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Evaluating a Stepped Care Protocol for Postpartum Depression in a Pediatric Primary Care Clinic

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A dissertation

presented to

the faculty of the Department of Psychology

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Doctor of Philosophy in Psychology

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by

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August 2017

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Keywords: RE-AIM, postpartum depression, primary care, pediatrics, behavioral health consultant

ABSTRACT

Evaluating a Stepped Care Protocol for Postpartum Depression in a Pediatric Primary Care Clinic

by

Sarah Courtney Smith

Postpartum depression (PPD) is a prevalent, complex illness impacting 10% to 20% of mothers and their families. Treatments for PPD, such as medication and psychotherapy, are effective at reducing the severity of symptoms and generally improving quality of life for new mothers and their families. Unfortunately, many mothers with PPD go unrecognized due to a lack of standardized screening methods. Further, mothers regularly encounter barriers to accessible, evidence-based follow-up care to treatment even when symptoms of PPD are detected. The use of a stepped care protocol, set in a pediatric primary care clinic, is one proposed strategy to address the insufficient rates of screening, detection, and maternal contact with treatment. This study examines the feasibility of implementing a stepped care protocol to screen and provide brief therapeutic treatment to mothers reporting symptoms of PPD in one pediatric primary care clinic. The RE-AIM (*reach*, *effectiveness*, *adoption*, *implementation*, and *maintenance*) framework was used to evaluate implementation outcomes. Results suggest this stepped care protocol was feasibly implemented in one pediatric primary care clinic. The protocol was largely successful in screening mothers at a majority of well child checks (83.76%) for PPD and connecting them with resources based on the severity of symptoms reported. Future studies should further evaluate the impact brief onsite mental health treatments have on reports of PPD symptoms, longitudinal maternal and child outcomes as a result of the protocol, as well as the protocol's replicability to pediatric practices elsewhere.

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CHAPTER 1

INTRODUCTION

Prevalence and Terminology

Interest in the prevalence rates and treatment of maternal depression has increased over the past two decades. The publication of the U.S. Surgeon General's Report on Mental Health (2000) catalyzed a call to arms to healthcare providers to detect and treat depression in women following childbirth (US Public Health Service, 2000). Soon after the report, PPD was classified as the most common postnatal complication (Wisner, Parry, & Piontek, 2002). However, prevalence *and* definitions across the globe appear widely varied in published literature. A recent meta-analysis (Norhayati, Hazlina, Asrenee, & Wan Emilin, 2015) found the prevalence of PPD ranges from 1.9% to 82.1%, with Germany reporting the lowest percentage and the United States reporting the highest rate and with the greatest range (3.4% to 82.1%). Commonly cited rates of occurrence fall in the range of 10% to 20% of mothers (Gaynes et al., 2005; Gold, 2002; O'Hara & Swain, 1996), and the American Academy of Pediatrics asserts about 12% of children are born to mothers with PPD every year (APA, 2010), with rates doubling in low-income and teenage mothers in the United States (Isaacs, 2004).

There are several labels used to describe depressive symptoms occurring around the time of childbirth. PPD terminology is varied in the literature based on symptom clusters and symptom onset. *Postpartum blues*, more colloquially referred to as the "baby blues," occurs in about 50% to 85% of women immediately following delivery, with symptoms peaking in severity around the fourth day, then remitting naturally within about 10 days to 2 weeks (Cohen et al., 2010). Symptoms include, but are not limited to, brief crying spells, sadness, poor sleep, and irritability. These symptoms appear consistent with major depressive disorder symptoms;

however, due to the brevity and mild severity, postpartum blues do not typically require treatment. On the other end of the spectrum is *postpartum psychosis*, a rare (0.1%-0.2%) occurrence that includes symptoms of paranoia, disorganized thoughts, impulsivity, hallucinations, delusions, and possible thoughts of infanticide and suicide. The severity of postpartum psychosis requires immediate treatment, such as a psychiatric evaluation and possible hospitalization (Guille, Newman, Fryml, Lifton, & Epperson, 2013) to protect the infant and the mother. *Antenatal depression* describes the occurrence of depressive symptoms during pregnancy (Cohen et al., 2010) and occurs in about 10% of pregnant women (Mukherjee, Trepka, Pierre-Victor, Bahelah, & Avent, 2016). Some symptoms of antenatal depression may resolve during pregnancy, soon after childbirth, or could increase the risk for depression following childbirth.

Postpartum depression (PPD), the most common label used to describe depression in women after childbirth, is often used interchangeably with labels such as "maternal depression" and "perinatal depression" (though perinatal depression can encompass both antenatal and postnatal depressive disorders). PPD is characterized as a depressive period during which a range of symptoms appear at any time during the first year following childbirth. In a past reference manual, the Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revised (APA, 2000), the American Psychiatric Association (APA) used the term PPD to refer to depressive symptoms occurring after childbirth; however, the current Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM 5; APA, 2013) now refers to PPD as *peripartum major depressive episode*. The DSM 5 does not recognize peripartum depression as a distinct disorder with a specific code but considers it a clinical Specifier of Depressive Disorders. The

DSM 5 (APA, 2013) stipulates the onset of peripartum depression must occur during pregnancy or within the first four weeks of childbirth.

Table 1, adapted from Guille et al., provides an overview of MDD and how those symptoms manifest as PPD and distinguishes between expected stressors of new motherhood and clinically relevant concerns. Symptomatic manifestations of PPD (see Table 1) can include excessive sadness, tearfulness, increased anxiety, guilt, difficulty concentrating, sleep disturbances, loss of interest in previously enjoyable activities, as well as suicidal ideation (Patel, Bailey, Jabeen, Ali, & Barker, 2012). According to the DSM 5, severity of MDD/peripartum symptoms can range from moderate to severe, the definitions of which are unclear but are presumably determined using clinical judgment, and are considerably worse than the mild, brief depressive symptoms of the “baby blues” (Cohen et al., 2010).

Table 1. *Consideration for the Diagnosis of Major Depression with Postpartum Onset Adapted from Guille, Newman, Fryml, Lifton, & Epperson (2013)*

DSM 5 Diagnosis of Major Depression (5 or more symptoms) with at least 1 being #1 or #2, present for most of the day, nearly every day for at least 2 weeks	**Occurrence in the postpartum period**	**Suggestive of Postpartum Depression**
1) Depressed mood	Common in "baby blues"; typically peaks 4 to 5 days after birth, may last hours to days and resolve by 2 weeks	Sad or depressed mood that persists daily for at least 2 weeks.
2) Lack of pleasure or interest in activities	Uncommon after childbirth	Inability to derive pleasure from experiences or lack of interest in things that are normally enjoyable.
3) Sleep disturbance	Common due to newborn care	Inability to rest or sleep when newborn is sleeping or inability to care for newborn because of hypersomnia.
4) Loss of energy	Common due to sleep deprivation	Continues despite adequate sleep or napping
5) Agitation or retardation	Uncommon after childbirth	Moving or speaking so slowly that others have noticed or being so fidgety or restless that one is unable to sit still.
6) Excessive feelings of guilt or worthlessness	Uncommon after childbirth	Feeling badly about oneself, feeling like a failure, or having let self or family down
7) Diminished concentration or indecisiveness	Common due to sleep deprivation	Frequently losing train of thought or inability to make decisions
8) Frequent thoughts of death or suicide	Uncommon after childbirth	Thoughts of "I wish I would not wake up" or "my baby would be better off without me" or intent, desire or plans to end one's life.

The wide-ranging terms used to measure and describe depression in women after childbirth create a challenge when attempting to integrate findings. Though the DSM 5 now refers to PPD as peripartum depression, this paper will employ the term PPD to mean either a single episode of major depression or major depressive disorder occurring during the first year following childbirth (Gaynes et al., 2005), since this is generally the most common definition, and a more stringent operational definition is not relevant for this study, since this study addresses clinical impairment and distress related to depressive symptoms following childbirth, regardless of a precise diagnosis.

PPD Symptom Trajectory

A longitudinal study conducted by Horowitz and Goodman (2004) assessed mothers for 2 years following childbirth and found PPD to peak around 4-8 weeks postpartum, decreasing over time with notable significant mean change in scores from 4-8 weeks to 10-14 weeks and no significant mean changes from weeks 10-14 to 14-18 weeks. Additionally, mothers who reported persistent PPD at 10-14 weeks continued to experience symptoms for at least 2 years following childbirth, at which time the study ended and further assessment of symptoms ceased (Horowitz & Goodman, 2004). These results suggest two pathways: 1) those whose symptoms peak early and improve in the first three months after childbirth, and 2) those whose symptoms increase during the first three months and remain stable over a longer period of time.

Etiology and Risk Factors

To date, research shows a myriad of biological, genetic, psychological and social risk factors can place mothers at a higher risk of experiencing PPD, with compounding risk as the number of risk factors increases. Biological factors for PPD include poor physical health (Sword et al., 2011), higher body weight, and having a negative body image (Green, Broome, &

Mirabella, 2006). Couto and colleagues (2015) assert genetics (e.g., 5HTT, TPH, OXTR genes) may play a pivotal role in the development of PPD, and depression in general, as discussed in their recent systematic review of the literature.

The list of psychological risk factors is lengthy and includes a history of antenatal depression (Lee, Lam, Sze Mun Lau, Chong, Fong, 2007), anxiety, as well as a previous history of other psychiatric illnesses (e.g., depression, bipolar disorder; APA, 2013) and substance abuse (Rich-Edwards et al., 2006). Additional psychosocial risk factors include poor marital relationship, stressful life events (Escriba-Aguir & Artazcoz, 2011), childcare stress (Leung, Martinson, & Arthur, 2005), a negative attitude toward pregnancy (Kitamura et al., 2006), poor quality of life (de Tychey et al., 2005), and a perceived high level of stress (Wang & Chen, 2006).

Socio-demographic factors predicting PPD include young maternal age (Sword et al., 2011), low education level (Chien et al., 2006), low income (Eastwood, Jalaludin, Kemp, Phung, Barnett, 2012), and unemployment (Rubertsson, Wickberg, Gustavsson, Rådestad, 2005). One of the most significant predictors of PPD is the lack of social support from family and friends (Gaillard, LeStra, Mandelbrot, Keïta, Dubertret, 2014). Studies of risk factors that have rendered inconclusive findings of their contribution to PPD include unplanned pregnancies, sex of child, mode of delivery, and the non-initiation of breast-feeding (Norhayati et al., 2015). The numerous of biological, psychological, and genetic variables related to PPD onset and severity makes the task to prevent or lessen symptoms as well as treat the underlying cause an uphill battle, especially when it comes to a starting point in care.

Impact of PPD on Mothers and their Children

If left untreated PPD can have short- and long-term deleterious effects on the mother and the child. PPD can increase a mother's risk for future psychiatric illnesses and substance abuse and decrease her adaptive functioning (Norhayati et al., 2015). The impact of PPD can also extend to poorer family functioning (e.g., increased arguments with spouse, disrupted daily routines) and work productivity (Beck, 2001; Stewart, Ricci, Chee, Hahn, & Morganstien, 2003).

Mothers with PPD are less emotionally and physically able to care for their child (Kingston, Tough, & Whitfield, 2012). From a pediatric perspective, research shows PPD can distract from pediatric safety practices such as securing a child's car seat or bringing a child to their Well Child Check visits (WCC; Mandl, Tronick, Brennan, Alpert, & Homer, 1999), and may contribute to decreased rates of breastfeeding (McLennan & Kotelchuck, 2000) and poorer response to their child's hunger signs and boredom (Beck, 1995). Moreover, families with at least one parent coping with depression are also more likely to over-utilize pediatric acute healthcare services in young ages (Sills, Shetterly, Xu, Magid, & Kempe, 2007).

One hypothesized mechanism through which PPD can have negative consequences on child development is poor attachment or infant-mother bonding. Mother-child dyads with a healthier and secure attachment predict appropriate emotional development in children (Onunaku, 2005), whereas mothers who are depressed are more likely to develop less secure attachments with their children, which can result in poorer emotional development within the child (Beck, 1995). This lack of attachment can function as a negative feedback loop, resulting in a child with a lowered interest in interacting with his/her mother and impeding a mother's attempts to develop intimacy with her child, thereby resulting in a cyclical pattern of depression in the mother later in life.

Negative effects of PPD can extend from infancy into important early childhood domains, such as developmental, behavioral, emotional, and physiological functioning. Developmentally, if mothers do not spend an adequate amount of quality time with their child then language acquisition may be delayed (NICHD, 1999). Children of mothers who had PPD are more likely to exhibit behavioral disturbances in later toddler and early childhood years (NIHCM, 2010), and having a parent with depression, PPD or otherwise, is also a risk factor for the onset and persistence of major depressive episodes in adulthood (Lara & Klien, 1999). Children of mothers who had PPD is correlated to stress placed on the hypothalamic-pituitary-adrenal system which results in increased levels of cortisol. Increased levels of cortisol impact one's ability to appropriately adapt behaviorally to future stress; therefore, chronic environmental stress early in life, such as maternal depression, during critical brain development periods. This can negatively impact a child's physiology, placing them at a higher risk for internalizing disorders, such as anxiety, social wariness, withdrawal, and externalizing and disruptive behaviors (Essex, Klein, Cho, & Kalin, 2002).

