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POSTPARTUM DEPRESSION SCREENING WITH THE EDINBURGH POSTNATAL DEPRESSION SCALE AND THE POSTPARTUM DEPRESSION CHECKLIST

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POSTPARTUM DEPRESSION SCREENING WITH THE EDINBURGH POSTNATAL DEPRESSION SCALE AND THE POSTPARTUM DEPRESSION CHECKLIST

By

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ABSTRACT

POSTPARTUM DEPRESSION SCREENING
WITH THE EDINBURGH POSTNATAL DEPRESSION SCALE
AND THE POSTPARTUM DEPRESSION CHECKLIST

By

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Postpartum depression is highly prevalent and often undiagnosed. This study sought to determine the relationship between the Edinburgh Postnatal Depression Scale (EPDS) and the Postpartum Depression Checklist (PDC), and the sociodemographic characteristics associated with elevated depression scores. The sample consisted of 30 women returning to an obstetric clinic six to eight weeks postpartum. Statistical analysis of the data revealed that the EPDS and the PDC had a moderately high degree of correlation ($r=.64$, $p<.01$). The only sociodemographic characteristic of significance was being non-white, this correlated with higher depression scores ($z=-1.95$, $p=.05$). Other identified risk factors examined were age, marital status, partner/significant other support, level of education, income level, employment status, planned pregnancy, parity, complications, type of delivery, history of depression, and family history of depression, none of which demonstrated a significant association with an elevated depression score. Implications for advanced practice nurses are discussed in terms of screening for depression in postpartum women.

This thesis is dedicated to my parents, Pat and Marie Mullin, who have lovingly encouraged and supported me throughout my life, and to my nephew and niece, Neal and Taylor Hamilton, who have filled many of my days with love and joy.

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INTRODUCTION

Background

The postpartum period for many women is a healthy developmental process. Postpartum for other women may be a period besieged with transitions that challenge coping resources and subsequent adaptation. Studies conducted between five and eight weeks postpartum have shown that postpartum depression occurs at a rate of between 8% to 23% (O'Hara, 1987). However, only a small proportion of these postpartum women are identified as depressed by health professionals due to lack of screening (Beck, 1995b).

There are at least three separate postpartum affective disorders that are frequently labeled postpartum depression. These disorders, the postpartum blues, postpartum depression, and postpartum psychosis, differ markedly from one another with regard to onset, severity, and length of symptoms, and each requires distinct nursing interventions for both postpartum women and their families. In this study postpartum depression, not postpartum blues or psychosis, will be specifically examined. The postpartum blues are generally self-limiting, while postpartum psychosis is infrequent and may first present as postpartum depression (Cox, 1989).

According to Holden and Phil (1991), the present knowledge about postpartum depression suggests that not only is it a serious condition and one of the commonest postpartum complications, it is also a serious threat to the health and well-being of the family. Depression after childbirth may have long-term effects on a woman's personal happiness, her relationship with her partner, her view of herself as mother, her child's social, emotional, and cognitive development, and the emotional well-being of the family

as a whole.

Early detection of postpartum depression has been hindered by the tendency of women to under-report their feelings, and by unclear, diagnostic categories delineating postpartum disorders. Unless florid manic or depressive symptoms are displayed, postpartum depression many times remains covert and undiagnosed. Because childbirth is supposed to be joyful, a woman feels confused, embarrassed, and guilty if she doesn't conform to the happy maternal stereotype. Our society does not often encourage people to come forward with symptoms of depression, thus it is unlikely that a woman would approach the issue of postpartum depression with her health care provider due to denial, shame or embarrassment (Unterman, Posner & Williams, 1990).

Detection has also been hindered by the use of standardized clinical interviews and self-report questionnaires that are frequently borrowed from studies used to detect depression in the general population. The diagnostic criteria used to study child-bearing women are still based on the assumption that their depression is similar to that exhibited in the general population (Affonso, Lovett, Paul, & Sheptak, 1990). Many depression measures have been used such as the Beck Depression Inventory (BDI) and Schedule for Affective Disorders and Schizophrenia (SADS) that are inappropriate for use with pregnant and childbearing women (O'Hara, Neinaber, & Zekoski, 1984). It can no longer be assumed that depression symptoms of childbearing women fit the same diagnostic criteria for depression as in the general population. Existing depression scales may be misleading at a time when somatic symptoms such as sleep disturbance do not necessarily indicated depression (Holden & Phil, 1991).

In reviewing the literature, two tools found to best screen for postpartum

depression after delivery were the Edinburgh Postnatal Depression Scale (EPDS), (Cox, Holden, & Sagovsky, 1987), a self-report questionnaire that mothers themselves complete, and the Postpartum Depression Checklist (PDC), (Beck, 1995b). The PDC is designed to be administered by a health professional, thereby engaging mothers in a dialogue.

Purpose

The early detection and the development of reliable and valid screening tools specific to postpartum depression that are easy for health professionals to use are needed. The purpose of this study is to compare the EPDS and the PDC in order to further develop screening and detection of depression in postpartum women. The EPDS and the PDC was administered to postpartum women and the data correlated. Also sociodemographic data was obtained from subjects to establish who may be a higher risk for postpartum depression.

With the information from this study, nurses will gain more knowledge regarding the PDC's and EPDS's use in practice for screening postpartum depression, and characteristics associated with depression.

Study Questions

(1) What is the relationship between the Edinburgh Postnatal Depression Scale (EPDS) and the Postpartum Depression Checklist (PDC)?

(2) What sociodemographic characteristics are associated with elevated depression scores?

LITERATURE REVIEW

Effects on Women

Early assessment and identification of postpartum depression can reduce the ill effects on women and children. A woman with postpartum depression suffers from withdrawl, irritability, and fatigue, which limits and distorts healthy family interaction. Postpartum depression and its family sequalae also bring further pain and suffering upon the woman (Martel, 1990). A mother's depression may be so deep that she may attempt suicide or infanticide (Ugarriza, 1990). This is the worst scenario if a woman with postpartum depression is untreated.

Effects on Children

Research has consistently demonstrated that maternal depression affects infants with outcomes ranging from delayed cognitive development (Cogill, Caplan, Alexandra, Robson, & Kumar, 1986) to behavior disturbances (Whiffen & Gotlib, 1989). The effects of maternal depression also persist in older children. Behavioral problems have been seen in the three-year-old children of postnatally depressed mothers (Wrate, Rooney & Thomas, 1985), and significant cognitive deficits were observed in four-year-olds whose mothers had suffered depression during the children's first year (Cogill, Caplan, Alexandra, Robson & Kumar, 1986).

The correlates of maternal depression identified in older children may have evolved from the mothers' inability to provide an appropriate environment for the infants' psychological development (Murray, 1988). When postpartum depression goes undetected by health professionals, mothers and their families are left untreated.

Assessment

There are three types of assessment of patients for depression: first, a full clinical interview with a psychiatrist, second, a structured clinical interview, and third, observer-rated scales. The first two methods are both time-consuming and impractical in screening large numbers of women, the majority of whom are well. Observer-rated scales are more practical, but they too require some form of training in their application (Harris, Huckle, Thomas, Johns & Fung, 1989).

Depression may be overdiagnosed if clinicians use self-reported measures solely, or without carefully interviewing women to separate the symptoms of depression from symptoms of pregnancy and postpartum (Affonso, Lovett, Paul & Sheptak, 1990). There has been a tendency in previous studies to use global measures of independent variables (i.e; stress, social support) rather than to investigate specific factors that contribute to postpartum depression (Affonso, 1992).

For example, measures of self control related to postpartum depression as measured by the Beck Depression Scale (BDI), (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) was not confirmed when a clinical syndrome diagnosis of depression was made using Research Diagnostic Criteria (O'Hara, Rehm & Campbell, 1984). This suggests that studies using the Beck Depression Inventory as the only measure of depression following childbirth may give misleading results.

Some possible explanations for these apparent limitations of well established scales when used on childbearing women include their emphasis on the somatic symptoms of psychiatric disorder which may be caused by normal physiological changes associated with childbearing, (i.e; sleep and eating disturbances, fatigue, psychomotor

retardation) as well as reluctance to use questionnaires which may be regarded as time-consuming or which appear to lack face validity (Cox, Holden & Sagovsky, 1987).

Cursory assessments or limited self-report information can result in either an overdiagnosis of depression or failure to identify a negative emotional state requiring treatment (Affonso, 1990). To be useful as a screening test for depression following childbirth, a self-report scale must be fully acceptable to women who may not regard themselves as unwell, or in need of medical help. The depression scale also needs to be simple to complete, and not require the health care giver to have any specialized knowledge of psychiatry. It must have satisfactory reliability and validity. The Edinburgh Postnatal Depression Scale (EPDS) satisfies these requirements (Cox, Holden, & Sagovsky, 1987).

The EPDS, a 10 item self-report screening tool, was devised from the earlier work of Snaith (1978) and concentrates on the psychic aspect of depression in the puerperium, containing within it a rating for anhedonia. Anhedonia is the "absence of pleasure from the performance of acts that would ordinarily be pleasurable" (Spraycar, 1995, p. 90). Its only rating of a biological nature is for difficulty sleeping , and unhappiness is specified as the reason for sleep difficulties, eliminating the confusion with sleep deprivation early postpartum (Harris, Huckle, Thomas, Johns & Fung, 1989).

The EPDS was developed to assist primary care health professionals to detect mothers suffering from moderate postpartum depression not the postpartum "blues" or puerperal psychosis (Cox, Holden, & Sagovsky, 1987). The advantages of such a tool are obvious in that it is a self-report scale and by design can be used by a variety of health professionals. The scale does not replace full psychiatric assessment, but identifies a

population which needs further evaluation. The scale will not detect mothers with anxiety neurosis, phobias, or personality disorders. The EPDS's reliability and validity are well established (Harris, Huckle, Thomas, Johns & Fung, 1989). The EPDS has been widely used in Europe, but has only recently been used in the midwest United States (Schaper, Roonely, Kay, & Silva, 1994). The EPDS has been cited as not giving women the opportunity to describe their symptoms fully (Holden & Phil, 1991), whereas, the PDC is more interactive and allows women to describe their symptoms in greater detail.

Unlike the EPDS, the PDC is designed to be administered by a health professional thereby engaging mothers in a verbal dialogue. Before developing the PDC, two qualitative studies on postpartum depression were conducted. A phenomenological study (Beck, 1992) and a grounded theory study (Beck, 1993). Use of two theoretical perspectives, phenomenology and symbolic interactionism, provided a theoretical basis that enabled a more complete and holistic portrayal of postpartum depression. The grounded theory study also confirmed the findings of the phenomenological study.

