

NOTE TO USERS

Page(s) not included in the original manuscript are unavailable from the author or university. The manuscript was microfilmed as received.

31

This reproduction is the best copy available.

UMI

THE UNIVERSITY OF CALGARY

Postpartum Depression:
Adaptation or Culture-Bound Phenomenon?

by

Elisabeth R. Ross

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
DEGREE OF MASTERS OF ARTS

DEPARTMENT OF ANTHROPOLOGY

CALGARY, ALBERTA

APRIL, 2000

© Elisabeth R. Ross 2000



**National Library
of Canada**

**Acquisitions and
Bibliographic Services**

**395 Wellington Street
Ottawa ON K1A 0N4
Canada**

**Bibliothèque nationale
du Canada**

**Acquisitions et
services bibliographiques**

**395, rue Wellington
Ottawa ON K1A 0N4
Canada**

Your file Votre référence

Our file Notre référence

The author has granted a non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of this thesis in microform, paper or electronic formats.

The author retains ownership of the copyright in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de cette thèse sous la forme de microfiche/film, de reproduction sur papier ou sur format électronique.

L'auteur conserve la propriété du droit d'auteur qui protège cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

0-612-49584-1

Canada

ABSTRACT

This research project examines postpartum depression from an evolutionary perspective. An evolutionary perspective seeks to determine the adaptive function of the phenomenon under investigation. To date, there have been no formal investigations into the adaptive nature of postpartum depression. Three hypotheses along with several predictions were formulated to test the adaptiveness of postpartum depression: birth spacing hypothesis, resource acquisition hypothesis, and parental solicitude hypothesis. A mixed methodological approach utilizing quantitative and qualitative data on over 14,000 women from sixteen countries was used to test the predictions. Strong evidence supported the birth spacing and resource acquisition hypotheses. The parental solicitude hypothesis was not supported by the data. Future research on postpartum depression would need to compare the reproductive success of women in relation to birth spacing and resource acquisition to substantiate these findings.

DEDICATION

This thesis is dedicated to Christina Sprinkhuysen, wife of Spencer, mother of Jason, Christian, and Nicolas, and my best friend. After the birth of her second son, Christina fell into a deep depression, a depression that was unlike anything she had ever experienced before. The question that came to my mind was “why”? She had a healthy baby, a caring husband, and an abundance of relatives and friends therefore depression did not seem to fit the picture. From that point on my goal has been to investigate why Christina and countless other women from all over the world experience what is commonly referred to as “postpartum depression”.

TABLE OF CONTENTS

Approval Page.....	ii
Abstract.....	iii
Dedication.....	iv
Table of Contents.....	v
List of Tables	vii
 I. INTRODUCTION	 1
II. REPRODUCTIVE LIFE HISTORY.....	4
A. The Reproductive Life History Model.....	4
B. Sociobiology and Human Reproduction	8
C. Adaptive Characteristics of Female Reproduction	18
 III. THE PROBLEM: POSTPARTUM DEPRESSION	 23
A. Case for an Evolutionary Adaptive Strategy	23
I. Birth Spacing Hypothesis	24
II. Resource Acquisition Hypothesis	27
III. Parental Solicitude Hypothesis	30
IV. The Null Hypothesis	34
 IV. THE ASSUMPTIONS: ROBUSTNESS OF POSTPARTUM DEPRESSION	 35
A. Evidence for Historical Foundation.....	35
B. Evidence for a Biological Basis of Postpartum Depression.....	37
C. Distinctiveness of Postpartum Depression.....	43
D. Indiscriminate Nature: Psychosocial and Demographic Correlates.....	46
E. Postpartum Depression as a Universal Phenomenon	49
 V. RESEARCH METHODOLOGY.....	 53
A. The Adaptationist Approach	53
B. Mixed Methodologies	53
C. Quantitative Method: Meta-Analysis	55
D. Quantitative Data Analysis	59
E. Qualitative Method: Phenomenological Review.....	60
F. Qualitative Data Analysis.....	61
G. Limitations of Methodology	62

