EFFECTIVENESS OF DEPRESSION INTERVENTIONS FOR ADOLESCENT MOTHERS: A META-ANALYSIS

by

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ABSTRACT

Objective: The purpose of this thesis was to examine existing literature about depression in adolescent mothers by focusing on interventions to decrease depression in the adolescent mother population, and to perform a meta-analysis on those interventions to develop a single conclusion with greater statistical power that showed that depression interventions need to be a part of parenting programs for adolescent mothers. Methods: Research studies for the meta-analysis were identified by searching the PubMed and PsycINFO databases. Data was extracted from nine studies that met the inclusion criteria. These nine studies included thirteen interventions. The variables extracted from these interventions were the mean depression score of the intervention and control or baseline groups, the standard deviations, and the respective sample size. The mean depression score for each intervention was standardized because they were measured using different depression scales and to be able to find effect sizes. Effect sizes measured the strength of an intervention, and can be compared to other standardized studies. Effect sizes for the intervention effects on depression in teen mothers were calculated using Comprehensive Meta-Analysis, a statistics computer software program. Results: Findings from these nine studies indicated an overall positive effect size of 0.207 (95% CI [0.115; 0.299]), with a p-value of 0.000, which proved that depression interventions are statistically significant and should be included in teen parenting programs. Conclusion: The pooled effect size of the meta-analysis

showed one statistically significant conclusion from multiple studies, which demonstrated that overall, these interventions work. The meta-analysis also showed that multidisciplinary approaches should be explored as a viable option for interventions or programs. The public health relevance of this research is it can help start a conversation within different organizations that work with adolescent mothers to help them discover ways they can adopt and implement these effective interventions throughout their programs or curriculum to decrease depression in teen mothers. It is of public health significance to reduce depression among teen mothers so that they and their children can grow up to lead happy, healthy, and successful lives.

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PREFACE

I would like to dedicate this thesis in memory of my father, Russell W. Ripper, and in honor of my mother, Janis M. Ripper, and brother, Mark R. Ripper. My family has encouraged me in every endeavor of my life and I could not have done this without them. I would also like to acknowledge Barb Folb and Jenna Colavincenzo for their time and help in preparing this paper, and the members of the committee for their support.

1.0 INTRODUCTION

The United States has one of the highest adolescent pregnancy rates in the developed world. Teenagers in the United States are two and a half times more likely to give birth as compared to teens in Canada, approximately four times as likely as teens in Germany or Norway, and almost 10 times as likely as teens in Switzerland (Kearney & Levine, 2012). In 2009, the US teen pregnancy rate was 37.9 births per 1,000 teenagers ages 15-19, and in 2010, the rate was 34.3 births (Kearney & Levine, 2012).

Teen pregnancy and parenting are associated with adverse health outcomes for both mother and child (Reid & Meadows-Oliver, 2007; Ruedinger & Cox, 2012). There is a strong correlation between teen parenting and depression. Some research have demonstrated the rates of depression among adolescent mothers as ranging from 46%-61%, which is higher than rates of depression for adult mothers (approximately 20-28%) and non-pregnant nor parenting adolescent peers (approximately 7.5%) (Barnet, Liu, DeVoe, Alperovitz-Bichell, & Duggan, 2007; Cox et al., 2008; McGuinness, Medrano, & Hodges, 2013; Meadows-Oliver & Sadler, 2010).

Depression among teen parents is a component that teen parenting programs should address, because it will affect all areas of the teen's (and her child's) life. Depression and its symptoms can negatively impact the adolescent mother's functioning at work and school, as well as her relationships with her baby and significant others (Logsdon, Hines-Martin, & Rakestraw, 2009). Addressing depression in adolescent mothers is important because increased depressive

symptoms have been associated with decreased maternal confidence in parenting abilities and perceived social supports, as well as more rapid repeat pregnancies (Barnet et al., 2007; Cox et al., 2008). An increase in an adolescent mother's depressive symptoms have also been associated with lower economic status, decreased maternal confidence, perceived feelings of social support, lack of interest in continuing education, and an increase in rapid repeat pregnancy (Meadows-Oliver & Sadler, 2010; Secco et al., 2007).

The adolescent mother's child can also experience negative outcomes and experience negative developmental effects. Children of mothers with higher levels of depressive symptoms display more emotional and social problems and have lower language skills compared with children of mothers with lower depressive symptoms (Meadows-Oliver & Sadler, 2010). There is an association between maternal depression and insecure attachment in young children (Hodgkinson, Beers, Southammakosane, & Lewin, 2014). Secure attachment is when the child is able to separate from the mother, but able to go back to her when frightened to seek comfort. The child greets his or her mother with positive emotions and prefers the mother to strangers. Insecure attachment occurs when the caregiver is inconsistent or does not respond to the infant when needed. Some long term negative effects of poor attachment in the child include behavioral and academic consequences in adolescence, such as substance abuse, depression, and learning disorders (Canadian Paediatric Society, 2004). Children of adolescent mothers who have higher levels of depressive symptoms display more emotional-social problems and lower language skills (Meadows-Oliver & Sadler, 2010). If adolescent mothers lack educational achievement, their children are more likely to have lower educational attainment, have lower income levels, and more likely to be incarcerated (Jutte et al., 2010).

Few adolescent mothers with symptoms of depression are referred for diagnostic evaluations and receive treatment due to barriers in knowledge, access, and fear (Logsdon et al., 2009).

This issue of depression in teen mothers has not been widely addressed in public health practice, which is what makes this topic significant in public health. During the author's practicum experience, she interned at a local non-profit organization that has a residential group home facility for pregnant and parenting teen mothers and their children. One of the themes that came up in conversations with the mostly older, African American female staff was that the bad behavior exhibited by the teenage girls in their care was due to just being a moody teenager, not because of mental health issues or trauma related issues. These observations are consistent with examples in the literature provided by McGuinness et al. (2013) that attribute depressive symptoms to "teenage hormones".

The purpose of this thesis was to examine existing literature about depression in adolescent mothers by focusing on interventions to decrease depression in the adolescent mother population, and to perform a meta-analysis on those interventions to develop a single conclusion with greater statistical power that shows that depression interventions need to be a part of parenting programs for adolescent mothers. This paper will define depression, depressive disorder, and postpartum depression in this population. Research was reviewed that suggests causes, factors, and barriers to mental health care in the adolescent mother population. Screening instruments and treatment options are provided for background information. This thesis demonstrated the results of a meta-analysis that reviewed existing literature about interventions that decrease depression in teen mothers. Results and significance of findings are addressed, as

well as how this research can be translated for public health knowledge, practice, and dissemination.

2.0 BACKGROUND

2.1 DEFINITIONS OF DEPRESSION

Depression is an umbrella term that consists of many different forms of depressive illnesses. In this thesis, the author focused on depression and its symptoms, depressive disorder, and postpartum depression in adolescent parents. These terms are described as "depression" throughout the paper.

2.1.1 Depression

Depression, overall, can be defined as feeling sad for weeks at a time. The signs and symptoms of depression are different for different people, but can include: feeling sad or empty, feeling hopeless, irritable, anxious, or guilty, loss of interest in favorite activities, feeling very tired, not being able to concentrate or remember details, not being able to sleep or sleeping too much, overeating or not wanting to eat at all, thoughts of suicide or suicide attempts, aches or pains, headache, cramps, or digestive problems (National Institute of Mental Health, 2013). There are several different forms of depression which vary in severity.

2.1.2 Depressive Disorder

The American Psychiatric Association described depressive disorders in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) as a Major Depressive Episode (2013). A Major Depressive Episode is a period of at least two weeks during which there is either depressed mood or the loss of interest or pleasure in nearly all activities (American Psychiatric Association, 2013). Depression in adolescents may present as irritability rather than sadness. To be diagnosed as having a major depressive episode, the individual must experience at least four additional symptoms drawn from a list that includes changes in appetite or weight, sleep, and agitation; decreased energy; feelings of worthlessness or guilt; difficulty thinking, concentrating, or making decisions; or recurrent thoughts of death or suicide ideation, plans, or attempts (American Psychiatric Association, 2013). Major depressive disorder has severe symptoms of depression that can interfere with an adolescent mother's ability to work, sleep, study, eat, and enjoy life (National Institute of Mental Health, 2013).

