least two subthreshold or threshold symptoms on the K-SADS-PL), who had CES-D scores between 16 and 39, who did not meet criteria for a current depressive episode and had a C-GAS score of 61 or higher.  Other exclusionary criteria included a current diagnosis of depression, dysthymia, bipolar disorder, psychosis, panic disorder, obsessive-compulsive disorder, post-traumatic stress disorder, oppositional defiant disorder, conduct disorder, or untreated attention deficit hyperactivity disorder.  Fifty-nine adolescents who met these criteria participated in the study; 36 in the IPT-AST group and 21 in the school counseling (SC) or treatment as usual group.

The final sample for this study consisted of 32 participants who were originally selected from the 36 adolescents included in the IPT-AST condition in the Young, Mufson and Gallop (2010) study.  Due to substantial missing data, four participants from the original sample had to

be excluded from our analyses. Participants were 18 girls and 14 boys ranging in age from 13 to 17 years enrolled in the 9th and 10th grades. Their average age was 14.53 (*SD* = .72) years and there were more females than males in the study (56.3 %). In terms of ethnicity, 65.6 % of adolescents identified themselves as Hispanic. In terms of race, 59.4 % of participants were White, and 40.6 % were African American. Most adolescents (65.6 %) lived in a dual-parent household and 12.5 % reported a gross household income of $25,000 or less.

<div align="center">Procedure</div>

In the original Young, Mufson & Gallop (2010) study, potential trial participants with elevated symptoms of depression were identified through a two-stage screening procedure. The process of recruitment for the study began in November 2005 and ended in February 2007. See Appendix C on page 99 for study recruitment flow chart.

*Screening:* The first stage of screening took place in the form of a classroom-based screening. A letter was sent out to the parents of students in the 9th and 10th grades with information regarding the study by school administrators. Parents who did not want their child to participate in the study could send back a notice of refusal. If a refusal letter was not received, another letter was sent, thus providing parents with two opportunities to refuse participation. On the day of the screening, information was provided to adolescents regarding the study procedures and those who were willing to participate signed a screening assent form. Eventually, three hundred forty-six (30.98%) parents and 125 (11.19%) adolescents refused participation in the study. There were also four adolescents who were repeatedly absent, and were also not included.

The second-stage of the screening consisted of having adolescents complete the CES-D (Radloff, 1977), a 20-item measure that assesses depressive symptoms over the past week.

Adolescents were considered eligible for the study if they had a CES-D score between 16 and 39; those with a score of 40 or higher were seen by the Principal Investigator (PI) to assess clinical severity and determine potential eligibility.

The average CES-D score of the 642 adolescents was 15.23 ($SD = 10.27$) and the total number of adolescents that scored between 16 and 39 on the CES-D were 235. Two adolescents scored 40 or above but were considered eligible to participate in the preventive study as they did not meet criteria for a depressive episode when assessed by the PI. Families of adolescents that were found to be eligible were contacted by the research staff to describe the prevention project.

Families that were interested in having their child participate came to the school to learn about the project and provided informed consent and assent to participate in an eligibility evaluation and the prevention program. A third of the families ($N = 79$) agreed to participate in the project. The two most common reasons identified for refusal to participate in the study were disinterest on the part of the adolescent (25.58%), parents (11.63%) or both (13.95%), and lack of perceived need (30.23%). The adolescents who had consented to participate in the prevention component of the project were compared to those who had refused to participate on several key variables. No significant differences were found in age (14.42 versus 14.34; $t(235) = -0.86$) or gender (56.96% female versus 62.03% female; $\chi^2 = 0.45$) between the two groups. However, there was a significant difference on screening CES-D scores (26.37 versus 22.83; $t(235) = -4.10$, $p < .01$); adolescents who had agreed to participate had higher depression scores than those who had refused.

*Structured Clinical Interview and Assessments*: The adolescents who consented to participate in the project completed the K-SADS-PL (Kaufman, Birmaher, Brent, & Rao, 1997) and the CGAS (Shaffer et al., 1983) to determine eligibility. Adolescents with at least two subthreshold

or threshold depression symptoms on the K-SADS-PL who did not meet criteria for a current depressive episode, were considered eligible.  A CGAS score of 61 or higher was also required for eligibility.  Adolescents with a current diagnosis of depression, dysthymia, bipolar disorder, psychosis, panic disorder, obsessive-compulsive disorder, post-traumatic stress disorder, oppositional defiant disorder, conduct disorder, or untreated attention deficit hyperactivity disorder were excluded from the prevention study.  Four adolescents were excluded because they did not have enough depression symptoms; 10 because of a current depression diagnosis, suicidal ideation or self-harm behaviors; seven adolescents met criteria for one of the other exclusionary diagnoses.

*Assignment to groups*: Using a table of random numbers, 57 adolescents were randomly assigned to either the IPT-AST or the School Counseling (SC) conditions.  The random number table was generated to ensure that approximately two-thirds of adolescents in each school would be randomized to the IPT-AST condition.  In this way, 36 adolescents were randomly assigned to the IPT-AST condition and 21 were randomly assigned to SC.   The two schools were also randomized to include parent participation in the IPT-AST condition in either the first or second year of the study.  The IPT-AST group without parental involvement (AST) comprised of 21 adolescents and the IPT-AST group with parental involvement (ENH) comprised of 15 adolescents.  The groups were combined due to improper randomization of subjects to groups in the original study.  The current study was unable to use the data of four participants as it was missing or was incomplete.

<u>Instrument</u>

*Assessment of depressive symptomatology*

The current study used a single instrument-- *The weekly depression symptom checklist*, which subjects in the IPT-AST group completed prior to each group session. Typically, an adolescent who attended all group sessions would have completed a total of eight weekly depression symptom checklists. The weekly depression symptom checklist was used as a clinical tool in the original study and is not a standardized (i.e. reliable or valid) measure of depression/depression symptoms. The checklist included questions which record changes in mood, physical, cognitive, and suicidal symptoms on a 3-point rating scale. Responses were recorded as "Yes, Sometimes and No."

For the purposes of the present study, the checklist (see Appendix B, page 98) consisted of two distinct clusters—Mood /Motivational and Vegetative symptoms cluster.

*Mood/Motivational Symptom Cluster*

Questions in the mood/motivation cluster included items that assessed the affective experiences of adolescents in the last week. They included question numbers 1, 2, 3, 4, 5 and 10 from the depression symptom checklist, e.g. "Have you felt sad a lot?" "Have you felt hopeless that things may never get better?" "Have you gotten mad easily- sometimes over little things?" "Has it been difficult to have fun doing things you used to enjoy?" and "Have you felt guilty about things that may not be your fault?"

*Vegetative Symptom Cluster*

The vegetative symptoms cluster assessed any physical symptoms experienced by adolescents in the last week. They included items 6, 7, 8, 9, and 13 from the weekly depression

checklist, e.g. "Have you had trouble falling asleep or staying asleep?" "Have you felt more or less hungry than you used to?" and, "Have you had less energy than you used to?"

## Interventions

*IPT-AST*

Adolescents in the IPT-AST condition had two pre-group individual sessions and eight weekly 90-minute group sessions. All of the sessions took place in the schools. The pre-group individual sessions occurred during students' free periods or after school and the group sessions took place after school. Four groups without parental involvement (AST) and three groups with parental involvement (ENH) were conducted over the course of two years. The primary investigator of the original study co-led two of the groups. The other group leaders were either masters or doctoral level psychologists or child psychiatrists who were trained and supervised by the primary investigator of the original study. Each group contained four to six adolescents.

*Pre-Group meeting*: During the pre-group meetings, an assessment of depressive symptoms was carried out by the leader who also provided a framework for the group and completed the interpersonal inventory with the adolescent in order to identify interpersonal goals to be addressed in the group.

*Group meeting*: The group helped educate adolescents about the symptoms of depression, the link between feelings and interpersonal interactions and taught communication and interpersonal strategies that can be applied to improve relationships in their lives. In the ENH groups which included parental involvement, parents participated in one of the two pre-group sessions with the adolescent. Parents also participated in a mid-group parent-adolescent session to work on an interpersonal issue identified by their child, and a post-group parent-adolescent session to review

progress or point out any additional work to be done.  If a parent was absent or unable to attend the session, the adolescent met alone with the group leader.  The other group (AST) did not receive any parental involvement, but was similar in all other respects to the parental involvement group.

*School Counseling*

Adolescents in the SC group were referred to the school counselor to be seen at a frequency determined by the adolescent and the counselor.  In the original study, SC was chosen as the comparison group because it approximates what normally occurs in the schools.

SC sessions consisted of supportive individual counseling and were 30-45 minutes in duration.  Some topics discussed in these sessions included relationships with parents (35.14%) and academic issues (24.32%).  A variety of other topics (e.g., stress, peer relations, extracurricular activities) were also discussed.  One adolescent from the SC condition was hospitalized for several weeks due to depression during the follow-up period and subsequently withdrew from the study.  Five additional adolescents reported seeing the school counselor during the follow-up.

The current study did not utilize the data of the SC group, as this group was not required to complete the weekly depression symptom checklist.

Chapter III

RESULTS

This chapter focuses on the results of the analyses performed to address the research

questions of this study. In the first section, the operationalizations and statistical analysis

strategy will be described. In the second section, descriptive statistics for the sample background

characteristics are provided, along with reliability coefficients and descriptive statistics for the

mood/motivation scores and the vegetative scores for each week of the study. Then, each of the

aims and hypotheses of this study are reviewed, and the results for each are presented. The

chapter ends with a summary of the key findings from this study.

The review of the literature revealed a lack of consistency in terms of which symptoms

were included to create particular clusters i.e mood/motivation, vegetative and cognitive clusters.

Initially, the current investigation sought to focus on vegetative symptoms, cognitive symptoms

and combined motivation and mood symptoms from the depression symptom checklist in our

analysis. However, the number of cognitive symptoms was too few in order for us to carry out

any meaningful comparisons in differential improvement between the three clusters. Thus, we

decided to include five vegetative and six mood/motivation symptoms as part of our analyses.

As mentioned earlier, responses on the checklist were recorded as "Yes, Sometimes and No."

During the data analysis, "sometimes' and "yes" responses were scored as 1 and "No" was

scored as 0.

Since the two clusters (mood/motivation and vegetative) contained an unequal number of

items (six for mood, and five for vegetative), we used standardized means in the analysis of most

of the data to make the comparisons meaningful, except for three of the analyses (Poisson

regression, early/late/no change classification and the 'no improvement' graphical analysis).

Two-tailed tests and an alpha level of .05 were used for all inferential tests.