VI. RESEARCH RESULTS	64
A. The Database	64
B. Qualitative Review	69
Theme One – The Importance of Social Support	69
Theme Two – The Consequences of Postpartum Depression	72
Theme Three – The Duration of Postpartum Depression	74
Theme Four – Childcare Stress and Multipara Vulnerability	75
Theme Five – Cultural Contingencies and Methodological Concerns	76
Theme Six – Etiology of Postpartum Depression	79
Theme Seven – Biological Components	82
VII. DISCUSSION	84
A. Analyzing the Predictions	84
B. Analyzing the Hypotheses	91
I. Birth Spacing Hypothesis	91
II. Resource Acquisition Hypothesis	93
III. Parental Solicitude Hypothesis	95
C. Impact of Postpartum Depression on Child Development	96
D. Implications for Future Research	98
VIII. CONCLUSION	100
BIBLIOGRAPHY	103
ANNOTATED BIBLIOGRAPHY FOR META-ANALYSIS	117
ANNOTATED BIBLIOGRAPHY FOR PHENOMENOLOGICAL REVIEW	123
APPENDICES	125

LIST OF TABLES

TABLE 1: A Cross-Hypotheses Comparison of the Predictions.....	33
TABLE 2: From Menarche to Menopause: Depression in Women	38
TABLE 3: Location of Studies and Prevalence Rate.....	65
TABLE 4: Research Effects	65
TABLE 5: Demographic Effects	66
TABLE 6: Factors Associated with Postpartum Depression.....	68
TABLE 7: Thematic Responses in the Study of Postpartum Depression.....	69
TABLE 8: Birth-Spacing Hypothesis.....	92
TABLE 9: Resource Acquisition Hypothesis.....	94
TABLE 10: Parental Solicitude Hypothesis	95

Postpartum Depression:

Adaptation or Culture-Bound Phenomenon?

“By shifting to a paradigm that is an extension of the life sciences, by thinking evolutionarily in terms of emerging modes of programming of the psyche, by asking “why” as well as “how” new historical personalities have been produced, psychohistory can, I think, begin to achieve the scientific basis for social science that has so far eluded it” (Demaue 1989: 368).

I. Introduction

Medical Anthropology, as a social science discipline, utilizes the biocultural approach integrating social, cultural, and behavioral variables in the research design. Medical anthropologist Ann McElroy believes in the importance of studying the connection between biological and cultural factors affecting human health. The goals of medical anthropology include increasing the level of communication between the health sciences and the social sciences and understanding both biological and cultural evolutionary processes in relation to human responses to the environment (McElroy 1991: 244). The evolutionary perspective integrates biological and cultural processes in investigations that attempt to answer why the phenomenon has been shaped by natural selection to serve a specific function and how that function has benefited human evolution to the extent it is still found in human populations today.

In Why We Get Sick Randolph Nesse and George Williams (1996) argue how physically painful phenomena assumed to be anomalies or pathologies, such as fever and cough, are not diseases in themselves but rather are evolved defenses against pathogens more harmful to the body (p. 8). Similarly, Randy and Nancy Thornhill (1989) argue psychologically painful phenomena assumed to be mental sickness, such as anxiety, phobia, or depression are evolved defenses against threatening social or environmental stresses or problems. Mental pain, like physical pain, could also be associated with a social display of need (Thornhill and Thornhill, 1989: 78-79). Observable traits of sickness and disease signal to others that help is required. Within medical anthropology,

Horacio Fabrega Jr. (1997) has called for a more concentrated effort to understand the evolution of sickness and healing:

“In summary, behaviors surrounding sickness are viewed not as random mechanical effects of organismic failures but as biologically meaningful. Such behaviors communicate disability and need and elicit efforts at (self and other) healing” (p. 30).

Fabrega (1997) suggests that sickness and healing behaviors are adaptations for maintaining balance between increased longevity and demographic parameters (e.g., birth spacing, infant dependency, gestation, and sexual maturity) (p. 28). During the evolution of *Homo sapiens*, increases in the length of birth intervals, gestation, period of infant dependency and age of sexual maturity constrained the number of offspring a female could produce in her lifetime. Those who recognized sickness and practiced healing behaviors would have been able to lower the death rate due to sickness and subsequently increase their reproductive success.

The fundamental measure of adaptability is reproductive success. Darwinian evolution assumes that all organisms including *Homo sapiens* strive to maximize reproductive success. The number of genetically related offspring that live to reproductive age measures the reproductive success of an organism. Organisms execute adaptations that pattern their behaviors for reproductive success although not all strategies appear to be adaptive. The physiological and physical limitations of human reproduction may reduce the total number of births however a greater investment in each offspring will increase the number that reach reproductive age. Human menopause may shorten the female reproductive life span but could indirectly increase reproductive success by helping related offspring raise their children (Pavelka and Fedigan, 1991). Becoming depressed appears to be a maladaptive outcome of reproduction nevertheless a closer examination of the relationship between postpartum depression and successful reproductive behavior may indicate an adaptive strategy at work.