2.1.3 Postpartum Depression

The American Psychiatric Association described postpartum depression in the DSM-V as the specifier "With Postpartum Onset" (2013). It can be applied to the current or most recent Major Depressive, Manic, or Mixed Episode of Major Depressive Disorder, Bipolar I Disorder, or Bipolar II Disorder of to Brief Psychotic Disorder if onset is within four weeks after delivery of a child (American Psychiatric Association, 2013). Postpartum depression is not recognized as its own diagnosis, but rather, added to a diagnosis. The cause of postpartum depression is unknown, but research suggests that it is a composite of three factors: hormone fluctuations, situational

risk, and life stress (Munoz, Agruss, Haeger, & Sivertsen, 2006). Women with postpartum Major Depressive Episodes often have severe anxiety, panic attacks, spontaneous crying long after the usual duration of the "baby blues" (which usually occurs 3-7 days postpartum), disinterest in their new infant, and insomnia (American Psychiatric Association, 2013). The DSM-V noted that many women felt guilty about having depressive feelings at a time when they should be happy, and that they may be reluctant to discuss their symptoms or negative feelings.

2.2 CONTRIBUTING FACTORS AND BARRIERS TO DEPRESSION AND MENTAL HEALTH CARE IN ADOLESCENT MOTHERS

This section of the thesis consists of a brief literature review demonstrating contributing factors and barriers to depression and mental health care in adolescent mothers. The contributing factors and barriers that adolescent mothers may face and cause depression are the transition to motherhood, lack of knowledge about mental health issues, family history, social support, rapid repeat pregnancy, educational attainment as a stressor, relationship with the father of the child as a stressor, and health care barriers. These contributing factors and barriers, while different for every adolescent mother, were the most common during the literature review process. They were included to provide background information for readers and to show how depression could take root in adolescent mothers.

2.2.1 Transition to motherhood

The transition to motherhood can be sudden and much different than adolescent mothers expect. It is hard to go from being a kid to having one. Caring for a child is a big change and responsibility for any mother, especially adolescent mothers. Instead of being with her friends, a teen mom has to stay home and care for her child. Adolescent parents are required to focus their attention on another person at a time when they are developmentally focused on their own maturation (Beers & Hollo, 2009). Many of the following factors and barriers affect not only adolescent parents' mental health, but also their transition into motherhood. Logsdon et al. (2009) found that adolescents were surprised that they did not instantly feel like mothers and that they had to do a lot more work than they had thought.

2.2.2 Lack of knowledge about mental health issues

Some adolescent mothers do not have knowledge of mental health issues like depression. When Logsdon et al. (2009) formed a focus group of adolescent mothers to understand their meaning of and experience with depression and depression treatment, they found that the teen mothers used "up and down" language to describe their experiences with motherhood. "Up" moments included pride about their babies' behaviors. The "down" moments were described as negative feelings in terms of sadness, withdrawal, fear, disappointment, and not caring. These negative feelings were labeled as "stress and depression," "baby blues," "frustration", and "sadness" (Logsdon et al., 2009). None of the adolescents could define the terms "depression" or "postpartum depression", instead choosing to expand upon their earlier descriptions of negative feelings rather than providing an actual definition of the terms (Logsdon et al., 2009). The

descriptors used by the adolescent mothers in the focus groups included crying, sadness, anxiety, frustration, wanting to be alone, not being in the relationship one wants to be in, having flashbacks, having a lack of patience and appetite, having a lack of interest in activities and the baby, being stressed out, and not being able to put up with everything (Logsdon et al., 2009). While the participants in the focus groups were able to describe negative feelings, those feelings seem to be based on external rather than internal forces.

When Logsdon et al. (2009) asked the participants in their focus groups how they resolve these negative feelings, adolescent mothers reported that they would see a counselor, talk to a family member, friend, or boyfriend, and engage in self care remedies such as praying, going to church, writing feelings down, playing with their child, or going to sleep.

Fear of mental health issues and treatment is another barrier to getting care for mental health. Adolescents in general (whether they are pregnant, parenting, or neither) report moderate levels of mental illness stigma and low mental health literacy (Pinto-Foltz, Logsdon, & Myers, 2011). It appears as though adolescents want to talk to their peers and adults in their social network about mental health and treatment, but fear negative responses. One example of fear of mental health was reported in the literature as an adolescent mother being afraid to receive any sort of health care for herself or her child because she had to navigate the systems by herself and was afraid that someone would take her child away from her or something else would happen to her child (Logsdon et al., 2009).

2.2.3 Family history

Family relationships can influence depressive symptoms. If a teen mother has an absent father, less support from her mother, or conflict with her mother, she is more likely to exhibit depressive

symptoms (Reid & Meadows-Oliver, 2007). It is important to take note of an adolescent's family history and personal history. Trauma (such as abuse), parental mental health history, and type of household (single parent versus two parent) and dysfunctional families can affect the adolescent mother's mental health (Hodgkinson et al., 2014). Family members can have a positive influence on the adolescent mother and family relationships by offering support. Studies in the Reid and Meadows-Oliver (2007) integrative literature review on postpartum depression in adolescent mothers revealed that for most adolescent mothers, an association exists between social support and depressive symptoms. This means that if an adolescent mother has social supports in place she will have fewer depressive symptoms.

2.2.4 Social support

Adolescent mothers identify social support, including both parenting an emotional support, as primarily emanating from family members, particularly their own mothers, as well as from the father of the baby (Beers & Hollo, 2009). Social support occurs on an individual and interpersonal level. The individual social support is what the teen mother perceives to be the support offered to her. Interpersonal social support consists of family members and friends. Some adolescent mothers may overestimate the scope and availability of support of their family members and peers prenatally and are subsequently dissatisfied with support levels and communication after the child is born (Beers & Hollo, 2009). Other forms of social support can come from the organizational level and community level, such as a religious center and the people that go there. It has been found that although adolescent mothers consider community supports important, they do not access them as much as family resources (Beers & Hollo, 2009).

2.2.5 Rapid repeat pregnancy

Rapid repeat pregnancy (RRP) is defined as a pregnancy that occurs within 24 months of the previous birth (Raneri & Wiemann, 2007). RRP is associated with increased maternal and infant risks, including maternal, fetal, and early neonatal deaths, as well as preterm birth, low birth weight, and small infant size (Patchen & Lanzi, 2013). Patchen and Lanzi (2013) reported that moderate to severe depressive symptoms may be associated with RRP within six months. This could be because of other factors that lead to depression in teen mothers, such as non-supportive relationships with family, friends, and the community combined with the immediate transition to motherhood an adolescent faces. These factors can be very overwhelming. Having more than one child can increase depressive symptoms in adolescent mothers because they have more responsibility, less time to focus on educational pursuits and employment, and experience greater levels of stress. There is a strong need for routine screening of adolescent mothers for depression to identify mothers who would benefit from mental health evaluation and counseling, contraceptive counseling, and follow-up (Patchen & Lanzi, 2013).

2.2.6 Stressors

One stressor for teen mothers is continuing their education. McGuinness et al. (2013) reported that only half of teens who become pregnant will attain a high school-level education by age 22, compared with the 90% of young women who do not give birth as teens. Teen mothers might feel that education gets in the way of caring for their child, or they become so involved with trying to care for their child or finding childcare that education falls to the wayside. This lack of school and activity for the mother could increase the symptoms of depression. Educational

attainment and goals are important factors for teen parents. If teens drop out of school, they are more likely to have negative consequences for their families, such as rapid repeat pregnancies, increased reliance on social services, and less ability to maintain economic self-sufficiency (Lachance, Burrus, & Scott, 2012). Dropping out of school means less social support from school teachers and staff. The teachers and staff are then not able to reach or follow up with the mother. Staying in school can help a teen mother to work toward a better future for her family and set an example for her child.

The adolescent mother's relationship with the father of her child is a unique stressor. Poor partner relations are associated with increased rates of depression (Beers & Hollo, 2009). A poor relationship with the father of the child can lead to stress and sadness, can contribute to symptoms of depression. Grandmothers may influence the type of relationship the teen mother has with the father. The grandmother may serve as a gate-keeper to her daughter and grandchild. This gate-keeping behavior may be related to the disapproval of the young father and/or his relationship with the adolescent mother, or a desire to have the young father provide financial support to gain access to the child (Beers & Hollo, 2009). Adolescents struggle with wanting to create a home environment that is different from what they might have experienced, and may feel frustrated with their inability to create the perfect, nuclear family (Logsdon et al., 2009).