## Missing Data

In order to account for missing data across the eight weeks of preventive treatment, the study employed three techniques. The first method consisted of averaging bi-weekly mean symptom scores leading to 4 time-points of assessment. Time l indicates the average mean mood and vegetative scores at weeks 1 and 2, Time 2 indicates the averaged mean scores from weeks 3 and 4, Time 3 includes averaged mean scores from weeks 5 and 6, and finally Time 4 indicates averaged mean scores from weeks 7 and 8. For participants missing data at either week points (for example week 1), their Time 1 score consisted of the average of their mean week 2 scores. For those participants with both week 1 and week 2 scores available, their Time 1 score comprised of the average of their mean week 1 and week 2 scores. Most of the analysis in this dissertation used "Time" data in order to arrive at the results. However the Poisson analysis employed weekly total scores (and not mean scores) as Poisson requires integer values.

The second method used to work with the issue of missing data consisted of imputations, where scores from the last time point were carried forward. This method was used in the "no symptom improvement" analysis where subjects whose week 1 or week 8 scores were missing, were substituted by their week 2 or their week 7 scores. For participants missing any further data during the week time points, Maximum Likelihood Estimation was used to estimate the most likely value for the particular missing data point.

Descriptive Statistics

In this section of the results, descriptive statistics for study variables including age, gender, race, and ethnicity are provided.  Table 1 contains descriptive statistics for these variables.  The majority of the participants (56.3%) were female, and most (65.6%) were Hispanic.  Racially, most of the participants (59.4%) stated that they were Caucasian.  Most of the participants (65.6%) lived in dual-parent households, and although most came from households (84.4%) which had a gross income greater than $25,000, the range of the income variable was unknown.  The average age of the participants was 14.53 years old ($SD = .72$).

Table 1

Demographic and Background Characteristics for Categorical Variables

|  | Frequency | Percentage |
|---|---|---|
| Gender |  |  |
| Female | 18 | 56.3 |
| Male | 14 | 43.8 |
| Ethnicity |  |  |
| Hispanic | 21 | 65.6 |
| Non- Hispanic | 11 | 34.4 |
| Race |  |  |
| White | 19 | 59.4 |
| African American | 13 | 40.6 |
| Parental Status |  |  |
| Single-parent household | 11 | 34.4 |
| Dual- parent household | 21 | 65.6 |
| Annual household income |  |  |
| Less than $25,000 | 4 | 12.5 |
| More than $25,000 | 27 | 84.4 |
| Missing | 1 | 3.1 |
|  | *M* | *SD* |
| Age | 14.53 | .72 |

Table 2 shows descriptive statistics for the mood/ motivation scores and for the vegetative scores (computed as the mean item score at each time point for each scale). Based on the values from this table, it can be seen that there was a tendency for mood/ motivation scores and vegetative scores to decrease over the eight weeks examined in this study.

Table 2

*Descriptive Statistics for Composite Scores as a Function of Week*

| Week | Mood/ Motivation | | | Vegetative | | |
|---|---|---|---|---|---|---|
| | *n* | *M* | *SD* | *n* | *M* | *SD* |
| Week 1 | 23 | .58 | .38 | 23 | .74 | .51 |
| Week 2 | 24 | .51 | .33 | 24 | .75 | .56 |
| Week 3 | 24 | .34 | .30 | 24 | .67 | .53 |
| Week 4 | 21 | .52 | .38 | 21 | .83 | .51 |
| Week 5 | 22 | .38 | .33 | 22 | .80 | .57 |
| Week 6 | 27 | .41 | .45 | 27 | .53 | .48 |
| Week 7 | 21 | .38 | .37 | 21 | .49 | .49 |
| Week 8 | 28 | .26 | .33 | 28 | .41 | .42 |

Table 3 shows reliability coefficients (Kuder-Richardson internal consistency reliability coefficients) for the composite mood/motivation scores and the vegetative scores for each week. In two cases (Week 2 mood/motivation scores and Week 5 mood/motivation scores), the reliability coefficients were below .60. In seven other cases (mood/motivation scores in Weeks 1,

3, and 4, and vegetative scores in Weeks 1, 4, 6, and 8), the reliability coefficients were between

.60 and .70. In the remaining seven cases, the reliability coefficients were greater than .70.

Table 3

*Kuder-Richardson Internal Consistency Reliability Coefficients*

| | Scale | |
|---|---|---|
| Week | Mood/Motivation (6 items) | Vegetative (5 items) |
| Week 1 | .62 ($n = 23$) | .63 ($n = 23$) |
| Week 2 | .50 ($n = 24$) | .76 ($n = 24$) |
| Week 3 | .60 ($n = 24$) | .75 ($n = 24$) |
| Week 4 | .66 ($n = 21$) | .62 ($n = 21$) |
| Week 5 | .56 ($n = 22$) | .74 ($n = 22$) |
| Week 6 | .81 ($n = 27$) | .63 ($n = 27$) |
| Week 7 | .72 ($n = 21$) | .75 ($n = 21$) |
| Week 8 | .74 ($n = 28$) | .61 ($n = 28$) |

Hypothesis 1

The first aim of this study was to measure differences in patterns of mood/ motivation,

and vegetative symptoms within the IPT-AST condition. It was hypothesized that among

adolescents treated with IPT-AST, improvements in mood/motivation will precede

improvements in vegetative symptoms, as measured by the depression symptom checklist. The

analysis for this hypothesis was conducted in six different ways.

The first method to examine the first aim of this study was to test whether there had been a specific significant decrease in mood/motivation and vegetative symptoms over the 8 weeks of preventive treatment. The results from the Young, Mufson & Gallop (2010) study had found significantly greater rates of change in depressive symptoms and overall functioning from baseline to post-intervention, however rate of change in terms of the two clusters had not been studied by the original authors and hence needed to be determined prior to analyzing the relationship between the two clusters.

The Poisson regression was used to test for overall significance in improvement in the two clusters and used weekly data, comparing total symptom scores at Week 1, Week 4, and Week 8. Given that Poisson regression requires count data (integer scores) as input, raw scores from Week 1, Week 4, and Week 8 were used in these analyses rather than the mean item scores used in prior analyses using weekly data as a unit of measurement. Hence the dependent variable was mood/motivation and vegetative scores that were measured along the independent variable- Weeks.

The results of the regression are shown in Table 4. The top portion of the table shows the results from the analysis of mood/motivation scores. The Poisson regression equation indicated that participants' scores were best predicted by the following regression equation: 4.40 - .35(week). That is, to predict an individual's score at any given week, .35 times the number of weeks since the beginning of treatment would be subtracted from 4.40. For example, to predict a person's score in Week 5, the regression equation would be $4.40 - .35(4) = 4.40 - 1.40 = 3.00$. The average weekly reduction of .35 points was statistically significant, $\text{Wald}(1) = 28.77$, $p < .001$, indicating an overall significant reduction in mood/motivation symptoms over 8 weeks.

The results for the Poisson regression analysis on vegetative scores are shown in the bottom section of Table 4. The regression equation for vegetative scores was 4.56 - .30(week). Thus, the estimate of a person's score at week 8 would be $4.56 - .30(7) = 4.56 - 2.1 = 2.46$. The average weekly reduction of .30 points was statistically significant, Wald(1) = 21.86, $p < .001$, indicating an overall significant reduction in vegetative symptoms over 8 weeks. In summary, for both mood/motivation scores and for vegetative scores, there was a statistically significant weekly decrease according to the Poisson regression analysis. The average reduction for mood/motivation was .35 points, while the average reduction for vegetative symptoms was .30 points.

Table 4

*Results from Poisson Regression Analyses on Mood/Motivation Symptoms and Vegetative Symptoms for Weeks 1, 4, and 8*

|  | *B* | *SE*$_B$ | Wald | *Df* | *P* |
|---|---|---|---|---|---|
| Mood/Motivation Symptoms |  |  |  |  |  |
| Intercept | 4.40 | .53 | 69.50 | 1 | <.001 |
| Week | -.35 | .07 | 28.77 | 1 | <.001 |
| Vegetative Symptoms |  |  |  |  |  |
| Intercept | 4.56 | .53 | 74.47 | 1 | <.001 |
| Week | -.30 | .06 | 21.86 | 1 | <.001 |

*Note*. For the Poisson model on mood/ motivation scores, Quasi-likelihood under independence model criterion (QIC) = .93; Correct quasi-likelihood under independence model criterion (QICC) = -4.29. For the Poisson model on vegetative scores, QIC = -80.72; QICC = -84.53.

The second analysis for the first hypothesis was a curve estimate procedure conducted to explore the pattern of improvement of both the mood/motivation and vegetative symptoms over 8 weeks as well as to test for the assumption of linearity of the data. Curve estimation was computed separately for mood/motivation scores and for vegetative scores. Table 5 shows the results from the analyses with mood/motivation scores as the dependent variable in the top section of the table and vegetative scores as the dependent variable in the bottom section of the table. As with the Poisson analysis, scores from Weeks 1, 4, and 8 were included in the Curve estimation procedures, however instead of raw scores used for the Poisson analysis, mean item scores were used in the Curve estimation analysis. This is because Curve estimation can accommodate non-integer values.

Table 5

*Results from Curve Estimate Analyses on Mood/Motivation Symptoms and Vegetative Symptoms for Weeks 1, 4, and 8*

|  | $B$ | $SE_B$ | $\beta$ | $t$ | $P$ |
| --- | --- | --- | --- | --- | --- |
| Mood/Motivation Symptoms |  |  |  |  |  |
| Constant | .50 | .08 |  | 6.13 | <.001 |
| Linear | -.05 | .01 | -.36 | -3.23 | .002 |
| Quadratic | -.01 | .01 | -.09 | -.85 | .400 |
| Vegetative Symptoms |  |  |  |  |  |
| Constant | .81 | .11 |  | 7.51 | <.001 |
| Linear | -.05 | .02 | -.29 | -2.63 | .011 |

| | | | | | |
|---|---|---|---|---|---|
| Quadratic | -.02 | .01 | -.20 | -1.83 | .072 |

*Note.* For mood/motivation symptoms, $R^2$ for linear term = .13, $F(1, 70)$ = 10.60, $p$ = .002; increase in $R^2$ with the addition of the quadratic term = .01; overall $R^2$ for complete model = .14, $F(2, 69)$ = 5.64, $p$ = .005. For vegetative symptoms, $R^2$ for linear term = .09, $F(1, 70)$ = 6.90, $p$ = .011; increase in $R^2$ with the addition of the quadratic term = .04; overall $R^2$ for complete model = .13, $F(2, 69)$ = 5.24, $p$ = .008.