Not only can PPD impact psychosocial functioning of the mother-child dyad and family, PPD can be a monetarily costly illness and contributes to the overall high treatment cost of depression in the United States. The exact economic burden of PPD is unknown since there are no reliable mechanisms to evaluate specific burdens; however, in 2000 it was estimated that general depression was responsible for $26.1 billion dollars in direct medical costs, $5.4 billion in suicide-related mortality costs, and $51.1 billion in workplace costs (NICHM, 2010). Furthermore, these numbers do not appear to include pediatric costs of frequent acute and emergency pediatric visits (Sills et al., 2007), and more developmental and behavioral issues

requiring treatment (Essex, Klein, Cho, & Kalin, 2002; NICHD, 1999), which could contribute to a higher economic burden on the family as well as the healthcare system.

Treatment Options

If more moderate or severe symptoms are left untreated, PPD is unlikely to remit (O'Hara & Swain, 1996) and symptoms continue to impact maternal, child and family functioning. Fortunately, there is evidence to suggest PPD can be treated successfully. Effective treatments for PPD include psychotherapy and psychopharmacology, and the National Institute for Health Care Management (2010) offers an outline for recommended PPD treatment modality according to reproductive status. Intuitively, the earlier treatment begins, such as when symptoms first emerge and during infancy of the child, the more opportunity for reduced risk in the mother and child (Essex et al., 2002).

Psychotherapy is often the first line treatment for mild to moderate depression (Freeman, Joffe, & Cohen, 2012), and it is well-documented that mothers typically prefer psychotherapy instead of medication, as mothers are often concerned of exposing their newborn to medication via breastfeeding (Dennis & Chung-Lee, 2006; Pearlstein et al., 2006). Peer support and interpersonal therapy (IPT) are two researched modalities of treatment that have demonstrated moderate reductions in symptoms in patients when compared with treatment as usual groups.

A multisite randomized controlled trial (Dennis et al., 2009) found peer support telephone calls (mother-to-mother) to be a helpful method in preventing postnatal depression in women considered high risk (screening within the "At-Risk" or "Clinically Significant" ranges of the Edinburgh Postnatal Depression Scale; EPDS; Cox, Holden, & Sagovsky, 1987). Mothers were eligible for the study if they were two weeks postpartum and at least 18 years of age. Mothers were then randomized to a control group or an intervention group. The intervention group

included access to all standard postpartum care (i.e., services from public health nurses, physicians, and various community providers or resources) and a match with a peer volunteer, similar in demographic categories, who made at least 4 contacts with the mother, or more as desired, with an average of 8 contacts. The control group only had access to those services if they were actively sought out by the mother. Nurses blinded to the conditions followed-up with mothers at 12 and 24 weeks postpartum and found women in the intervention group were significantly less likely than those in the control group to report symptoms of postpartum depression (Dennis et al., 2009).

Another randomized controlled trial found brief (9 sessions) Interpersonal Therapy for mothers (IPT-MOMS) was effective at reducing symptoms of depression, as measured by the Hamilton Depression Rating Scale, and increasing functioning, as measured by the Global Assessment of Functioning, compared to the treatment as usual group (i.e., provided feedback on score, psychoeducation, and encouraged to seek treatment) at 3- and 9-month follow-ups (Swartz et al., 2008). A similar study found comparable results using Interpersonal Therapy Brief (IPT-B; 8 sessions) compared with a treatment as usual group (Grote, Swartz, Geibel, Zuckoff, Houck, and Frank, 2009). Grote et al. (2009) concluded IPT-B can help to reduce PPD symptoms and improve social functioning. Stuart and O'Hara (1995) also found mothers with PPD who were randomly assigned to a 12-week manualized IPT treatment, compared to a waitlist condition, reported significantly fewer depressive symptoms, as well as significant improvements in their relationships with their partners at the end of treatment.

In a study conducted by Cooper, Murray, Wilson, & Romaniuk (2003) in the United Kingdom, short- and long-term maternal mental health outcomes, as measured by the Edinburgh Postnatal Depression Scale (Cox et al., 1987), were assessed in 193 mothers at four distinct times

(4.5, 9, and 18 months postpartum and 5 years postpartum) across 5 years. Mothers were assigned to one of four groups (routine primary care, non-directive counseling, cognitive-behavioral therapy, psychodynamic therapy). This study found all three treatment groups notably improved maternal mood 4.5 months following treatment, but failed to find detectable difference in the number of mothers who spontaneously remitted from depression and those who were treated soon after giving birth from 9 months to 5 years.

Acceptance and Commitment Therapy (ACT) is another form of psychotherapy with empirical support to treat a range of psychological concerns (Substance Abuse and Mental Health Service Administration, 2010). ACT works to alter one's relationship with internal experiences (i.e., unhelpful thoughts, physiological sensations) to strengthen value-directed action (Hayes, Strosahl, & Wilson, 1999). ACT has been shown to reduce depressive symptoms in adults. Bohlmeijer, Fledderus, Rokx, and Pieterse (2011) conducted a study in which 49 participants were assigned to receive ACT for two hour sessions for eight weeks, and 44 participants were assigned to a waitlist control. The average depression score among those who received the ACT intervention was below cut-off and significantly lower than the waitlist controls immediately following treatment and three months following treatment.

Focused Commitment and Acceptance Therapy (FACT), a briefer form of ACT, designed for use in primary care settings, improves access to effective and short-term treatments. One study found FACT was just as effective at Solution-Focused therapy but yielded fewer dropouts (Strosahl, Hayes, Bergan, and Romano, 1998); however, more research is needed to support and examine the utility of FACT in primary care settings.

For mothers experiencing moderate to severe PPD, and/or who have comorbid symptoms, such as anxiety, or are unresponsive to therapy, antidepressants are often a

recommended and appropriate treatment starting point. Significant improvements in depressive symptoms are well-documented for mothers using antidepressants, including fluoxetine (Prozac), sertraline (Zoloft), nortriptyline (Palemor), paroxetine (Paxil), venlafaxine (Effexor), fluvoxamine (Luvox), and bupropion SR (Wellbutrin SR; Guille et al., 2013).

According to Dietrich and colleagues (2003), patients receiving either psychotherapy or antidepressants usually begin to see an improvement in symptoms within 6 to 8 weeks. However, if an antidepressant is the chosen method of treatment it is suggested that patients with a first-time diagnosis of depression should continue pharmacological treatment for 9 to 12 months after depression symptoms have abated (Logsdon, Wisner, Billing, & Shanahan, 2006). Although research suggests no immediate short-term negative effects to the child, little is known regarding long-term effects on the child's brain or nervous system development (Thurgood, Avery, & Williamson, 2009), which may also explain why some mothers wish to forego psychopharmacological treatment if they are breastfeeding.

Some research has also demonstrated the treatment of depression, in general, to be effective at mitigating negative outcomes in children (Pilowsky et al., 2008), while other studies suggest improvement in outcomes for the mother may not translate to improved short- and long-term child outcomes. Pilowsky et al. (2014) conducted a randomized study in which mothers and fathers were assigned to one of three treatment groups: bupropion (Welbutrin); escitalopram (Lexapro); or both. The study examined whether parents treated for depression improved child outcomes, as measured by rates of anxiety, using the Multidimensional Anxiety Scale for Children (March, 2013), depression, using the Children's Depression Inventory (Kovacs, 2011), and overall functioning (e.g., Columbia Impairment Scale; Bird, Shaffer, Fisher, & Gould, 1993, Child Global Assessment Scale; Shaffer et al., 1983) scales for children. Interestingly, results

suggest children function better with depressed fathers at baseline but yield more functional improvement when their mothers are treated for depression. However, a limitation of this study was the few number of fathers (n = 9) compared to the number of mothers (n = 34).

Another large-scale study was conducted in the United States by Forman et al. (2007) comparing mothers with PPD randomly assigned to IPT or a waitlist, to a non-depressed comparison group. Mother's in the IPT treatment group reported improved perceptions of stress compared to the waitlist control but their levels of stress perception did not decrease to the level of the non-depressed control group. Although mothers' perceptions of stress improved, the treatment group reported no significant improvements in child outcomes 18 months later, rating their children as low in attachment security, high in behavioral concerns, and more negative in temperament than non-depressed mothers.

Preliminary results are encouraging. Treatment appears to improve mother and child's psycho-social outcome. Cooper et al. and Forman et al. recommend future development of treatments should include a focus on the mother-child dyad instead of improvements for the mother alone. Indeed, Milgrom and Holt (2014) have proposed a randomized controlled trial to test an intervention designed to target the mother-infant dyad in mothers experiencing postnatal depression. This study has yet to be published.

Despite the existence of efficacious interventions to treat mothers and improve their outcomes, many mothers are untreated due to a variety of personal and systemic barriers (NIHCM, 2010). For example, some mothers might be concerned about social stigma surrounding depression following childbirth (Koniak-Griffin, Logsdon, Hines-Martin, & Turner, 2006), whereas others may have concerns about the cost of treatment or insurance coverage. A lack of knowledge about the impact of depression on personal and familial health may also

contribute to low treatment rates (NIHCM, 2008). Some mothers may be less likely to mention their symptoms to their child's pediatrician fearing their provider may judge or report them to child protective services (Heneghan, Mercer, & DeLeone, 2004). Lastly, many mothers may be unaware of the psychoeducation related to PDD or local treatment resources and may lack access to childcare if they decide to seek treatment (Gjerdingen, Katon, & Rich, 2008).

Many pediatricians are admittedly hesitant to approach mother about PPD concerns, which further compounds the burden of mother's perceptions that others would judge their internal experience. For example, one study found approximately 2 out of 5 pediatricians believed it was not in their job description to detect PPD in new mothers. Providers, both OB/GYN and pediatricians, also reported having a low level of confidence in accurately detecting and managing symptoms of depression in their patients' mothers (Olson et al., 2002). Further, providers indicate they lack the time to address mothers' mental health issues since the child's health is at the forefront of the visit (NIHCM, 2010). Other workforce barriers such as a shortage of mental health providers, especially in rural areas, may discourage primary care providers from asking mothers about their feelings and providing a referral if there are few community resources to address their concerns (McCue Horwitz et al., 2007; Wiley, Burke, Gill, & Law, 2004).

Detection of PPD

To eliminate the many barriers hindering the connection of treatment of PPD, several agencies, including the United States Preventative Services Task Forces (USPSTF, 2009; Pignone et al., 2002) and the Bright Futures organization, closely partnered with the American Academy of Pediatrics (AAP), have made detection of PPD a top priority and developed recommendations for providers to follow. For example, the USPSTF advocates for screening all

mothers for PPD in the first few WCC and recommends medical practices create individualized systems to ensure screening, treatment, and follow-up for mothers occurs.

A recent update of the USPSTF Recommendations Statement, entitled "Screening for Depression in Adults" (2016), endorsed screening as an effective method for improving detection of depression in adults and listed antidepressants, psychotherapy, and combination treatments as effective in decreasing morbidity and improving clinical outcomes. It is also considered appropriate to recommend psychotherapy over medication to women who are pregnant or breastfeeding. The USPSTF grades their own recommendation as "B," with the operational definition of the "B" grade being: "The USPSTF recommends the service. There is high certainty that the net benefit is moderate, or there is moderate certainty that the net benefit is moderate to substantial." (p. 381, USPSTF, 2016).

However, the USPSTF and AAP offer little in terms of empirically-supported methods for reliably achieving acceptable levels of screening and follow-up services and leaves the execution of these recommendations up to the individual practice. The paucity of methods is due, in part, to the widely variable resource and assistance availability and procedures of medical practices. Indeed, it would be challenging to suggest a universal screening and follow-up procedure that fits the needs of every practice.

Further, the USPSTF acknowledges their limitations in being unable to consider cost, policy, and coverage in their recommendations (USPSTF, 2016). The previous recommendations (2009) included the caveat that screening and management of depression in adults in primary care settings were only to be conducted if there were "staff-assisted" care supports in place; however, the USPSTF (2016) has adjusted to the evolving nature of collaborative healthcare and recognizes care supports are becoming more common and have now eliminated that caveat to the

recommendations. The content most pertinent to this study is the inclusion to specifically encourage screening for postpartum depression (USPSTF, 2016).

Pediatricians have a unique advantage to screening new mothers for PPD. As a result of treating the child, pediatricians see new mothers more frequently than the mothers' own primary care provider and/or their obstetrician and gynecologist (Chaudron, Szilagyi, Kitzman, Wadkins, & Conwell, 2004). The AAP strongly encourages families, which are typically biological mothers, to bring their child to 6 scheduled WCC's within the first 6 months of a child's life (2 days, 1 week, 1 month, 2 months, 4 months, 6 months). In addition, the pediatric primary care provider has a unique relationship with families providing continuity of care throughout the child's formative years. This care focuses not only on the child but also on how parental health and family dynamics contribute to child health and well-being (Earls, 2010). Although the identified patient remains the child, considering family functioning as it affects the child is within scope of practice for pediatricians, who are in a prime position to provide family support and referrals to resources that directly or indirectly enhance a child's functioning and development (Earls, 2010).