The main objective of this research project is to test whether or not postpartum depression is an evolutionary adaptive strategy. To establish the robustness of the

phenomenon under investigation, an extensive literature review will be conducted to validate the following five assumptions:

1. Postpartum depression is historically relevant.
2. Postpartum depression is a unique entity, similar to but distinguishable from major depression.
3. Postpartum depression has a physiological basis that may indicate a heritable variation in the evolutionary past.
4. Postpartum depression has a psychosocial component that may indicate an indiscriminant affliction.
5. Postpartum depression is a universal phenomenon that can be found in women of all cultural backgrounds.

Provided the above assumptions are valid, three hypotheses designed to test the functional significance of postpartum depression have been generated. Principles of evolutionary adaptive behavior and the reproductive life history model provide the framework in which the following hypotheses have been developed:

- I. Birth Interval Hypothesis.
- II. Resource Acquisition Hypothesis.
- III. Parental Solicitude Hypothesis.

Stemming from each hypothesis will be a series of predictions. The predictions are based on William Hamilton's (1964) inclusive fitness and kin selection theories, and Robert Trivers' (1972) theories of parental investment and parent-offspring conflict. These predictions will serve as a means of testing hypotheses by attempts to falsify them. To validate a hypothesis all the predictions must be true therefore if a prediction is false the hypothesis must also be false. Should all of the above hypotheses be proven false, a fourth, alternative hypothesis has been added:

- IV. The Null Hypothesis; i.e. postpartum depression does not have an adaptive value.

II. Reproductive Life History

A. *The Reproductive Life History Model*

Darwinian evolution is based on the notion that individuals who possess characteristics that best suit their environment will produce more viable offspring than those who lack such characteristics. Subsequently, following generations will include more individuals with similar characteristics that allow them to maximize environmental resources. These characteristics will vary according to the resources available in the environment. The “reproductive life history model” assumes organisms are allocated a finite amount of time and energy. In Animal Reproductive Behavior Wittenberger (1981) describes how over the course of an individual's reproductive life history organisms use their time and energy in three ways: (1) to enhance their own survival; (2) to enhance their own reproductive success or the reproductive success of relatives; and (3) to enhance the survival and reproduction of offspring they have already produced (p. 342). How an organism distributes time and energy will pattern their reproductive life history.

A central tenet of biological science and the reproductive life history model is that all organisms must allocate time and energy resources between self-maintenance and reproductive success. An organism will allocate resources for reproduction based on the costs and benefits. These costs and benefits, also known as a reproductive “trade-off”, force the organism into making a decision that will effect their reproductive success. There is a reproductive trade-off between (1) current and future reproduction; (2) offspring quantity and offspring quality; (3) reproduction and growth; (4) reproduction and self-maintenance; and (5) reproduction and parental care (Mulder 1992: 341; Wittenberger 1981: 348-351). Differences in individual reproductive success result from how costs and benefits are weighed. In summary, individual patterns of time and energy contributions to survivorship, parental investment, and parental care determines one's reproductive life history.

Survivorship is increased when an organism invests resources in growth and self-maintenance rather than in reproduction. Foraging, thermo-regulation, and avoiding predators can be classified as behaviors that promote survivorship (Hames 1992: 204)

and energy that is diverted elsewhere will potentially reduce survivorship. Some situations force an organism to choose between survivorship and parental care. For example, feeding and defending young will render the parent vulnerable to predators. When predators are present, parents must decide whether to continue to feed and defend their offspring or to stop these activities to ensure their own survival.

Environmental conditions affect reproductive decisions. In some conditions it is even beneficial for females to delay reproduction, for example, in times of scarce resources. Anthropologist Sarah Blaffer Hrdy (1981) studied reproductive strategies of non-human primates:

“Deferment of reproduction for a malnourished mother would be adaptive insofar as it allowed her to conserve resources until a more favorable opportunity to breed arises” (p. 108).

Alternatively, non-human primates with access to resources such as high-ranking female baboons reproduce at a faster rate than their low-ranking counterparts (Hrdy 1981: 107). Resources invested in survivorship are not mutually exclusive from those invested in parental care. A parent may gather food for themselves while they gather food for their offspring and it follows that any activity that enhances their own survival will increase their future reproductive opportunities. Even though reproductive success is contingent on survivorship, individuals who spend more time and energy on self-preservation than on reproductive and parental activities will not maximize reproductive success. Therefore, evolutionary theory would predict organisms to invest more in reproduction even when their survivorship is at risk.