Table 6

For mood/motivation symptoms, the $R^2$ for linear term was .13, $F(1, 70)$ = 10.60, $p$ = .002. A quadratic term was added to test for the existence of a non-linear relationship between mood/motivation symptom improvement and time, given the possibility that mood/motivation (and vegetative symptoms) may fluctuate in response to the preventive treatment prior to improving. However, the addition of the quadratic term increased the $R^2$ to .14, F(2, 69), = 5.64, $p$ = .005, for an addition of only .01 in the $R^2$ value. The linear effect was statistically significant, $B$ = -.36, $p$ = .002, indicating that mood scores decreased by .36 points per week. The quadratic effect was not statistically significant, $B$ = -.09, $p$ = .400, indicating that the linear term was sufficient in explaining the decrease in mood/motivation scores. Hence the pattern of mood symptom improvement over 8 weeks was found to decrease at a steady pace.

In the analysis of vegetative symptoms, shown in the second part of Table 7, the linear term $R^2$ was .09, $F(1, 70)$ = 6.90, $p$ = .011, indicating that the linear effect explained 9% of the variance in vegetative symptom scores. Again, a quadratic term was added to test for non-linearity in the relationship between vegetative symptom improvements over time. When the quadratic term was added, the $R^2$ increased to .13, $F(2, 69)$ = 5.24, $p$ = .008, for an increase of .04. However, while the linear term was statistically significant, $B$ = -.29, $p$ = .011, the quadratic term was not, $B$ = -.20, $p$ = .072. This indicated that the linear term was sufficient in explaining

changes in vegetative symptom scores, with a decrease of .29 points per week, pointing to a stable decrease of vegetative symptoms over time.

Since a determination of overall significance of mood/motivation and vegetative symptoms, and a linear relationship of the two clusters over time was found through the Poisson regression and Curve Estimation procedure, we wanted to examine differences in symptom improvement between mood/motivation and vegetative scores using graphical analysis.

Mood/ motivation scores were plotted with vegetative scores in a line graph. The graph compared changes in mood/motivation scores with changes in vegetative scores to determine if there is a trend toward one or the other type of depressive symptom showing improvement first. In addition to examining the weekly scores in various sections of this chapter, each pair of weeks was combined into what will be referred to as "Time" scores for other analyses. Weeks 1 and 2 scores were combined into Time 1, Weeks 3 and 4 scores were combined into Time 2 and so on. As discussed earlier, the conversion of weekly data into biweekly data was done by combining each pair of weeks to increase the data available for various analyses. Table 6 shows the mean scores for mood/motivation symptoms and vegetative symptoms for these four time points, and Figure 1 shows a line graph of these means.

Referring to the data in Table 6, the decrease from Time 1 to Time 2 for mood/ motivation symptoms averaged .10, while the decrease for vegetative symptoms for this time period was only .02, indicating that mood/motivation symptoms decreased more rapidly than vegetative symptoms. The decrease from Time 2 to Time 3 was slightly larger for vegetative symptoms than for mood/motivation symptoms, with an average decrease of .04 for mood/motivation symptoms and .09 for vegetative symptoms. From Time 3 to Time 4, the average decrease for mood/motivation symptoms was .10 compared to an average decrease of

.20 for vegetative symptoms.  Overall, vegetative symptoms had an average decrease of .31

compared to an average decrease of .24 for mood/motivation symptoms, but the

mood/motivation decreases appear to have started earlier than the change in vegetative

symptoms.

Table 6

Descriptive Statistics for Mood and Motivation and Vegetative Symptoms as a Function of Time

Point

| Time Point | Mood and Motivation | | Vegetative | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| Time 1 | .55 | .32 | .74 | .48 |
| Time 2 | .45 | .34 | .72 | .51 |
| Time 3 | .41 | .39 | .63 | .45 |
| Time 4 | .31 | .31 | .43 | .40 |
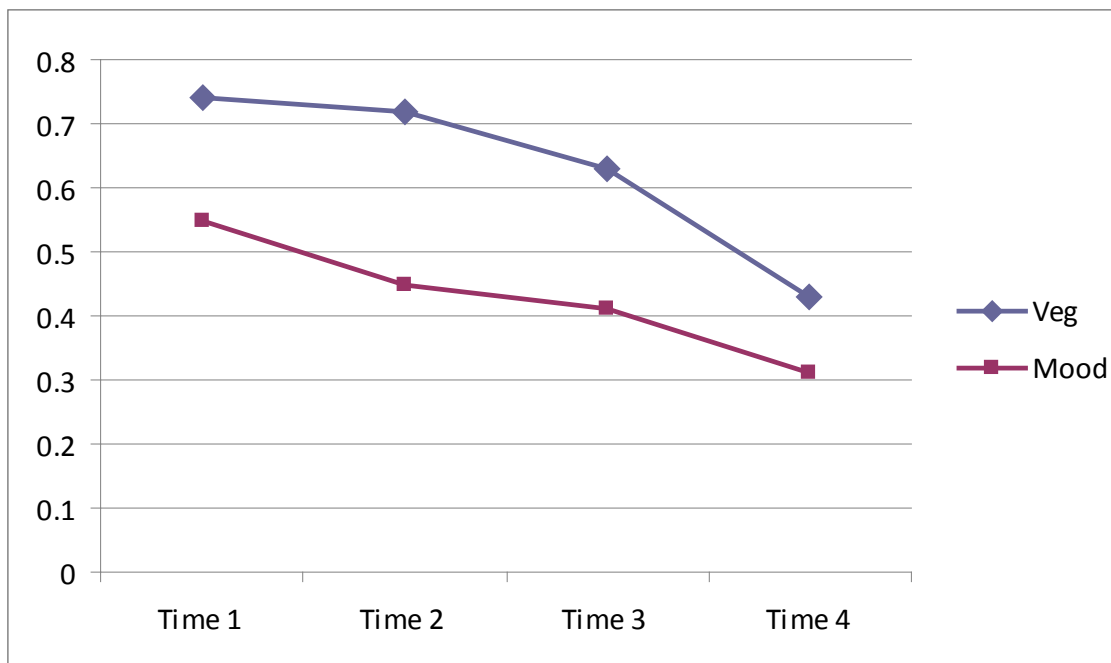
*Figure 1.* Mood/motivation and vegetative symptoms as a function of time point.

Since differences in the rate of improvement within the mood/motivation and vegetative clusters were observed in the graphical analysis at different time points, the first hypothesis of this study also included an examination of changes separately for mood/motivation symptoms and for vegetative symptoms. Paired samples *t* tests were considered appropriate for comparing successive mood/motivation scores and successive vegetative scores to look for *within* cluster differences given the small sample size of the current study. For Time 1 to Time 2 changes in mood/motivation scores, the difference was statistically significant, $t(26) = 2.45$, $p = .021$, but changes for the same time period for vegetative symptoms scores were not statistically significant, $t(26) = 1.90$, $p = .068$. This indicated that mood/motivation scores decreased immediately, while vegetative symptoms scores did not decrease significantly across the first time period.

The change from Time 2 to Time 3 for mood/motivation scores was not statistically significant, $t(26) = 1.20$, $p = .242$, and the same was true for change for vegetative scores, $t(26) = .68$, $p = .500$. This indicated that neither mood/motivation scores nor vegetative scores decreased significantly during the middle time period. The Time 3 to Time 4 change for mood/motivation scores was not statistically significant, $t(27) = 1.52$, $p = .141$, but change over this same time period for vegetative symptom scores did reach a level of statistical significance, $t(27) = 2.88$, $p = .008$. Thus, vegetative symptoms scores decreased significantly over the final time period whereas mood/ motivation scores did not. Finally, the comparison of Time 1 to Time 4 mood/motivation scores was statistically significant, $t(25) = 3.60$, $p = .001$, as was the Time 1 to Time 4 change for vegetative symptom scores, $t(25) = 4.42$, $p < .001$. Thus, for both mood/ motivation scores and for vegetative scores, the decrease from the initial time point to the final time point was statistically significant.

The fifth method for examining the first hypothesis of this study was to conduct *t* tests in order to look more closely at *between* cluster differences at Time 2-Time 1, Time 3-Time 2, Time 4-Time 3 and Time 4-Time 1 for mood and vegetative symptoms. Difference scores were computed representing the Time 1 to Time 2 difference, the Time 2 to Time 3 difference, the Time 3 to Time 4 difference, and the Time 1 to Time 4 difference. The paired samples *t* test comparing the Time 1 to Time 2 difference for the two types of symptoms was not statistically significant, $t(26) = .32$, $p = .752$, indicating that the decrease in score from Time 1 to Time 2 was not different for mood/motivation symptoms versus vegetative symptoms. Similarly, there was no difference between the change in scores between mood/motivation symptoms and vegetative symptoms for Time 2 to Time 3, $t(26) = .22$, $p = .826$, or Time 1 to Time 4, $t(25) = -1.10$, $p =$

.282. However, mood/motivation scores were significantly lower than the vegetative scores for Time 3 to Time 4, *(M* = .05*, SD* = .25), *t*(24) = -2.52, *p* = .019.

The final set of analyses for the first hypothesis consisted of a repeated-measures ANOVA to examine within-cluster differences across the four time points separately for mood/motivation symptoms and for vegetative symptoms. The repeated -measures ANOVA was possibly the most appropriate test to conduct the analysis of hypothesis 1; however there was also the possibility of finding non-significant results due to our small sample size. Hence, after the paired sample t-tests revealed significant differences between the rate of decrease of mood/motivation and vegetative symptoms, we wanted to test the robustness of our conclusions using a more statistically stringent test such as the repeated-measures ANOVA. The test revealed that for mood symptoms, the overall change from Time 1 to Time 2, to Time 3, and to Time 4 was statistically significant, $F(3, 66) = 7.77$, $p < .001$. This indicated that mood/motivation scores across the four time points were significantly different.

In order to determine which time points differed from which others, planned contrasts were performed comparing each time point to the next. The results from the contrast tests indicated that Time 2 mood/motivation scores (*M* = .44, *SD* = .35) were significantly lower than Time 1 scores (*M* = .57, *SD* = .32), $F(1, 22) = 5.09$, $p = .034$. Similarly, Time 3 scores (*M* = .36, *SD* = .37) were significantly lower than Time 2 scores, $F(1, 22) = 6.21$, $p = .021$, and Time 4 scores (*M* = .29, SD = 29) were significantly lower than Time 3 scores, $F(1, 22) = 12.37$, $p = .002$. The means for the repeated-measures analysis differ somewhat from the means presented above in Table 6 because only participants with all scores at all four time points were included in the repeated-measures ANOVA analysis.