To prepare pediatricians to effectively broach and address PPD, Bright Futures and the AAP suggest pediatricians use one of two methods to identify at-risk mothers, which, seemingly, offers a specific recommendation that the USPSTF does not offer. The first method is a validated two-question screener that can be administered orally (i.e., "Over the past two week have you ever felt down, depressed, or hopeless?" and "Over the past two weeks have you ever felt little interest of pleasure in doing things?"). The second method is using the 10-item Edinburgh Postnatal Depression Scale (EPDS, Cox et al., 1987), the most widely used screener in clinical practice for PPD assessment (Gaynes et al., 2005; Norhayati et al., 2015), especially in primary

care settings (Olin et al., 2016). Items on the EPDS assess more facets of depressive symptoms (e.g., anxiety, difficulty sleeping, suicidal ideation) and its short length, simple scoring procedure, and zero cost make it an ideal instrument to use in busy and financially-strapped pediatric settings (Cox et al., 1987). The AAP encourages the use of a screening mechanism at 1-, 2-, 4- and 6-month WCC visits, when symptoms are most likely to emerge and peak (Earls, 2010; Horowitz & Goodman, 2004) and to utilize the Current Procedural Terminology (CPT) code 99420 to bill for the risk assessment instrument.

Feasibility of Screening

In a meta-analysis by Pignone et al. (2002), PPD screening practices significantly improved detection rates of PPD from 10% to 49%, regardless of screening measure (e.g., EPDS, Cox et al., 1987; Center for Epidemiological Study Depression Scale; Radloff, 1977, Self-Depression Scale; Zung, 1965, Beck Depression Inventory; Beck, Steer, Brown, 1996, Hamilton Depression Scale; Hamilton, 1967). Though screening practices are intended to assess 100% of individuals considered high risk for a condition (target population), research suggests efforts to screen every mother at all the recommended WCC's falls short of capturing data on everyone in the intended target population. Chaudron et al. conducted a study examining the feasibility of incorporating the EPDS as part of a universal screening protocol for mothers of children aged 0 to 1 year, in a pediatric primary care clinic. This was a pre- and post-design study in which 110 infant charts were randomly selected and reviewed prior to the universal screening protocol and 110 charts were reviewed after the protocol implementation to examine differences in detection rates of depression. Results indicated that of 223 child visits, 46% (N = 102) of the post-intervention visits included an EPDS. Chaudron et al. noted a significant increase in screening, detection (up from 1.6% in cohort 1 to 8.6% in cohort 2), and referrals to social work (up from

0.2% in cohort 1 to 3.5% in cohort 2) from the previous year but failed to assess every mother eligible. Arguably, there is room for procedural improvement to ensure every mother is screened. This study lacked a description or recommendations regarding how to appropriately train pediatric office personnel to ensure all mothers are screened.

Freeman et al. also conducted a study designed to examine the feasibility of assessing mothers at their child's WCC with slightly better results. All mothers attending their child's 2-month visit were asked if they would be willing to complete the EPDS. One-hundred seventy-two women were approached and 89 agreed to participate, yielding a screening rate of 51.7%. Both studies yielded modest screening adoption rates, 46% and 51%, respectively, (Chaudron et al., 2004; Freeman et al., 2005).

Possible explanations for screening rates of approximately 50% rather than 100%, as discussed by Chaudron et al. and Freeman et al., may include clerical error, such as a misplaced instrument, a mother's refusal to complete the questionnaire due to length or privacy concerns, and the presence of a father, grandparent, or foster parent instead of their mother. One study (Freeman et al., 2005) gave mothers the option to complete the EPDS instead of incorporating it into the routine paperwork, and this choice may have allowed more mothers to decline more readily than if it was included in routine paperwork.

Maternal satisfaction with the screener is another important consideration in the feasibility and sustainability of PPD screening practices. In focus group interviews with 27 postpartum women with self-reported emotional complications (e.g., anxiety, depression), barriers and facilitators to maternal postpartum care by their child's pediatrician were assessed (Byatt, Beibel, Friedman, Debordes-Jackson, & Ziedonis, 2013). A majority of mothers felt it was within the realm of the pediatrician's responsibility to assess the well-being of the mother as

well as the child, and several mothers suggested the pediatric office was the ideal location to address PPD. Further, mothers indicated that psychoeducation about the unique stressors of new motherhood was helpful, and that they felt greatly validated and cared for when the pediatrician provided the appropriate referral when symptoms of depression were disclosed. It is relevant to note that a minority of mothers felt it was not appropriate for their child's pediatrician to inquire or provide guidance on their mental health (Byatt et al., 2013). This small subset of mothers could perhaps explain why some children did not have depression screener notations in their chart in the studies conducted by Chaudron et al. and Freeman et al.

Follow-up Services

Despite commendable screening and detection efforts among at least some pediatric practices, the extant literature suggests that even with an accurate diagnosis, many mothers may not receive appropriate treatment (Horowitz & Cousins, 2006). Screening practices, ethically, must be accompanied by a system to ensure effective referral, treatment, and follow-up procedures (Gjerdingen & Yawn, 2008). Essentially, if a concern is detected, it must be addressed responsibly. Results on whether screening practices increase referral, treatment and maternal outcome rates are mixed, and it can be challenging to draw conclusions about screening, referral and treatment practices when methods to do so and measurement of the referral and/or follow-up process vary notably across studies.

Yawn et al. (2012) conducted an evaluation of the screening, diagnosis and management of eight PPD screening programs. Again, as previously discussed, their results indicated that screening rates varied between 33% and 95%. Fortunately, screening occurs in most primary care practices or pediatric practices; unfortunately, some programs did not include a follow-up or management plan for those screening as high risk, and the symptom severity evaluative

processes were not consistent across settings. Only half of the programs reported on maternal outcomes and only two of those reported positive maternal outcomes.

Yawn et al. argued screening for PPD in primary care is a feasible and appropriate practice with the potential to improve maternal outcome 6 to 12 months following childbirth when barriers are eliminated. Yawn et al. postulate facilitators (i.e., variables that promote success) within the two sites yielding positive maternal outcomes, specifically improved screening scores, included trained nurses in brief therapeutic techniques (e.g., motivational interviewing, suicide risk assessment) to be delivered immediately and within the setting in which the screening occurred. Further, the authors suggest additional evaluative and dissemination studies are needed to confirm feasibility and positive outcomes.

The research is scarce on what follow-up for mothers presenting and reporting symptoms of PPD in pediatric offices looks like and whether or not initiating follow-up care occurs. Yawn et al. and Olin et al. assert the current literature also lacks studies discussing the *feasibility* of incorporating behavioral health services within a pediatric primary care clinic for mothers, despite intuitive knowledge that offering behavioral health services within a pediatric office could directly combat barriers related to follow-through (e.g., transportation, times, stigma). Olin et al. reviewed several studies of primary care PPD screening practices occurring within a primary care setting, with emphasis on pediatric primary care settings. Reports on outcome results were not necessarily a priority of the review, though some studies reported on that domain. Similar to Yawn et al. (2012), Olin et al. found PPD screening in a primary care setting is a feasible method and presented the most common methods of follow-up care. In terms of implementation, they found referrals, followed up by staffing (most often by nurses, not necessarily mental health professionals), were the most common strategies for support. Olin et al.

emphasized that though some studies included referring mothers for medication management to treat symptoms. Olin et al. did not find any studies that reliably incorporated a brief in-session, or referral to, psychotherapeutic treatment in the PPD program; this is especially salient since mothers tend to prefer therapy over medication to treat depression symptoms.

Though research shows screeners are effective instruments for detecting PPD and are feasible to implement is primary care practices (Cox et al., 1987: Downie et al., 2003; Schaper, Rooney, Kay, & Silva, 1994; Yawn et al., 2012), only half of all mothers are administered screening measures during their child's WCC (Chaudron et al., 2004; Freeman et al., 2005). Moreover, detection as a stand-alone intervention provides little in the way of relief for mothers and the literature and agency guidelines are sparse in terms of recommendations and outcomes for follow-up care for mother's reporting symptoms of depression at their child's WCC.

Stepped Care Model for PPD

To address the question of how to ethically and thoughtfully proceed if a mother endorses PPD symptoms, Gjerdingen and Yawn (2007) attempted to provide primary care providers (e.g., general practitioners, pediatricians) with a comprehensive method of care that included screening *and* follow-through for mothers scoring high on a measure of PPD. Gjerdingen and Yawn (2007) assert that starting with a collaborative relationship between medical and *mental* health care professionals can not only yield a more reliable screening procedure but can put mothers into contact with meaningful treatments and follow-up care; stating that a stepped care method for PPD would work best within an existing multidisciplinary clinic that includes a pediatrician, a case manager, a social worker, and mental health service provider. Increasingly, evidence-based research supports the application of stepped care protocols and collaborative care for mental health concerns (Araya et al., 2003; Patel et al., 2010).

Gjerdingen et al. conducted a thorough review of various components of PPD management literature (e.g., identification, diagnosing, and initial treatment) and constructed a set of best practice recommendations, which emphasized collaborative efforts among health professionals from screening through follow up care. The authors proposed a "stepped care intervention model," which is conceptualized as a cost-effective and efficient method of managing an illness or condition to "benefit both the provider and the patient" (Gjerdingen et al., 2008, p. 47). In a stepped care protocol, resources for treatment are allocated based on the patient's needs with more resources being directed to those with more complex and severe symptoms (Peterson, Lund, & Stein, 2011), and when initial interventions are deemed insufficient, more intensive interventions and follow-up may be applied.

Gjerdingen et al. suggest that in order for a stepped care protocol to be effective for PPD, immediate access to an on-site mental health professional is critical. Quick access to a behavioral health professional also functions to eliminate practical barriers that frequently impede mental healthcare delivery generally, such as transportation and time. With this type of arrangement, pediatricians would also have access to an on-site mental health professional with whom they could engage in brief consultation about how to best proceed with patient care, concurrent with the patient's visit. This advantage is especially salient for patients with at-risk backgrounds, such as low-income or impoverished families, in which the use of a private vehicle and time spent away from family and work is often impractical.

Current Gap in PPD Treatment Literature

Research findings have shown: 1) screening for PPD has not been deployed reliably due to systemic barriers (e.g., stigma, time), 2) mothers are not offered follow-up treatments such pharmacotherapy and psychotherapy (often their preferred method of treatment), and 3) a

proposed, but not studied, stepped care model may work to feasibly detect and treat PPD in a primary care setting. The purpose of this study to evaluate the coordination of these empirically-informed methods as a cohesive package (i.e., the stepped care protocol) implemented in a real-world setting. Additionally, this study will hopefully contribute to a broader research movement to accelerate the pace with which research is conducted, analyzed, and utilized to inform treatment within primary care (deGruy et al., 2015), to shrink the gap between research and application in real-world settings.

Specifically, this study evaluates the implementation outcomes of one practice's use of a stepped model of PPD (Gjerdingen et al., 2008) including routine screening and a range of best-practice responses to high scores, including psychosocial treatment, which has yet to be examined in the literature (Olin et al., 2016). This study also aims to serve as a replication study for the screening portion of this protocol. Finally, this study describes the functions behavioral health consultants serve as members of a pediatric healthcare team. The RE-AIM model, a well-established model from the Dissemination and Implementation Science (D&I Science) field (Brownson, Colditz, & Proctor, 2012), was the scaffolding used to format the hypotheses for this project and present outcomes.

RE-AIM Model

D&I Science aims to identify best practice models and methods for translating efficacious treatments into real world settings (Brownson, Colditz, & Proctor, 2012). The RE-AIM model, specifically, is a D&I Science method used to evaluate implementation programs such as a stepped care protocol for PPD. Developed by Glassgow, Vogt, and Boles (1999), RE-AIM evaluates real-world internal and external validity of public health and health behavior interventions in a way that meaningfully contributes to a generalizable body of knowledge. This

model has the flexibility to be applied to diverse settings (Glasgow, Vogt, & Boles, 1999) and could provide a solution to the lack of evaluative cohesion across PPD programs as the Yawn et al. (2012) review noted.

RE-AIM stands for *reach, effectiveness, adoption, implementation, and maintenance*, which the model's developers claim are markers of suitable and sustainable interventions (Glasgow, Vogt, & Boles, 1999; see Table 2). This study will utilize all domains of the RE-AIM model; any modification of the model for study purposes is acceptable to accommodate the uniqueness of each clinical practice, as long as domains are clearly conceptualized (Kessler et al., 2012).