2.2.7 Health care barriers

Hodgkinson et al. (2014) reported that up to 50% of pediatric visits address some behavioral or psychosocial concern, but of the 15 million children and adolescents with a diagnosed mental health disorder, only 25% or less receive ongoing mental health services. Youth and families from low socioeconomic backgrounds face disparities to accessing mental health care. One

disparity is the lack of access to mental health services in urban and rural areas. This lack of services means that sometimes the care is inadequate and does not meet the needs of every group in the population, especially adolescent mothers. Teen mothers may receive care from primary care providers, but these providers vary in their expertise and ability to treat mental health disorders in adolescents (Hodgkinson et al., 2014). Other barriers that teen parents may encounter include lack of insurance, time availability, and transportation (Hodgkinson et al., 2014). Some teen mothers may avoid mental health services because they are afraid their parents or guardians will find out about it, further adding to fear and stigma about accessing mental health services.

Mental health providers and program staff should be aware that the structure of mental health appointments also may be a barrier (Hodgkinson et al., 2014). Adolescent parents may be more likely to seek mental health treatment or care if the appointments are flexible enough to accommodate school schedules, child care, and emergencies and if they are allowed to discuss their problems at their own pace (Hodgkinson et al., 2014). Providers and program staff that work with teen mothers need to have a better understanding of depression in teen mothers. They should screen mothers for depression regularly to be able to connect the mother to appropriate treatments, interventions, or services within a timely fashion before the depression manifests into something bigger.

2.3 SCREENING INSTRUMENTS

There are many scales used to measure depression. Some of the more common scales that were found in the literature on depression in adolescent mothers are discussed in this section. The

interventions used in the meta-analysis of this thesis measured depression using one or more of these scales. This section on testing instruments has been included for background information so that lay readers can develop an understanding and familiarity with these instruments. This thesis does not include every scale, and it is important to remember that some of these scales are self-report and measure the presence and degree of symptoms and do not give an actual clinical diagnoses.

2.3.1 Structured Clinical Interview for DSM-V Axis I Disorders

The Structured Clinical Interview for DMS-V Axis I Disorders (SCID-I) is considered to be the gold standard in the assessment of depression (B. A. Lewis et al., 2012). The SCID-I is given by clinicians to assess more than 30 of the more frequently diagnoses Axis I disorders in adults (Spitzer, Williams, Gibbon, & First, 1992). Axis I disorders include psychological disorders like depression, anxiety, and others, but not mental disabilities or personality disorders. The clinicians assesses depression symptoms like mood disturbance, loss of pleasure, weight, sleep, and psychomotor disturbances, low energy levels, self-esteem, and cognitive functioning, suicidal thoughts, difficulty working, death of a loved one, and other physical illnesses (B. A. Lewis et al., 2012). While this scale is useful in getting a clinical diagnosis of depression, it has to be given by a clinician and not appropriate for self-report measures. A clinician can adapt the scale for use with adolescents if needed.

2.3.2 Beck Depression Inventory and Beck Depression Inventory-II

The Beck Depression Inventory (BDI) is a 21 item, self-report questionnaire with scores ranging from 0-63 (Panzarine, Slater, & Sharps, 1995). This scale uses a Likert scale of four point items ranging from 0-3 to best describe feelings over the past two weeks and are categorized as exhibiting no depressive symptoms (0-9), mild symptoms (10-15), mild to moderate symptoms (16-19), moderate to severe symptoms (20-29) and severe symptoms (30-63) (Panzarine et al., 1995; Secco et al., 2007).

The BDI-II is a revision of the BDI that better reflects the symptoms of depression according to the DSM-IV criteria (Smarr & Keefer, 2011). The BDI-II is also a 21 item, self-report questionnaire that written at a sixth grade reading level with scores range from 0-63 with a cut-off point of greater than or equal to 13 for mild depressive symptoms (Meadows-Oliver & Sadler, 2010). Scores for each item range from 0 to 3. The BDI-II has been found to accurately discriminate between depressed and non-depressed youth on the basis of diagnostic criteria (Meadows-Oliver & Sadler, 2010). The BDI and BDI-II instruments can be used with subjects who are 13 years of age or older.

2.3.3 Center for Epidemiological Studies Depression Scale

The Center for Epidemiological Studies Depression Scale (CES-D) is a 20-item instrument with questions about depressions symptoms asked on a Likert scale ranging from 0-3. A score of greater than or equal to 16 indicates evidence of depression. This screening tool was developed for use in the general population, has high specificity and sensitivity in adolescents, and high

internal consistency reliability in pregnant and postpartum women and in young pregnant and parenting adolescents (Logsdon & Myers, 2010).

2.3.4 Center for Epidemiological Studies Depression Scale for Children

The Center for Epidemiological Studies Depression Scale for Children (CES-DC) is a modified version of the adult CES-D. It is sometimes used to assess depressive symptoms instead of the adult version due to the lower reading level and high reliability of CES-DC in populations under the age of 18 (Brown, Harris, Woods, Buman, & Cox, 2012). It is self-administered and can be used for children, adolescents, and young adults ages 6-23 (Shahid, Wilkinson, Marcu, & Shapiro, 2012). The CES-DC consists of 20 self-report items on a Likert scale (from 0=not a lot to 3=a lot), except for four which are reverse scaled (Brown et al., 2012). The total possible score is 60, but a score greater than or equal to 15 signifies depressive symptoms and indicates follow up for treatment (Brown et al., 2012; Shahid et al., 2012).

2.3.5 Edinburgh Postnatal Depression Scale

The Edinburgh Postnatal Depression Scale (EPDS) specifically screens for postpartum depression. It is a self-report instrument that contains ten short statements of common depressive symptoms that a woman may or may not have experienced in the past week, such as sadness, anxiety or worry, difficulty sleeping, and lack of enjoyment of activities, and uses a Likert scale format of 0-3 for responses (B. A. Lewis et al., 2012; Logsdon & Myers, 2010). Possible scores range from 0-30, but a cutoff score of greater than or equal to 12 is used to

indicate symptoms of depression. The scale has good specificity and sensitivity, especially in the postpartum period (as compared to the BDI) and is sensitive to change over time for depression (Ho et al., 2009; B. A. Lewis et al., 2012). Logsdon and Myers (2010) performed a ROC (receiving operating characteristic) curve on three different depression instruments, one being the EPDS. Based on ROC analysis techniques, they found that the EPDS instrument had the best overall performance and suggested it to be the best screening instrument to use in adolescent mothers to screen for postpartum depression (Logsdon & Myers, 2010).

2.4 TREATMENT OPTIONS

Just as there are many different screening tools for depression, there are many different treatment options for depression. There are non-pharmacologic and pharmacologic treatments that should be considered to determine the best course of treatment for depression in the teen mother. These treatments differ in what they are providing and affect individuals differently.

Non-pharmacologic treatments include cognitive behavioral therapy (CBT), interpersonal psychotherapy (IPT), family and martial group therapy (PDT), electroconulsive therapy, peer-support groups, and light therapy (Munoz et al., 2006). Pharmacologic treatment options use medications like selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs) to treat depression (Munoz et al., 2006). While pharmacological treatment has been shown to be equally as effective as CBT, these treatments need to be taken on a case-by-case basis, as pharmacological management for breastfeeding mothers is complicated (Munoz et al., 2006).

The interventions in this meta-analysis are non-pharmacological treatments. These interventions were limited to non-pharmacological treatments because the target audiences for this thesis are organizations and agencies that work with parenting teen mothers. Organizations that work with this population can implement non-pharmacological treatments on their own without bringing in physicians and pharmacists to prescribe and dispense medication.

The interventions in this meta-analysis used different scales to screen for and measure depression in teen mothers. The purpose of this study is to determine which interventions are more effective in decreasing depression and why, and the overall effectiveness of addressing depression and mental health for adolescent mothers in a program setting.