In terms of the analysis performed on vegetative scores, the overall change across Time 1, Time 2, Time 3, and Time 4 was statistically significant, $F(3, 66) = 6.68$, $p = .001$, indicating that scores across the four time points differed. Follow up contrasts indicated that for vegetative symptoms, the scores for Time 2 ($M = .65$, $SD = .49$) did not differ from the scores from Time 1 ($M = 77$, $SD = .50$), $F(1, 22) = 2.94$, $p = .101$. Similarly, the scores from Time 3 ($M = .63$, $SD = .48$) did not differ from the scores from Time 2, $F(1, 22) = 1.26$, $p = .274$. However, scores from Time 4 ($M = .44$, $SD = .44$) were found to be significantly lower than scores from Time 3, $F(1, 22) = 16.17$, $p = .001$. The results from this analysis of vegetative scores indicated that statistically significant change did not occur until the Time 3 to Time 4 period.

The finding for vegetative scores from the repeated-measures ANOVA may appear somewhat contradictory to the results from the Poisson regression, in that the ANOVA shows a significant decrease for vegetative symptoms only at Time 4, whereas the Poisson results indicate that the average reduction in vegetative symptoms over eight weeks as significant. However, it is important to note that the Poisson procedure (unlike the ANOVA) does not test each individual time point for statistical significance; rather the overall change is tested. Thus, the repeated-measures ANOVA indicated that there was no change in vegetative symptoms scores until the fourth time point, and the Poisson procedure demonstrated that the average weekly change, overall, was statistically significant. Hence these two tests do not have comparable conclusions.

One of the prominent depression outcome criteria is *response* and its operationalization as a 50% reduction in depressive symptomatology score continues to be widely used as an outcome measure in both psychotherapy and antidepressant medication treatment trials (e.g., Bech et al., 2000; Klier, Muzik, Rosenbaum, & Lenz, 2001; Lesperance et al., 2007; Schramm et

al., 2007; Zarate et al., 2006). Similar to the analysis conducted by Worthington et al. (1995), where participants were identified as having a full response (defined as having a greater than or equal to 75% improvement from baseline score during the first four weeks of treatment and maintained until the end), early partial improvement (defined as greater than or equal to 50% improvement from baseline score occurring during the first four weeks of treatment), and late complete improvement (defined as greater than or equal to 75% improvement from baseline score occurring during the last four weeks of treatment), a supplemental set of analyses was performed to examine early and late responders to treatment in this study using a 50% improvement threshold.

Categories of improvement created and analyzed in this study were defined as *early sustained change, early unsustained change*, *late change* and *no change*. A participant classified in the early sustained change category was a participant who showed a 50% reduction in symptoms by Week 4 and at Week 8. A participant classified in the early unsustained change category was a participant who showed improvement at Week 4 but not at Week 8. A participant classified in the late change category was a participant who showed a 50% reduction in symptoms by Week 8. A participant classified in the no change category was a participant who showed less than 50 % reduction in symptoms at Week 4 and at Week 8. In order to account for missing data, scores from Week 2 were imputed for missing data at Week 1. Similarly, scores were imputed from Weeks 3 and 7 for those subjects missing data at Weeks 4 and 8, respectively. The imputation of scores was necessary to determine percent reductions in the current classification analysis, but was not necessary and therefore not performed for the other analyses in this study.

Table 7 shows the percentage of participants falling into each of the categories defined above in terms of their mood/motivation symptoms. With reference to Table 7, one-quarter of the participants (25.0%) experienced early change (by Week 4) that was sustained through Week 8. Nearly one-third of the participants (31.3%) experienced late change by Week 8 but not early change by Week 4, and this was the largest group of participants. An additional 6.3% of the participants experienced early change by Week 4 that was not sustained through Week 8, while 12.5% of the participants experienced no change at either Week 4 or Week 8. The remaining participants did not have data at all three time points. This included 6.3% of the participants who did not have Week 8 data and had not improved by Week 4, 3.1% of the participants who had no Week 4 data but had improved by Week 8, and 3.1% of the participants who had no Week 4 data and had not improved by Week 8. The remaining 12.5% of the participants had insufficient data for this analysis.

Table 7

Analysis of Categories of Improvement of Mood/Motivation Symptoms

| Group | Frequency | Percentage |
| --- | --- | --- |
| Early sustained change | 8 | 25.0 |
| Early unsustained change | 2 | 6.3 |
| Late change | 10 | 31.3 |
| No change | 4 | 12.5 |
| No data at midpoint, late change | 1 | 3.1 |
| No data at midpoint, no late change | 1 | 3.1 |

| Group | Frequency | Percentage |
|---|---|---|
| No change at midpoint, no data at end | 2 | 6.3 |
| Missing data | 4 | 12.5 |

Table 8 shows the percentage of participants falling into each of the categories defined above in terms of their vegetative symptoms. In this group, 15.6% of the participants experienced early change (by Week 4) that was sustained through Week 8. Similar to participants in the mood/motivation improvement category, 6.3% of the participants experienced early change in vegetative symptoms by Week 4 that was not sustained through Week 8. The two largest groups in this category were the participants who experienced late change by Week 8 but not early change by Week 4 (25.0%), and the no change group (25.0%) who experienced no change at either Week 4 or Week 8. The remaining participants did not have data at all three time points. This included 6.3% of the participants who did not have Week 4 data and had not improved by Week 8, 3.1% of the participants who had improved by Week 4 but who had no Week 8 data, and 3.1% of the participants who had not improved by Week 4 data and had no data for Week 8. The remaining 15.6 % of the participants had insufficient data for this analysis.

Table 8

Analysis of Categories of Improvement of Vegetative Symptoms

| Group | Frequency | Percentage |
|---|---|---|
| Early sustained change | 5 | 15.6 |
| Early unsustained change | 2 | 6.3 |
| Late change | 8 | 25.0 |
| No change | 8 | 25.0 |
| No change at midpoint, no data at end | 1 | 3.1 |
| No data at midpoint, no late change | 2 | 6.3 |
| Change at midpoint, no data at end | 1 | 3.1 |
| Missing data | 5 | 15.6 |

Hypothesis 2

Hypothesis 2 of this study was that controlling for baseline severity of symptoms, adolescents who show improvements in mood/motivation symptoms would also show improvements in vegetative symptoms, as measured by the depression symptom checklist. The rationale for this hypothesis was that given the participants in the study were experiencing subthreshold depressive symptoms; there would not be much difference in terms of those participants who improved on mood symptoms and the participants who improved on vegetative symptoms. More simply, we believed that due to a restricted range in the scores of the

participants of our study, we would not find significant variance in subjects' improvement pattern on the two clusters.

In order to test this hypothesis, the difference between the Time 4 scores (the average of Week 7 and Week 8 data) and the Time 1 scores (the average of Week 1 and Week 2 data) were computed for each subject for the mood/motivation score and the vegetative score. Then, the partial correlation between changes in mood/motivation scores and changes in vegetative scores were computed. Both bivariate (Pearson) correlations and partial correlations (controlling for baseline depression scores on both the mood/motivation scale and the vegetative scale) were computed. Table 9 shows descriptive statistics for the four variables involved in testing this hypothesis.

Table 9

*Descriptive Statistics for Scores for Partial Correlation Analysis*

|  | Minimum | Maximum | *M* | *SD* |
| --- | --- | --- | --- | --- |
| Mood/Motivation Time 1 | .00 | 1.33 | .55 | .32 |
| Vegetative Time 1 | .10 | 1.80 | .74 | .48 |
| Mood/Motivation Change | -1.08 | .67 | -.25 | .35 |
| Vegetative Change | -1.00 | .20 | -.33 | .38 |

The Pearson correlation between changes in mood/motivation scores and changes in vegetative scores was found to be significant, $r = .48$, $p = .013$. This indicated that changes in mood/ motivation scores were positively correlated with changes in vegetative scores. However,

the partial correlation between changes in mood/ motivation scores and changes in vegetative scores controlling for Time 1 scores on both scales was not statistically significant, $r = .37$, $p = .108$. This indicated that changes in mood/motivation scores were not significantly correlated with changes in vegetative scores when controlling for baseline levels of mood/motivation scores and vegetative scores. Put another way, these results indicate that there is a difference in the association of mood symptom improvement and vegetative symptom improvement across different levels of depression.

Exploratory Analyses

Given that this dissertation attempted to shed light on a process not previously examined, specifically with regards to adolescent symptom improvement, we wanted to conduct other analyses in addition to the hypotheses presented above. We believed that these analyses would further our understanding of the relationship of moderator variables such as gender and treatment condition, but also reveal important information regarding the relationship between mood/motivation, vegetative and total depression symptoms at baseline and at the end of the treatment.

*Exploratory 1:* The first exploratory analysis was an examination of gender differences. Although the Young, Mufson, & Gallop (2010) had looked at pertinent differences between subjects (including gender), at baseline, sex of participants had not been examined as a moderator variable in the study.

Hence, a multivariate analysis of variance (MANOVA) was conducted including mood/motivation scores and vegetative scores from Times 1, 2, 3, and 4 as dependent variables. The independent variable was gender.

Overall, the effect of gender on the dependent variables was not statistically significant, $F(2, 20) = 2.28$, $p = .127$, indicating that males and females did not differ.  However, the main effect for time was statistically significant, $F(6, 16) = 4.30$, $p = .009$.  This indicated that scores from Time 1, Time 2, Time 3, and Time 4 were not equivalent, as demonstrated in prior analyses.  The interaction between gender and time was not statistically significant, $F(6, 16) = .509$, $p = .793$.  This indicated that the effect of time was the same for males and females.  Due to the fact that gender was not statistically significant in prior analyses, follow-up tests were not performed.

*Exploratory 2:* A second set of exploratory analyses was conducted comparing conditions.  This analysis was felt necessary as the Young, Mufson, & Gallop (2010) had found significant differences between the AST (without parental involvement) and ENH (with parental involvement) conditions, with the ENH condition reporting lower post-intervention depression scores than the AST group. However, as mentioned in the results section, due to randomization issues, no significant conclusions could be drawn from these findings.

A MANOVA was performed with mood/motivation scores at Times 1, 2, 3, and 4 and vegetative scores at Times 1, 2, 3, and 4 as the dependent variables.  The independent variable was condition: AST versus ENH.  The main effect for condition was found to be statistically significant, $F(2, 20) = 4.41$, $p = .026$ indicating that participants in the two conditions AST and ENH differed significantly in terms of their improvement on the mood/motivation and vegetative clusters.  Follow up univariate tests using a Bonferroni correction indicated that the effect of condition was statistically significant for mood/motivation symptoms, $F(1, 21) = 5.60$, $p = .028$, but was not statistically significant for vegetative symptoms, $F(1, 21) = .13$, $p = .726$. This meant that differences between the two conditions existed for mood/motivation symptoms but

not for vegetative symptoms.   The mood/ motivation symptom means of the AST group were

larger, averaging .51 (*SD* = .05) across times, while the ENH group averaged .24 (*SD* = .06)

across times showing that the ENH group fared better in terms of their mood/motivation

symptoms.  For vegetative symptoms, no differences emerged and the two means were not

statistically different: *M* = .60 (*SD* = .08) for the AST group and *M* = .67 (*SD* = .11) for the

ENH group.