An optimal reproductive life history pattern is one that distributes resources in a way that best enhances inclusive fitness: the sum of individual reproductive success plus the effect their behavior has on the reproductive success of relatives (Daly and Wilson, 1983: 30). William Hamilton’s (1964) “kin selection theory”, based on the principle of inclusive fitness, suggests that relatives can increase their own reproductive success by helping to rear related offspring. Genes that increase the tendency to help kin (who share some of the same genes) will tend to increase in frequency in the gene pool if the help is

less expensive to the giver than the benefit to the receiver, multiplied by the proportion of genes shared in common (Hamilton 1964: 21).

Helping to rear related offspring, also known as “non-parental nepotism”, will increase an individual's reproductive success through its effect on the survival and reproduction of the individual's relatives (Thornhill and Thornhill, 1989: 81). For example, in many bird species young adolescent birds will stay home to help feed their younger siblings and in group-living monkeys, brothers and sisters defend each other in attacks and spend a lot of time mutually grooming (Daly and Wilson, 1983: 46). However, reproductive behavior always entails costs and benefits. Grooming costs time and energy, resources that could be used in other activities that increase individual fitness directly (Gray 1985: 132-135). It has been suggested that the benefits include removal of ecto-parasites from the body; increased peripheral blood circulation; and more efficient manufacturing of vitamin D which are all necessary for longevity. Nepotism is considered to be an adaptive behavior because of the benefits received by both the giver and receiver.

Robert Trivers' (1972) parental investment theory purports that “any investment by the parent in an individual offspring that increases the offspring's chance of surviving (and ultimately achieving reproductive success) is at the cost of the parent's ability to invest in other offspring” (p. 139). Parental investment includes the time and energy used in producing gametes, attracting a mate, achieving fertilization, gestation, and rearing the offspring. Parental investment can be divided between mating effort and parental effort. Parental effort is “all an individual's activities and structures relating to improving the survival and, hence, the reproduction of descendant relatives” and mating effort is “the activities and structures associated with obtaining, guarding and inseminating mates” (Thornhill and Thornhill, 1989: 81).

In mammals, males and females invest different amounts of resources in mating effort and parental effort. Females invest more energy in parental effort whereas males generally invest more energy in mating effort. Males compete with each other for access to fertile females while females rarely compete with each other for access to males.

Females do not expend as much effort in mating because they are generally the limiting resource for males and it is assumed that males will come to them (Daly and Wilson 1983: 93). In general, males will mate with any willing female. As George Williams (1966) stated “with little to lose and much to gain, males can profit, in the currency of natural selection, by harboring an aggressive and immediate willingness to mate with as many females as may be available” (p. 183). Since each male represents a different reproductive value, females have more to lose by mating with any male that comes along. With lengthy periods of gestation and lactation, females have a great investment in each offspring. Females are limited by their maternal investment and males are limited by access to willing females. Put together these two limitations have helped to create a system of bi-parental care.

In mammals mothers are the primary parental care providers. In most mammals and many other species the father invests very little effort in the care of his offspring. This behavior enables the male to secure other mating opportunities thereby maximizing his reproductive success. Bi-parental care is likely to occur only in situations where the male leaves more offspring when he assists the female to rear their young (Trivers 1972: 157). Patterns of bi-parental care such as monogamy are common in, one lemur species (*Indri indri*), marmosets, tamarins, owl monkeys, one langur monkey species (*Presbytis potenziani*), gibbons and siamangs, and humans. In these primates both males and females may contribute to the feeding, playing, and protecting of their mutual offspring. Individuals may vary their resource allocation to parental care in response to increases or decreases in the care offered by their mates (Mulder 1992: 362). Any resource allocated to the offspring will increase the offspring's chance for survival and reproductive success, which in turn will increase the reproductive success of both parents.

Since natural selection favors those who maximize the number of offspring surviving to reproductive age, parents must weigh the costs and benefits of investing in either current or future offspring. The benefits are the degree to which the investment increases the survival of the current offspring and the costs are the degree to which the parent's ability to invest in other offspring (both born and unborn) is decreased (Trivers

1985: 145-168). These costs and benefits comprise the parent-offspring conflict. The parent-offspring conflict suggests that resources allocated to one child may diminish the parent's ability to produce and raise other children. It is in the best interest of the offspring to maximize the amount of parental care received, which may conflict with the parents overall reproductive best interest. A prime example of the parent-offspring conflict is the decision between continuing lactation to benefit the present offspring or ceasing lactation to produce another child. Breast-feeding contributes significantly to infant survival by providing optimal nourishment. Since the positive effects of breast-feeding decrease as the child develops, therefore despite the infant's resistance, weaning should take place when the offspring is gaining little in survival value (Gray 1994: 172).