3.0 METHODS

3.1 SEARCH STRATEGY

Research studies for the meta-analysis were identified by searching the PubMed and PsycINFO databases. The author searched for articles about depression in adolescent mothers but focused on the depression interventions within those articles to be able to use them in the meta-analysis. Search terms used in PubMed were based on the medical subject headings, or MeSH terms. MeSH is a thesaurus of the National Library of Medicine. MeSH terms are used to index research articles. These MeSH terms were expanded to build more searches. In this paper, MeSH terms used to search PubMed consisted of “pregnancy in adolescence”, “adolescent”, “mothers” “depressive disorder”, “depression, postpartum”, “maternal health services”, “intervention studies”, “pilot projects”, “program evaluation”, “clinical trials as topic”, “epidemiologic study characteristics”, “case-control studies”, “questionnaires”, “psychiatric status rating scales”, and “severity of illness index”. These search terms were combined with each other using the “and” “or” search operators to further define and build the search. Some searches combined “and” “or” search operators with terms in a Boolean search to increase the effectiveness of the search. In addition to the search terms and operators, some searches were filtered by age (adolescent: 13-18 years) so that the articles would be tailored to the population of interest. The results of the search can be found in Appendix A.

In addition to the PubMed search, a search was also done in the PsycINFO database. The database consists of peer-reviewed literature in behavioral sciences and mental health. The terms used to search PsychINFO consisted of the following: “adolescent pregnancy”, “adolescent mothers”, “major depression”, “depression (emotion)”, “postpartum depression”, and “intervention”. PsycINFO has a feature called Explode. This feature retrieves records of a term that is searched for plus any narrower terms underneath it. It is shown in Appendix B as “exp”. Just as with PubMed, these terms were combined with “and” “or” search operators to further define and build the search.

3.2 INCLUSION AND EXCLUSION CRITERIA

Inclusion and exclusion criteria were used to narrow the search and to define the results of articles about depression in adolescent mothers with a focus on their interventions to decrease depression. The criteria can be found in Table 1.

Table 1. Inclusion and Exclusion Criteria

Inclusion	Exclusion
• English language • Studies from 2003-2013 • US programs • Adolescents ages 13-18 years • Measure depression using means and standard deviation	• Non-English • Prior to 2003 • Non- US programs • Non- adolescent studies • Does not measure depression using means and standard deviation

Table 1 Continued

• Interventions take place in the school, home, medical center, or community	

These criteria were chosen to help guide the selection process of articles for the meta-analysis. To be included in this meta-analysis study, studies had to be written in English, be published during the years 2003-2013, take place in the United States, measure the construct of depression with means and standard deviations, and the interventions had to fit one or more place settings. Programs specifically from the United States were targeted because international programs have cultural norms or attitudes that differ from the US. In addition, because the topic focuses on adolescent parents, studies were included if participants in the study were between 13-18 years of age.

The four categories of interventions are specific to settings where the intervention took place. A school based intervention program in the context of this meta-analysis includes those that take place in the school, school-based health clinics, and residential or alternative school placements for pregnant and parenting teens (Savio Beers & Hollo, 2009). One problem with school based intervention programs is that is does not reach those teen mothers who have dropped out of school. Home based programs for pregnant and parenting teens have services provided by a wide range of providers at different intensities with different goals in the teen's home (Savio Beers & Hollo, 2009). Medical setting based programs are those that are run by a health care center. These programs work to provide comprehensive services like case

management, mental health services, parenting education, social work support, and medical care by the provider to the teen mother and her child (Savio Beers & Hollo, 2009). Community based programs for pregnant and parenting teens operate at a wide variety of sites and offer many programs for this population, but most programs tend to fall along case management or parenting groups (Savio Beers & Hollo, 2009).

3.3 DATA EXTRACTION

Data was extracted from nine studies that met the inclusion criteria. The variables extracted were the mean depression score of the intervention and control or baseline groups. The sample size for each respective group was also extracted.

3.4 DATA ANALYSIS

Although the included studies measured mean depression based on intervention and control groups or from baseline to after treatment, they were measured using different depression scales. This means that just comparing the means will not work. In order to solve this problem, the standardized mean difference was found. The standardized mean difference is the difference in means from intervention and control groups or end and beginning measurements divided by the pooled standard of deviation between the groups. The standardized mean difference is often referred to as the effect size in a meta-analysis. Effect sizes measure the strength of an intervention, and can be compared to other standardized studies. Effect sizes for the intervention

effects on depression in teen mothers were calculated using a statistics computer software program called Comprehensive Meta-Analysis.

The Comprehensive Meta-Analysis software set up a data table. The table included a study name column. Columns were inserted using the software's tutorial for effect size data. There are many different ways to compute effect size based on what kind of data is available. The "continuous (means)" tab was selected for this study. Under that tab, "unmatched groups, post data only" was selected, followed by the "mean, standard deviation, and sample size in each group" tab. This tab opened up columns for the intervention and control or baseline means, standard deviations, and sample sizes in the data table. The effect direction was selected as positive for each study to make it easier to interpret and analyze. After putting the data in, the software program calculated the standard difference in means, standard error, Hedge's g, and the difference in means. Hedge's g is used to calculate effect sizes of continuous outcomes.

Next, data analysis was run. Statistics for each study were found. These statistics included the standard difference in means, standard error, variance, upper and lower limits for a 95% confidence interval, Z-value, and p-value for each study. With these statistics, a high resolution Forest plot was created. The Forest plot graphically represents the relative strength of treatment effects in multiple studies.

4.0 RESULTS

The number of items found in each search from PubMed and PsycINFO can be found in Appendices A and B, respectively. After each search query, article titles and abstracts were scanned to see if they matched the general topics of depression and adolescent parenting. The articles that matched the general topics were then examined further to see if they met the inclusion criteria. Thirty-five articles were chosen to be reviewed further.

4.1 CHARACTERISTICS OF EXCLUDED STUDIES

Of these 35 articles chosen for further review, seven articles were excluded because they provided background information about depression in teen parents instead of a study about teen parents and depression. Of the 28 studies left, 19 were excluded further because they did not meet the inclusion criteria. Two studies were written before 2003. Four of the studies discussed non-US programs. Five of the studies did not have adolescents aged 13-18 years old as their participants. Thirteen studies did not measure depression as a mean and standard deviation. Finally, four studies were not depression interventions. These four studies focused on testing screening instruments, parenting competence, social support, self-esteem, mental health stigma, health literacy, and attitudes instead of measuring depression in adolescent mothers.

4.2 CHARACTERISTICS OF INCLUDED STUDIES

There were nine studies that met all the inclusion criteria. These studies covered a total of 1,741 participants. The nine studies had thirteen interventions within them to that were included in the meta-analysis. Some of the studies that were included in the meta-analysis tested more than one intervention, which is why there were thirteen interventions from nine studies. Nine studies with thirteen interventions were considered sufficient for this meta-analysis because it is an exploratory meta-analysis.

Brown et al. (2012) studied adolescent mothers ages 18 years or younger at a teen tot clinic. This teen tot program was hospital-based and located in an urban area. A teen tot program provides a medical home for the mother and child with access to a multidisciplinary team that provides mental health, social work, parenting support services. At this program where the study took place, teen mothers were followed for three years from the birth of their child or until the mothers turned 21 years old. Most participants were African-American or Latina. The study participants were followed prospectively, with measurements being taken at baseline, 12 weeks, and one year. The scale used to measure depression in this study was the Center for Epidemiological Studies Depression Scale for Children (CES-DC). Other measurements that were taken included demographic information and social support, as measured by the Duke-UNC Functional Social Support Questionnaire instrument. Brown et al. (2012) found that depressive symptoms were prevalent among adolescent mothers. The mean CES-DC scores of the adolescent mothers in this study were greater than or equal to 16 points at all three time points during the study. A score of greater than or equal to 16 on this scale is suggestive of major depression (Brown et al., 2012).

Carta, Lefever, Bigelow, Borkowski, and Warren (2013) studied 371 adolescent mother and child pairs that were recruited from community health, early education, and social services agencies serving low-income families. In this randomized experimental design, the authors evaluated the effectiveness of two parenting interventions. The two parenting interventions were Planned Activities Training (PAT) and Cell-Phone Enhanced PAT (CPAT). The aim of PAT was to prevent challenging child behavior and improve parent-child interactions by focusing on specific parenting strategies like planning activities in advance, explaining activities, establishing rules and consequences, giving choices, talking to the child, using positive interaction skills, ignoring minor misbehavior, giving feedback, and providing rewards and consequences. The PAT intervention was delivered through home visits with a family coach, who modeled the strategies and provided positive feedback on the mother's use of the different strategies. CPAT also used PAT training, but participants assigned to this treatment group also received a cell phone and service for the intervention phase. The CPAT intervention group received individualized, focused text messaged about using the strategies two times per day.