The main effect for time was statistically significant, *F*(6, 16) = 5.36, *p* = .003 showing

that there were significant differences between mood/motivation symptom improvement and

vegetative symptom improvement regardless of condition. Follow up tests were performed using

a Bonferroni adjustment to compare each pair of times separately for mood/motivation

symptoms and for vegetative symptoms.

For mood/motivation symptoms, Time 1 scores (*M* = .56, *SD* = .05) were significantly

higher than Time 2 scores (*M* = .39, *SD* = .05), *p* = .047, Time 3 scores (*M* = .31, *SD* = .05), *p* =

.009, and Time 4 scores (*M* = .25, *SD* = .04), *p* = .001.  The other pairs of consecutive time

points (e.g., Time 2 versus Time 3) did not differ in these analyses despite the fact that they

differed in the prior analyses due to the use of the conservative Bonferroni adjustment in the

follow up tests for the MANOVA.

For vegetative scores, Time 4 scores (*M* = .41, *SD* = .07) were significantly lower than

Time 1 scores (*M* = .79, *SD* = .08), *p* = .001, Time 2 scores (*M* = .69, *SD* = .07), *p* = .014, and

from Time 3 scores (*M* = .64, *SD* = .08), *p* = .017.  Thus it can be concluded from these results

that for mood/motivation symptoms, the earliest time point differed from all later time points,

indicating early improvement, whereas for vegetative symptoms, the last time point differed from all earlier time points, indicating late improvement.

The interaction between condition and time was not statistically significant, $F(6, 16) = 1.16$, $p = .373$, indicating that the effect of time was the same for the two conditions. Participants in the two conditions do not change differentially over time.

*Exploratory 3:* Another exploratory aim of the study was to examine the category of participants who showed no improvement on the two clusters through the eight time points. The reason for conducting this analysis was to see what pattern would emerge for these participants who possibly did not benefit from the IPT-AST preventive treatment. Those subjects whose final (week 8) score of mood motivation, and vegetative symptoms were no lower than their initial (week 1) score on mood/motivation, and vegetative symptoms were identified and their scores across the eight time points were plotted separately on a line graph.

Since data from all 8 weeks were included in the analysis, imputations were used to work with any missing data, where if a subject was missing a score at week 1, their score from week 2 was substituted. Similarly, if their score at week 8 was missing, then their score at week 7 was imputed. For subjects who may have missing data at both weeks, Maximum Likelihood Estimation was used to provide estimates that would most likely have resulted in the data that was missing. Figure 2 shows the scores of participants who had no improvement on mood/motivation symptoms and Figure 3 indicates the scores of participants who had no improvement on vegetative symptoms.
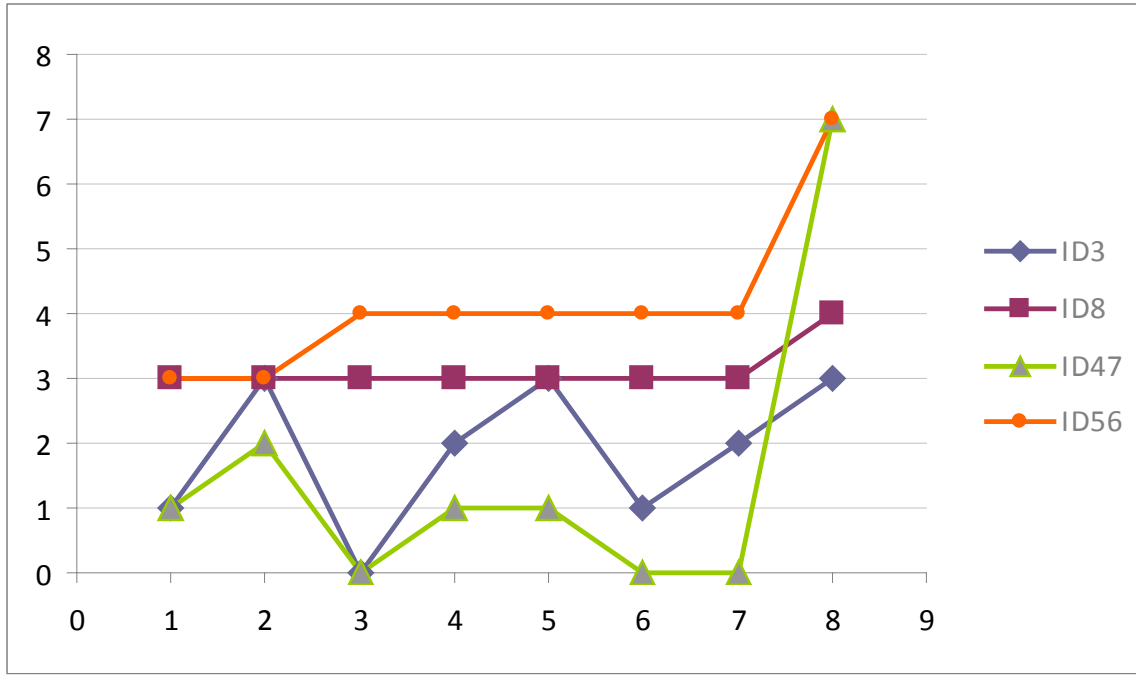
*Figure 2.* No improvement scores on Mood/ motivation symptoms as a function of weeks.

The graph in Figure 2 demonstrates that four participants were classified as having not improved on the basis of the difference between their week 8 and week 1 mood/motivation scores. Of these four participants, at least two subjects can be identified as having a more dramatic increase in the mood/motivation symptoms closer at week 8. Hence it appears that IPT-AST preventive treatment may not benefit all adolescents with sub-threshold depression in terms of their mood/motivation symptoms.
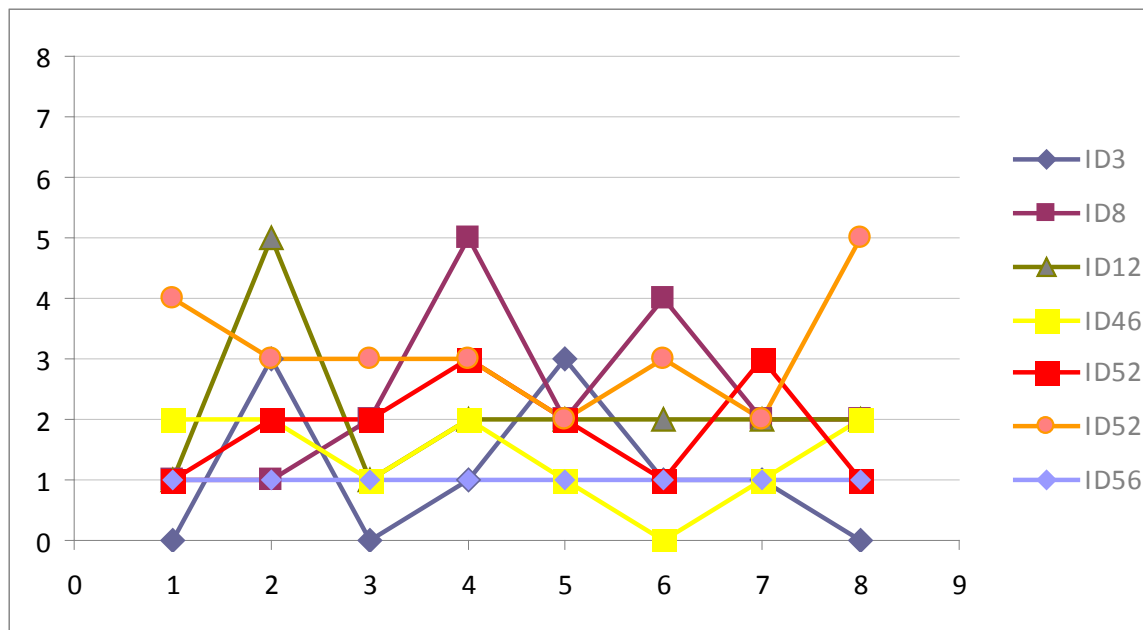
*Figure 3.* No improvement scores on Vegetative symptoms as a function of weeks.

The graphs in Figure 3 demonstrate that seven participants were classified as having not improved on the basis of the difference between their week 8 and week 1 vegetative scores. In comparison to the subjects who did not improve on their mood/motivation symptoms, more participants did not improve in terms of their vegetative symptoms. Three participants identified as having not improved on this graph were also observed to not improve on the previous graph demonstrating that some subjects did not improve on both categories. The results from these two figures also indicate that subjects whose mood/motivation symptoms did not improve, may also not improve on their vegetative symptoms, but subjects who don't improve on vegetative symptoms may experience an improvement in their mood/motivation symptoms.

*Exploratory 4:* An additional supplemental analysis was performed to determine if there was a relationship between improvements in vegetative or mood symptoms and improvement in overall depression symptoms, over time as measured by the depression symptom checklist. In

order to test these relationships, correlations were computed between improvement in overall

depression scores (Time 4 scores – Time 1 scores) and improvement in mood/motivation scores

(Time 4 scores – Time 1 scores) and improvement in vegetative scores (Time 4 scores – Time 1

scores).

Table 10 shows these correlations. Changes in mood/motivation scores were positively

correlated with changes in vegetative scores, $r = .47$, $p = .013$. Changes in mood/motivation

scores were highly, positively correlated with total depression changes, $r = .87$, $p < .001$, and

changes in vegetative scores were also positively correlated with total depression changes, $r =$

$.84$, $p < .001$. Hence, over the four time points, subjects who improved on mood symptoms also

improved on vegetative symptoms and total depression symptoms. Conversely, subjects who

improved on vegetative symptoms also improved on mood symptoms and total depression

symptoms. Therefore, improvements in all forms of depressive symptoms were positively

correlated with changes in other forms of depressive symptoms as well.