In the second study, using grounded theory, a substantive theory of postpartum depression was developed (Beck, 1993). Data were obtained through participant observation in a postpartum depression support group over an 18-month period. In addition, 12 in-depth, taped interviews were conducted with mothers who had attended the support group. Using the constant comparative method, loss of control emerged as the basic social psychological problem in postpartum depression (Beck, 1995b).

The PDC describes 11 symptoms mothers suffering from postpartum depression reported experiencing. The 11 items are arranged in a checklist beginning with the least threatening symptoms, such as lack of concentration, and ending with the most

threatening symptom of contemplating death. The checklist is not intended to be used to make a diagnosis of postpartum depression or to replace a full psychiatric assessment. It can be used to define a population that may need further evaluation.

When the EPDS is compared with the PDC, there are five symptoms that are not included in the EPDS: 1) loss of control; 2) obsessive thinking; 3) loss of self; 4) loneliness; and 5) lack of concentration. There are two symptoms in the EPDS that are not included on the PDC: 1) difficulty sleeping related to unhappiness, and 2) crying related to unhappiness.

The PDC's "loss of interests" question is similar to a EPDS question about looking forward with enjoyment to things (question two). Both questions encompass the characteristic of anhedonia. The PDC's insecurity questioning is similar to EPDS questions that include feeling scared, panicky, and overburdened (questions five and six). The PDC questions about lack of positive emotions and feelings of emptiness, feeling like a robot, and not feeling joy and love toward infant are related to EPDS questions regarding laughing, seeing the funny side of things, and feeling sadness and misery (question one and eight).

The PDC anxiety attacks question regarding periods of palpations, chest pains, sweating, and tingling hands would compare to a EPDS question of feeling worried or anxious (question four). The PDC guilt questioning, guilt related to the infant, thoughts of harm to the infant, and being a good mother, is similar to a EPDS question regarding blaming self when things go wrong (question three).

Contemplating death is the last question on the PDC as is the related question on the EPDS inquiring about thoughts of harming self. Both tools progress from least severe

to most severe symptoms. In analysis the PDC questions appear to be more encompassing, time consuming, and specific, but wordy. The EPDS questions appear to be more general, direct, understandable, and less time consuming. However, in general not as much information is potentially generated using the EPDS.

The EPDS is a validated instrument developed specifically to identify women experiencing postpartum depression. The PDC is a newly developed postpartum screening tool that has been content validated but not criterion validated. By comparing screening results from the two instruments the PDC's usefulness in the detection and screening of postpartum depression will be further established.

Other Factors in Depression

A review of the literature indicates that various factors may influence the incidence of postpartum depression. Schaper, Rooney, Kay, and Silva (1994), using the EPDS with 287 randomly choosen women six weeks postpartum found marital instability, lack of medical insurance, and a history of depression were the factors found to correlate significantly with elevated EPDS scores. In addition women who were unmarried, divorced, separated, or widowed scored significantly higher on the EPDS. Other identified risk factors which showed no relationship with depression were type of delivery (vaginal/ceasarean), breast feeding, high-risk pregnancy, unplanned pregnancy, and peripartum stress. Furthermore, although the woman's occupation was not associated with depression, if unemployed 43% were at risk of developing postpartum depression (Schaper, Rooney, Kay, & Silva, 1994). This study was a retrospective chart review that was conducted by the investigators to identify high-risk factors present in the patient population. These risk factors were then correlated with the scores on the EPDS.

A heterogeneous sample of 360 women an average of 4.2 weeks after delivery using the Beck Depression Scale (BDI) and Schedule for Affective Disorders and Schizophrenia (SADS) found that postpartum depression was unrelated to age (Gotlib, Whiffen, Mount, Milne & Cordy, 1989).

Watson, Elliot, Rugg, and Brough (1984) interviewed 128 women six weeks postpartum and found a significant association between postpartum depression and dissatisfaction with the marital relationship and a previous psychiatric history. The study showed no association of postpartum depression with social class, martial status, or parity.

In a study of 99 women assessed at three and six weeks postpartum for depression the researchers found a significant association between postpartum depression and a history of depression and family history of depression (O'Hara, Neunaber & Zekoski, 1984).

Paykel, Emms, Fletcher, and Rassaby (1980), assessed 120 women six weeks postpartum in a clinic setting for postpartum depression using the Raskin 3- Area Depression Scale. A previous psychiatric history and marital discord was significantly associated with depression. While social class, being unmarried, parity, and unplanned pregnancy showed no association woth postpartum depression.

Postpartum factors associated with depression in the literature are personal or family history of depression, stressful life events, cognitive style, lack of social or economic support, hormonal sensitivity, obstetric stress, and genetic variables (Schaper, Rooney, Kay, & Silva, 1994). Inadequate financial resources and dissatisfaction with education are also factors associated with postpartum depression (Posner, Unterman, &

Williams, 1985).

One finding deserves particular attention because of its consistency in many postpartum studies (Bookman-Livingood, Daen & Smith, 1983; Paykel, Emms, Fletcher & Rassaby, 1981; O'Hara, Rehm, & Campbell, 1983; Oakley, 1980; Watson, Elliot, Rugg & Brough, 1984; and Cox, Conner & Kendall, 1982) that have documented a relationship between postpartum depression and 'marital difficulties' or a 'poor relationship with the husband.'

Even though different authors use the term 'marital difficulties' to describe somewhat different phenomena (communication, affection, support), the consistency with which the role of the husband is associated with postpartum depression is striking However, some have suggested that it is the woman's mental state which is responsible for the marital problems in the first place, so depression may be a cause not an effect of marital difficulties (Romitio, 1989).

A review of the literature revealed that studies involve many different samples of women, with different instruments and criteria for depression, and at many different times after birth. It is not surprising that many factors have been proposed as associated with postpartum depression.

Despite many factors suggesting risk for postpartum depression in the literature overall it is still difficult to predict. Data was collected on the following sociodemographic variables in this study: age, marital status, partner/significant other support, level of education, income level, employment status, planned pregnancy, parity, complications, type of delivery, history of depression, and family history of depression. All variables chosen were suggested in the literature as being associated with postpartum

depression.

Conceptual Definition

There is an implicit notion that postpartum depression occurs sometime in the first 12 months following childbirth. Even within this time span, there is no clear agreement on either the onset or duration of the disorder. The greatest incidence varies from occurring two weeks after childbirth (Lepper, DiMattio, & Tinsley, 1994); four weeks (McIntosh, 1993); five weeks (Cox, Murray, & Chapman,1993);and six weeks (Holden & Phil, 1991).

The average duration ranges from at least two weeks, (Ugarriza, 1992); two months, (Lepper, DiMatteo, & Tinsley, 1994); to thirty-six weeks (Cox, Murray, & Chapman, 1993); with others indicating a duration of one year or more (Cox, Holden & Sagovsky, 1987). Clearly, there is no agreement on the onset and duration of postpartum depression.

Furthermore, there is no widely accepted definition of postpartum depression. Wolman, Chalmers, Hofmeyr, and Nikodem (1993), describe postpartum depression as "...a group of poorly defined, depressive type symptoms that have their onset in the early postpartum weeks or months and can persist for more than a year" (p. 1388). These symptoms because of their severity or persistence, cause debilitating problems for postpartum women.

In general postpartum depression can be defined, as "a recurrent and pervasive state of apathy, despair, disorientation, agitation, or helplessness occurring in a woman within the first year following the birth of a child" (Landy, Montgomery & Walsh, 1989, p. 2).

According to the American Psychiatry Association criteria (Diagnostic and Statistical Manual of Mental Disorders, 4th edition, DSM-IV, 1994), moderate postpartum depression is classified as a major depressive disorder with onset within four weeks postpartum. These women are characterized as having severe anxiety, panic attacks, spontaneous crying, disinterest in their infant, insomnia, and guilt.

Clarification must be made between postpartum depression and two other disorders that may occur after childbearing. These are the mild postpartum "blues" and severe postpartum psychosis. According to Nicolson (1990), "It is estimated that 50% to 75% of all women who bear a child experience at least some transitory blues" (p. 3).

The postpartum "blues" are the transitory weepiness, irritability, fatigue, mild confusion, and anxiety which usually last no longer than two or three days, and are restricted to the first two weeks after childbirth. It is generally accepted that this particular emotional response is due to the wide hormonal fluctuations that occur during labor, delivery, and the immediate postpartum period (Gitlin, 1989). It is also important to recognize that in rare instances what appears to be severe blues can merge into a postpartum depression when the mother returns home or, more rarely, be the early symptoms of a major psychoses (Cox, 1989).

Postpartum psychosis is a severe illness that occurs in only one or two per 1,000 deliveries (Kendall, 1984). The clinical features of postpartum psychosis include delusions, hallucinations, incoherence or loosening of associations, and grossly disorganized or catatonic behavior. Postpartum psychosis usually surfaces within three weeks of delivery (Gjerdingen, Froberg, & Wilson, 1986).

The conceptual definition for postpartum depression for purposes of this study

includes any of the following pervasive symptoms in the six to eight weeks after childbirth: loss of control, obsessive thinking, loss of self, loneliness, lack of concentration, loss of interests, insecurity, lack of positive emotions, anxiety, guilt, contemplating death, difficulty sleeping, and crying (Beck, 1995b; and Cox, Holden, & Sagovsky, 1987).

Theoretical Framework/Model

The foundation for this study was based on King's (1971, 1981) framework for nursing (See Figure 1). The conceptual model addresses client interaction and nursing. King's model focuses on the deliberate action of the client and the achieving of a goal or result. In this framework, nursing is defined as a "process of human interactions between nurse and client whereby each perceives the other and the situation, and through communication, they set goals, explore the means and agree on the means to achieve goals" (King, 1981, p. 144).