Almost half of the participants self-identified as Hispanic, 33% identified as African America, 17% identified as European American, and 4% identified as mixed race or other. The measures were taken as a pre-test, post-test, and six month follow-up assessments. The scale used to assess depression in this study was the Beck Depression Inventory-II. Other assessment tools used to measure the outcome of the program included PAT checklist, Keys to Interactive Parenting Scale, Parenting Stress Index-Short Form, Behavioral Assessment Scale for Children-2-Parent Report Scale, and the Child Behavioral Rating Scale.

The results of this study showed that mothers receiving PAT and CPAT demonstrated more frequent use of parenting strategies and engaged in more responsive parenting than mothers

in the control group (Carta et al., 2013). Mothers receiving CPAT used more PAT parenting strategies than mothers in the other intervention or control groups and experienced greater reductions in depression and stress, and their children demonstrated higher levels of adaptive behaviors (Carta et al., 2013).

Crittenden, Boris, Rice, Taylor, and Olds (2009) studied predictors for rapid repeat pregnancy among a high-risk group of adolescents. The study used longitudinal data for 354 adolescent mothers that were a part of the Memphis trial of the Nurse-Family Partnership. The Nurse Family Partnership is a home visiting program that offers women, especially adolescents, support and knowledge from pregnancy until the child is two years old. The participants in this study were predominately African American and nearly half were from low income families. Measures were taken at baseline and by 24 months postpartum. Depression was measured in conjunction with two other mental health factors through the RAND Mental Health Inventory. Other factors defined as predictors for rapid repeat pregnancy that were measured in this study include aggression, substance use, negative life experience, birth control use, and sociodemographic factors. The study found that a baseline report of later age of first period and a greater likelihood of aggression were significantly associated with having a rapid repeat pregnancy (Crittenden et al., 2009). Depression was not a statistically significant association for rapid repeat pregnancy, which surprised the researchers. They thought it was due to study limitations, and suggested that pubertal onset and individual mental health as it relates to measures of aggression should be considered when developing programs targeting adolescents at highest risk for rapid repeat pregnancy (Crittenden et al., 2009).

Fagan and Lee (2010) studied the association between father involvement with the child and adolescent mothers' postpartum depressive symptoms. The study used data from the

Adolescent Father Involvement Intervention Project (AFIIP). The AFIIP assessed the impact of co-parenting and child development on young fathers and their adolescent partners. The interventions are only given to the fathers before the birth of the child. The co-parenting intervention focused on parenthood responsibilities, communication, sharing responsibilities with the mothers, and solutions to barriers for successful co-parenting. The child development intervention focused on pregnancy, labor and delivery, and baby care. One hundred adolescent mothers participated in the study. The majority of the mothers were African American or Latina. The study measured depression in the mothers prenatally and postpartum using the Center for Epidemiological Study's Depression Scale (CES-D). Other measures in this study included father's care giving involvement with the child, father's prenatal involvement, satisfaction with father involvement, parenting sense of competence, parenting stress, father's support of mother, and conflict. The researchers of this study found that higher levels of mothers' satisfaction with father involvement rather than perception of amount of fathers' care giving was significantly associated with fewer postpartum depressive symptoms (Fagan & Lee, 2010).

Logsdon, Birkimer, Simpson, and Looney (2005) studied the impact of a social support intervention using written and videotaped materials on the incidence of postpartum depression among adolescents who attended a teenage parent program. The materials had a low reading level when appropriate and were culturally sensitive. The materials described social support needed and desired by postpartum adolescents. The study took place with 128 participants in an alternative school of pregnant and parenting adolescents. This school provided transportation, child care, health services, and some individualized counseling. Over half of the participants were African American, and nearly 40% were Caucasian. Measures were taken at 32 to 36 weeks of pregnancy and again at six weeks postpartum. Depression was measured using the

Center for Epidemiological Studies of Depression (CES-D) scale. Other measurements taken during this study included social support and self-esteem. This study found that there were no significant differences in the CES-D scores among the groups at six weeks postpartum (Logsdon et al., 2005). However, the authors used path analysis to determine the predictors of symptoms at six weeks postpartum. The predictors of symptoms at six weeks postpartum were: receiving more support from friends, family and others, and having low self-esteem (Logsdon et al., 2005).

Miller, Gur, Shanok, and Weissman (2008) studied two different ways that interpersonal psychotherapy (ITP) for depression could be offered to pregnant adolescents in a New York City alternative high school for pregnant and parenting teens. During the first intervention, ITP was offered through health classes, and the second intervention offered ITP through the school to adolescent parents who had a DSM-IVR diagnosis with depressive or adjustment disorders. The majority of the 11 participants were African American or Hispanic. The measurements for the study were taken at pre-intervention week 0, post-intervention week 12, and at postpartum week 20. Several depression scales were used in each study to measure depression. For this meta-analysis, the Beck Depression Inventory at pre- and post-intervention was selected for data extraction for this study. The results of the first intervention showed that at the twelve week termination of the intervention, the level of depressive symptoms in participants decreased by 50%, and the second intervention showed a 40% decrease in the levels of depressive symptoms among participants(Miller et al., 2008).

Oswalt, Biasini, Wilson, and Mrug (2009) took a different approach to decreasing depression among teen mothers by examining the effects of an infant massage intervention on adolescent mothers' attitudes and perceptions of their infants. The authors wanted to see if mothers massaging their infants increased maternal-infant physical contact, lowered depression,

and influenced perceptions of infant temperament. Twenty-five African American adolescents who were enrolled in a parent training program for high school students called Young Mothers' Program were participants in this study, although only 15 completed both baseline and 2 month follow-up measures. The Beck Depression Inventory II (BDI-II) was used to measure depression. This study also measured maternal confidence and physical contact. This study found some support for teaching infant massage to adolescent mothers as a way of enhancing maternal-infant physical contact, lowering depression, and positively influencing mothers' perceptions of infant temperament (Oswalt et al., 2009)

Ramos-Marcuse et al. (2010) studied the prevalence and patterns of depressive symptoms among 181 urban, low income, first-time, African American adolescent mothers. These participants were recruited from urban hospitals after delivery to participate in a longitudinal randomized controlled trial of a home intervention that was designed to promote parenting and adolescent development. Measures were taken at baseline, six months, and 24 months after the birth of the child. The Beck Depression Inventory (BDI) was used to measure depression in adolescent mothers. Other measures this study assessed were self-esteem, life events, and parenting satisfaction. The results of this study showed that half of the mothers had BDI scores greater than nine at baseline, with significant correlations between BDI scores across all visits (Ramos-Marcuse et al., 2010). In addition, the study found that the high depressive symptom group reported lower self-esteem, more negative life events, and lower parenting satisfaction than the low and moderate depressive symptoms groups (Ramos-Marcuse et al., 2010).

Walkup et al. (2009) evaluated the efficacy of a paraprofessional-delivered, home-visiting intervention among young, reservation-based American Indian mothers on parenting knowledge, involvement, and maternal and infant outcomes. The treatment invention was the

Family Spirit Intervention, which was a home visitor program that reflected local native practices and included parenting lessons, family planning, substance abuse prevention, problem solving, and coping skills lessons. The control intervention was called the Breastfeeding Nutrition Control Group. This group received a previously developed breastfeeding nutrition education program through home visits. Home visits took place between 28 weeks prenatally to 6 months postpartum. There were 167 participants. Measures were taken at baseline, and two, six, and 12 months postpartum. The depression scale used for this study was the Center for Epidemiological Studies-Depression instrument. Other outcomes measured were parenting knowledge and involvement, home environment, child behavior, substance use, social support, and parenting stress. The results of this study showed that treatment mothers had greater knowledge gains than control mothers, but there were no between-group differences were found for maternal involvement, home environment, or mothers' stress, social support, depression, or substance use (Walkup et al., 2009).