Table 10

*Correlations Among Mood/Motivation, Vegetative, and Total Change Scores*

|  | Mood/ Motivation Change | Vegetative Change | Total Depression Change |
| --- | --- | --- | --- |
| Mood/motivation Change | 1.00 |  |  |
| Vegetative Change | .47* | 1.00 |  |
| Total Depression Change | .87** | .84** | 1.00 |

*p<.05. **p<.001

*Exploratory 5:* We were also interested in examining the correlations between changes in scores for mood/motivation, vegetative and total depression symptoms at Time 1, to determine whether or not people who have elevated scores on mood/motivation at baseline are the same as those who have elevated scores on vegetative symptoms at baseline. Table 11 shows the correlations among Time 1 scores on the three scales. Results indicated that mood/motivation scores were positively correlated with vegetative scores at Time 1 ($r = .43$, $p = .020$), and positively correlated with total depression scores at Time 1 ($r = .81$, $p < .001$). In addition vegetative scores were positively correlated with total depression scores at Time 1 ($r = .88$, $p < .001$). This indicates that those subjects who had high mood symptoms at baseline also tended to have high vegetative symptoms at baseline and conversely, those subjects who had low mood symptoms at baseline also tended to have low vegetative symptoms at baseline.

Table 11

*Correlations Among Mood/ Motivation, Vegetative, and Total Scores at Time 1*

|  | Mood/motivation | Vegetative | Total Depression |
| --- | --- | --- | --- |
| Mood/Motivation | 1.00 |  |  |
| Vegetative | .43* | 1.00 |  |
| Total Depression | .81** | .88* | 1.00 |

 *p<.05. **p<.001

*Exploratory 6:* It was also of interest to determine if baseline (Time 1) total depression scores were related to mood/motivation scores and vegetative scores at later time points (Times 2, 3, and 4). Results shown in Table 12 were indicative that baseline total depression scores were positively correlated with Time 2, 3, and 4 vegetative scores, but not significantly related to Time 2, 3, or 4 mood and motivation scores. These results convey that the more depressed a subject was at baseline was strongly related to how many vegetative symptoms they had later on but not to how many mood/motivation symptoms they had later on. Put another way, subjects who had higher total depression symptoms in the beginning tended to have greater vegetative symptoms later on but not greater mood/motivation symptoms.

Table 12

*Correlations Among Baseline Total Depression Scores and Mood/motivation and Vegetative Scores at Times 2, 3, and 4*

|  | Total Depression |
| --- | --- |
| Mood/ Motivation |  |
| Time 2 | .34 |
| Time 3 | .27 |
| Time 4 | .23 |
| Vegetative |  |
| Time 2 | .73* |
| Time 3 | .61* |

Time 4                                    .61*

*p<.001*

     *Exploratory 7:* An additional set of analyses were performed to determine if participants who had the most elevated levels of total depression at baseline also had elevated mood/motivation and vegetative depression scores at baseline.  In order to categorize participants as elevated or non-elevated, median splits were performed on total depression scores, mood/motivation scores, and vegetative scores at Time 1. The median score for mood/motivation symptoms was determined to be .42, the median score for vegetative symptoms was determined to be .70 and the median score for total depression symptoms was determined to be .55. Table 13 shows the crosstabulations of total depression group with group membership on the mood/motivation and vegetative scores.  Of the participants with elevated total depression scores, 63.6% also had elevated mood/motivation scores, while only 38.9% of those without elevated total depression scores had elevated mood/motivation scores, however the relationship between elevations on total depression and mood/motivation was not statistically significant, $\chi^2(1) = 1.68$, p = .196.  Of the participants with elevated total depression scores, 100.0% also had elevated vegetative scores, while only 22.2% of those without elevated total depression scores had elevated vegetative scores.  This relationship was found to be statistically significant, $\chi^2(1) = 16.54$, p < .001.  Hence it can be concluded that elevations in total depression are related to elevations in vegetative symptoms but not to elevations in mood/motivation symptoms. These results reveal that of subjects who were worst in the beginning (or had the highest total

depression scores in the beginning) had greater vegetative symptoms than mood symptoms at baseline.

Table 13

*Crosstabulation Between Elevations in Total Depression with Elevations in Mood/Motivation and Vegetative Scores at Time 1*

|  | Total Depression | | |
|---|---|---|---|
|  | Not Elevated | Elevated | Total Sample |
| Mood/Motivation |  |  |  |
| Not Elevated | 11 (61.1%) | 4 (36.4%) | 15 (51.7%) |
| Elevated | 7 (38.9%) | 7 (63.6%) | 14 (48.3%) |
| Vegetative |  |  |  |
| Not Elevated | 14 (77.8%) | 0 (0.0%) | 14 (48.3%) |
| Elevated | 4 (22.2%) | 11 (100.0%) | 15 (51.7%) |
| Total Sample | 18 (100.0%) | 11 (100.0%) | 29 (100.0%) |

*Exploratory 8:* The final set of exploratory analyses was conducted to determine if baseline scores on mood/motivation symptoms or vegetative symptoms were related to end-point total depression scores. Like the previous exploratory analysis, a median split was performed for mood/motivation symptom scores and for vegetative symptoms scores at baseline (Time 1) to categorize participants as either low baseline or high baseline on each of the two scales. Then, a

two-factor ANOVA was conducted as we had two independent variables with two levels: mood/motivation (high or low) baseline group and vegetative (high or low) baseline group. Total depression scores at Time 4 was entered as the dependent variable.

Table 14

*Average Time 4 Total Depression Scores as a Function of Level of baseline Mood/motivation and Vegetative Scores*

|  | Low Baseline Mood/ Motivation Symptoms (*n* = 13) | | High Baseline Mood/ Motivation Symptoms (*n* = 13) | |
| --- | --- | --- | --- | --- |
|  | *M* | *SD* | *M* | *SD* |
| Low Baseline Vegetative Symptoms (*n* = 13) | .27 | .11 | .41 | .21 |
| High Baseline Vegetative Symptoms (*n* = 13) | .26 | .13 | .56 | .48 |

Table 14 shows the mean Time 4 total depression scores as a function of group membership on the baseline mood/motivation and vegetative groups. The main effect for baseline mood/motivation group was not statistically significant, $F(1, 22) = 3.91$, $p = .061$, and the main effect for baseline vegetative group was not statistically significant, $F(1, 22) = .37$, $p = .550$. In addition, the interaction between baseline mood/motivation group and baseline vegetative group was also not statistically significant, $F(1, 22) = .55$, $p = .465$. Thus, baseline mood/motivation group and baseline vegetative group were not significantly related to total

depression scores in the final period of data collection, which indicates that clinical presentation of a subject did not determine what happened to them at the end of the preventive treatment.

### Summary of Findings

The first hypothesis of this study was that improvements in mood/motivation will precede improvements in vegetative symptoms. This hypothesis was supported by several of the findings from this study. First, the graphical analysis showed that the initial decrease in mood/motivation scores was larger (averaging .10 points) than the initial decrease in vegetative symptom scores (averaging .02 points). While the overall decrease in symptom scores across the duration of the study was similar for the two types of depressive symptoms, the graphical analysis indicated that mood/motivation symptoms decreased more quickly, with most of the decrease in vegetative symptoms occurring near the end of the 8 week period of this study.

The second source of support for the first hypothesis of this study came from the paired samples *t* tests were performed comparing successive mood/motivation scores and successive vegetative scores separately. The Time 1 to Time 2 decrease in mood/motivation scores was statistically significant, while the Time 1 to Time 2 decrease in vegetative scores was not. This indicated that mood/motivation scores decreased immediately, while vegetative symptoms scores did not. From this analysis, the change in both mood/motivation scores and vegetative scores during the middle time period was not statistically significant, but vegetative scores decreased significantly through the final time period while mood/motivation scores did not. Again, these analyses indicated that mood/motivation scores decreased during the initial time period while vegetative scores decreased during the final time period.

Third, the repeated-measures ANOVA analysis indicated that mood/motivation scores decreased significantly from Time 1 to Time 2, while vegetative scores did not. For vegetative symptoms, the statistically significant decrease in scores did not occur until the Time 3 to Time 4 period. In addition, while not a planned procedure for testing the first hypothesis of this study, the MANOVA performed to compare treatment conditions indicated that for mood/motivation symptoms, the earliest time point differed from all later time points, indicating early improvement, whereas for vegetative symptoms, the last time point differed from all earlier time points, indicating late improvement. It should be noted that despite these sources of support for the first hypothesis of this study, the comparisons between mood/motivation scores and vegetative scores at each time point, the Poisson regression analysis, and the curve estimate procedures did not provide support for the first hypothesis of this study.

The second hypothesis of this study was that controlling for baseline severity of symptoms, adolescents who show improvements in mood/motivation symptoms would also show improvements in vegetative symptoms. While the Pearson (bivariate) correlation between improvements in mood/motivation symptoms and improvements in vegetative symptoms was statistically significant, the partial correlation was not statistically significant. This indicated that changes in mood/motivation scores were not significantly correlated with changes in vegetative scores when controlling for baseline levels of mood/motivation scores and vegetative scores, and therefore the second hypothesis of this study was not supported.

In addition to the planned hypothesis tests, supplemental and exploratory analyses were performed. These analyses produced the following findings:

1. For mood/motivation symptom improvement, the two largest groups of participants were those that experienced late change (31.3%) or early and sustained change (25.0%),

indicating the efficacy of the treatments due to the fact that most of the participants experienced a 50% reduction in mood/motivation symptoms at some point during the study. For vegetative symptom improvement, a large group of participants experienced late change (25.0%) indicating that vegetative symptoms respond closer towards the end of treatment.

2. Males and females did not differ in their levels of symptoms or improvement throughout the 8 weeks of the study.

3. Participants in the AST group tended to have more mood/motivation symptoms than those in the ENH group, but the two groups did not differ in terms of vegetative symptoms, and there was no difference in changes in symptom scores (for either mood/motivation or vegetative symptoms) for the two conditions.

4. An analysis of the relationship between reduction in vegetative or mood/motivation symptoms and improvement in overall depressive symptoms indicated that changes in mood/motivation scores were positively correlated with changes in vegetative scores, that changes in mood/motivation scores were positively correlated with total depression changes, and that changes in vegetative scores were positively correlated with total depression changes.

5. Participants with high baseline scores on the mood/motivation scale also tended to have high baseline scores on the vegetative scale, and vice versa.

6. Baseline total depression scores were related to subsequent scores on the vegetative scale but not on the mood/motivation scale.

7. Participants who had the most elevated baseline levels of total depression also tended to have elevated baseline vegetative scores but did not tend to have elevated baseline mood/motivation scores.

8. Baseline mood/motivation group and baseline vegetative group were not significantly related to total depression scores in the final period of data collection.

The next chapter presents a discussion of the results presented in this chapter in the context of past research.  In addition, the implications of these findings and recommendations for clinical practice and future research are presented.