Table 2. *RE-AIM Model Domains Adapted from Glasgow, Vogt, & Boles (1999)*

Domain	Definitions
Reach	"proportion of the target intervention that participated in the intervention"
Effectiveness	"success rate if implemented as in guidelines; defined as positive outcomes minus negative outcomes"
Adoption	"proportion of settings, practices, and plans that will adopt this intervention"
Implementation	"extent to which the intervention is implemented as intended in the real world"
Maintenance	"extent to which a program is sustained over time"

Hypotheses

The overall aim of this project was to evaluate the real-world employment of a stepped care protocol, as delivered by a multidisciplinary healthcare team (i.e., pediatricians, nurses,

front-desk administrators, social workers, and an on-site behavioral health consultant), to effectively screen new mothers for PPD and provide follow-up care, which included brief psychosocial interventions. The specific aims and hypotheses are outlines using the RE-AIM domains, which are listed as follows and detailed in Table 3:

1. *Reach* is the willingness of participants to engage in the intervention; however, mothers were not given a choice to participate in the protocol (i.e., each mother was automatically handed the screening instrument at their child's well child check), as they were within the Freeman et al. (2005) study. Therefore, "willingness" per se, was not able to be assessed. *Reach* was defined as the percentage of screeners completed and recorded for all types of WCC (1 week, 1 month, 2 month, 4 month, and 6 month) within one year. This approach to *reach* has been used in previous research (e.g., Belkora, 2015). The second way in which *reach* was measured, was by capturing the percentage of WCC in which a positive screening score was detected (i.e., within the screening instrument's "At-Risk" or "Clinically Significant;" score of $\geq$ 9). This facet of the *reach* domain is particularly important since mothers with positive screens are the specific target of this protocol and helped identify the prevalence of PPD among the families served within this particular clinic. Finally, *reach* also measured whether or not mothers screening positive came into contact with one of the interventions listed in the menu of options (e.g., psychoeducation, onsite BHC visit, follow-up phone call, outside mental health referral).

    Hypotheses:

    a) The implementation of the stepped care protocol, as adapted from Gjerdingen et al., will result in a higher screening rate (i.e., the screen will reach more patients) than previous research, which showed a reach rate of approximately

50% (Chaudron et al., 2004; Freeman et al., 2005) given the use of D&I Science to inform the intervention. In other words, a majority of WCC notes for children aged 0 to 6 months will receive an EPDS screener, as evidenced by documentation within the child's WCC note.

b) Based on previous research it is anticipated that approximately 10% to 20% of EPDS scores recorded in visit notes will yield a positive screen (i.e., "At-Risk" or "Clinically Significant"; NIHCM, 2010).

c) It is hypothesized that a majority of mothers screening positively on the EPDS will come into contact with Step 3 (i.e., psychoeducation, brief intervention, and/or EPDS) and/or Step 4 (one-week follow-up phone call) of the stepped care protocol (see Figure 1).

2. *Effectiveness* is defined as the impact on an intervention's targeted outcome. This study measured *effectiveness* using a multiple regression analysis to examine the relationship between an early depression score, collected at either 1 or 2 months (if a child was not seen for their 1-month, then the child's 2-month WCC was used), when symptoms tend to emerge and peak (Horowitz and Goodman, 2004) and a mother's final EPDS score at 6 months for children seen for each visit over the six-month period. Further, the potential moderating role of the type of intervention received (i.e., education, onsite BHC visit, BHC phone call follow-up), as compared to non-intervention (i.e., No Action) for mothers scoring high at their 1- or 2-month visit was examined.

Hypothesis:

a) It is hypothesized that mothers scoring within the "At-Risk" or "Clinically Significant" range at the 1- or 2-month WCC who received at least one type of

intervention from the menu of options at that time will endorse significantly lower scores on the screening instruments at the 6-month WCC compared to those mothers who did not receive any type of intervention within Step 3 or 4 of the protocol.

3. *Adoption* is defined as the percentage of eligible WCC's (e.g., newborn to 6-month WCC) for whom the EPDS score is documented in the EHR by each *pediatrician*. In this study, *reach* is also directly related to the extent to which the intervention was *adopted*, which is the extent to which (i.e., the percentage of a pediatrician's WCC's that have an EPDS score documented in the note) absolute number of intervention agents (i.e., pediatricians) willing to participate, or carry out, components of the protocol.

   Hypothesis:

   a. A majority of the clinic's pediatricians will have an EPDS score listed in WCC notes, an improvement from the rates reported in Chaudron et al. (2004) and Freeman et al. (2005), which were 46% and 51.7%, respectively.

4. *Implementation* refers to the intervention agents' fidelity to all intervention components. To evaluate *implementation* this domain examined the course of care for every mother who brought her new child to the Clinic for *every scheduled* WCC for the first 6 months of the child's life (5 visits total), including screening and follow-up care. This domain will examine the pattern of care only for mothers who attended all 5 WCC's and answer the question: "What is the typical care for mothers who screen positive and negative on the EPDS?" This hypothesis is operationalized as an assimilation of *reach*, *adoption*, and *maintenance*.

   Hypothesis:

   a. Given the highly collaborative environment of the pediatric primary care clinic and the time devoted to develop a D&I Science-guided implementation process,

and the use of the Consolidated Framework for Implementation Science to guide development and implementation of the protocol, it is hypothesized that the stepped care protocol had the supports in place to be implemented as designed for all mothers who attended all five WCC. Specifically, mothers who screen within the "positive" range will have interventions ordered and receive care (e.g., onsite BHC visit, BHC phone call follow-up) as outlined by the stepped-care protocol (see Figure 1).

5. *Maintenance* is the extent to which an intervention becomes a part of routine practice within an organization. Monetary reimbursement is a motivating and contributing component to the longevity of an intervention. To evaluate and determine this component of the protocol's sustainability, the total dollar amount the clinic received in reimbursement from the EPDS was calculated.

Hypothesis:

a) Based on pilot data (Smith, Polaha, Tolliver, & Baker, manuscript in preparation), it is hypothesized that the practice will make approximately $15,000 over 12 months, since the screening instrument used is reimbursable using the *Current Procedural Terminology* (CPT) code 99420, which is the "administration and interpretation of health risk assessment instrument".

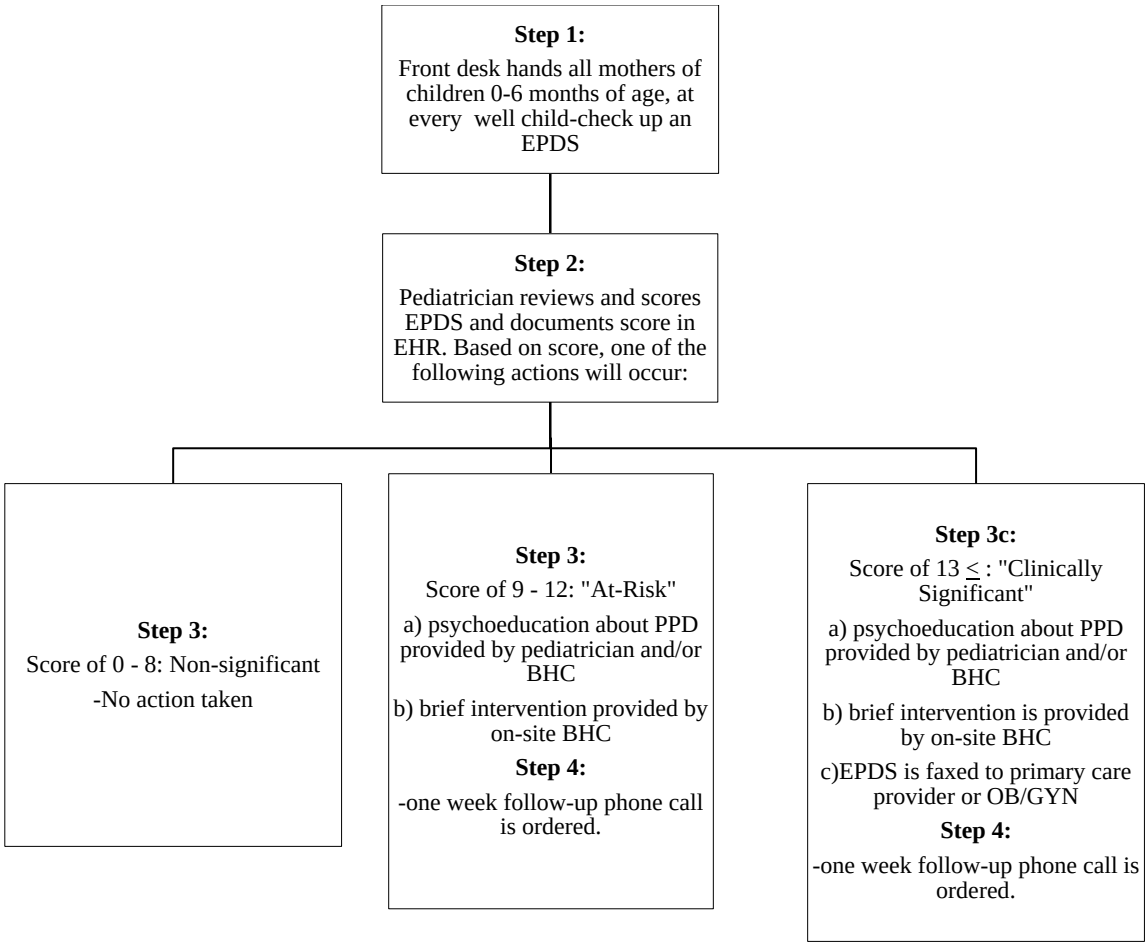

Figure 1. Stepped Care Protocol of Postpartum Depression in a Pediatric Setting

Table 3. *RE-AIM Aims and Hypotheses of the Postpartum Depression Stepped Care Protocol*

Aim 1: Evaluating ***reach*** by capturing the percentage of visits with a positive score during which an intervention (i.e., Step 3 and/or 4) was provided.	
Question	Hypotheses
a) Of all visits between February 25, 2014 and September 15, 2015, how many visits have an associated EPDS score documented in the visit note? b) How many EPDS scores yield a positive screen? c) Of mothers who screen positively on the EPDS, how many came into contact with at least one type of intervention from the menu of options (i.e., Steps 3 and 4).	a) The implementation of the stepped care protocol, as adapted from the guidelines set forth by Gjerdingen, et al., will have a higher *screening* rate than previous research has found of approximately 50%(Chaudron et al., 2004; Freeman et al., 2005). b) Based on previous research, it is anticipated that approximately 10% to 20% of EPDS scores collected will yield positive EPDS scores (NIHCM, 2010) c) A high number of mothers will come into contact with Step 3 and/or 4 of the stepped care protocol.
Aim 2: Evaluating ***effectiveness*** by examining the relationship between the EPDS scores at 1 or 2 months and the score at 6 months, and whether or not the mother's score at 6 months is moderated by the type of intervention a mother received compared to mothers who did not come into contact with an intervention.	
Question	Hypothesis
a) Can 1- or 2-month EPDS score predict 6-month EPDS scores? b) Is the relationship between 1- or 2-month EPDS score moderated by the presence of an intervention provided by the pediatric clinic?	a) Mothers provided at least one type of intervention will endorse significantly improved scores at the 6 month WCC compared to those mothers who did not come into contact with an intervention.
Aim 3: Evaluating the ***adoption*** by determining the percentage of eligible WCC that have a documented EPDS score by pediatrician	
Question:	Hypothesis:
a) What is the percentage of WCC notes with an EPDS score noted categorized by pediatrician?	a) A majority of the clinic's pediatricians will have an EPDS score listed in over 50% of their WCC notes.
Aim 4: To evaluate ***implementation*** by providing an overview of the typical care a mother, screening positively, receives.	
Question:	Hypothesis:
a) What is the typical care of a mother who scores within the "At-Risk" or "Clinically Significant" range of the EPDS?	a) The stepped care protocol will be implemented as designed.
Aim 5: To evaluate the sustainability and ***maintenance*** of the stepped care protocol.	
Question:	Hypothesis
a) In sum, how much did the practice collect in reimbursement from the EPDS screener across 12 months?	a) Based on preliminary data it is hypothesized the practice will make approximately $15,000 over one year

CHAPTER 2

METHOD

Setting and Providers

This study took place in a university-affiliated Pediatric Clinic (hereafter referred to as the Clinic) in the southern Appalachian region of the United States. The site is an established training agency for medical students and residents gaining clinical experience under a preceptorship model, and other healthcare graduate students (clinical psychology and social work) attending the local state university. At the time of this evaluation, the Clinic supported 8 pediatric faculty preceptors, 19 interns and residents, 8 nurses, and a rotation of medical students (typically 4 medical students during any given week throughout the year).

The Clinic serves children 12 years of age and under seen for routine well child checks (WCC), follow-ups, and acute visits, who live within the surrounding region of southern Appalachia, including northeastern Tennessee, southwestern Virginia, and northwestern North Carolina. Based on conversations with Clinic administrative personnel who manage operations and billing, approximately 70% of all patients of the Clinic are covered under various types of Medicaid insurance, which is typically held by families living in a lower socio-economic status. Approximately 30% of patients hold private health insurance plans. The level of integration within the clinic may fall under the category of "Level 5: Close Collaboration Approaching an Integrated Practice" model of care to provide team-based care for their patients (SAMHSA-HRSA, 2013). Based on a flow chart, published by Waxmonsky, Auxier, Romero, and Heath (2014) this clinic operates, in part, through frequent communication between multiple providers, have regular meeting to discuss overall patient care and specific patient issues, and have in-depth understanding of roles and culture.