4.3 META ANALYSIS RESULTS

Data analysis was conducted using the Comprehensive Meta Analysis software. The statistics for each study are listed below in Figure 1. There is a line of statistics at the bottom of all the studies which shows the "fixed" statistics and values. Fixed refers to the combined, pooled effect from the thirteen different interventions. From the data analysis, a high resolution plot was created. This plot is called a Forest plot, which graphically represents the effect of the studies. The Forest plot in Figure 1 shows the effect estimated and weight for each study. The box represents the mean effect estimate for the study. The area of the box represents the weight

given to that study, so that eyes are drawn towards the studies that have more weight (S. Lewis & Clarke, 2001). The horizontal line that runs through the square shows the confidence interval at a 95% confidence interval. The diamond at the bottom is the representation of the fixed value, and the horizontal tips of the diamond represents the confidence interval (S. Lewis & Clarke, 2001). The horizontal axis represents the scale measuring the intervention effect. The vertical axis represents that the intervention and control groups have the same effect.

The studies that are statistically significant are Brown et al. (2012), Miller et al. (2008), and Ramos-Marcuse et al. (2010), with p-values of 0.004, 0.027, and 0.015, respectively. The pooled effect value (the diamond) is statistically significant between the intervention and control groups (p=0.000). There are more episodes of outcomes in treatment groups than in control groups. The studies look like they are staggered and stacked and on the same side as the pooled effect estimate, which means the results are positive and have homogeneity.

5.0 DISCUSSION

This meta-analysis studied the effectiveness of thirteen different depression interventions for adolescent mothers from nine studies. Findings from these nine studies indicate an overall positive effect size of 0.207 (95% CI [0.115; 0.299]), with a p-value of 0.000. While this effect size is small, it is statistically significant. It is also generally consistent with the literature on depression interventions to reduce depression, with slight variation due to the populations studied and the types of therapy or interventions included (Jane-Llopis, Hosman, Jenkins, & Anderson, 2003; van der Waerden, Hoefnagels, & Hosman, 2011; Weisz, McCarty, & Valeri, 2006; Wilson & Lipsey, 2001).

5.1 INTERVENTION CHARACTERISTICS

Thirteen interventions that reduced depression in teen mothers were extracted from nine studies. There were three studies (Carta et al., 2013; Logsdon et al., 2005; Miller et al., 2008) that included more than one intervention within the study. This was why thirteen interventions were included in the meta-analysis. The overall pooled effect size was statistically significant, and of the thirteen studies, three were statistically significant by themselves. These studies took place in a variety of settings: one took place in a medical center, one in the home, and one in the school (Brown et al., 2012; Miller et al., 2008; Ramos-Marcuse et al., 2010). These interventions took a

multidisciplinary approach to decreasing depression in adolescent mothers. The multidisciplinary approach recognizes that there are many different social determinants to health. Where a mother and her child are born, live, work, play, grow and age can affect their health, so the multidisciplinary team tries to reach and affect those areas all at once instead of individually.

The multidisciplinary approach in Brown et al. (2012) was a teen tot clinic in a hospital. Teen tot programs provide a medical home for the teen mother and her child. The program was run by a multidisciplinary team that provided intensive mental health and social work services as well as affective and cognitive parenting sup0port (Brown et al., 2012). This approach allowed the teen mother to also receive care while the child is being cared for. The depression intervention in this study was a psychoeducational parenting group. Psychoeducational parenting groups would allow the teen mothers and group leaders to address mental health and their role as parents in a strength based, positive way. Strengths based training means that instead of telling a teen mother that she is feeding her baby the wrong way, one should frame it in a more positive, constructive, and helpful way either through modeling or other ways that suit the mother's learning needs the best. This intervention worked well because addressed multiple areas of life rather such as maternal health, child health, social services, and more rather than just focusing on, for example, mental health.

The multidisciplinary approach Miller et al. (2008) took was to bring interpersonal psychotherapy (IPT) with pregnant or parenting adolescents to the schools. This study took place at a school for pregnant and parenting teen girls in New York City. Almost all pregnant girls are transferred to this school by guidance counselors and principals (Miller et al., 2008). Miller's second pilot study, the IPT for pregnant and parenting girls with DSM-IVR diagnosis, was shown to have a positive and statistically significant effect in the meta-analysis. The

participants in this study had a diagnosis of depression. A group was formed where the girls would receive IPT as a group session for twelve weeks. IPT is a short-term, well-validated treatment for depression which focuses on depression as occurring within an immediate social context (Miller et al., 2008). The immediate social context is important because adolescents' brains are still developing and some might not have the ability to recall "fake" situations when they are truly in the situation. Focusing on immediate social contexts makes the situations easier to remember because it is IPT working in the present moment. IPT can be useful when treating pregnant and parenting adolescents because depression in this population is associated with interpersonal stressors like maternal conflict and conflict with the father of the child, so therapy can help teach the girls presently think about this situation and how to proceed further (Miller et al., 2008).

The multidisciplinary approach Ramos-Marcuse et al. (2010) took was to recruit adolescent mother participants enrolled in a longitudinal randomized controlled trial of a home intervention designed to promote parenting and adolescent development among low-income families, and recruit participants from three hospitals. The person who did the home intervention with the adolescent mother served as a connector who can connect the adolescent mother with resources to help her and her child stay happy, healthy, and live a better life. This study found that 36% of adolescent mothers continued to have depressive symptoms at 24 months, when these symptoms should decline as maternal hormones stabilize and as mothers adjust to their new caregiving role. A multidisciplinary approach could help stabilize or prevent depressive symptoms in adolescent mothers by continuing to provide mental health services in an appropriate way for the mothers.

5.2 LIMITATIONS

Some limitations to this study should be noted. First, despite extensive searching for studies that met the search criteria, only nine studies were found. This meta-analysis does not include every study that has been published on the topic of adolescent mothers and depression. There are many wonderful interventions and programs to reduce depression in teen mothers that were not included because they did not meet the inclusion criteria. A small number of studies proved to be best for an exploratory meta-analysis.

Another limitation to this study was that the study measures are specific to depression. Several of the studies included in the meta-analysis measure other variables like social support, self-esteem, and mental health stigma, among others. These variables could influence the symptoms of depression. For example, a teen mother who has high social support is less likely to have depression compared to someone with little or no social support. An interesting direction for future work would be to run a meta-analysis with all of these variables, as they are related to depression. These variables might be moderator variables that influence the intervention effects.

One final limitation was that these studies had small sample sizes. There is a greater need to public health professionals to do evaluation research on these programs and with differing populations so that there can be appropriate sample sizes and trials. Evaluation research can also help improve the internal and external validity of the interventions. Improving the internal validity of an intervention would minimize error or bias. Improving the external validity of an intervention would generalize it to other populations. When this occurs, there will be better interventions.

5.3 PUBLIC HEALTH PRACTICE IMPLICATIONS

Developing interventions to reduce depression among teen mothers and researching their effectiveness is only the first step toward improving teen mothers' health and well being. Translating efficacious programs into real world setting and maintaining them there is a complicated, long term process that requires dealing effectively with the successive, complex phases of dissemination, adoption, implementation, and sustainability (Durlak & DuPre, 2008). Dissemination is how well information about a program's existence and value is supplied to communities (Durlak & DuPre, 2008). Adoption is when a local group or organization decides to try the new program (Durlak & DuPre, 2008). Implementation is how well the program is conducted during the trial period, and sustainability is whether the program is maintained over time (Durlak & DuPre, 2008). These phases make up knowledge translation, which is how knowledge and research can be transferred into practice and policy to improve people's lives and health.

This section of the thesis discusses how this meta-analysis research can be translated into practice via the socioecological model. The socioecological model is a good model to use for this research because depression interventions for teen mothers are not just about where the intervention takes place, but at which levels. The socioecological model can also be used to plan and frame a multidisciplinary approach to preventing or decreasing depression among teen mothers. This multidisciplinary approach involving the levels of the socioecological model recognizes that there are many different social determinants of health. Where a mother and her child are born, live, work, play, grow, and age can affect their health, so multidisciplinary teams and levels can reach and affect all those areas at once instead of individually. This approach meets teen moms where they are. This multipdisciplinary approach with input via the

socioecological model levels support knowledge translation and can work together to create a great example of public health practice.