Chapter IV

DISCUSSION

The primary aim of this study was to closely examine the responses of adolescents who completed the IPT-AST preventive treatment and look for any trends in their symptoms as they changed over the 8 weeks of treatment. It is believed that these trends would help the mental health community recognize symptom response to IPT-AST preventive treatment and be more aware of risks associated with symptom abatement following response to treatment. This study included an examination of two types of symptoms commonly found in depression: mood/motivation symptoms such as sadness, hopelessness and guilt, and neurovegetative or physical symptoms such as sleep, appetite, and energy levels. Based on the identification of knowledge gaps in the literature, two main research questions were developed.

First, in looking at differences in patterns of mood/ motivation, and vegetative symptoms within the IPT-AST condition, which symptoms would improve faster—mood or vegetative? Second, controlling for baseline severity of symptoms, would adolescents who show improvements in one category of symptoms (mood/motivation or vegetative) also show improvements in the other category of symptoms? The rationale for some of these research questions was presented earlier in the results section.

For the first research question, it was predicted that improvements in mood/motivation symptoms would precede improvements in vegetative symptoms. This hypothesis was confirmed by the analyses conducted to test for differences between the rates of improvement for the two clusters. Namely, the graphical analysis, paired sample *t*-tests which compared within cluster differences (successive mood/motivation scores and successive vegetative scores separately) as well as between cluster differences (differences between mood/motivation and

vegetative symptom scores at different time points), as well as the repeated-measures ANOVA demonstrated that mood/motivation symptoms of the adolescents tended to decline prior to the decline of their vegetative symptoms. The results of the Poisson regression analysis and the curve estimate procedures were not used to provide direct support for the first hypothesis of this study, instead they were used to comment specifically on the nature of overall improvement of symptoms in the two categories which was found in order to support further investigation.

Support for the first hypothesis also came from the MANOVA results that compared differences in symptom clusters (mood/motivation and vegetative) between the two conditions (AST and ENH). When pairs of time points were compared separately for mood/motivation and vegetative symptoms, Time 1 scores were found to be significantly higher than Time 2, Time 3 or Time 4 points. Since the earliest time point differed from subsequent time points, it can be concluded that mood/motivation symptoms experienced an earlier change than vegetative symptoms, for which Time 4 scores were significantly different from Time 1, Time 2 and Time 3 scores, indicating a later change.

These results confirming the findings of hypothesis 1 are consistent with other studies identified in the literature. Rush et al's., (1982) study which compared the effects of cognitive therapy and pharmacotherapy (imipramine hydrochloride) found that in response to cognitive therapy, symptoms of hopelessness, and mood symptoms improved prior to vegetative symptoms as well as our own pilot study which found that although non-significant, symptoms of mood/motivation tended to improve prior to vegetative symptoms, (Sinh et al.; unpublished).

The second research question of the study had sought to examine whether improvement in one category of symptoms (mood/motivation or vegetative) accompanied improvement in the other category of symptoms, across different levels of baseline depression. As mentioned earlier,

it was thought that due to the specific properties of our sample (small in size and exhibiting subthreshold symptoms), we would find associations in the improvement of symptoms in the two clusters when controlling for baseline levels of mood and vegetative symptoms. However, this hypothesis was not confirmed by the study and partial correlations between mood/motivation and vegetative symptom improvement across different levels of depression were found to be non-significant. Although these results did not support our hypothesis, it clarified that subjects with varying levels of depression at baseline, had differential improvement on their mood/motivation and vegetative symptoms over time. Clinically, it seemed reasonable for a distinction to exist between a person's improvement on mood/motivation and vegetative symptoms, based on their presentation at baseline. However, since none of the literature reviewed included any analyses of associations of improvement controlling for certain variables, these findings should be viewed somewhat tentatively.

*Exploratory Analysis Results*

In addition to the two main research questions of this dissertation, exploratory analyses were also carried out with the purpose of making more clarifications regarding the role of variables such as gender of the participants in terms of their improvement. This study seemed relevant, as prior research has demonstrated the presence of modest gender-based differences in the presentation of depression of adolescents (Bennett, Ambrosini, Kudes, Metz, & Rabinovitz, 2005). However, to our knowledge, gender-specific remittance of symptoms in adolescent boys and girls with subsyndromal depression has not been studied. The current study also found no differences in symptom improvement on mood/motivation and vegetative scores over time indicating that males and females did not differ significantly in terms of their improvement on mood/motivation and vegetative symptoms. One explanation for these results is that the current

study used the depression symptom checklist which is a self-report measure.  Perhaps if another measure had been incorporated to corroborate the self-report screen or symptoms had been tracked by a clinician or obtained from parents, teachers or care-givers, we may have obtained data more sensitive to gender differences in improvement as was found in the Bennett, Ambrosini, Kudes, Metz, and Rabinovitz (2005) study noted earlier.  Another possible reason is that since symptoms endorsed on the depression symptom checklist were subclinical to begin with, the trajectory for improvement in symptoms did not have sufficient room to allow for significant differences to emerge between boys and girls in our study.

The current study also explored the breakdown of mood/motivation symptoms and vegetative symptoms over time when the original IPT –AST vs. ENH treatment conditions were analyzed.  Although no differences were found between groups on vegetative symptoms, significant differences were found between the AST and ENH groups on mood/motivation symptoms. Specifically, the ENH group with parental involvement was found to outperform the AST group in terms of mood/motivation symptom improvement but not in terms of vegetative symptom improvement. Non-significant findings between conditions over time may have been due to the randomization issue of the two groups (noted earlier in Method section) which led them to being collapsed into one single IPT-AST group.  Given that the AST group had somewhat higher mean mood/motivation symptoms than the ENH group, it might be expected that some differences in the rate of mood/ motivation symptom changes between the two conditions may occur. It could be speculated that the rate of change of mood/motivation symptoms for the AST condition would be expected to be lower than the ENH group, although our results did not demonstrate this.  One explanation for the lack of difference in the rate of mood/motivation symptom change between the two conditions over time, may again be due to

low average mood/motivation symptoms in the ENH group (.25 across times), indicative of a floor effect where there was little room for the mood/motivation symptoms to improve.

Although prior studies reviewed had not conducted analyses of participants who did not respond to treatment, the current study investigated participants demonstrating no-improvement over the 8 weeks of treatment. The graphical analysis of the no-improvement group for both mood/motivation and vegetative symptoms did not reveal specific trends regarding individual adolescent trajectories. For mood/motivation symptoms, all four subjects included as having not improved began treatment with relatively few mood/motivation symptoms (three) which could again indicate that they did not have much room for improvement to begin with. However, at least two adolescents were noted to worsen significantly near the end of the data collection in Weeks 7 and 8 indicative of natural variability or the possibility that IPT-AST may not work for all adolescents.

For vegetative symptoms, more subjects were identified as having not improved (7 as opposed to 4 in the mood/motivation cluster) with a majority of subjects listing between 0 to 2 symptoms at Week 1. However, there were no specific trends with regards to their lack of improvement. It is also of note that only three subjects were common to both groups, indicating that approximately 90% of the participants improved according to the improvement criteria created for the purposes of this investigation. These result also shows that participants who don't improve on vegetative symptoms, may in fact improve in terms of their mood symptoms, however if mood symptoms do not demonstrate improvement, chances are that vegetative symptoms may not improve either.

*Relationship between baseline and end-point mood/motivation, vegetative, and total depression symptoms*

An exploration of the relationship between improvement in mood/motivation and vegetative symptoms and overall depression symptoms over time revealed that improvements in both mood/motivation and vegetative symptoms were associated with improvements in overall depressive symptoms.  Hence, mood improvements were related to total improvements, vegetative improvements were related to mood improvements, and both vegetative and mood improvements were related to total improvement. These results were in the expected direction since the formula used to compute overall depression was (mood/motivation + vegetative symptoms at week 1) - (mood/motivation + vegetative symptoms at week 8).  Therefore, it was to some extent a mathematical necessity that overall depression symptoms would be related to both mood/motivation symptom changes as well as vegetative symptom changes. These associations in improvement between symptoms in the two clusters  are consistent with results from Hypothesis 2, which also found the relationship between mood/motivation symptom change scores and vegetative symptom change scores to be significant (when not controlling for baseline mood/motivation and vegetative scores).

From a clinical standpoint, we were interested in knowing whether adolescents who presented with high mood/motivation symptoms at baseline also presented with high vegetative symptoms at baseline.  Results tended to support our research question and adolescents who had high mood symptoms at Time 1 also tended to have high vegetative symptoms at Time 1.  These results are consistent with an epidemiological survey which showed that for adolescents with MDD, the most prevalent symptoms include depressed mood as well as sleep disturbances, and weight/appetite disturbances (Roberts, Lewinsohn, & Seeley, 1995).  Although the sample in the

current study included participants with subclinical depressive symptoms and not symptoms severe enough to be in the range of MDD, it is interesting that similar trends were obtained in our study as were in the Roberts, Lewinsohn and Seeley (1995) paper mentioned above which included a sample of 1,710 adolescents (grades 9-12) from community high-schools. Additionally, given what is known about the risk of suicide being higher for patients who present with more affective symptoms than vegetative symptoms, or whose affective symptoms improve prior to their vegetative symptoms, these results may be protective of adolescents in terms of the risks associated with presenting with high affective and low vegetative symptoms.

We were also curious about whether an initial clinical presentation corresponds to specific gains made in the treatment either in terms of mood/motivation improvement or vegetative symptom improvement. However, we did not find any evidence to support this idea, and an initial presentation of depression did not seem to affect mood/motivation scores, but instead had a greater impact on vegetative scores, such that the higher the baseline total depression scores, the higher were the vegetative scores later on. One conclusion of these findings is that vegetative symptoms were least responsive to the IPT-AST treatment of the study, than mood/motivation symptoms which is consistent with the findings of the "no-improvement" groups. This however has further implications in terms of who is most likely to benefit from IPT-AST treatment. Our data showed this to be true for patients with more mood/motivation symptoms.

When we studied whether a participant's initial clinical presentation determined the direction of their improvement, we hoped to find whether baseline severity of depression or how a subject who presents with a particular combination of symptoms (low mood- high vegetative, high mood- low vegetative, low mood- low vegetative, and high mood-high vegetative) may

respond by the end of treatment. Surprisingly, we found no relationship between initial presentation (baseline mood/motivation or vegetative symptoms) and treatment response on the basis of differential improvement on the two clusters. This finding was confusing as we had expected to find differences in improvement based on depression severity, especially since in a prior analysis we had found non-significant relationship between mood symptom improvement and vegetative symptom improvement controlling for baseline levels of depression. One plausible explanation for these results is that the dependent variable for the two-factor ANOVA used in the analysis was total depression scores from the checklist. Perhaps if external endpoint scores from assessments such as the BDI or HAM-D had been used, a significant interaction between the independent (baseline mood and baseline vegetative) variables and dependent variable may have emerged. Similarly, using median splits to dichotomize participants as either elevated or non-elevated on the two clusters and on total depression scores, runs the risk of categorizing participants into homogenous categories when they in fact may be more heterogeneous, leading to a loss in power (Cohen ,1983). Hence, methodological issues may have prevented us from fully understanding the relationship between these variables.