Behavioral Health Consultants

The Clinic has a five-year history of engaging a collaborative practice model with behavioral health. Specifically, they have incorporated students from a local state university clinical psychology doctoral program as the on-site mental health professional, referred to as the Behavioral Health Consultant (hereinafter referred to as BHC), to address common pediatric and child behavioral, developmental, and psychological issues that often arise in pediatric visits (e.g., disruptive behaviors, noncompliance, ADHD, sleep, toileting). A licensed clinical psychologist, for the state of Tennessee, supervises the BHC position. It is important to note that there was some fluctuation of BHC coverage. At the start of implementation of the protocol, BHC coverage spanned approximately 30 hours across two BHC providers; however, 5 months later BHC coverage increased to 40 hours per week across 3 providers. Coverage depended on available funding for the BHC position, which was provided via external sources.

The BHC works closely with physicians, nurses, social workers and office staff to deliver comprehensive, quality assessments and care by using evidenced-based practices (e.g., warm hand-offs, screeners). A similar training arrangement was made for social work master students under the supervision of a Licensed Clinical Social Worker for the state of Tennessee to address functional needs of the family (e.g., housing, food, respite care).

A majority of patient referrals to the on-site BHC are conducted through the "warm hand-off" method. In a warm hand-off, a pediatrician identifies a behavioral or psychological concern that arises during a routine WCC or acute visit and then locates the BHC to see the patient during the same visit. Other possible patient contact with the BHC occurs through scheduled initial appointments and "warm hand-off" follow-up appointments. Additionally, parental, adult and family therapeutic strategies are skills needed to be successful in the BHC position. The BHCs

providing care to families in the Clinic receive general therapy training across the lifespan and are equipped with the skills and resources to address maternal depression.

Protocol Development: Consolidated Framework for Implementation Research

The protocol was developed, in part, using the Consolidated Framework for Implementation Research model (CFIR; Danschroder, Aron, Keith, Kirsh, Alexander, & Lowery, 2009) as a guide, which presents a range of recommended constructs to consider when developing and individualizing a specific intervention. CFIR is a comprehensive theory designed to organize and incorporate constructs of existing implementation science theories into five domains of importance: the *characteristics of the intervention*, *inner* and *outer settings*, the *individuals involved*, and the *process* by which implementation is accomplished. The components of an intervention that fall under the domains can be categorized as strengths (i.e., facilitators) or weaknesses (i.e., barriers), and the domains interact to influence implementation effectiveness (Danschroder, Aron, Keith, Kirsh, Alexander, & Lowery, 2009). The developers of the CFIR recognize not every domain is applicable to every setting or intervention and encourage researchers to use domains that are relevant to their intervention to allow for individualization.

Development of Stepped Care Protocol

Pediatricians at the Clinic often collaborate with the psychology staff on system-wide changes oriented toward implementing evidence-based practice or encouraging better adherence to practice guidelines. In early 2013, an interest among the Clinic's collaborative team developed an initiative to screen mothers for PPD. The initiative was ignited after several pediatricians and the supervising clinical psychologist attended a continuing education workshop titled *Behaviorally Effective Healthcare in Practices*, held by the State Chapter of the American Academy of Pediatrics, in conjunction with the Volunteer State Health Plan, a subsidiary of the

Blue Cross Blue Shield of Tennessee insurance provider. This workshop disseminated information on evidence-based methods of screening mothers for PPD (Earls, 2010), as well as practical considerations such as reimbursement. Following this workshop, Clinic providers were encouraged to incorporate screening practices for PPD using the collaborative team to develop a protocol adapted to fit the Clinic's organization and flow. The protocol development team consisted of 5 pediatricians, a clinical psychologist, the current BHC, and a social work graduate student.

An initial concern regarding a PPD protocol development was that the identification and response to mothers' psychosocial concerns is outside a pediatrician's scope of practice. Therefore, physicians relied on the extant collaborative practice model with department of psychology to lead the development of a protocol designed to address mothers' psychosocial needs, which falls more ethically within psychology scope of practice. The team began the development process by meeting formally (i.e., two scheduled meetings) and informally (i.e., emails, in-office discussions) in the Fall of 2013. The formal meetings were used to discuss topics such as which screener to use, which mothers to screen, how to distribute and score the screeners, what actions should be taken based on significant scores, and how to respond when mothers endorsed the item indicating they have thoughts of harming themselves or others. Informal meetings involved discussing perceptions of implementation, and disseminate updates. Table 4 provides more specific organization and insight regarding facilitators and barriers to the development process. Smith, Polaha, Tolliver, and Baker (manuscript in preparation) chronicles a detailed discussion of the various barriers and facilitators in the development of this specific protocol.

Table 4

Emergent Facilitators and Barriers of the Stepped-Care Protocol Organized by the Domains of the Consolidated Framework for Implementation Research (CFIR)

CFIR domains	Facilitator	Barrier
Intervention Characteristics	• *Evidence strength and quality*: EPDS is perceived to be an effective in identifying mothers with PPD symptoms by providers, based on peer-reviewed literature and established organizational guidelines and stated best practices (TNAAP). • *Evidence strength and quality*: Provider perception of the finalized stepped-care protocol as acceptable and manageable. • *Adaptability*: The finalized protocol maintained "core" components of the protocol (e.g., EPDS) while adapting "periphery" components to best fit the needs and flow of the practice. • *Cost*: The EPDS screener generated revenue.	• *Cost*: Development and implementation cost provider uncompensated time.
Outer Setting	• *Patient needs*: the protocol fills the assessment and initial treatment need to screen mothers for PPD. • *External policies*: There exists an external standard for pediatricians to implement PPD screening as a part of quality care as set by TNAAP. • *External incentives*: Insurance companies reimbursed the practice for each screener completed by mothers.	
Inner Setting	• *Structural characteristics* and *culture*: The integrated context of the clinic offers structural characteristics and a culture that are an important strength conducive to facilitating practice change	• *Readiness for implementation*: Some providers did not fully understand the sequence of steps required for proper EHR and billing documentation.

	and protocol implementation psychological in nature.	
Characteristics of Individuals	• *Knowledge and beliefs about the intervention*: The positive attitudes towards this change make implementation more likely.	• *Self-efficacy*: Low self-efficacy of pediatricians to identify and manage maternal symptoms of depression, given mother is not the patient.
Process	• *Engaging*: A multidisciplinary team was involved throughout the process. • *Executing*: Making the initial "kick-off" day unique from other days to bring attention to the change in the practice behavior to clinic team. • *Evaluating*: Evaluation occurred informally throughout the implementation.	• *Planning*: The effort and time to plan and coordinate of necessary team meetings. • *Planning*: The development of a documentation tool within the EHR was cumbersome and required the BHC to become familiar with a new system. • *Evaluating*: There has not been a formal evaluation or feedback process since the protocol began.

Note. The Consolidated Framework for Implementation Research table is adapted from Robbins, Jackson, Green, Korngiebel, Forces, Baldwin (2013)

Figure 2 depicts the implementation timeline. In 2013, several formal and informal meetings were conducted to collect opinions, and review research. The protocol was launched as scheduled in January 2014 and *reach* was evaluated within its first month to monitor progress. Data on maternal satisfaction and billing records were collected immediately to evaluate initial implementation in 2014.

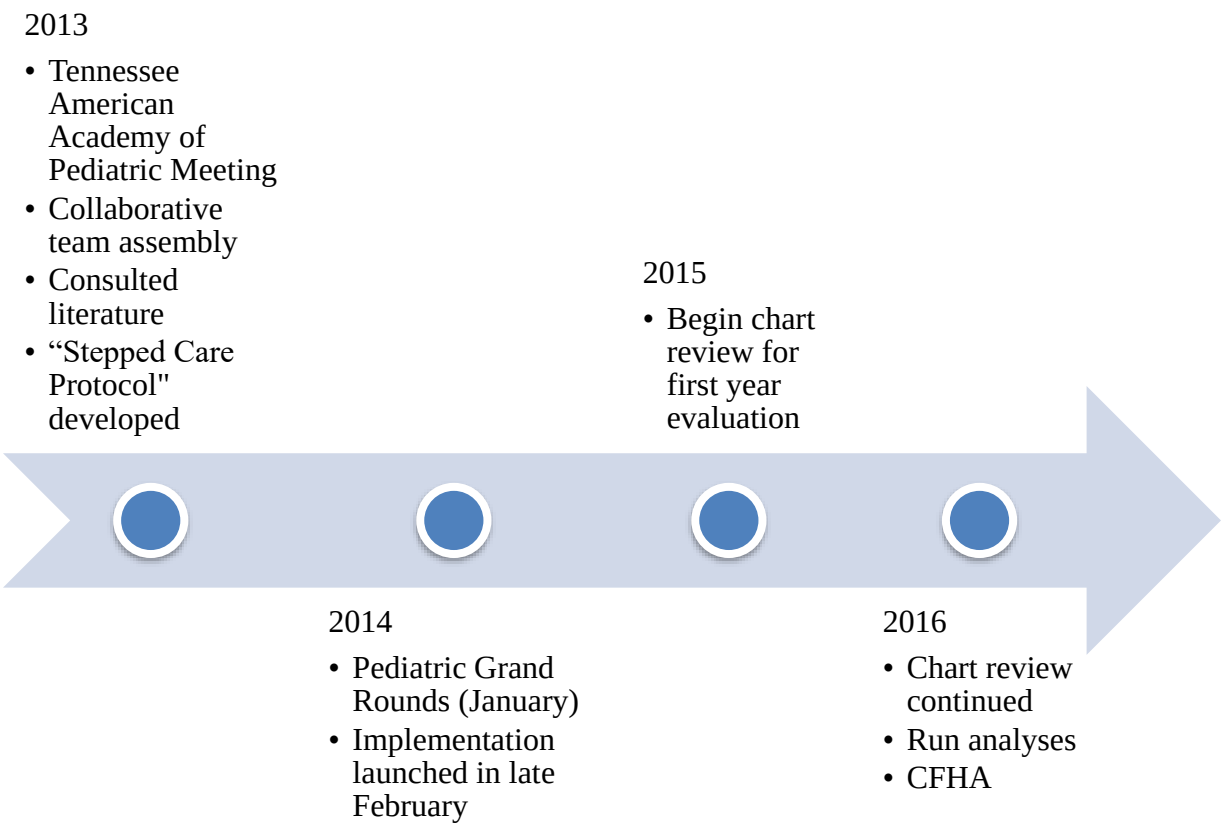

Figure 2. Implementation Timeline

Finalized Stepped Care Protocol

The team wished to develop not only a screening method, as recommended by the State Chapter of the AAP, but to also expand the procedure to provide a preliminary intervention to mothers during their child's WCC, based on research suggesting mother's prefer therapeutic interventions over medications and follow-through on those referrals is unknown. The final

protocol was not based on a single intervention but on a theory-based stepped care intervention (i.e., Gjerdingen et al., 2008), which was adapted to best fit the needs and flow of the practice (see Figure 1).

The final stepped care protocol included four distinct stages. In Step 1, the EPDS was distributed by the front desk staff at check-in to all mothers presenting to the Clinic for a WCC with children 0 to 6 months of age. The EPDS was printed on purple paper to distinguish it from other screeners and required forms. The decision to screen mothers from 0 to 6 months was based on recommendations by the AAP to utilize screening during months when PPD symptoms are highest, which include 1-, 2-, 4-, and 6-month WCC (Earls, 2010).

In Step 2, the EPDS was scored by the pediatrician, documented in the child's note within EHR as "non-significant" (score = 0 – 8), "At-Risk" (score = 9 –11) or "Clinically Significant" (score $\geq$ 12). Screening results were sent to the mother's Primary Care Provider (PCP) or OB/GYN, and pediatricians indicated the EPDS *Current Procedural Terminology* (CPT) code (99420), which is used for health risk assessments, on the Clinic's billing sheet.

Steps 3 and 4 were only employed if warranted and involved the delivery of a menu of options that were "ordered" by the pediatrician using the embedded platform as illustrated in Figure 1. Step 3 was employed if a mother screened positively (i.e., "At-Risk" or "Clinically Significant"), or if the mother endorsed any level on item 10 of the EPDS. The mother was provided one or multiple of the following options: a) education via pediatrician or BHC (when onsite), b) a brief, evidence based intervention, such as cognitive behavior therapy, acceptance-commitment therapy, by the onsite BHC (when on site), and/or c) a referral to an outside mental health provider and/or their primary care provider for medication options. The decision to employ one option over another was determined by the collaborative team clinical discretion.

Step 4 concluded the protocol and involved a one-week follow-up phone call to the patient conducted by the BHC or social worker who was working at the Clinic onsite (see Figure 1) for a visual depiction of the protocol).

Documentation of the EPDS score (Step 2) occurred within the EHR, as did the "EPDS Plan of Action" (Step 3) and the follow-up phone call order to the BHC (Step 4). If the BHC saw the mother, then a note was placed in the chart containing details of the encounter. If a mother completed the EPDS, then her physician scored the measure and documented the action taken (i.e., "no action needed"; "education;" "referred to the BHC;" "community referral") under the "History of Present Illness" section of the child's note. In order to follow through with the scheduled one-week follow-up phone calls for mothers, the pediatricians could order a phone call that was subsequently sent to a specific "worklist" (an alert system specific to the Clinic's electronic health record to notify providers of outstanding tasks related to client visits) the BHC could access and complete within one week. Each BHC interaction and follow-up phone call attempt and contact was documented within the child's EHR chart.