King's conceptual framework is based on a systems approach of viewing human interaction and nursing. There are three dynamic systems with King's interacting systems framework: (a) individuals as personal systems; (b) two or more individuals forming interpersonal systems and; (c) larger groups with common interests and goals forming social systems. These three open systems consist of individuals or groups of individuals interacting with one another, influencing one another, and the world around them for a purpose. For the purpose of this study postpartum depression is conceptualized within

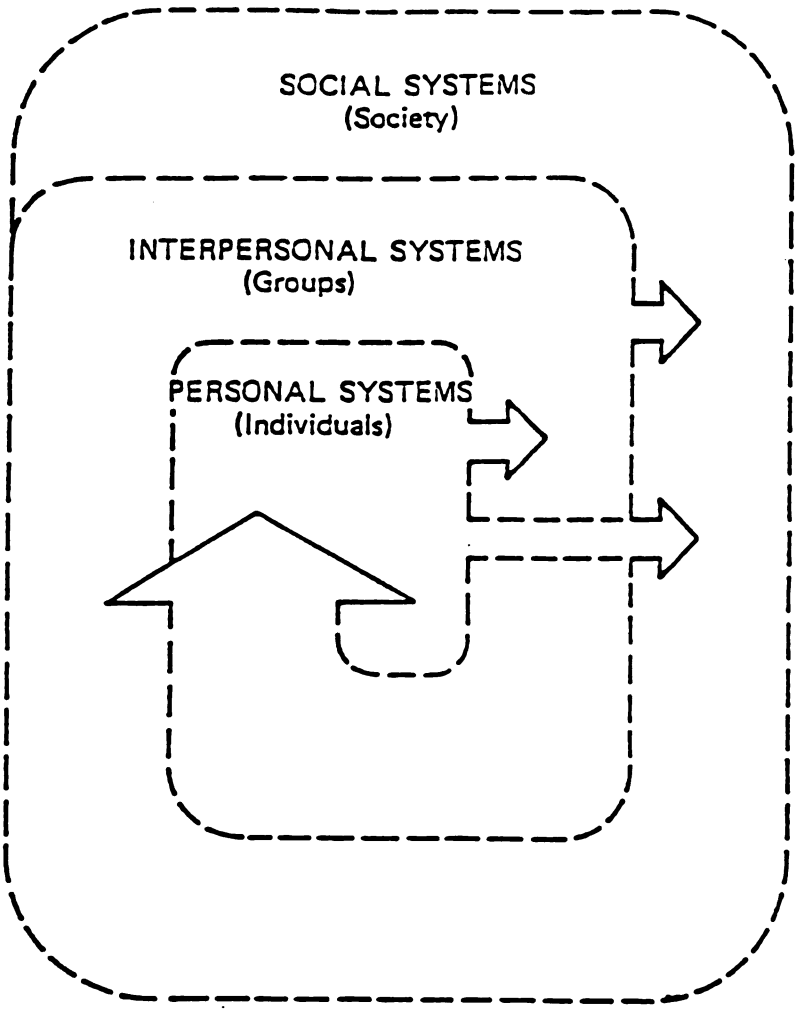

Figure 1. A conceptual framework for nursing: dynamic interacting systems (King, 1971, p. 20).

the personal system and screening within the interpersonal system (see Figure 2 for adapted framework).

Screening is conceptualized from King's (1981) concept of interaction for interpersonal systems. King placed the concept of interaction within the interpersonal system because interaction occurs between two people. The nurse and client come together to help and be helped to maintain a state of health that permits functioning in roles. King's theory of goal attainment occurs in the interpersonal system with interaction.

Screening can be conceptualized within this theory. Both nurse and postpartum woman perceive judge, act, and react, and interact with one another for transaction. The nurse's role is already set as the screener for the purpose of this study.

King's theory of goal attainment has been adapted to the postpartum mother (see Figure 3). Perceptions of the woman are postpartum concerns modified by past experience and present sociodemographic factors. Judgement is her evaluation of the postpartum period based on perceptions. Actions are the mental and physical behaviors used to overcome postpartum stressors.

Reactions are the signs and symptoms of postpartum depression experienced by the woman. Interaction is between the postpartum woman and nurse with screening for postpartum depression. Transaction is the outcome of postpartum depression screening. This may be the indication for mental health intervention. If postpartum depression is found then interaction would transpire with postpartum depression intervention as the goal the outcome then would be mental health. According to King, interaction is

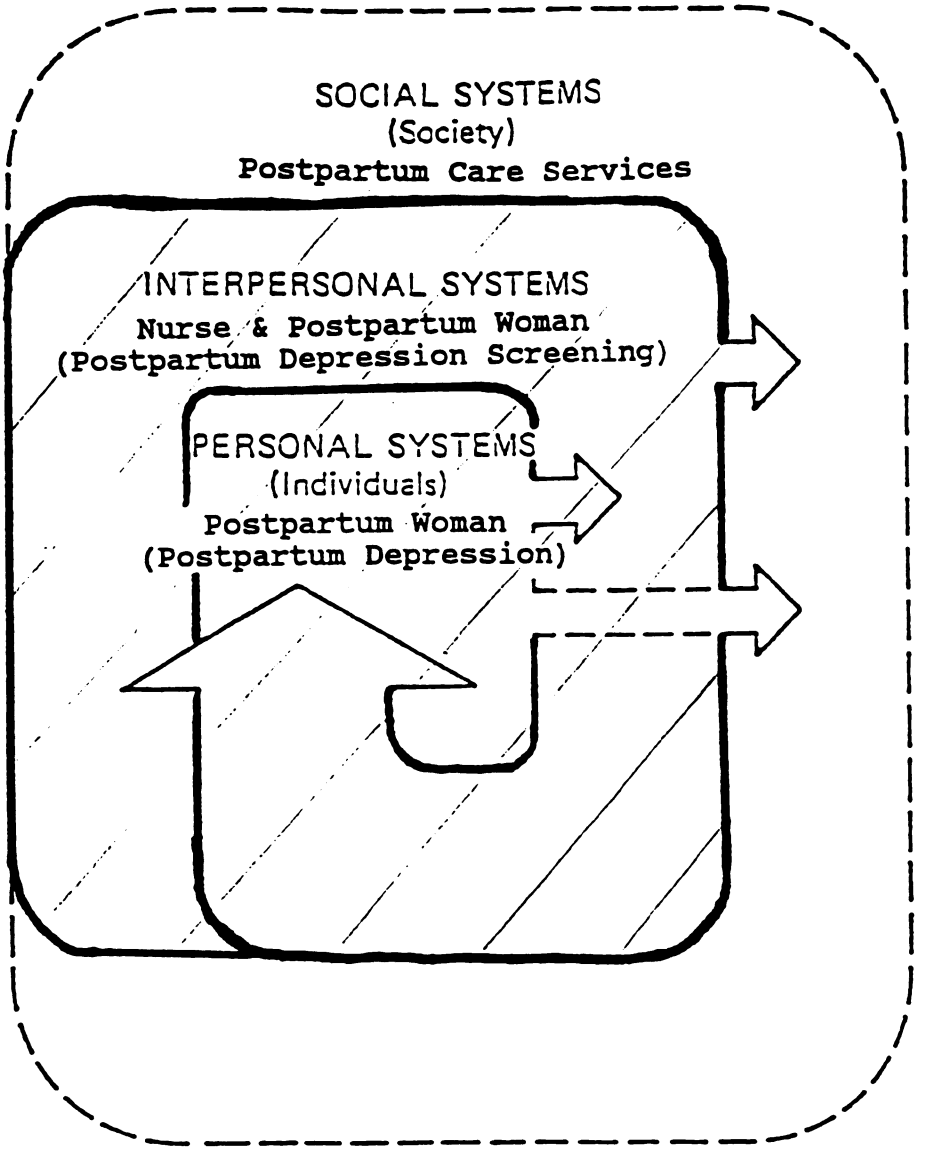

Figure 2. An adapted conceptual framework for nursing: dynamic interacting systems (King, 1971, p. 20).

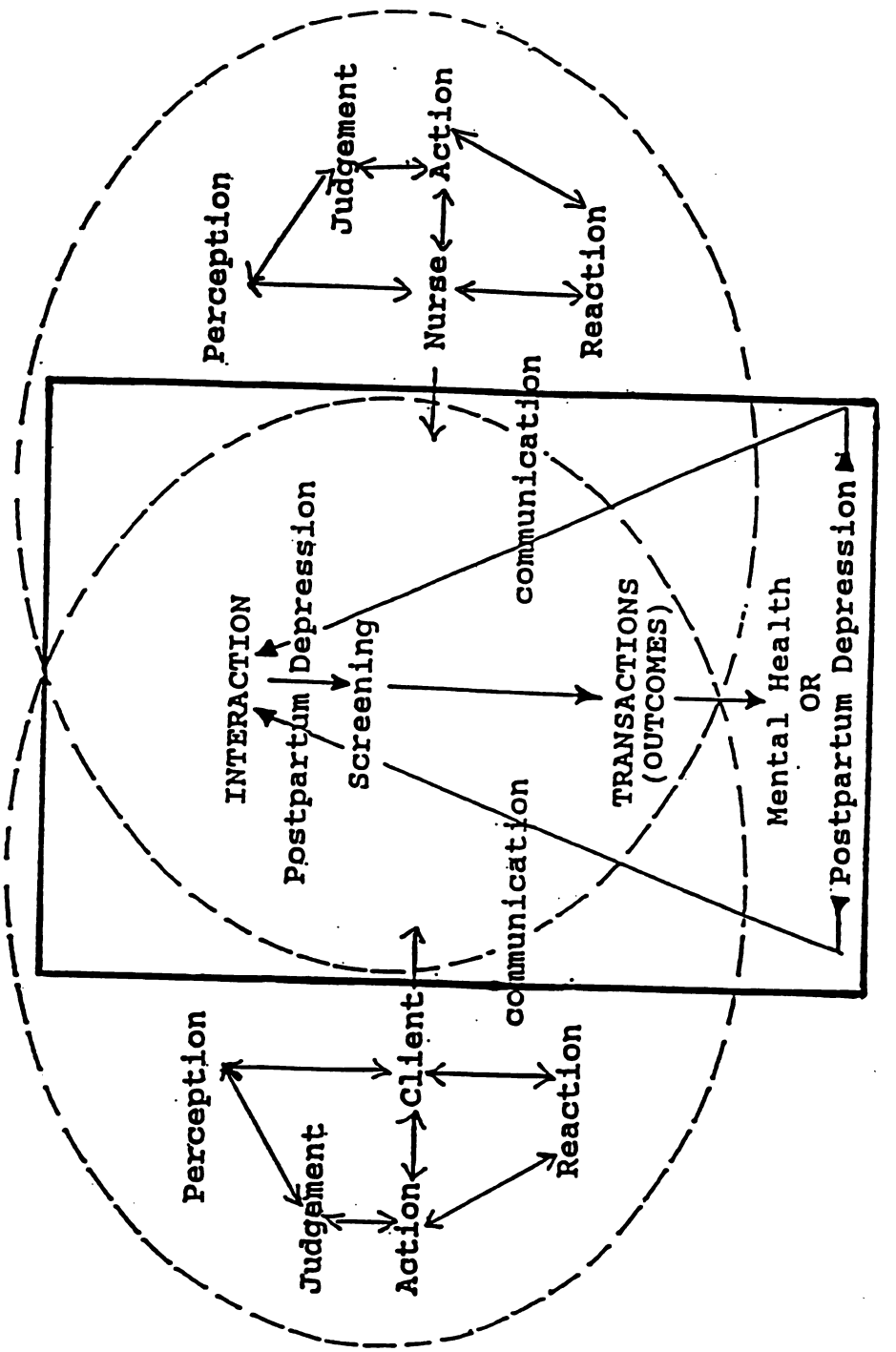

Figure 3. An adapted diagram of a theory of goal attainment which depicts the interrelationships between King's (1981) concepts and the study concepts (King, 1981, p. 157).

essential for growth, change, and personal development to take place.