The individual level of the socioecological model describes influencing an individual to change or educate her on her behaviors and attitudes. A program or intervention to reduce depression in teen mothers works at the individual level by providing them with education about depression, an outlet express themselves, and tools or ideas to help work through those feelings. A few concepts are needed to have a successful program to reduce depression. The program needs to be non-stigmatizing and strengths based. No teen mother should have to feel bad or stigmatized for seeking help. A strength based approach is a positive way to influence a change in attitudes or behaviors and helps the teen mothers continue to get the mental health care that they need. These programs can help increase the teen mother's self-efficacy by helping her discover her strength and increasing her belief that she can be a good mother and that it is ok to ask for help.

The interpersonal level facilitates individual behavior change by affecting social and cultural norms. This level consists of family members and peers, who can provide social support to the teen mother. Having strong social supports and social networks can decrease depression, especially because social isolation can predict depressive symptoms. However, Yozwiak (2010) points out the increasing overall social support may be misguided, and even counter therapeutic, because providing support when it is not warranted or needed may convey to the adolescent mother that she is deficient in her ability to care for her child. A thorough assessment of the adolescent's support needs would ensure that the support offered matches the expectations of the adolescent so that her self-efficacy is promoted and enhanced, rather than diminished (Yozwiak,

2010). It is important to establish relationship with the teen mother. These relationships can come in the forms of family members, peers, or clinicians, among others.

The organizational level includes agencies and organizations that work with the adolescent mother population. These agencies and organizations include heath care systems, schools, non profits, and other community based organizations. These organizations are often the groups bringing in programs for the adolescent mother population. The information presented in this thesis needs to be disseminated to these groups to show that depression in adolescent mothers is a significant public health issue. Mental health is an issue that is not actively discussed and is still stigmatized. Staff at these organizations might not feel comfortable discussing mental health due to their own experiences with it or their own misconceptions about mental health. For example, in one community based organization in Pittsburgh, PA for pregnant and parenting teen mothers, bad behavior and acting out and moodiness by the adolescents was interpreted by the staff as the girls just being teenagers, when in actuality, it could have been an underlying depression, mental health issue, or trauma that caused them to act that way. There is a need for staff training on mental health and trauma informed care so that staff at these organizations can spot and effectively work to reduce depression in teen mothers. Dissemination of this research to these organizations and the staff should also be done in a strength based way. It is not appropriate to go into an organization and try to change everything without input from the organization and its staff. It is appropriate to work with an organization and its staff to collaborate and work to integrate or adopt a depression or mental health component into their existing programs or curriculum for parenting adolescents. Innovative methods should be addressed, such as the multidisciplinary team approach or the use of cell phones to continue contact with the teen mothers.

The community level promotes collaboration with other organizations or groups to provide the best care for adolescent mothers and their children. This works by establishing relationships. Not just the interpersonal relationship between clinician or staff and the teen mother, but relationships within the community to connect resources and work together to reduce depression in teen parents. These relationships will allow for appropriate referrals to mental health agencies in the community that can optimize care for adolescent mothers and their children (Hodgkinson et al., 2014). An example of the community approach is the multidisciplinary teams that provide teen-tot clinics. This brings in a variety of providers in one space that follows a comprehensive care model. This erases stressors that teen mothers may experience when trying to schedule appointments like finding child care, transportation, and missing school. These comprehensive care models can be flexible and meet the teen mothers' needs regarding time. There is an additional need for continuous screening for depression and referral to appropriate resources. It has been recommended in the literature that health providers of all disciplines be involved in screening and educating mothers about depression (Meadows-Oliver & Sadler, 2010).

The last level of the socioecological model is policy. Federal, state, and local governments can support the programs that reduce teen mother depression and increase positive health outcomes for mother and child. Some policy initiatives that this research can support are the need to build stronger families and providing resources for children. This can be accomplished by budgeting for compensatory resources like home visiting programs, Early Head Start, and other programs that support women and children. These programs are addressing the whole adolescent mother and the whole child, not just focusing on one small area like mental

health. Investment in these programs while the child of an adolescent mother will most likely save costs, and promotes health education and better lives from a young age.

The socioecological model shows that all levels need to work together in order to change the stigma and access of mental health care in teen mothers. Every level is influenced by the levels above it. By working together in a multidisciplinary approach, many health outcomes are also improved, not just mental health.

6.0 CONCLUSION

This meta-analysis showed that overall, depression interventions are significant. The pooled effect size of the meta-analysis showed one statistically significant conclusion from multiple studies, which indicated that overall, these interventions work. The meta-analysis also showed that multidisciplinary approaches should be explored as a viable option for interventions or programs.

Although modest and exploratory, this research can help start a conversation within different organizations that work with this population to help them discover ways they can adopt and implement these effective interventions throughout their programs or curriculum to decrease depression in teen mothers. These programs will not only help the teen mothers, but also increase awareness among staff about depression. This will allow staff to improve their understanding of depression and be better equipped to help their clients.

There are several different future directions for this meta-analysis research. First, additional studies with different measures of change in depression scores, like means, standard deviations, and odd's ratios, among others, should be included in another meta-analysis. There could be a greater significance in changes in depression scores overall if more studies were included. Another direction for future work would be to run a meta-analysis with multiple variables as they relate to depression. Several of the studies included in this meta-analysis measured other variables like social support, self-esteem, and mental health stigma, among

others. These variables could influence the symptoms of depression. For example, a teen mother who has high social support is less likely to have depression compared to someone with little or no support. The meta-analysis or other statistical tests could determine if these other variables are moderator variables that influence the intervention effects. Finally, there is a need for evaluation research to further test interventions and programs for the general adolescent mother population so that the best programs and interventions are being given. It would also be a good idea to research the role of multidisciplinary approaches within the interventions and programs.

It is of public health significance to reduce depression among teen mothers so that they and their children can grow up to lead happy, healthy, and successful lives.