Finally, to train all necessary healthcare providers (i.e., nurses, pediatricians, administrative staff) on the protocol, a Grand Rounds, given in late January 2014, by a clinical psychology doctoral student who assisted in the development of the protocol, disseminated information on the Clinic implementation. At that time, the collaborative team answered questions and asked the Clinic staff to provide regular feedback during implementation. The first day of implementation was intentionally unique and highlighted as different from other days, and the licensed psychologist was present in the Clinic to remind the nurses and physicians of the protocol. Specifically, the supervising psychologist was present and made face-to-face contact with the attending, residents, medical students, nurses, and administrative assistants working that

day.

Participants

Participants are operationalized as the mother-child dyads seen at the Clinic. This study was submitted for review by the university's Institutional Review Board and approved on October 30, 2015. Given the retrospective nature of the study, informed consent was not required.

Research assistants reviewed the electronic medical record (EHR) notes (documentation of a visit with the pediatrician) within the charts of 755 patients aged 0 to 6 months between the dates of February 25, 2014 and February 24, 2015. Only the notes of patients attending their 1-week, 1-month, 2-month, 4-month, and 6-month WCC were collected, since the EPDS was only provided at those visits. Exclusion criteria included acute and follow-up visit notes.

It was not expected that every patient would attend every WCC from 0 to 6 months. Patients might not have attended visits for a variety reasons (e.g., patient recently moved to/from the area, parents did not bring their child according to the AAP recommended intervals); however, the patient's data from as many WCC as possible was captured despite missing visits. In an effort to capture complete information, additional data was collected for patients whose final visits fell on dates past the designated one year mark. Mother-child dyads who were born after February 25, 2014, yet prior to February 25, 2015, and had remaining WCCs, up to their 6 month WCC falling after February 25, 2015, were included to provide more complete data; therefore, the final date for which data was collected fell on September 25, 2015.

Eighteen patient files were removed due to chart restrictions or the caregiver at the child's first well child check (WCC) was not the biological mother of the patient, as noted in the patient's chart and therefore unable to complete the Edinburgh Postnatal Depression Scale. A

total of 737 patients' (boys = 355, girls = 382) charts, for a total of 2,408 WCC, were included in the analyses. The age of mothers ranged from 15 to 46 years (*M* = 27.10, *SD* = 5.71) at the first WCC.

The number of WCC patients attended ranged from 1 to 5 visits (*M* = 3.27, *SD* = 1.45). One hundred and twenty-one *patients* attended just one WCC, 134 presented for two WCC, 114 presented for three WCC, 159 presented for four WCC, and 205 arrived for all five WCC. Three hundred and thirty-five WCC *appointments* were captured for 1 week WCC, 543 for 1-month, 472 for 2-month, 539 for 4-month, 519 for 6-month. Sixty-seven percent of all WCC notes had an associated EPDS scanned into the chart.

Materials

Edinburgh Postnatal Depression Scale (EPDS)

The EPDS is an empirically supported instrument with well-established reliability (Cronbach's α range: .87-.88) and construct validity (convergent with Research Diagnostic Criteria for Definite Major Depressive Illness; Cox et al., 1987), with a sensitivity of 86% and specificity of 78%. It is a 10-item questionnaire assessing psychological symptoms of PPD experienced within the past week (e.g., "I have blamed myself unnecessarily when things go wrong" or "I have been so unhappy that I have had difficulty sleeping"). Additionally, the EPDS has one item that asks directly about a mother's thoughts of harming herself or others. A unique feature of the EPDS is the flexibility for a provider to administer it frequently since the instrument asks only about the previous week (Cox et al., 1987). Each item provides a 3-point Likert response scale ("yes, most of the time" = 3, to "no, never" = 0). Each item is individually scored and all scores are summed to arrive at a total score ranging from 0 to 30.

Scores 13 and higher are considered “Clinically Significant” for PPD and scores falling on, or between 9 and 12 help to detect those experiencing milder symptoms of depression, increasing the measure’s sensitivity (Cox et al., 1987; Matthey, Henshaw, Elliott, & Barnett, 2006). The consistently validated “cut-off” score is 13 or higher (Matthey, Henshaw, Elliott, & Barnett, 2006); however, the “cut-off” score should not replace clinical judgment (Cox et al., 1987; Murray & Carothers, 1990). The EPDS is not a diagnostic instrument but one that illuminates potential current risk. A Spanish version of the EPDS was translated by the Clinic’s Spanish language interpreter and was administered to Spanish-speaking families.

For this project, three categories of scores are distinguished. Scores ranging from zero through 8 are considered non-significant for symptoms of PPD, scores from 9 through 12 are considered “At-Risk,” and scores of 13 or higher are considered “Clinically Significant.” Scores falling in the “At-Risk” or “Clinically Significant” range are collectively referred to as “positive screeners” (Matthey, Henshaw, Elliott, & Barnett, 2006).

Procedure

Data Collection

Patient data was extracted from the Clinic’s EHR system. A list of eligible patients and billing record (i.e., reimbursement amount and insurance carrier) associated with each visit was obtain with the cooperation of Clinic administrative personnel in charge of EHR and patient billing. Aside from the principle investigator, three research assistants (RA; two psychology undergraduate students and one fulltime research assistant) assisted with EHR extraction. Two research assistants were recruited through an advertisement posted to the university’s psychology department listserv distributed to all undergraduate students taking at least one psychology course. Both students were interviewed and hired based on their academic interests and goals, as

well as their subjective fit with the principal investigator (PI), and under the assumption each would demonstrate a strong work ethic. The additional research assistant was assigned to work on this project, as stipulated in her employee contract. Each RA applied for and was approved to access patient EHR charts by EHR administrators and completed the Collaborative Institutional Training Initiative required of those engaged in Human Subjects Research. All three RAs were individually trained by the PI on how to review and collect data within the EHR in a manner compliant with the Human Information Portability Accountability Act. The RA's were periodically reminded of the importance of performing research activities in a manner compliant with HIPAA regulations (i.e., using the EHR to review only the charts of patients needed to fulfill research needs).

The RAs reviewed each patient's chart starting with visits from February 25, 2014 through September 25, 2015, and extracted information listed in the coding sheet (Appendix A) and recorded it into an SPSS 22 (IBM Corp., 2010) software file. It's important to note that if the EPDS was scanned in the child's chart, the RA used the score on the scanned file in place of the number reported in the note by the physician. Finally, to ensure accuracy of data collection across raters (RAs) a Cohen's Kappa reliability coefficient of .96 was calculated to correct for chance agreement (McHugh, 2012) using 13.6% of the participants.

Data Analyses

Aim 1: The first component of the *Reach* aim divided the total number of eligible WCC by the total number of WCC with an EPDS score recorded within the "History of Present Illness" section of the note yielding a percentage. The second component was measured by dividing the total number of WCC with a recorded EPDS score by the total number of scores that fell within the "positive" range (i.e., separate calculations for "At-Risk" and "Clinically Significant" were

computed). Finally, the third component of this aim divided the total number of positive EPDS screens by the total number of positive screen visits that had Step 3 (only options “a” and “b” were recorded) and/or Step 4 follow-up phone call, as recorded in the EHR. Aim 2: To evaluate *effectiveness*, a multiple regression was conducted to determine whether or not 1 or 2 month EPDS scores, “education,” “onsite BHC visit,” and “BHC follow-up phone calls” held any predictive value for 6 month scores. Aim 3: *Adoption* was measured by dividing the number of WCC seen from February 25, 2014 through September 25, 2015, by the number of those WCC charts containing an EPDS score for each pediatrician. Aim 4: *Implementation* examined a mother’s typical course of care over her child’s first 6 months across all 5 visits for mothers. This aim answers how closely the protocol was implemented with fidelity to the protocol developed by the collaborative development team. Aim 5: *Maintenance* examined the financial feasibility of the stepped care protocol by determining the total amount which the pediatric clinic was reimbursed between February 25, 2014 through September 25, 2015 from the extracted billing records.

CHAPTER 3

RESULTS

Aim 1: Reach

Percentages were used to determine the *reach* of the EPDS for each WCC. Results indicate a higher percentage of WCC had documented screeners, compared to previous studies (Chaudron et al., 2004; Freeman et al., 2005). Specifically, 83.76% (n = 2,017) of the 2,408 WCC had an EPDS score recorded in the patient chart (see Table 4).

Table 4. *Range of EPDS scores by WCC in percentage and N*

	Well Child Check (WCC)					
	1 week	1 month	2 month	4 month	6 month	Total WCC
Total Visits	335	543	472	539	519	2408
EPDS in chart	290 (86.57%)	465 (85.64%)	398 (84.32%)	456 (84.60%)	408 (78.61%)	2017 (83.76%)
"At-Risk"	26 (8.97%)	28 (6.02%)	29 (7.29%)	31 (6.80%)	29 (7.11%)	143 (7.90%)
"Clinically Significant"	13 (4.48%)	25 (5.38%)	31 (7.79%)	36 (7.89%)	24 (5.88%)	129 (6.40%)
"Positive" (combined)	39 (13.45%)	53 (11.40%)	60 (15.08%)	67 (14.69%)	53 (12.99%)	272 (13.49%)

Note: Cut-off for At-Risk is a score of ≤ 9 and for clinical significance is ≤ 13. A "positive" score is considered "At Risk" or "Clinically Significant" Chaudron et al., 2004; Freeman et al., 2005Risk or above

Hypothesis (b) was supported; the prevalence of depression symptoms fell within the range often cited by previous studies (Gaynes et al., 2005; Gold, 2002; O'Hara & Swain, 1996). The percentage of WCCs with EPDS scores falling within the "positive" range (combining "At Risk" and "Clinically Significant") for all WCC was 13.5% (N = 272; see Table 4 for further breakdown by WCC). Additional information gleaned from the results, which was not initially hypothesized, revealed 177 (24%) mothers scored in the "At Risk" and "Clinically Significant"

range during *at least one WCC* and indicated EPDS scores ranged from 0 to 30 with the average score around 3 for each type of WCC (see Figure 3).

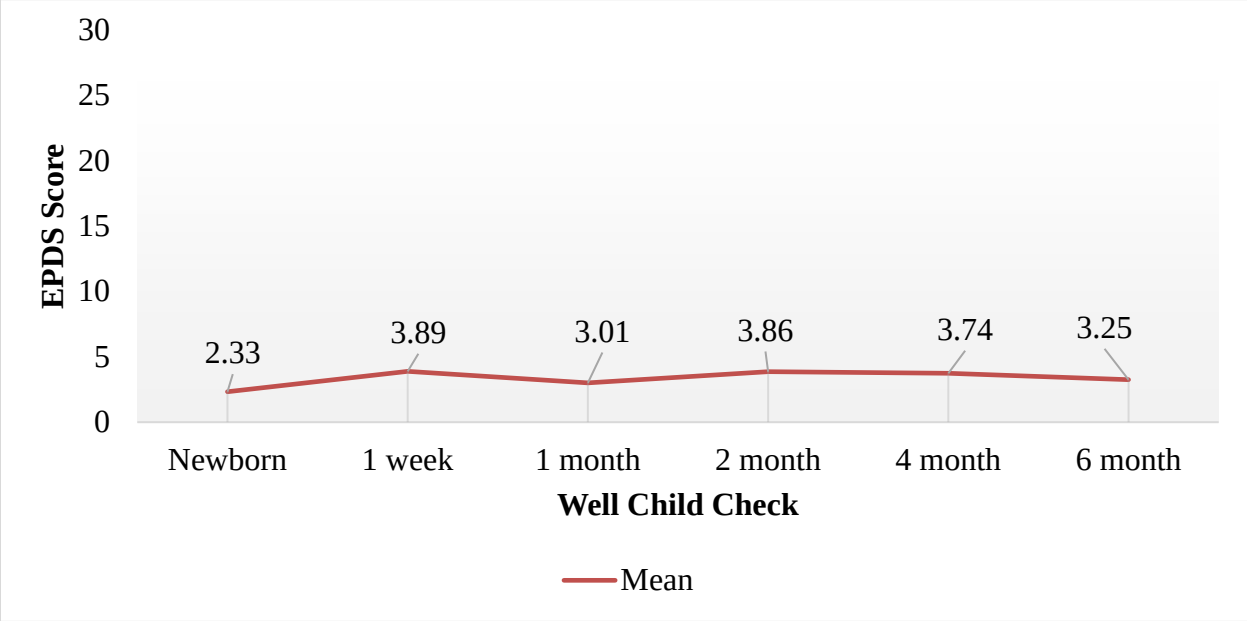

Figure 3. Average EPDS Score across WCC

Hypothesis (c) was also supported. The percentage of WCC with an intervention *ordered*, when the EPDS score fell within the "At-Risk" (score falling between 9 and 12) or "Clinically Significant" (score > 12) ranges, showed pediatricians *ordered* an intervention and noted it in the chart for over 85% of patients as shown in Table 5. In addition, Table 6 shows the frequency with which each type of intervention (i.e., "No Action Needed," "Education," "Referral to BHC," "Referral to Social Work," "Community Referral," "Brief Intervention by BHC," "Phone Call by BHC," "Phone Call by Social Worker," or nothing recorded in note) was ordered. A majority of actions ordered included a "referral to BHC" and "education" (provided by pediatrician or onsite BHC), respectively, followed by "community referral," "brief intervention by BHC," and "Phone call by BHC." Table 7 provides further detail regarding whether or not the BHC Visit actually occurred, a phone call follow-up was attempted and whether a follow-up phone call was achieved, as evidenced by a BHC note within the patient's chart.