Rationale

In view of the high incidence and the nature of the illness, it would be helpful to screen mothers of newborns to identify those suffering from postpartum depression, and hence refer them for appropriate help and treatment. However, the need exists to develop more efficient screening assessments for postpartum depression. The benefits of brief rating scales to screen for and predict postpartum depression, as found with Cox's EPDS, are well documented (Affonso, Lovett, Paul, & Sheptak, 1990).

Accurate assessments are crucial for early identification and intervention before progression of depression necessitates hospitalization or lengthy treatments that cause pain and suffering to the woman and that disrupt interactions in the marriage, with the infant, and other family members (Affonso, Lovett, Paul & Sheptak, 1990). Undiagnosed and untreated depression may cause death. Rapid intervention can prevent the tragedies of suicide, child abuse, and infanticide due to postpartum depression that have been reported (Ugarriza, 1990).

Traditional diagnostic depression criteria and assessment methods fail to take into account the possibility that some depressive symptoms may simply reflect normal changes and stresses during pregnancy and postpartum.

METHODS

Introduction

This study will describe the relationship between the Postpartum Depression Checklist (PDC) and the Edinburgh Postnatal Depression Scale (EPDS) and the sociodemographic characteristics associated with elevated depression scores. The methodology of the study including sample criteria, field procedures, data collection, human rights protection, operational definitions, content of the instruments, reliability and validity of the instruments, scoring and data analysis will be described in this section.

Sample

A convience sample of 30 women were selected, six to eight weeks postpartum, from three obstetric clinics belonging to the same health-maintenance-organization within the same suburban community in the midwestern United States. Those who were minors, below the age of 18, or who could not read and write English were excluded from the study. Thirty women were asked to participate in the study. The response rate was 100%.

For this study postpartum depression was screened for at six to eight weeks postpartum, clearly within range according to the onset period of postpartum depression and adequately removed from the period of postpartum "blues." Holden and Phil (1991), recommend the EPDS to be given six to eight weeks after childbirth. In previous studies, diagnostic assessments, have been conducted anywhere from two weeks(Cutrona, 1983) to 20 weeks postpartum (Cox, Conner, & Kendell, 1982) with the time frame covered by the interview ranging from one week (Cox, Conner & Kendall, 1982) to nine weeks

(O'Hara, Neunaber & Zekoski, 1984). In general, the rates of depression obtained later in the postpartum period are higher than those reported when the interviews are conducted closer to delivery.

The fact that the cumulative rate of depression continues to increase as women are assessed later in the postpartum suggests that depression in the postpartum is stable: women diagnosed as depressed shortly after delivery are likely to continue to be so, as well as other new women diagnosed depressed later in the postpartum (Gotlib, Whiffen, Mount, Milne & Cordy, 1989).

Field Procedures

Consent to use the Postpartum Depression Checklist (PDC) and Edinburgh Postnatal Depression Scale (EPDS) was obtained (see Appendix A). Consent to use the PDC was obtained from the author . The EPDS may be reproduced without permission providing copyright is respected by quoting the names of the authors, the title and the source of the paper in all reproduced copies (Cox, Holden & Sagovsky , 1987).

Personal contact and a letter of introduction was given to the physicians to explain the purpose of the study (see Appendix B). A copy of the client consent form and questionnaires accompanied the letter. The researcher personally asked the physicians for permission to approach their clients for inclusion in the study. Following the physicians' stated permission to allow their clients to be approached to participate in the study, a signed letter documentating their agreement was then attained (see Appendix C). Before contact with the patient was made the researcher obtained the date of the baby's birth from the receptionist.

A standard script (see Appendix D) was used for each initial contact with the

subject in the waiting room. This included the following information: An introduction of the investigator by name and title, the purpose of the study, and that participation in the study would require approximately 20 minutes to complete the questionnaires and answer questions. Women were assured that all information would remain confidential.

If the woman did not wish to participate in the study she was thanked for her time and communication with her was terminated. If the woman agreed to participate in the study she was escorted to a clinic room. The researcher then gave the consent form to the woman, asking her to read it and sign (see Appendix E). Women were told by the researcher to feel free to ask any questions. The women were also asked by the researcher if they could be referrred to the physician if results indicated a risk for postpartum depression or if they were likely to be experiencing postpartum depression. If the participants responded no this was documented on the consent form. No woman choose to do this.

Data Collection

After patient consent was obtained each participant received the sociodemographic questionnaire and EPDS to complete (see Appendix F & G). If accompanied by another person, participants were requested to complete questionnaires alone. The researcher asked each participant to answer each question on the sociodemographic questionnaire to the best of their knowledge and then with the EPDS to underline the answer that came closest to how they felt that day and within the last week only. The EPDS also had written instructions with the questionnaire (see Appendix G). Upon completion of the sociodemographic questionnaire, and the written EPDS, the oral PDC was administered (see Appendix H).

The researcher completed the PDC and gave verbal instructions to the participants. They were as follows: "I am going to ask you a number of questions on how you may have felt within the last week. If you have had this feeling answer yes, if not, no." The researcher then proceeded to ask the items of the PDC. If the participant answered yes to one of the questions on the PDC then the suggested probing questions were asked by the researcher. All questions of the PDC were answered with a yes or no. Some of the questions on the PDC checklist proved difficult for the participants to understand. When that happened the researcher asked the appropriate probing questions. The specific probing questions enabled the participant to better understand the question in order to answer with a yes or no.

If the probing questions were answered "no" the researcher considered the answer to the original PDC checklist question as a "no". If the probing questions were answered "yes" the researcher considered the answer to the original PDC checklist question as a "yes." All PDC verbal responses were recorded by the researcher on the PDC form. Only one researcher collected all of the information to insure reliability.

At the completion participants were given a list of postpartum depression resources (see Appendix I). Participants were thanked for their involvement, given a baby gift, and escorted back to the waiting room. The baby gift consisted of a bag of samples including baby wipes, lotion, powder, shampoo, and coupons. The gifts were donated by Providence Hospital, Southfield, Michigan. The questionnaires, and screening instrument (EPDS and PDC) were assigned participant code numbers.

Human Rights Protection

Specific procedures were followed to assure that the rights of the study participants were not violated. These procedures were required and approved by the Michigan State University Committee on Research Involving Human Subjects (UCRIHS) (see Appendix J). Permission to approach subjects for inclusion in the study was obtained from the obstetric clinics (see Appendix C). Participation in the study was voluntary and participants could withdraw from the study at any time without penalty. Written consent from the participants was obtained. A code number was assigned to each returned questionnaire.

Operational Definitions

In this study screening of symptoms characteristic of postpartum depression included: loss of control, obsessive thinking, loss of self, loneliness, lack of concentration, loss of interests, insecurity, lack of positive emotions, anxiety, guilt, contemplating death, difficulty sleeping, and crying. Both the EPDS and PDC included questions regarding these symptoms. In this study postpartum depression was the disorder specifically being screened for in the first six to eight weeks postpartum.

Sociodemographic Variables

A review of the literature indicated that various sociodemographic and modifying variables might influence the incidence of postpartum depression. Data was collected on these sociodemographic, and modifying variables (see Appendix F). Operational definitions of these variables follow.

Sociodemographic variables: Information was requested on the age of the respondent, race/ethnic background, level of education, annual family income,

employment status, marital status, partnerr/significant other support, planned pregnancy, parity, type of delivery, complications, history of depression,and family history of depression.

Instrumentation

The two instruments used were the EPDS and the PDC (see Appendix G & H). The EPDS is a written paper-pencil, self-report questionnaire containing 10 statements on symptoms of depression. Each statement has four possible responses. Women were asked to underline the response that came closest to how they felt during the past week. A score above a threshold of 9/10 in primary care settings indicates women who should be further assessed for clinical depression. Validation studies advocate using a score of above 10 to identify women at risk for postpartum depression (Murray & Carothers,1990). Women scoring above 13 are likely to be experiencing postpartum depression (Schaper, Rooney, Kay, & Silva, 1994). The EPDS takes less than five minutes to complete.

The PDC is an 11 item questionnaire with accompanying probe questions, which is administered orally by a researcher. Responses are used to define women who should be further assessed for clinical depression. The PDC was designed to be used primarily as an informal checklist by health professionals in the course of their routine contacts. Nurses and other health care professionals can go through this brief yes/no list of 11 symptoms with mothers when they come in for an appointment for themselves or their infants and children. The PDC is a screening device to help identify women who might be experiencing postpartum depression and might need to be referred for follow up. The PDC should take no longer than 15 minutes to complete.

Women were also asked probing questions about their experiences with the items on the PDC if they answered yes to the main item (see Appendix H). The suggested questions are all derived from experiences mothers shared regarding these symptoms in the two qualitative studies by Beck (1992, 1993).

An understanding of postpartum depression must incorporate mothers' experiences with symptom distress so that cues and patterns suggesting difficulty in coping and adaptation to motherhood can be recognized (Affonso, 1992). Questioning mothers about their experiences with the 11 symptoms on the PDC will potentially provide nurses with rich data on the meaning mothers attach to the symptoms they are experiencing as reported on the EPDS.

Reliability/Validity

Sociodemographic and modifying variables were surveyed that may influence postpartum women. Questions regarding factors associated with postpartum depression were developed by the investigator based on a review of the literature. The PDC was developed from two qualitative studies on postpartum depression: a phenomenological study (Beck, 1992) and on a grounded theory study (Beck, 1993). The reliability and validity of the EPDS will now be discussed in detail.

The reliability of an instrument can be assessed by utilizing a measure of internal consistency. The split-half reliability of the EPDS was found to be 0.88. The standardized alpha-coefficient for the EPDS was 0.87 (Cox, Holden & Sagovsky, 1987).

The EPDS has satisfactory validity based on content validity. Content validity is based on judgement and concerns itself with the sampling adequacy of the content area being measured. No objective measures exist for assuring adequate content coverage of

an instrument as the evaluation of content validity is a subjective measure often based on the judgement of experts in a field or careful planning by the researcher. For this study, content validity of the EPDS instrument was based on published reviews by experts in the field of postpartum depression.