*Limitations*

This study has several limitations. First is the small sample size, which increased the possibility of the Type II error (not finding significant differences when they in fact exist) and lowered the power of all analyses. The sample used in the study comprised of adolescents mostly of Hispanic origin, who exhibited only subthreshold symptoms. Thus, results from this study cannot be generalized to the community at large; rather, they should be used to develop a preliminary understanding of what trends in symptom improvement of subclinical depression symptoms in adolescents may appear.

Second, this study relied heavily on a single self-report measure and did not incorporate clinician ratings or collateral information from parents, caregivers or teachers to corroborate adolescent symptom ratings and improve the validity of the data. As with any self-report data, it is quite possible that there is a discrepancy between what the subjects are stating and what they are actually experiencing. Hence, the checklist used in this study relies on the level of accuracy and honesty demonstrated by the adolescent in completing the measure.

The depression symptom checklist has also not been validated for use with clinical populations, nor does it capture all depression symptoms. Perhaps a more refined instrument that touches more specifically on every depressive symptom is required to better assess levels of symptom improvement in this sample. Additionally, although changes in appetite and energy levels were included in the checklist, other indicators of vegetative symptoms such as changes in weight or lethargy were not assessed. Similarly, additional items to study motivation could have been added and other categories such as cognitive or attention variables could have also been included to study their relative contribution to trends in the analyses.

Another factor problematic to the data analysis of the study was the limited sample size and the presence of missing data. Although time points were created (each inclusive of two weeks) in order to work with the missing data, this lead to inconsistencies in analyzing and reporting results, with some analysis incorporating time points, whereas other using weeks.

*Conclusions*

This study was the first of its kind to explore the temporal relationship in symptoms as they improve following treatment for depression in adolescents. Specifically, symptoms as classified as mood/motivation and vegetative, were explored in details with regards to their expression as well as their improvement.

Taking the above limitations into account, this study found strong evidence that mood/motivation symptoms improve faster than vegetative symptoms for adolescents who present with subthreshold depression and received the preventive IPT-AST treatment. In addition, mood symptoms were also found to respond more to the IPT-AST treatment condition than vegetative symptoms. Hence, IPT-AST may be a strong option when considering a referral for an adolescent who presents with more mood/motivation symptoms or as an adjunct treatment when vegetative symptoms are responding to pharmacotherapy. In addition, adolescents should be monitored for their response to the IPT-AST preventive treatment. If improvements in mood symptoms don't occur, it is unlikely that vegetative symptoms would improve and perhaps other treatment options may then need to be considered.

*Clinical Implications*

The results from this dissertation have significant implications for the mental health community at large, as well as for caregivers including parents and teachers who may refer their child or student to receiving IPT-AST treatment for subthreshold depression. Mood and vegetative symptoms have different trajectories towards improvement with certain clusters of symptoms improving faster than others. Hence, prior to considering appropriate referrals for treatment, clinicians should assess for severity of mood symptoms and vegetative symptoms when adolescents present with depression, and be cognizant about risks associated with adolescents who have more mood symptoms and low vegetative symptoms.

Second, given the pattern of symptom change for IPT-AST preventive treatment tends to be similar to trends found in symptom improvement following response to cognitive therapy (Rush et al, 1982) with IPT-AST producing most rapid changes in mood symptom improvement than vegetative symptom improvement, referrals to this form of treatment may be preferred if

mood symptoms are being targeted for early improvement. However, clinicians would also need to be aware of the potential time-lag in symptoms as they improve (with adolescents being referred to, or already in treatment with IPT-AST) where despite reporting continued symptoms in the vegetative cluster (with improved mood symptoms), there may still be a possibility for improvement and the potential of responding to treatment.

*Future Directions*

Future research should make use of larger, more generalizable samples obtained from school but also from the medical community including community clinics and other out-patient services. Studies should aim to recruit subjects from varying ethnicities and socioeconomic backgrounds, as trends may vary between different demographic or ethnic groups.

In addition, weekly self-report measures should be balanced with other assessments that include clinician ratings to track any observable changes in mood, motivation, or physical activity of the participants. Collecting information from in-person interviews supplemented with information from caregivers, parents or other informants could further elaborate on the timeline in symptom abatement and further our understanding of how and when symptoms improve.

One main issue encountered in this study was the lack of clarity or consistency with regards to the clustering of variables in the literature reviewed. Some studies researched affective symptoms separately, others combined symptoms into specific clusters without providing further details regarding those symptoms. Hence, further studies need to more carefully operationalize the categorization of various depression symptoms, and possibly also include other categories such as cognitive symptoms and suicidal symptoms, to better understand the complex relationship between symptoms and their improvement.

Additionally, as a post-hoc analysis that could not compare differences in rate of improvement between groups, only one group could be the focus of study (based on their completing the depression checklist). The ability to compare findings of trends within the IPT-AST preventive treatment to a control group or TAU group would have added to the robustness of our conclusions, hence future studies should include a control group or other treatment group which would make conclusions regarding trends more meaningful and impact on clinical work more effective.

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Appendix A

*Demographic and Sample Characteristics of Young, Mufson & Gallop (2010) Study*

| | IPT-AST (N = 36) | SC (N = 21) | *p* value |
|---|---|---|---|
| Demographics | | | |
| Age, mean (SD) | 14.57 (0.68) | 14.52 (0.87) | 0.84 |
| Female (%) | 20 (55.56) | 14 (66.67) | 0.41 |
| Hispanic (%) | 25 (69.44) | 17 (80.95) | 0.34 |
| African American (%) | 15 (41.67) | 7 (33.33) | 0.53 |
| Baseline Measures | | | |
| CES-D, mean (SD) | 26.56 (6.72) | 26.05 (5.86) | 0.69 |
| CGAS, mean (SD) | 70.75 (4.12) | 70.10 (6.11) | 0.55 |
| CDRS-R, mean (SD) | 51.75 (11.17) | 48.43 (5.67) | 0.25 |
| Current Diagnoses | | | |
| No diagnosis (%) | 29 (80.56) | 18 (85.71) | 0.73 |
| DD NOS (%) | 1 (2.78) | 1 (4.76) | 1.00 |
| Adjustment (%) | 2 (5.56) | 1 (4.76) | 1.00 |
| GAD (%) | 1 (2.78) | 0 (0.00) | 1.00 |
| Specific Phobia (%) | 2 (5.56) | 1 (4.76) | 1.00 |
| Tic Disorder (%) | 1 (2.78) | 0 (0.00) | 1.00 |

Note: IPT-AST = Interpersonal Psychotherapy-Adolescent Skills Training; SC = school counseling.

Appendix B

Symptoms of Depression Checklist

*During the past week...*

| | | | | |
|---|---|---|---|---|
| 1. | *Have you felt sad a lot?* | *Yes* | *Sometimes* | *No* |
| 2. | *Have you felt hopeless that things will never get better?* | *Yes* | *Sometimes* | *No* |
| 3. | *Have you gotten mad easily, sometimes over little things?* | *Yes* | *Sometimes* | *No* |
| 4. | *Has it been difficult to have fun doing things you used to enjoy?* | *Yes* | *Sometimes* | *No* |
| 5. | *Have you felt guilty about things that may not be your fault?* | *Yes* | *Sometimes* | *No* |
| 6. | *Have you felt more or less hungry than you used to?* | *Yes* | *Sometimes* | *No* |
| 7. | *Have you had trouble falling asleep or staying asleep?* | *Yes* | *Sometimes* | *No* |
| 8. | *Have you taken lots of naps or felt like sleeping all the time?* | *Yes* | *Sometimes* | *No* |
| 9. | *Have you had less energy than you used to?* | *Yes* | *Sometimes* | *No* |
| 10. | *Have you felt bad about yourself?* | *Yes* | *Sometimes* | *No* |
| 11. | *Has it been difficult to pay attention in school?* | *Yes* | *Sometimes* | *No* |
| 12. | *Has it been hard to make decisions?* | *Yes* | *Sometimes* | *No* |
| 13. | *Have you had headaches or stomachaches a lot?* | *Yes* | *Sometimes* | *No* |
| 14. | *Have you wished you weren't born or you could just disappear?* | *Yes* | *Sometimes* | *No* |
| 15. | *Have you thought about hurting yourself?* | *Yes* | *Sometimes* | *No* |

RATE YOURSELF ON A SCALE OF 1-10, WHERE 1 IS THE BEST YOU'VE EVER FELT AND 10 IS THE MOST DEPRESSED YOU'VE EVER FELT.

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 1       2       3       4       5       6       7       8       9       10
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Appendix C

Recruitment Flow Chat of Young, Mufson & Gallop (2010) study

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                    ┌─────────────────────────┐
                    │   Screen letters sent   │
                    │       n = 1117          │
                    └─────────────────────────┘
                         │              │
          ┌──────────────────────┐   ┌─────────────────────────┐
          │  Parent refused      │   │   Screened with CES-D   │
          │    n = 346           │   │       n = 642           │
          │  Teen refused        │   └─────────────────────────┘
          │    n = 125           │
          │  Teen absent         │
          │    n = 4             │
          └──────────────────────┘
        │                    │                              │
┌──────────────────┐  ┌─────────────────────┐   ┌────────────────────────┐
│  Normal CES-D    │  │   Eligible CES-D    │   │    CES-D too high      │
│  CES-D< 15       │  │  16<CES-D<39        │◁──│    CES-D>40            │
│    n = 386       │  │    n = 235 + 2      │   │  n = 19 (2 were included│
└──────────────────┘  └─────────────────────┘   │      as eligible       │
                        │                │       └────────────────────────┘
            ┌───────────────────────┐  ┌──────────────────────────┐
            │ Refused to Consent to │  │ Consented to diagnostic  │
            │ diagnostic interview  │  │      interview           │
            │    n = 158            │  │       n = 79             │
            └───────────────────────┘  └──────────────────────────┘
                              │                         │
                  ┌────────────────────┐    ┌────────────────────┐
                  │   Ineligible       │    │    Eligible        │
                  │    n = 21          │    │    n = 57          │
                  │  Left school       │    └────────────────────┘
                  │    n = 1           │       │            │
                  └────────────────────┘  ┌──────────┐ ┌────────────────────┐
                                          │ IPT-AST  │ │ School Counseling  │
                                          │  n = 36  │ │     n = 21         │
                                          └──────────┘ └────────────────────┘
```