Table 5. *Percentage of Actions Ordered*

	Well Child Check					
	1 week	*1 month*	*2 month*	*4 month*	*6 month*	*Total*
Number of Patients with Positive Screen (“At-Risk” and “Clinically Significant”)	39	53	60	67	53	272
Percentage and number of Patients with an Action Ordered	94% (n = 37)	90% (n = 48)	90% (n = 54)	79% (n = 53)	79% (n = 42)	86% (n = 234)

Table 6. *Plan of Action Ordered for Mothers Scoring within the Positive range*

	Plan of Action Recorded					
	1 week	*1 month*	*2 month*	*4 month*	*6 month*	*Total*
"Referral to BHC"	48% (n = 19)	49% (n = 26)	35% (n = 21)	31% (n = 21)	42% (n = 22)	43% (n = 118)
"Education"	59% (n = 23)	43% (n = 23)	46% (n = 28)	28% (n = 19)	33% (n = 18)	41% (n = 111)
"Community Referral"	85% (n = 33)	9% (n = 5)	10% (n = 6)	10% (n = 7)	8% (n = 4)	29% (n = 79)
"Phone Call by BHC"	36% (n = 14)	23% (n = 12)	30% (n =18)	25% (n = 17)	25% (n = 13)	27% (n = 74)
"Brief Intervention by BHC"	13% (n = 5)	15% (n = 8)	12% (n = 7)	10% (n = 7)	9% (n = 5)	12% (n = 32)
"No Action Needed"	0% (n = 0)	8% (n = 4)	10% (n = 6)	16% (n = 11)	15% (n = 8)	11% (n = 29)
Nothing Recorded	5% (n = 2)	2% (n = 1)	3% (n = 2)	6% (n = 4)	8% (n = 4)	5% (n = 13)
"Phone Call by Social Worker"	0% (n = 0)	0% (n = 0)	2% (n = 1)	0% (n = 0)	0% (n = 0)	0.37% (n = 1)
"Referral to Social Work"	0% (n = 0)	0% (n = 0)	0% (n = 0)	0% (n = 0)	0% (n = 0)	0% (n = 0)

Table 7. *Actions that Occurred*

	BHC-related Actions that Occurred					
"Onsite BHC Visit"	37% (n = 15)	54% (n = 27)	36.6% (n = 22)	43.3% (n = 29)	35.8% (n = 19)	41.2% (n = 112)
"Phone Call Follow-up Contact"	22.5% (n = 9)	1.9% (n = 1)	23.3% (n = 14)	8.96% (n = 6)	11.3% (n = 6)	13.2% (n = 36)

Aim 2: Effectiveness

The hypothesis regarding the effectiveness of the interventions ("education," "onsite BHC visit," "BHC phone follow-up call contact") delivered to mothers falling within the "At-Risk" and "Clinically Significant" ranges of the EPDS at their child's 1- or 2-month WCC was explored using a multiple regression. The multiple regression was specifically used to determine if 1- or 2-month WCC EPDS scores predicted outcomes at the 6-month WCC. Only mothers who attended both a 1- or 2- month WCC, and scoring in the "At Risk" or "Clinically Significant" range (Time 1), and had a 6-month WCC EPDS noted in the chart (Time 2), were included in the analysis. Thirty (9.43%) mothers had a positive screen noted in their child's chart ("At-Risk," n = 18; "Clinically Significant," n = 12) at 1- or 2- months and 27 (8.50%) had positive screens ("At-Risk", n = 16; "Clinically Significant," n = 11) at 6 months. Results indicate that Time 1 scores were predictive of Time 2 score, and the type of intervention did not contribute uniquely to the Time 2 score.

Analysis results of a multiple regression are shown in Table 8. The hypothesis that the interventions provided would significantly lower EPDS scores at 6-month WCC was not supported. Of the four independent variables only Time 1 (1- or 2- month WCC) resulted in a statistically significant ($p < .05$) explanation of variance for the dependent variable, 6-month.

Overall, the model accounted for 37.7% of the variance in the 6 month score, $F(4, 26) = 2.348$, $p < .082$, $R^2 = .27$.

Table 8.

Multiple Regression Model 6 Month EPDS Score

Independent Variable	*b*	*SEB*	*β*	*t*	*Sig*
1- or 2- month	.81	.29	.50	2.82	.009*
Education	-2.50	2.28	-.20	-1.20	.285
Onsite BHC Visit	-3.47	2.33	-.27	-1.50	.150
BHC follow-up phone call contact	.654	4.66	.03	.14	.889

Note. $R^2 = .27$
*p<.05

Aim 3: Adoption

The hypothesis regarding adoption of the screener explored the percentage of WCC that had an EPDS documented in the child's note. The hypothesis was supported. Both preceptors and residents, ranged from 67.42% to 100%, with 83.74% of all notes including an EPDS score, which surpasses the hypothesized rate of 50% indicated by previous literature (Chaudron et al., 2004; Freeman et al., 2005). See Table 9 for additional details across pediatricians (de-identified).

Table 9. *Adoption by Provider*

Pediatrician	*Number of Notes*	*Number of Notes with EPDS*	*Percentage*
A	11	11	100%
B	58	55	94.82%
C	435	389	89.43%
D	514	457	88.91%
E	683	584	85.51%
F	158	124	78.48%
G	305	237	77.70%
H	152	117	76.97%
I	89	60	67.42%
Total	2405	2014	83.74%

Aim 4: Implementation

The hypothesis regarding Implementation examined the integrity of the protocol. To explore this hypothesis only the mothers who arrived with their child to all 5 WCC were included in analyses. Based on the following results, the hypothesis was supported and the protocol appears to have been implemented as intended. A total of 205 patients were seen for all 5 visits between February 25, 2014 and September 25, 2015. A combined total of 1,025 WCC had a documented EPDS score (99 visits did not have a documented EPDS score). Thirty (14.63%) mothers scored “positive” during one WCC. Twelve (5.85%) mothers screened “positive” at two WCC. Five (2.44%) mothers at three WCC. Six (2.93%) mothers at four WCC, and only one (.49%) mother screened “positive” at five WCC. Of the mothers scoring within the “positive” range, 100% received an intervention for each visit.

Aim 5: Maintenance

Based on preliminary data, it was hypothesized the EPDS reimbursement rates would generate approximately $15,000 in one year. Results collected from the billing records indicate that the clinic received a cumulative amount of $21,028 across 17 months as calculated by 737 chart reviews, which averages to about $28.51 per EPDS. EPDS reimbursement rates ranged from $0 to $35. This reimbursement rate exceeded the hypothesis amount of $15,000.

CHAPTER 4

DISCUSSION

Postpartum depression is a public health concern, occurring in 10% to 20% of mothers (Gaynes et al., 2005), with the potential to negatively impact maternal, child, and family wellbeing (Beck, 1995; Beck, 2001; Essex, Klein, Cho, & Kalin, 2002; Lara & Klien, 1999; NICHD, 1999; Stewart et al., 2003). Children with mothers experiencing symptoms of PPD are at an increased risk for slower development, an increased number of behavioral and emotional concerns, and these mothers are less likely to adhere to safety recommendations (e.g., improper car seat use; Norhayati et al., 2015). If moderate to severe forms of PDD are left untreated, symptoms are unlikely to remit and can persist for years (O'Hara & Swain, 1996). Fortunately, effective treatments in the form of psychotherapy and psychopharmacology are available (NIHCM, 2010) but, often, mothers encounter barriers to these treatments (e.g., time, cost, stigma; Gjerdingen et al., 2008; Heneghan et al., 2004; Koniak-Griffin et al., 2006; NIHCM, 2010).

This study contributes to the PPD screening and treatment literature by: 1) describing the application of an empirically-informed method (Gjerdingen et al., 2008) with which to deliver both PPD screening and innovative follow-up care that includes brief psychotherapy in a pediatric primary care clinic; 2) serving as a standard replication study for the screening portion of the protocol to improve rates of screening for PPD; 3) evaluating various components of implementation feasibility so other pediatric primary care clinics may glean information helpful to develop and execute a protocol that is effective and efficient, and to offer an example with which to compare their results, and finally; 4) describing the functions behavioral health consultants serve as valuable pediatric team members within pediatric primary care settings as

strengths of the protocol. The RE-AIM model (Brownson, Colditz, & Proctor, 2012) is the scaffolding used to present outcomes.

Feasibility of Protocol (RE-AIM)

Aim 1, *Reach*, is intended to assess the willingness of the target population to participate (Glasgow, Vogt, & Boles, 1999). Though mothers did not have a choice, as the EPDS was included in the required paperwork for their child's WCC visit, results showed a vast majority of mothers were screened, as evidenced by the presence of an EPDS score documented in a majority of the WCC notes (83.76%). These results are encouraging, as screening rates for this clinic far exceeded previous studies which reported approximately 50% of mothers were screened during their child's WCC (Chaudron et al., 2004; Freeman et al., 2005), and are within striking distance of the American Academy of Pediatrics' (AAP) practice guidelines to screen *all* mothers for PPD within the first year of having a child (Earls, 2010).

It is conceivable the *reach* of the screening tool may be even higher in actuality. Some pediatricians may have administered the verbal 2-item depression screener, as it is an alternate practice recommended by the AAP (Earls, 2010), and failed to record the results, or documented the results elsewhere, suggesting screening might have been conducted, but was not captured by the data collection methods used for this study.

This study also examined the rates of screening across the first five WCCs (1 week, 1 month, 2 month, 4 month, and 6 month), whereas Chaudron et al. (2004) intended to screen at all WCC's during the first year and Freeman et al. (2005) only screened at the child's 2 month WCC. This study suggests it is feasible to maintain a steady screening rate across multiple WCC's, with 86.57% of mothers being screened at the 1 week WCC and 78.61% at the child's 6

month WCC. Screening at five WCCs, instead of one, may have helped to establish it as a habit within the practice.

Consistent with previous research, “positive” screens fell between 10% and 20% for this clinic with 11.4% being the lowest rate at the 1 month WCC and 15.08% being the highest rate at the 6 month WCC (Gaynes et al., 2005; Gold, 2002; O’Hara & Swain, 1996); however, it is surprising these rates are not higher considering a majority, approximately 70%, of families served by this clinic hold Medicaid health insurance plans, and research has shown low-income families report higher rates of PPD (Isaacs, 2004).

Not only was this study able to demonstrate the feasibility of screening new mothers for PPD at their child’s pediatrician’s office with improved screening rates, but it also suggests that, when collaborative care is available (Dennis, 2005; Gjerdingen et al., 2008; Gilbody, Bower, Fletcher, Richards, & Sutton, 2006; USPSTF, 2002), it is feasible to ensure mothers have access to immediate follow-up care in various forms. For this clinic, follow-up care included delivery of brief psychoeducation by a pediatrician or a BHC, and same-day brief interventions provided by the BHC to mothers.

The most common referral ordered, ranked from most to least frequent, included Referral to the “BHC,” “Education,” “Community Referral,” and “Phone Call by BHC”. Only 11% of WCC with “positive” screens had “No Action Needed” attached to the note, suggesting the pediatrician made a conscious decision to incorporate clinical judgment and deemed the services offered in the clinic were not necessary. Reasons for not ordering a follow-up service at that time are speculative, but it may be that the mother was already receiving treatment from a mental or medical health professional to address her depressive symptoms (Gjerdingen et al., 2008). The least utilized options were the referral to and the phone call by the social worker. The graduate

student social worker, between February 25, 2014 and September 2015 was located in the office but in a separate location away from the exam room and the BHC. Additionally, social work coverage was less frequent than the BHC, averaging one day a week, versus BHC coverage that range from 3 to 5 days a week. Both variables may have contributed to the underutilization of the social worker.

These results suggest this protocol is a highly effective method of ensuring mothers who screen for symptoms of PDD are at least given the option of coming into immediate contact with evidence-based treatment. These results have strong implications for the way PPD is treated in a pediatric primary care setting. These services offer a method with which to overcome barriers that might otherwise impede a mother from receiving follow-up therapeutic services (e.g., time, stigma, cost; (Gjerdingen et al., 2008; Heneghan et al., 2004; Koniak-Griffin et al., 2006; NIHCM, 2010).

The concept of *adoption*, Aim 3, does not deviate significantly from *reach*, and can be discussed subsequent to the previous domain. Both domains measure the extent to which the EPDS screener was administered and scored, as measured by the proxy variable of documentation, but *adoption* examines the rate of adoption per each pediatrician. As expected, given the results from Aim 1, the overall pediatrician *adoption* was high. However, the range of adoption across pediatricians ranged from approximately 67% to 100%.