Although the EPDS was originally developed on a Scottish sample, it was used by Schaper, Rooney, Kay, and Silva (1994), to identify postpartum depression in 287 white women in a midwestern clinical setting. Murray and Carothers (1990), also used the EPDS in the United States on a community sample of 702 women at six weeks postpartum using the Research Diagnostic Criteria as a criterion related validity measure of depression. Using the cut-off score of 12/13 the specificity (true negatives) was 97.5 percent, and the sensitivity (true positives) to minor depression was 52 percent.

Construct validity is the degree to which an instrument measures the construct under investigation. The EPDS scores of 84 postnatal women were compared with the Standardized Psychiatric Interview (SPI) scores (Goldberg, Cooper & Eastwood, 1970) adjusted for somatic symptoms normal to the puerperium, and conducted by a psychiatrist at about 13 weeks postpartum. A threshold score of 12/13 on the EPDS identified all women with major depression, and the scale had a sensitivity of 86 percent, specificity of 78 percent, and positive predictive value of 73 percent (Holden & Phil, 1991).

The EPDS has also been validated by other researchers and found superior to the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) in detecting DSM-III major depression in 147 women at six to eight weeks postpartum (Harris, Huckle, Thomas, Johns & Fung, 1989). The EPDS showed a sensitivity of 95 percent and specificity 93 percent; the Beck Depression Inventory sensitivity was 68

percent and specificity 88 percent. A high correlation was also found between the EPDS and two observer-rated depression scales: the Montgomery-Asberg Depression Rating Scale (MADRS) (Montgomery & Asberg, 1979) and the Raskin 3 Area Scale for Depression (Raskin, Schulterbrandt, Reatig & Mekison, 1970) .

The EPDS was mailed to 702 Cambridge, England, women six weeks after delivery (Murray, 1990). The return rate of 97.3 percent indicated impressive evidence of the scale's acceptability to postpartum women. The authors concluded that their data underlined the importance of the EPDS as a tool for identifying postpartum depression, although the sensitivity (67.7%) was lower than reported by others.

Scoring

The EPDS has been used routinely to screen for postpartum depression or to substantiate a suspicion that a woman is depressed. Women scoring above threshold (9/10) should be assessed further before deciding on treatment. Each statement is rated on a scale zero to three, and possible scores range from 0-30. Questions numbered three, five, six, seven, eight, nine, and ten are reverse scored. The total score is calculated by adding together the scores for each of the ten items. Higher scores indicate the increased likelihood of depression. In this study the determined threshold is 10 based on previous studies done. If a woman scores 10 or above further evaluation for depression is needed.

The PDC is a 11item yes/no checklist not intended to be used to make a diagnosis of postpartum depression. The PDC does not replace a full psychiatric assessment, but can be used to define a population that may need further evaluation. No score has ever been calculated from this checklist that indicates a woman needs a referral for a possible postpartum psychiatric disorder. However, in this study an answer of yes to a question

will be scored as one point. Points will then be added to attain a numerical score.

Research Design

The research design was descriptive. The variables were scores on the PDC and EPDS instruments. The EPDS score is interval level data calculated from a likert scale and the PDC is also interval data calculated from the number of "yes" answers. A comparison will be made with the results from the EPDS, a standard measure of postpartum depression, and the number of items checked yes on the PDC.

Data Analysis

The major research questions for this study and the statistical procedures utilized to analyze the data obtained from the study follow.

Research question number one: To what extent are the PDC results and EPDS scores related? Correlational procedures were used to compare the PDC to the EPDS. The statistics used to describe and summarize this data was the Pearson r.

Research question number two: What sociodemographic and modifying variables are associated with elevated depression scores? Data related to the various sociodemographic and modifying variables is presented using nonparametric statistics due to the small sample size and the categorical nature of the independent variables. T-tests for two independent samples, Mann-Whitney U tests for independent samples, and Kruskal-Wallis one-way analysis of variance statistical procedures were used.

RESULTS/FINDINGS

Introduction

This descriptive study was designed to examine the relationship between the Edinburgh Postnatal Depression Scale (EPDS) and the Postpartum Depression Checklist (PDC) and sociodemographic characteristics associated with elevated depression scores. The study was conducted in three obstetric clinics belonging to the same health maintenance organization in the midwestern United States.

The sociodemographic questionnaire, the EPDS, and the PDC were administered by the researcher to 30 women, who were six to eight week postpartum, and were returning to the clinic for their postpartum visit. All participants completed the questionnaires individually, although some women had their baby with them. On two occasions, the babies were irritable or crying during the administration of the PDC. All information was self-report. None of the women who were approached by the researcher to participate in the study declined.

Demographic Characteristics

The respondents were asked to provide demographic information about themselves. The results of the frequency distributions used to summarize socio-demographic characteristics are presented in Table 1.

Table 1 - Demographic Variables (N=30)

Demographic Variable	Frequency	Percent
Race/Ethnic Background		
Asian	1	3.3
Black/African American	4	13.3
Hispanic	1	3.3
Native American	0	0.0
White (Non-Hispanic)	24	80.0
Other	0	0.0
Marital Status		
Married	26	86.7
Single	4	13.3
Spousal Support		
Very Supportive	19	63.3
Supportive	11	36.7
Education		
High School Graduate	6	20.0
Some college	12	40.0
Associate's Degree	3	10.0
Bachelor's Degree	7	23.3
Above Bachelor's Degree	2	6.7
Family Annual Income		
$10,000 to $29,999	2	6.7
$30,000 to $49,999	8	26.7
$50,000 to $69,999	8	26.7
$70,000 to $99,999	6	20.0
$100,000 and over	6	20.0
Present Employment Status		
Employed Full-time (40 hours/week)	11	36.7
Employed Part-time (Less than 40 hours/week)	8	26.7
Homemaker	10	33.3
Not Employed	1	3.3
Intentions for Employment		
Employment Full-time (40 hours/week)	7	23.3
Employment Part-time (Less than 40 hours/week)	10	33.3
Homemaker	13	43.3

The majority of the women in the study were White (non-Hispanic), married with perceived supportive spouses/significant others, highly educated, employed women with family incomes above $30,000.

Table 2 - Pregnancy Variables (N=30)

Pregnancy Variable	Frequency	Percent
Pregnancy Planned		
Yes	21	70.0
No	8	26.7
Major Complications		
Yes	6	20.0
No	23	76.7
Type of Delivery		
Vaginal	23	76.7
Vaginal with suction/forceps	1	3.3
VBAC	5	16.7
Caesarean	1	3.3
First Baby		
Yes	12	40.0
No	18	60.0
Treated for Depression		
Yes	1	3.3
No	29	96.7
Family History of Depression		
Yes	3	10.0
No	24	80.0

The majority of the women in the sample had a planned pregnancy (n=21, 70.0%), with eight (26.7%) reporting their pregnancies were unplanned. Major complications were reported by 6 (20.0%) women. Their complications included blood clots, bleeding, small bowel obstruction, diabetes, and high blood pressure.

Twenty-three (76.7%) of the deliveries were vaginal with one (3.3%) vaginal with suction/forceps, and five (6.7%) vaginal births after caesarean (VBAC). One (3.3%) woman reported her delivery was caesarean. Twelve (40.0%) of the women indicated this was their first baby.

Only one(3.3%) of the women had been treated previously for depression. Of the 30 women in the study, three (10%) reported a family history of depression.

The women completed the Edinburgh Postnatal Depression Scale (EPDS) (Cox, Holden, Sagovsky, 1987) and the Postpartum Depression Checklist with Script (PDC) (Beck, 1995). The first instrument was completed by the participants, with the second administered as a structured interview. Scores were obtained for both measures. The results of this analysis are presented in Table 3.

Table 3 - Depression Measures

Depression Measure	Number	Mean	SD	Median	Range	
					Minimum	Maximum
EDPS	30	6.13	3.59	6	0	12
PDC	30	2.10	1.77	2	0	6

The mean score for the EPDS was 6.13 (sd=3.59). The scores on this measure ranged from 0 to 12 with a median score of 6. Scores greater than 10 were considered at risk, with scores less than 10 considered not at risk. Four (13.3%) of the women had scores greater than 10 indicating they were at risk for postpartum depression. None of these women's scores exceeded 13, which would have indicated they had postpartum depression.

The mean number of items checked off on the PDC was 2.10 (sd=1.77), with a median number of 2.00. The minimum number of items that were reported was 0 with 6 as the maximum number of items checked off. The specific items that were checked off are presented in Table 4.

Table 4 - Frequency Distribution for Specific Items on the PDC

Checklist Item	Frequency	Percent
Lack of concentration	12	40.0
Loss of interest	2	6.7
Loneliness	12	40.0
Insecurity	8	26.7
Obsessive thinking	5	16.7
Lack of positive emotions	4	13.3
Loss of self	7	23.3
Anxiety Attacks	0	0.0
Loss of control	8	26.7
Guilt	5	16.7
Contemplating Death	0	0.0

The two most commonly cited checklist items on the PDC were lack of concentration (n=12, 40.0%) and loneliness (n=12, 40.0%). None of the respondents indicated they were having problems with anxiety attacks or were contemplating death. The interview also probed into specific situations for each of the checklist items.

Research Questions

Two research questions were posed for this study. These questions were answered using inferential statistical analyses, with all decisions on the statistical significance of the findings made using an alpha level of .05.

Research question 1: What is the relationship between the Edinburgh Postnatal Depression Scale (EPDS) and the Postpartum Depression Checklist (PDC)?

Pearson product moment correlations were used to determine the strength and direction of the relationship between scores on the EPDS and the PDC. The obtained r value of .64 ($p<.01$) was statistically significant indicating the two measures were related.

The positive nature of the correlation indicated that higher scores on the EDPS were associated with a greater number of items listed by the women on the PDC. The value of .64 indicated a moderately high degree of correlation between scores on the two instruments. As a result of this analysis, there appears to be a significant positive relationship between the two measures of postpartum depression.

Research question 2. What socio-demographic characteristics are associated with elevated depression scores?

The scores on the EPDS were used as the dependent variables in the statistical analyses used to determine if specific socio-demographic characteristics were associated with elevated depression scores. Due to the small sample size and the categorical nature of the independent variables, t-tests for two independent samples, Mann-Whitney U tests for independent samples, and the Kruskal-Wallis one-way analysis of variance statistical procedures were used. The choice of the statistical test was based on the number of respondents at each level of the independent variable. Age was the first socio-demographic variable that was tested to answer this research question.

The ages of the mothers were divided into two groups, less than 30 and 30 and older, based on the mean in the distribution of ages. Women naturally fell into one of two groups under 30 or over 30. A t-test for two independent samples was used to determine if there was a difference in the scores on the EPDS based on the age of the mothers. Table 5 presents the results of this analysis.