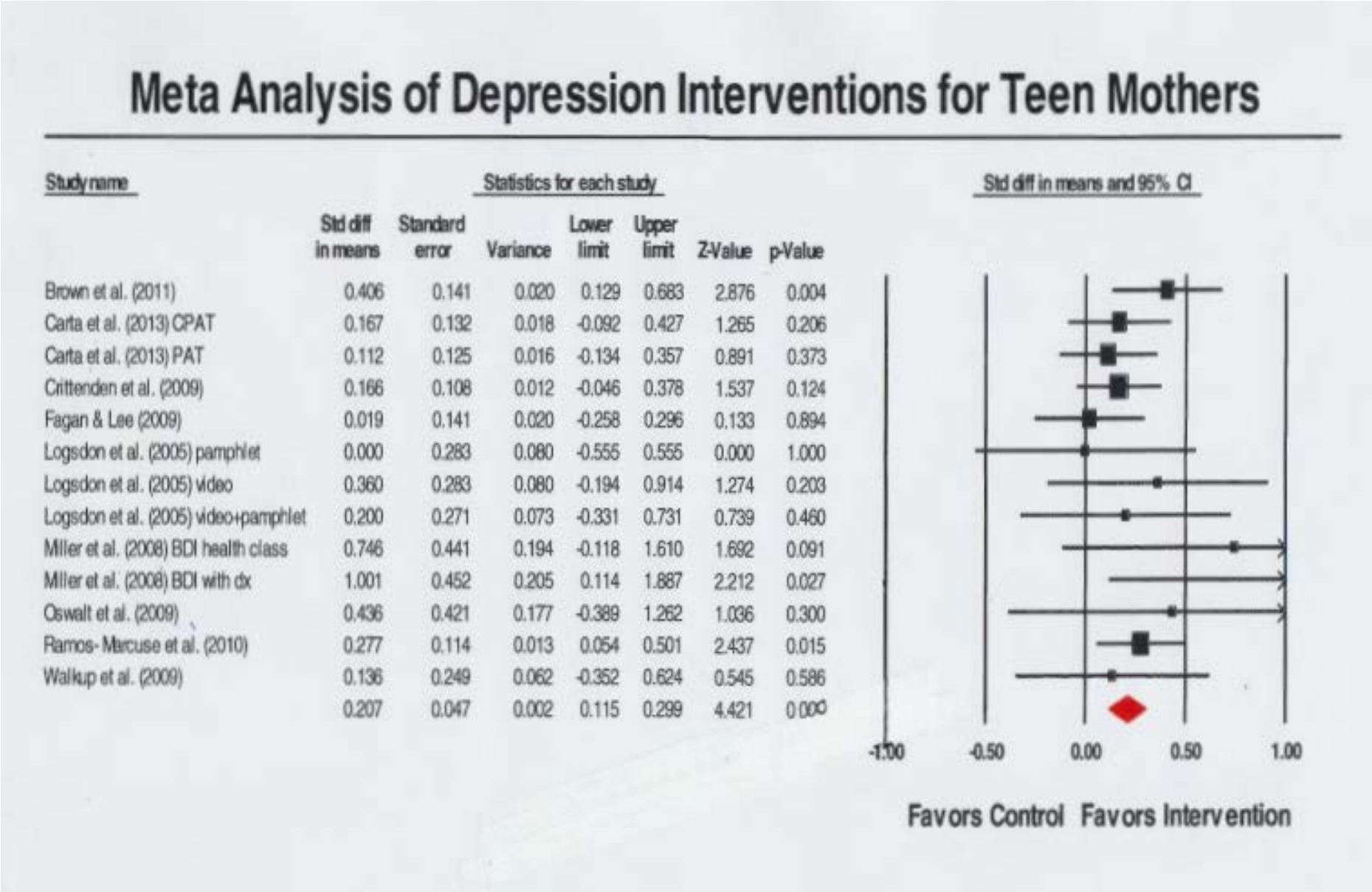

Figure 1. Meta Analysis of Depression Interventions for Teen Mothers

APPENDIX A

PUBMED SEARCH HISTORY

Search	Query	Items found
#56	Search (((((((("Questionnaires"[Mesh]) OR "Psychiatric Status Rating Scales"[Mesh]) OR "Severity of Illness Index"[Mesh]) AND adolescent[MeSH])) AND "Pregnancy in Adolescence"[Mesh]) AND "Depressive Disorder"[Mesh])) AND ((((((("Questionnaires"[Mesh]) OR "Psychiatric Status Rating Scales"[Mesh]) OR "Severity of Illness Index"[Mesh]) AND adolescent[MeSH])) AND "Pregnancy in Adolescence"[Mesh]) AND "Depressive Disorder"[Mesh]) AND adolescent[MeSH]) Filters: Adolescent: 13-18 years	9
#55	Search ((((("Questionnaires"[Mesh]) OR "Psychiatric Status Rating Scales"[Mesh]) OR "Severity of Illness	24

Search	Query	Items found
	Index"[Mesh]) AND adolescent[MeSH])) AND "Pregnancy in Adolescence"[Mesh]) AND "Depressive Disorder"[Mesh]	
#54	Search ((((((("Questionnaires"[Mesh]) OR "Psychiatric Status Rating Scales"[Mesh]) OR "Severity of Illness Index"[Mesh]) AND adolescent[MeSH])) AND "Pregnancy in Adolescence"[Mesh]) AND "Depressive Disorder"[Mesh] Filters: Adolescent: 13-18 years	24
#53	Search (((((((("Questionnaires"[Mesh]) OR "Psychiatric Status Rating Scales"[Mesh]) OR "Severity of Illness Index"[Mesh]) AND adolescent[MeSH])) AND "Mothers"[Mesh]) AND "Adolescent"[Mesh]) AND "Depressive Disorder"[Mesh] Filters: Adolescent: 13-18 years	24
#52	Search (((((((("Questionnaires"[Mesh]) OR "Psychiatric Status Rating Scales"[Mesh]) OR "Severity of Illness Index"[Mesh]) AND adolescent[MeSH])) AND "Mothers"[Mesh]) AND "Adolescent"[Mesh]) AND "Depressive Disorder"[Mesh] Filters: Adolescent: 13-18 years	136
#51	Search (("Questionnaires"[Mesh]) OR "Psychiatric	490306

Search	Query	Items found
	Status Rating Scales"[Mesh]) OR "Severity of Illness Index"[Mesh]	
#50	Search (("Questionnaires"[Mesh]) OR "Psychiatric Status Rating Scales"[Mesh]) OR "Severity of Illness Index"[Mesh] Filters: Adolescent: 13-18 years	108200
#45	Search (((((((("Intervention Studies"[Mesh]) OR "Clinical Trials as Topic"[Mesh]) OR "Program Evaluation"[Mesh]) OR "Case-Control Studies"[Mesh]) AND adolescent[MeSH])) AND "Mothers"[Mesh]) AND "Adolescent"[Mesh]) AND "Depressive Disorder"[Mesh]	16
#44	Search (((((((("Intervention Studies"[Mesh]) OR "Clinical Trials as Topic"[Mesh]) OR "Program Evaluation"[Mesh]) OR "Case-Control Studies"[Mesh]) AND adolescent[MeSH])) AND "Mothers"[Mesh]) AND "Adolescent"[Mesh]) AND "Depressive Disorder"[Mesh] Filters: Adolescent: 13-18 years	16
#43	Search ((("Intervention Studies"[Mesh]) OR "Clinical Trials as Topic"[Mesh]) OR "Program Evaluation"[Mesh]) OR "Case-Control Studies"[Mesh] Filters: Adolescent: 13-18 years	184080

Search	Query	Items found
#42	Search ((("Intervention Studies"[Mesh]) OR "Clinical Trials as Topic"[Mesh]) OR "Program Evaluation"[Mesh]) OR "Case-Control Studies"[Mesh]	956483
#38	Search ((("Adolescent"[Mesh]) AND "Mothers"[Mesh]) AND "Depressive Disorder"[Mesh]) AND ((((("Intervention Studies"[Mesh]) OR "Pilot Projects"[Mesh]) OR "Program Evaluation"[Mesh]) OR "Clinical Trials as Topic"[Mesh]) OR "Epidemiologic Study Characteristics as Topic"[Mesh]) AND adolescent[MeSH]) Filters: Adolescent: 13-18 years	405061
#37	Search ((("Adolescent"[Mesh]) AND "Mothers"[Mesh]) AND "Depressive Disorder"[Mesh]) AND ((((("Intervention Studies"[Mesh]) OR "Pilot Projects"[Mesh]) OR "Program Evaluation"[Mesh]) OR "Clinical Trials as Topic"[Mesh]) OR "Epidemiologic Study Characteristics as Topic"[Mesh]) AND adolescent[MeSH])	405061
#36	Search "Adolescent"[Mesh]	1564337
#35	Search "Adolescent"[Mesh] Filters: Adolescent: 13-18	1564337

Search	Query	Items found
	years	
#33	Search adolescent	1588469
#32	Search adolescent Filters: Adolescent: 13-18 years	1564337
#31	Search "Mothers"[Mesh]	25025
#30	Search "Mothers"[Mesh] Filters: Adolescent: 13-18 years	5470
#28	Search (("Intervention Studies"[Mesh]) OR "Pilot Projects"[Mesh]) OR "Program Evaluation"[Mesh]) OR "Clinical Trials as Topic"[Mesh]) OR "Epidemiologic Study Characteristics as Topic"[Mesh] Filters: Adolescent: 13-18 years	409632
#27	Search (("Intervention Studies"[Mesh]) OR "Pilot Projects"[Mesh]) OR "Program Evaluation"[Mesh]) OR "Clinical Trials as Topic"[Mesh]) OR "Epidemiologic Study Characteristics as Topic"[Mesh]	1987462
#9	Search ("Depressive Disorder"[Mesh]) AND "Pregnancy in Adolescence"[Mesh]	82
#8	Search "Maternal Health Services"[Mesh]	33844
#6	Search "Depression, Postpartum"[Mesh]	3195
#4	Search "Depressive Disorder"[Mesh]	78113
#2	Search "Pregnancy in Adolescence"[Mesh]	6493

APPENDIX B

PYSCINFO SEARCH HISTORY

Search	Query	Items found
1.	exp Adolescent Pregnancy/or exp Adolescent Mothers/	3735
2.	exp Major Depression/or exp 'Depression (Emotion)'/	110505
3.	1 and 2	191
4.	exp Intervention/	57205
5.	3 and 4	9
6.	exp Postpartum Depression/	2994
7.	2 or 6	110505
8.	1 and 7	191
9.	Find similar to Depression among adolescent mothers enrolled in a high school parenting program	123

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