The discrepancy in adoption across pediatricians could be explained by multiple operative factors. First, the discrepancy may reflect the number of days of the week the pediatrician spent in the Clinic; pediatricians spending more days in the Clinic might have more opportunities to develop a more reliable routine than those working fewer hours or days. Additionally, some pediatricians might have been absent during the grand rounds presentation

that occurred in January 2014, prior to implementation, which was meant to prepare pediatricians of the practice change; however, grand round attendance data was not collected, therefore, we are unable to make sound conclusions about attendance and rate of adoption for each pediatrician. Another possible explanation could be that maternal mental health may not be considered a priority for that pediatrician and may have been a topic overlooked more frequently (Olson et al., 2002), despite it being part of the AAP Anticipatory Guidelines for that age range (Earls, 2010). Finally, the pediatrician may not have worked on a day with BHC coverage during the earlier months of this study, since BHC coverage was limited to 3 day, instead of the 5 days of coverage that began in the summer of 2015. Thus, the visual reminder of having a BHC present may not have been there to prompt the pediatrician.

Though this study demonstrated improved rates of PPD screening, Yawn et al. (2012) encouraged future studies to report on maternal outcomes of programs that attempt to screen, diagnosis and initiate treatment for mothers with PPD. Aim 2, *effectiveness*, attempted to examine maternal outcomes. A significant decrease in EPDS scores from 1- and 2-month WCC to 6-month WCC was found. However, the interventions (i.e., “education,” “onsite BHC visit,” and “BHC phone follow-up call contact”) did not significantly contribute to the overall improved scores at the 6-month visit. The lack of clinical significance, as it relates to the interventions, associated with the drop in symptoms could be a result of a natural resolution of symptoms, as suggested by Horowitz and Goodman (2004). The small sample size (N = 30) and the lack of a waitlist, or treatment as usual group, weakens the ability to make meaningful statistical comparisons and generalizations. Further discussion of ways to improve this analysis is addressed below, in the Future Directions section.

As hypothesized in Aim 4, *Implementation*, mothers screening high on the EPDS made contact with more services (e.g., brief therapy with BHC and follow-up phone) compared to those screening within the non-significant level. Further, it is interesting to note that mothers scoring in the "Clinically Significant" range either received a higher *quantity*, or number, of services compared to those in the "At-Risk" range, or more *intense* types of services, such as brief therapy versus, or in addition to, education. Some mothers screening within the non-significant range also received services as if they had fallen into the "At-Risk" or "Clinically significant" ranges, which suggests some pediatricians may have employed clinical discretion and assigned an intervention from which they believed some mothers might benefit though their EPDS was not positive. This represents an appropriate implementation of clinical judgment. As with any mental health screener, it is important not to rely solely on one outcome measure, but instead to consider all available information and suggest treatment based on multiple sources of information (Gjerdingen & Yawn, 2007). For example, a mother may have scored within the non-significant range on the EPDS, but endorsed Item 10 (i.e., "The thought of harming myself has occurred to me"), which automatically leads to a BHC referral.

Though a majority of the protocol components were achieved, Step 4 (i.e., phone call made by the BHC) did not occur as frequently as planned. This was the least utilized step of the protocol. Only 13% of the mothers who screened "positive" for symptoms had documentation that a BHC was able to contact and discuss symptoms and functioning with the mother. The low rate of contact could be that BHC did not have much time throughout the work day to make those phone calls. The nature of an integrated BHC is to be physically visible, which often means the BHC is not sitting behind a desk but moving throughout the clinic hallways, with the intention of being available to any provider at any time. This flexibility may have interfered with

the BHC's ability to organize their time effectively to make phone calls, especially if the BHC was preoccupied managing other behavioral health concerns. Alternatively, the mother may not have had a working number, which happens frequently with low-income families who do not always have funds keep a phone number consistently active.

Maintenance, or sustainability, of a protocol is critical when considering implementation of a new protocol. One aspect of sustainability is the cost benefit. Results indicated the clinic generated $21,028 within 17 months, which surpasses the extrapolated anticipated amount of approximately $15,000 from preliminary data. This protocol takes time out of the pediatricians' and the BHCs' schedules, which can take time away from other reimbursable activities; however, the ability to bill for the EPDS allows a Clinic to cover the time of those most involved in the protocol development, execution, and maintenance. In addition to the clinical care training, the clinic was also informed on how to bill for the Health Risk Assessment code when the EPDS was administered, scored and documented in the note. This revenue has the potential to be higher since some pediatricians candidly noted they did not remember to bill for the code on the billing sheet for every visit. Further, the initial language used on the billing code was "Health Risk Assessment" but then changed to "Edinburgh Postnatal Depression Scale" to promote clarity and more consistent EDPS billing practices.

Strengths

Strengths of this office that contributed to the marked success of the *reach* and *adoption* of the screener protocol implementation are multiple, at the core of which was having a behavioral health consultant as an integral team member throughout the development and implementation of the protocol. Indeed, a systematic review of PPD psychosocial treatment literature suggests that coming into contact with a mental health professional soon after

childbirth can help to ameliorate PPD symptoms (Dennis, 2005). This was a training setting, which suggests keeping up with best practice guidelines are at the forefront of the clinic's mission to train a new generation of professionals in the most up-to-date best practices. The Level 5 model of integration (Heath, Wise Romero, & Reynolds, 2013) allowed for easy and immediate access to a BHC when needed, rather than having mothers make a follow-up appointment with a member in the community, a practice supported by research (Gilbody et al., 2006). Even when mothers required outside referrals, the BHC served as the point person with the intention of ensuring follow-up referrals were made. Finally, the BHC role was fulfilled by clinical psychology doctoral students completing a required practicum experience for their education and were paid by separate grants obtained by the university; therefore, the clinic did not have to address billing concerns related to BHC provider time, so less time was spent determining payment. Attempts to implement a similar protocol in other settings may encounter barriers with insurance reimbursement restrictions and may need to negotiate with insurance agencies about how to most successfully reimburse for services provided to the mother.

Limitations

Due to the real-world nature of this study there are numerous limitations to highlight. One limitation some researchers may identify is the seeming lack of rigor. Randomized Controlled Trials (RCTs) are regarded as the gold standard in scientific rigor. However, this study arguably helps to close the temporal gap between research conducted in controlled environments and real-world practice. RCTs are functional means of gleaning valuable information, but fall short in adaptability to fit into existing practices as variables in the real-world are infinite and unpredictable. Practice-based evidence (Green, 2006), such as this study, is intended to be a quick and flexible method of informing practice in the moment, using data in

EHRs and informal interviews to inform practice changes (Glassgow, 2014) and to disseminate relevant findings to those who can use it (Chambers, 2016).

This Clinic faculty and staff referred to empirical findings to inform clinical choices, such as using the EPDS and treating mothers with psychotherapy; however, the premise of the current study was to provide an example of a method to evaluate a real-world intervention and to do so without needing to conduct an RCT for reasons of practicality, as most healthcare service providers are not tasked with a mission to conduct research, nor are there extra resources and time. The RE-AIM model offers an alternative avenue for practice evaluation. From a RE-AIM perspective, a limitation of this study was its inability to compare the implementation to other practices. Future studies may be able to compare their results with this clinic using the same framework.

Another notable limitation is the absence of clear outcome data regarding maternal outcomes. Though meaningful preliminary data for the first year of the stepped care protocol implementation was found, its insufficient robustness leaves unanswered questions about the effectiveness of the BHC services. Consistent with the charge put forth by Olin et al. to conduct more outcome research on the use of BHCs in primary care, more outcome data must be collected to provide more substantial evidence that BHC services provided within a pediatric primary care office are effective in treating more mild forms of postpartum depression in mothers.

An additional limitation to the generalizability is the ability to find mental health providers who can treat depression in adults. The BHCs working at the Clinic receive generalist training within their program of study and have experience working with adults and children. BHCs with only child training may feel that treating mothers, even with brief therapy modalities,

is outside their professional scope; therefore, a training on how to address and treat mothers with mild to moderate symptoms of depression may be required as a best practice. The model may be better suited for a BHC working in a family medicine practice that sees a range of ages.

Given the large scope of this project to examine the feasibility of this project as it functions as a whole, there remain some components that require further examination and adjustment in order to contribute to the best practice literature. Though the psychoeducation provided to mothers was generally standardized across providers, the treatment delivered in the brief intervention pieces was not standardized across BHCs. Each BHC was familiar with Cognitive Behavioral Therapy as an evidence-based treatment for depression, but all had been more recently trained in Acceptance and Commitment Therapy (ACT), specifically Focused Acceptance and Commitment Therapy (FACT,) and were inclined to use that modality of treatment over others; however, the type of therapy and activities presented, discussed, and practiced were not tracked or evaluated, nor was that the focus of this project. Previous research does suggest, overall, that most psychotherapies are equal in potency and that differences in outcomes are potentially negligible (Smith & Glass, 1977).

Future Directions

Future directions for researchers and clinicians should focus on replication of this intervention in other pediatric practices to elucidate other barriers that may not have been apparent in this setting. Further exploration of the *effectiveness* of the various behavioral health interventions (e.g., psychoeducation, psychotherapy) is important when considering whether on-site services enhance access to care that works to reduce symptoms. For this effectiveness to be more thoroughly evaluated, a more standardized menu and delivery of services must occur and must be applied across several years to gather a large enough sample size to improve the

robustness of results. Possible waitlist control and treatment as usual trials could also contribute to rigorousness of a future study. However, future studies will need to think critically about the ethical implications of waiting to provide treatment since the symptoms of depression can directly impact the child's development during a critical period. Future studies should also measure maternal satisfaction regarding the protocol procedure. Studies exploring maternal satisfaction could also explore maternal preferences for type of care (e.g., primary care versus traditional outpatient mental health services). Mothers typically appreciate their child's pediatrician inquiring about their own mental health and prefer therapies to address those concerns over medication. Additional exploration could be conducted to determine if mothers value in-Clinic mental health services provided by their child's pediatrician's office over outpatient services. Future directions may also include standardizing a brief intervention treatment delivery package to determine the most potent therapeutic modality for mothers with postpartum depression. Various treatment modalities could be examined to see which one best fits the needs of the families and the setting of a pediatric setting. This may be best explored as an independent study instead of within the context of a larger study.

Future studies should also conduct a thorough cost-benefit analysis to quantify the financial need to support a mental health professional to address maternal mental health. This could be of importance when advocating for protocol implementation and policy change. In addition to using the RE-AIM model, at a set number of intervals to monitor progress and provide data to inform Clinic practices (Glasgow, 1999) within this practice. The RE-AIM framework can be applied to other pediatric primary care practices to create a consistent mechanism with which to discuss the strengths and weaknesses of the protocol model and its generalizability across locations.

Implications and Conclusions

The implementation successes of this study suggest screening and treating mothers with symptoms of PPD can be feasible when delivered in a stepped care format, and should be considered as an option for best practice in all pediatric offices. Yawn et al. (2012) urged future studies to report on maternal outcomes in addition to procedural outcomes related to screening, detection and referral success. While this project is limited in its ability to report robust maternal outcomes, results do support the feasibility of providing mothers with a range of immediate and accessible interventions (e.g., psychoeducation, brief therapy) directly in pediatric primary care practices, referring only the most severe of cases (e.g., chronic severe depression, current suicidal ideation) to outside providers. Since the EPDS is a reimbursable scale, with variable reimbursement rates depending on insurance company, the revenue can theoretically support some functions of BHCs, who may otherwise encounter difficulties billing for their time working with mothers. This method of generating revenue may be employed until insurance policies adjust to fit the needs of families and offer reimbursement of adult services within a pediatric setting, as research shows improved maternal mental health is critical to healthy family and child development and future functioning.

A final implication of this study reinforces the need and role for BHC to be situated within pediatric primary care settings and further, highlighting a need for those BHCs to be equipped with training and skills needed to work with adults to provide immediate care for mothers with depression.

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APPENDIX

Postpartum Depression Stepped Care Protocol Coding Key

Instructions: Please populate excel sheet/cells with available information/data. If information is not provided regarding a visit leave the cells blank.

Patient Name: _____

Unique Patient ID: _____

Coder Initials: _____

Sex of Patient: _____

Mother's Age: _____

Relationship to the Child: 0 = assumed biological mother; 1 = foster/adoptive mother; 2 = grandmother

Insurance Carrier: 0 = BCBC TN; 1 = Blue Care; 2 = United Healthcare

Visits: Newborn; 1 week; 1 month; 2 months; 4 months; 6 months

Date of Visit: _____

Provider: 0 = Attending M; 1 = Attending J; 2 = Attending S; 3 = Attending S; 4 = Attending Tl; 5 = Attending G; 6 = Attending Ma; 7 = Attending P; 8 = Resident

EPDS in note: 0 = no; 1 = yes

EPDS score: _____

Action Taken: 0 = no action needed; 1 education about postpartum depression provided; 2 = referred to in-clinic BHC; 3 = referred to in-clinic SW; 4 = community referral; 5 = brief intervention provided by in-clinic BHC; 6 phone call follow-up by BHC; 7 = phone call follow-up by SW

BHC visit: 0 = no; 1 = yes

BHC f/u phone call conduct (presence of a f/u note): 0 = no; 1 = yes

EPDS in chart paper: 0 = no; 1 yes

Associated EPDS billing code 99420: 0 = no; 1 = yes

Amount Clinic charged insurance company: _____

EPDS reimbursement amount: _____

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