Table 5 - t-Test for Two Independent Samples - Score on EPDS by Age of Mother

Age of Mother	Number	Mean	SD	DF	t-Value
Less than 30 years	13	5.15	3.60	28	1.32 (NS)
30 years and older	17	6.88	3.50		

The t-value of 1.32 (DF=28, p=.196) obtained for this analysis was not statistically significant. This finding indicated a trend that women who were less than 30 years of age (m=5.15, sd=3.60) had lower levels of depression than women who were 30 years and older (m=6.88, sd=3.50), although this difference was not statistically significant.

The race of the mothers were divided into two groups, White (n=24) and nonWhite (n=6) for the purpose of this analysis. A Mann-Whitney U test for independent samples was used to test for differences in scores on the EPDS relative to their race. Table 6 presents the results of this analysis.

Table 6 - Mann-Whitney U Test for Independent Samples by Revised Race of Respondent

Group	Mean	SD	Mean Rank	Z value
White	5.50	3.58	13.94	-1.95*
NonWhite	8.67	2.42	21.75	

*p.05

The z-value of -1.95 (p=.05) obtained for the scores on the EPDS was statistically significant indicating a difference between the White and nonWhite participants. The significant difference was supported by an examination of the mean ranks, with White participants (mean rank=13.94) having lower scores than nonWhite participants (mean rank=21.75). The mean score for White mothers (m=5.50, sd=3.59) provided additional support that their scores were significantly lower than the mean score for the nonWhite

mothers (m=8.67, sd=2.42).

The marital status of the participant was divided into two groups, married (n=26) and not married (n=4). A Mann-Whitney test for independent samples was used to compare the scores on the EPDS by the marital status of the mother. Table 7 presents the results of this analysis.

Table 7 - Mann-Whitney U Test for Independent Samples by Revised Marital Status of Respondent

Group	Mean	SD	Mean Rank	Z value
Married	6.15	3.76	15.58	-.12 (NS)
Not Married	6.00	2.58	15.00	

The obtained Z value of -.12 (p=.903) was not statistically significant indicating that the mothers' scores on the EPDS did not differ based on their marital status. The mean score of 6.15 (sd=3.76) on the EPDS for married women was similar to the mean score of 6.00 (sd=2.58) for the women who were not married.

The women were asked to rate their spouses' or significant others' supportiveness of them in the relationship. Their responses were either very supportive or supportive. These ratings were used as the independent variable to determine if scores on the EPDS differed based on the perceived support received by their partners. The results of the t test for two independent samples. The results of this analysis are presented in Table 8.

Table 8 - t-Test for Two Independent Samples - Score on EPDS by Perceived Level of Support by Spouse or Significant Other

Support of Spouse	Number	Mean	SD	DF	t-Value
Very Supportive	19	5.68	3.64	28	-.82 (NS)
Supportive	11	6.91	3.53		

The obtained t-value of -.82 (df=28, p=.377) was not statistically significant indicating that depression scores did not differ based on the perceived level of support obtained from spouses and significant others. However, the mothers who rated their support as very supportive (m=5.68, sd=3.64) had lower levels of depression than women who rated their support as supportive (m=6.91, sd=3.53), although this difference was not significant.

A Kruskal-Wallis one-way analysis of variance procedure was used to determine if scores on the EPDS differed based on the educational level of the women. Table 9 presents the results of this analysis.

Table 9 - Kruskal-Wallis One-Way Analysis of Variance - EPDS by Educational Level

Group	Mean	SD	Mean Rank	
High School	8.17	2.9	20.17	
Some College	5.33	3.06	13.50	
Associate Degree	8.00	5.29	20.17	3.71 (NS)
Bachelor Degree	5.43	3.95	13.93	
Above Bachelor	4.50	4.95	12.00	

The chi square value of 3.71 (df=4, p=.447) obtained on this analysis was not statistically significant indicating that the depression score did not differ relative to the educational level of the women in the study. The women who were either high school graduates or had associates degree had the highest mean depression scores with those who had completed some college or had educational levels above a bachelor level had the lowest scores on the EPDS.

Depression scores on the EPDS were compared by the self-reported family income levels of the respondents using a Kruskal-Wallis one-way analysis of variance.

The results of this analysis are presented in Table 10.

Table 10 - Kruskal-Wallis One-Way Analysis of Variance - EPDS by Family Income Level

Group	Mean	SD	Mean Rank	
10,000 to 29,999	6.50	2.12	16.00	
30,000 to 49,999	8.63	2.20	21.63	
50,000 to 69,999	5.00	4.24	12.63	7.03 (NS)
70,000 to 99,999	6.33	3.39	16.33	
100,000 and over	4.00	3.58	10.17	

The obtained chi-square value of 7.03 (df=4, p=.134) was not statistically significant indicating that depression did not differ among the women relative to their family incomes a trend was noted in that the women with family incomes between $30,000 and $49,999 (m=8.63, sd=2.20) had the highest scores on the EPDS, while those with incomes above $100,000 (m=4.00, sd=3.58) had the lowest scores.

The women's depression scores were compared by the women's present employment status and their intentions for employment in the next six months. The Kruskal-Wallis one-way analysis of variance procedures that were used for this purpose are presented in Table 11.

Table 11- Kruskal-Wallis One-Way Analysis of Variance - EPDS by Employment Status

Group	Mean	SD	Mean Rank	
Present Employment Status				
Employed Full-time	5.09	3.62	12.95	
Employed Part-time	6.13	3.91	15.69	1.76 (NS)
Homemaker	7.18	3.34	17.91	
Intentions for Employment in the Next Six Months				
Employed Full-time	6.00	3.42	15.00	
Employed Part-time	5.00	3.97	13.00	1.64 (NS)
Homemaker	7.08	3.59	17.69	

The comparisons regarding present employment status (^{2} = 1.76, df=2, p=.415) and intentions for employment in the next six months (^{2}=1.64, df=2, p= .439) were not statistically significant. These findings indicated that depression levels did not differ among the women based on their employment status, either currently or in the next six months. However, women who were planning to remain home in a homemaker role had the highest scores on depression.

The women's depression scores were compared relative to whether they had had complications during their pregnancy. Six of the 30 women reported complications. The two groups, complications and no complications, were compared on their EPDS scores using a Mann-Whitney test for independent samples. The results of this analysis are presented in Table 12.

Table 12 -Mann-Whitney Test for Independent Samples - EPDS by Pregnancy Complications

Group	Mean	SD	Mean Rank	Z value
Complications	5.83	3.37	14.00	-.32 (NS)
No Complications	6.00	3.64	15.26	

The resultant Z value of -.32 (p=.773) provided on the Mann-Whitney test for independent samples was not statistically significant. This finding indicated that women who had complications during pregnancy (m=5.83, sd=3.37) had similar scores on the EPDS as women who did not have complications (m=6.00, sd=3.64).

The responses to the question, was this your first baby, "yes" or "no," was used as the independent variable in a t-test for two independent samples. The scores on the EPDS were used as the dependent variable in this analysis. Table 13 provides the results of this analysis.

Table 13 - t-Test for Two Independent Samples - Score on EPDS by First Baby

First Baby	Number	Mean	SD	DF	t-Value
Yes	12	4.92	3.23	28	-1.55 (NS)
No	18	6.94	3.67		

The obtained t-value of -1.55 (df=28, p=.132) was not statistically significant indicating that mothers did not differ in their levels of depression based on whether or not this baby was their first child. The women who had had their first baby (m=4.92, sd=3.23) had lower levels of depression than mothers (m=6.94, sd=3.67) who had more than one child.

The women were asked if their pregnancy was planned. Their responses to this question were used as the independent variable in a Mann-Whitney U test for

independent samples. The scores on the EPDS were used as the dependent variable. Table 14 presents the results of this analysis.

Table 14 - Mann-Whitney Test for Independent Samples by EPDS scores by Planned Pregnancy

Group	Mean	SD	Mean Rank	Z value
Planned Pregnancy	6.00	3.90	15.12	-.12 (NS)
Unplanned Pregnancy	5.88	2.53	14.69	

The obtained Z value of -.12 (p=.905) was not statistically significant indicating that the depression scores did not differ based on whether their pregnancy was planned or unplanned. The mean scores for the two groups were similar with women whose pregnancy was planned (m=6.00, sd=3.90) having scores that were very close to the women who had unplanned pregnancies (m=5.88, sd=2.53).

DISCUSSION

Introduction

The Edinburgh Postnatal Depression Scale (EPDS) and the Postpartum Depression Checklist (PDC) were found to be significantly correlated ($r=.64$, $p>.01$). This is the first study to attempt to quantitatively score the PDC and compare the results to EPDS results . This positive correlation supports the PDC's use in practice as a screening method for postpartum depression. The four women who had scores greater than 10 on the EPDS, a score indicating risk, were referred to their physician for further evaluation. All participants gave verbal permission for results to be shared with the physician if indicated.

In relationship to the PDC probing questions, none of the respondents answered yes to having anxiety attacks or to have contemplated death. However, none of the women had an EPDS score that exceeded 13.

The sociodemographic characteristic that was found to be significantly related to elevated EPDS scores was being non-white ($z=-1.95$, $p=.05$). Six participants were non-white, four were Black/African Americans, one Asian, and one Native-American. In the study by Schaper, Rooney, Kay, and Silva (1995) that used the EPDS in the United States, race was not analyzed because 95% of the women in the study were White. However, numerous studies have reported higher levels of symptoms of depression in women and Blacks (rather than Whites) (Jones-Webb & Snowden, 1993).

None of the identified risk factors examined in this study demonstrated a significant association with an elevated EPDS score. These factors were age, marital

status, partner/significant other support, level of education, income level, employment status, planned pregnancy, parity, complications, type of delivery, history of depression, and family history of depression.

Of the four women with EPDS scores greater than 10, two were non-White, none had education beyond an associates degree, three were homemakers while one was employed full-time, and one had intermittent hypertension during her pregnancy. All four women were from middle income levels, were married, percieved their partner/ significant other as supportive,had a planned pregnancy, had a vaginal delivery, none was this their first baby, and none had a history of depression or family history of depression. The mean age for these women was 30. These characteristics were reflective of the sociodemographic results found in the study.

Sociodemographic Trends

Although not significant, the following trends were noted in the sociodemographic correlations with the EPDS. In the study, women who had a higher depression score on the EPDS tended to be 30 years and older. Women less than 30 years old had a mean score of 5.15 on the EPDS (SD=3.60) while those 30 years and older had a mean score of 6.88 on the EPDS (SD=3.70). In contrast to the results of the current study, Gotlib, Whiffen, Mount, Milne, and Cordy (1989) found postpartum depression to be unrelated to age.

In this study marital status was not significant nor was level of support obtained from spouses or significant others. However, there was a negative correlation between a woman's percieved support from her partner/significant other and levels of depression on the EPDS. This supports previous literature, which showed that an unstable relationship

with the husband or partner and lack of support is predictive of postpartum depression (Romito, 1989). Schaper, Rooney, Kay, and Silva (1994) also found women who were separated, divorced or widowed and who percieved marital instability to be at higher risk for postpartum depression.

Women who had completed some college or had educational levels above a bachelor level and those with incomes above $100,000 had the lowest scores on the EPDS. Inadequate financial resources and dissatisfaction with education are factors that have correlated positively with postpartum depression in previous studies (Posner, Unterman & Williams, 1985).

Women who were planning to remain home in a homemaker role had the highest scores on depression. This was supported by a previous study that found women who listed their occupations as housewife were at a significant higher risk for developing postpartum depression (Gotlib, Whiffen, Mount, Milne & Cordy, 1989).

Although not significant, complications during pregnancy were not in general indicative of higher depression scores. Oakley (1980) and Paykel , Emms, Fletcher, and Rassaby (1980) in postpartum studies of depression found no association with obstetric difficulties and complications. Mothers who had more than one baby had slightly higher depression scores. On the EPDS no difference was found based on whether the pregnancy was planned or unplanned. Schaper, Rooney, Kay, and Silva (1995) also found parity and unplanned pregnancy to demonstrate no significant association with elevated EPDS scores.

In this study, all deliveries were vaginal except for one caesarean. Only one woman had been treated prior for depression, and three had a family history of

depression. This data could not be analyzed due to the small sample size. Previous studies have found that those with a history of depression or family history of depression to be more likely to be at risk for depression (Schaper, Rooney, Kay & Silva, 1995; Watson, Elliot, Rugg & Brough, 1984; and O'Hara, Neunaber & Zekoski, 1984).

The current study findings indicate that postpartum depression is essentially unrelated to major sociodemographic variables with the sole exception of women who were non-white. These results would suggest that postpartum depression is not related to a consistent sociodemographic pattern.

Clinical Perspective

The EPDS was acceptable to the women, easily understood, convenient to administer, took about five to ten minutes to complete, could be completed in the waiting room by the patient, and was easy to score for immediate identification of women at risk for postpartum depression. Less information was obtained with the EPDS than with the PDC. However, ideally once women have completed the EPDS, women should always be given the chance to discuss their feelings (Holden & Phil, 1991).

The PDC was acceptable to women and easy to administer. Furthermore, actually talking about postpartum depression broke down barriers regarding mothers shame, embarrassment and denial associated with postpartum depression. If used appropriately the questions should encourage a dialogue between the patient and health care giver (Beck, 1995). As in this study, many times the participants answering PDC questions would verbalize their rationale of why they were experiencing a symptom. The major advantage of the PDC was the interaction generated between the health care provider and the woman. This type of interaction generates more information and builds a trusting

relationship between the patient and health care provider.

The PDC is more time consuming, has no established quantitative scoring, and demands the APNs time for verbal administeration in a private area. Confidentiality was more difficult to maintain with the PDC because it was administered orally. Also frequent clarification of misunderstood meanings had to be made by the researcher. In these instances the researcher proceeded to the appropriate probing questions. Special difficulty also existed in the participants understanding of the words like "cobwebs", "fogginess", and "robot."

The EPDS or PDC are both suitable for postpartum depression screening. The use of the tools would depend on the health care providers level of knowledge and comfort, availability of space, and time constraints. At this time the author would recommend the EPDS to be used in clinical practice until the PDC is further refined.

Assumptions

The investigator made the following assumptions in the study.

(1) Postpartum women are able and willing to honestly answer the questions regarding postpartum depression and its impact on their life.

Limitations

The following limitations were noted for this study.

(1) The convenience sample drawn from a midwestern suburb limits the population to which the study results can be generalized and is not representative of all postpartum women.

(2) The sample size was small and required the use of nonparametric statistics in many cases.

Recommendation for Further Research

This study can be a starting point for further development of the PDC as a quantitative instrument for measuring risk of postpartum depression. With further research a cut-off score on the PDC checklist could be determined to indicate those at risk for postpartum depression or more likely to be experiencing postpartum depression. Also a rating system for the PDC probing responses measuring severity and/or frequency of symptoms may be developed in the future. Wording could also be changed to clarify words like cobwebs, fogginess, and robot.

Revalidation of the PDC in other clinical settings must be carried out because a convenience sample of basically White, upper-income, highly educated women was used, therefore, generalizability of the findings is limited. Additional research using a more diverse population is needed to explore the generalizability of these findings. Furthermore, the study should be repeated using a larger sample size to look at multi-factorial combinations of sociodemographic variables and their contribution to depression using a multiple regression. The sociodemographic information gathered can be added to the already existing data as a source of comparison in future postpartum depression research.

Implications for Advanced Practice Nurses

Advanced practice nurses (APNs) in primary care need to assess all women routinely for postpartum depression. The author would recommend using the EPDS as an adjunct to clinical judgement in assessing patients for postpartum depression. Screening would identify women likely to have postpartum depression and women at risk for developing postpartum depression.

It is important to note the potential risk of a mother harming herself or infant also must be assessed. If a risk exists then immediate intervention by the APN must be taken. Family involvement is certainly indicated as is potentially immediate psychiatric evaluation and hospitalization, and contracting with the patient if she is to return home. These women must be followed-up in a timely manner that takes into account their needs. Ideally a protocal would be developed to facilitate referral and follow-up. Health care providers are more apt to screen for conditions if they think they know what to do once the condition is found.

Early nursing interventions should be implemented with women experiencing or at risk for postpartum depression to prevent long-term effects on mothers and their children. Most women with postpartum depression do not require psychiatric intervention (Holden & Phil, 1991). Research findings support the view that therapeutic listening and extra support by a professional may be sufficient to prevent women from developing postpartum depression (Holden, Sagovsky & Cox, 1989).

In a sample of ten mothers who experienced postpartum depression, Beck (1995a) identified seven themes that illustrated nurses' caring for mothers with postpartum depression. These themes were having sufficient knowledge about postpartum depression, using astute observation and intuition to make quick correct diagnoses, providing hope that the mothers' depression will come to an end, readily sharing their time, making appropriate referrals, providing continuity of care, and understanding what the mothers were experiencing. The themes identified should be incorporated into APN practice when caring for a woman experiencing postpartum depression.

APNs possess the skills to provide appropriate counseling interventions. The

APN can normalize the postpartum depression, acknowledge and validate the woman's feelings, counter ideas of self-blame, let her know she is not alone and that the feelings she is experiencing will end, and that help is available for postpartum depression. (Holden, Sagovsky & Cox, 1989). Other interventions may include medical management (antidepressants), education, connection with postpartum depression support groups, and/or referral to a psychiatrist. Also the development of a postpartum resource list to distribute to all postpartum women and antenatally when appropriate is highly recommended (Beck, 1995a). These interventions are all within the realm of the APN.

Furthermore, postpartum depression scores can be used when assessing a woman's risk of postpartum depression in future pregnancies. Recurrence has been featured prominently in the literature (Schaper, Rooney, Kay & Silva, 1994). Data summarized by Harding (1989) indicated that women with postpartum depression had a 30 to 50% chance of suffering another episode of postpartum depression after a subsequent pregnancy.

Conclusion

Due to the denial, shame, and embarrassment that often keep women with postpartum depression from seeking help, the rate at which postpartum depression occurs, and the detrimental impact it has on the mother and child, the need for early screening with the EPDS and/or PDC is essential in the secondary prevention of postpartum depression. This study supports these facts with four (13.3%) postpartum women identified at risk for postpartum depression and the sociodemographic variables not reliable in the identification of postpartum depression. Therefore, it is important to screen all women for postpartum depression.

APPENDICES

APPENDIX A

IVERSITY OF
DDE ISLAND

Appendix A

Postpartum Depression Checklist Consent

March 22, 1996

Mary Pat Mullen, RN
Providence Hospital
State of Michigan

Dear Mary Pat:

You have my permission to use my Postpartum Depression Checklist that had been published in JOGNN this past summer. I am delighted that you will be using it in your master's thesis. Good luck in your research endeavor!

Sincerely,

Cheryl Tatano Beck

Cheryl Tatano Beck, DNSc, CNM, FAAN
Professor

CTB:jrd

The University of Rhode Island is an affirmative action and equal opportunity employer.

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APPENDIX B

Appendix B

Letter of Introduction

XXXXXXXXXX
XXXXXXXXXX
XXXXXXXXXX

Dear

I am a nurse at XXXXXXXXXXX, XXXXXXXXXXX, and currently doing an externship with Dr. XXXXXXXXXX to complete requirements for a Master's degree in Nursing from Michigan State University.

Currently, I am also conducting research regarding postpartum depression. This includes the completion of three questionnaires by women six to eight weeks postpartum. I would like, with your permission, to approach your postpartum clients in the waiting room for inclusion in my study.

The questionnaires will take only approximately twenty minutes of your client's time for completion. Women who have participated in the study have found it to be an interesting and worthwhile experience. A copy of the client consent letter and questionnaires accompany this letter for your review.

If you have any questions regarding the material, or to reply to my request, please feel free to contact me at the number given
below. Thank you for your time and consideration.

Sincerely,

MaryPat Mullin R.N.,B.S.N.
MSN Candidate
Michigan State University
College of Nursing, Graduate Program
Family Clinical Nurse Specialist Program
Phone: (313) 432-2612

APPENDIX C

Appendix C

Physician Permission

February 29, 1996

I have given Mary Pat Mullin, a graduate nursing student at Michigan State University, permission to approach my clients who are six to eight weeks postpartum for inclusion in the study of postpartum depression.

The study involves participants answering a series of written and oral questions after consent has been ascertained. All the participants' responses on the study questionnaires will remain strictly confidential. I have been given a copy of the client consent and questionnaires to be used.

Signature of Physician Date

APPENDIX D

February 29, 1996

I have given Mary Pat Mullin, a graduate nursing student at Michigan State University, permission to approach my clients who are six to eight weeks postpartum for inclusion in the study of postpartum depression.

The study involves participants answering a series of written and oral questions after consent has been ascertained. All the participants' responses on the study questionnaires will remain strictly confidential. I have been given a copy of the client consent and questionnaires to be used.

Signature of Physician Date

Appendix D

Introduction Script

Hello I am __Name__.

I am a registered nurse and graduate nursing student at Michigan State University collecting data on postpartum depression. I would appreciate it today, if you could fill-out a questionnaire and answer a few questions to assist me with this study.

It takes approximately 20 minutes to complete, and all information shared is confidential.

YES /NO. Thank you for your time and consideration.

APPENDIX E

Appendix E

Patient Consent

The purpose of this study is to gather information on postpartum depression screening. I understand that:

1. The written and oral questionnaires will take approximately 20 minutes to complete.
2. Participation in the study or withdrawal from the study, will in no way effect the health care my family or I receive.
3. I understand that no claims of beneficial therapeutic or educational effects have been made.
4. I understand that reading and answering questions related to postpartum depression may cause emotional discomfort.
5. If I am distressed as a result of this interview, I know I can obtain help from thelist of postpartum depression resources given to me.
6. I may discontinue my participation at any time.
7. All information obtained will be treated with strict confidentiality and the identity of participants will remain strictly anonymous.
8. I have been given an opportunity to ask questions about the study.
9. Results will be made available to me upon written request.
10. Upon completion I will be given a free baby gift.

My consent to participate is freely given, without coercion by anyone.

_____

Signature of participant Date

_____

Signature of witness Date

If you have any questions or concerns that may be raised by participating in the study please feel free to contact me at (313) 432-2612.

APPENDIX F

Appendix F

Sociodemographic Questionnaire

Please answer each question to the best of your ability.

1. What is your race/ethnic background? (Please circle one).
   a. Asian
   b. Black/African American
   c. Hispanic
   d. Native American
   e. White (non Hispanic)
   f. Other (Specify) _____

2. What is your marital status? (Please circle one).
   a. Married
   b. Single
   c. Separated
   d. Divorced
   e. Widowed

3. If you have a spouse or significant other, how would you describe their supportiveness of you in the relationship?
   (Please circle one).
   a. Very supportive
   b. Supportive
   c. Unsupportive
   d. Very unsupportive

4. What is the highest level of education you completed?
   (Please circle one).
   a. Some high school
   b. High school graduate
   c. Some college
   d. Associates degree
   e. Bachelors degree
   f. Above Bachelors

5. What is your family's annual income? (Please circle one).
   a. $9,999 and under
   b. $10,000 to $29,999
   c. $30,000 to $49,999
   d. $50,000 to $69,999
   e. $70,000 to $99,999
   f. Above $100,000

6. What is your present employment status? (Please circle one).
   a. Employed full time (40 hours/week)
   b. Employed part time (Less than 40 hours/week)
   c. Homemaker
   d. Not employed

7. What are your intentions for employment in the next six months time? (Please circle one).
   a. Employment full time (40 hours/week)
   b. Employment part time (Less than 40 hours/week)
   c. Homemaker

8. Was your pregnancy planned? (Please circle one).
   a. Yes
   b. No

9. Did you have any major complications with your pregnancy? (e. g. high blood pressure, diabetes, etc.)? (Please circle one).
   a. Yes
   b. No
   If yes, please describe the complications you had: _____
   _____

10. What type of delivery did you have? (Please circle one).
    a. Vaginal
    b. Vaginal with suction/forceps
    c. VBAC
    d. Caesarean

11. Is this your first baby? (Please circle one).
    a. Yes
    b. No

12. Was there a time in your life when you were treated for depression. (Please circle one).
    a. Yes
    b. No
    If yes, when ____ (Please indicate year). Also who did you see:
    a. Physician/Psychiatrist (Please circle one).
    b. Counselor/Therapist
    c. Minister/Priest
    d. Other _____

13. In your family is there a history of depression? (Please circle one).
    a. Yes
    b. No
    c. Unknown

APPENDIX G

Appendix G

Edinburgh Postnatal Depression Scale

Edinburgh Postnatal Depression Scale. (From Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale, Br J Psychiatry *1987;150:782–786.)*

Today's date _____ Baby's age _____

Baby's date of birth _____ Birth weight _____

Mother's age _____ Baby's place in family: 1 2 3 4 5 6 7

HOW ARE YOU FEELING?

As you have recently had a baby, we would like to know how you are feeling now. Please underline the answer which comes closest to how you have felt in the past 7 days, not just how you feel today.

Here is an example, already completed:

I have felt happy:
Yes, most of the time
Yes, some of the time
No, not very often
No, not at all

This would mean: "I have felt happy some of the time" during the past week. Please complete the other questions in the same way.

IN THE PAST SEVEN DAYS

1. I have been able to laugh and see the funny side of things:
   As much as I always could
   Not quite so much now
   Definitely not so much now
   Not at all

2. I have looked forward with enjoyment to things:
   As much as I ever did
   Rather less than I used to
   Definitely less than I used to
   Hardly at all

3. I have blamed myself unnecessarily when things went wrong:
   Yes, most of the time
   Yes, some of the time
   Not very often
   No, never

4. I have felt worried and anxious for no very good reason:
   No, not at all
   Hardly ever
   Yes, sometimes
   Yes, very often

5. I have felt scared or panicky for no very good reason:
   Yes, quite a lot
   Yes, sometimes
   No, not much
   No, not at all

6. Things have been getting on top of me:
   Yes, most of the time I haven't been able to cope at all
   Yes, sometimes I haven't been coping as well as usual
   No, most of the time I have coped quite well
   No, I have been coping as well as ever

7. I have been so unhappy that I have had difficulty sleeping:
   Yes, most of the time
   Yes, sometimes
   Not very often
   No, not at all

8. I have felt sad or miserable:
   Yes, most of the time
   Yes, quite often
   Not very often
   No, not at all

9. I have been so unhappy that I have been crying:
   Yes, most of the time
   Yes, quite often
   Only occasionally
   No, never

10. The thought of harming myself has occurred to me:
    Yes, quite often
    Sometimes
    Hardly ever
    Never

APPENDIX H

Appendix H

Postpartum Depression Checklist With Probes

Yes	No	ITEM
		Question: Lack of Concentration
		Probes: Are you experiencing difficulty concentrating?
		: Does your mind seemed to be filled with cobwebs?
		: Does it seem at times like fogginess sets in?
		Question: Loss of Interests
		Probes: Do you feel your life is empty of your previous interests and goals?
		: Have you lost interest in your hobbies that used to bring you pleasure and enjoyment?
		Question: Loneliness
		Probes: Are you experiencing feelings of loneliness?
		: Do you feel as though no one really understands what you are experiencing?
		: Do you feel uncomfortable around other people?
		: Have you been isolating yourself from other people?
		Question : Insecurity
		: Have you been feeling insecure, fragile, or vulnerable?
		: Does the responsibility of motherhood seem overwhelming?
		Question: Obsessive Thinking
		Probes: Is your mind constantly filled with obsessive thinking such as, "What's wrong with me?" "Am I going crazy?" "Why can't I enjoy being with my baby?"
		: When trying to fall asleep at night, is your mind racing with repetitive thoughts?
		Question: Lack of Positive Emotions
		Probes: Are you experiencing feelings of emptiness?
		: Do you feel like a robot just going through the motions?
		: When caring for your infant/child, do you feel any joy or love?

Yes	No	ITEM
		Question: Loss of Self
		Probes: Do you feel as though you are not the same person you used to be?
		: Are you afraid that your life will never be normal again?
		Question: Anxiety Attacks
		Probes: Are you experiencing uncontrollable anxiety attacks?
		: Are you experiencing periods of palpitations, chest pains, sweating, or tingling hands?
		: When going through an anxiety attack, do you feel as though you're losing your mind?
		Question: Loss of Control
		Probes: Do you feel you are in control of your emotions and thoughts?
		: Are you experiencing loss of control in any aspects of your life?
		Question: Guilt
		Probes: Are you feeling guilty because you believe you are not giving your infant/child the love and attention he/she needs?
		: Are you experiencing guilt over thoughts of harming your infant/child?
		: Do you feel you are a good mother?
		Question: Contemplating Death
		Probes: Have you experienced thoughts of harming your self?
		: Have you been feeling so low that the thought of leaving this world was appealing to you?

APPENDIX I

Appendix I

Postpartum Depression Resources

Local Resources:
Postpartum Depression Support Group
Providence Hospital, Southfield, MI
First and third Tuesday of the month, 7:30 p.m.
(810) 737-3612

Postpartum Moms' Support Group
Reichert Bldg., Ann Arbor, MI
First and third Tuesday of the month, 5:30 p.m.
(313) 712-5400 or (800) 231-2211

International Resources:
Depression After Delivery
Support Group & Hotline Information
P.O. Box 1282
Morrisville, PA 19067
(215) 295-3994
(800) 944-4PPD

Postpartum Support International
927 North Kellogg Avenue
Santa Barbara, CA 93111

The Marce' Society
c/o Michael O'Hara Phd
Department of Psychology
University of Iowa
Iowa City, IA 52242
(319) 355-24520

Postpartum Adjustment Support Services (PASS-CAN)
P.O. Box 7282
Oakville, Ontario L6J 6C6 Canada
(905) 844-9009

Educational Resources:
Santa Barbara Birth Resource Center
2255 Modoc Road
Santa Barbara, CA 93101
(805) 682-7529

APPENDIX J

MICHIGAN STATE
UNIVERSITY

February 27, 1996

TO: Mary Pat Mullin
415 Orchard Ridge
South Lyon, MI 48178

RE:

IRB#:	96-076
TITLE:	POSTPARTUM DEPRESSION SCREENING WITH THE EPDS AND PDC
REVISION REQUESTED:	N/A
CATEGORY:	1-C
APPROVAL DATE:	02/27/96

The University Committee on Research Involving Human Subjects'(UCRIHS) review of this project is complete. I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the UCRIHS approved this project and any revisions listed above.

RENEWAL: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Investigators planning to continue a project beyond one year must use the green renewal form (enclosed with the original approval letter or when a project is renewed) to seek updated certification. There is a maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for complete review.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB # and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/ CHANGES: Should either of the following arise during the course of the work, investigators must notify UCRIHS promptly: (1) problems (unexpected side effects, complaints, etc.) involving human subjects or (2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of any future help, please do not hesitate to contact us at (517)355-2180 or FAX (517)432-1171.

Sincerely,

David E. Wright, Ph.D.
UCRIHS Chair

DEW:bed

cc: Linda Beth Tiedje

OFFICE OF
RESEARCH AND GRADUATE STUDIES

University Committee on Research Involving Human Subjects (UCRIHS)

Michigan State University
232 Administration Building
East Lansing, Michigan
48824-1046

517/355-2180
FAX: 517/432-1171

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LIST OF REFERENCES

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