Differential reproduction is a mechanism of natural selection that renders no two offspring alike. As a result, a parent may actively favor the offspring who are most able to increase their fitness. Termed "brood reduction", differences in reproductive value have been shown to cause parental discrimination within broods of many species (e.g., Cockburn 1994; Digby 1995; Evans 1996; Mappes et al., 1997) including humans (e.g., Cronk 1989; Margulis et al., 1993). In humans, Janet Mann (1992) lists four criteria on which the reproductive value of offspring is based: (1) the desired sex; (2) the desired size; (3) malformed; and (4) diseased. The reproductive value of offspring is considered to be the primary factor influencing parental care (Mann 1992: 370-371).

B. Sociobiology and Human Reproduction

Sociobiology, the science of the biology of social behavior, has its roots in the study of social insects (Campbell 1997: 41). Sociobiology claims that *Homo sapiens*, as social and biological organisms, are subject to the same evolutionary laws as other organisms. Hence the theories of kin selection, inclusive fitness, parental investment, and the parent-offspring conflict, which originated from animal behavior studies, have been applied to the study of human behavior. In 1975, E. O. Wilson published the classic Sociobiology: The New Synthesis that paved the way for a whole new approach to the study of human behavior. Wilson examined human behavior from the level of the gene and argued that genes are the ultimate cause of our behavior. Human behavior is seen as

something that can evolve, transmitted by genetic inheritance. Evolution operates on the level of the gene inasmuch as it is the gene rather than the behavior that is transmitted into the next generation. As a result of Wilson's' work, hundreds of evolutionary biologists, geneticists, ethologists, and anthropologists have used sociobiology theory to analyze numerous human behaviors.

Critics hold that sociobiology theory is being deterministic in saying that the genes are responsible for the behavior. However this is not the case, rather the theory depends on the premise that the genes may *influence* the behavior to some degree (Wittenberger 1981: 253). Others suggest language and culture have rendered humans exempt from the dependence on genes for the transmission of learned behaviors (Applebaum 1987: 457). In other words, culture overrides the genetic effectiveness of the transmission of behavioral information from individual to individual. Cultural evolution is analogous to Darwinian processes with cultural mores on how to behave analogous to genetic information transmitted from individual to individual. However there is a crucial difference between the two systems: genetic evolution depends upon forces in the environment whereas cultural evolution is subject to decisions made by the individual (Richerson and Boyd, 1992: 91). If reproductive success is the currency in which Darwinian evolution is measured humans have done very well. Perhaps it is the decision-making forces in the cultural system that has given humans a reproductive edge over other primates.

Similar to that of other primates, the human reproductive life history is characterized by long periods of gestation, lactation, and infant dependency, delayed maturation, and a heavy reliance on learning. However when compared to other primates, human infants are born premature and extending the gestation period from six to nine months would bring it more in line with other stages of development, like sexual maturity (Trevathan 1987: 16). Montagu (1961) proposed the term *extergestation* to describe the few months following birth when human neonates function more like a fetus than an infant (p. 56). Stephen J. Gould (1977) suggested that the human gestation period should actually be about eighteen months. As a direct result of the restriction placed on

the neonatal cranial size by the narrow bipedal pelvis, the fetus must be delivered half way through that period in order to be born at all (p. 369). Anthropologist Margaret Lock (1998) argues in association with the evolution of intelligence there was an increased brain size and a “dramatically lengthened time of dependency of human infants and juveniles before maturation, requiring prolonged adult attention not found among apes” (p. 417). The period of infant dependency is about six years, one-third to one-half longer than for any other primates (Trevathan 1987: 16). In general, long periods of infancy increase learning potential since more learning can take place while the brain is still developing.

Observing the lifestyle of modern-day hunter and gatherer groups provides a model of how our human ancestors may have lived and reproduced (Tooby and Cosmides, 1992: 49-50). In typical hunter and gatherer groups the males go on several hunting expeditions while the females stay close to home gathering food for themselves and their offspring. Lactating females practice on-demand feeding, nursing every fifteen minutes, which diminishes their ability to gather. Females may breastfeed for several years, longer periods of breastfeeding were related to increased infant survival. From a resource perspective, breastfeeding is a costly endeavor, lactating women require a higher amount food energy than their non-lactating counterparts. While she is lactating, obtaining enough food resources could be difficult unless she has selected a hardworking mate who will assist her with childcare. Irons' (1983) reviewed human female reproductive strategies by examining the ethnographic material of three hunter and gatherer groups (Palteau Tonga, Tiwi, and Yomut). He identified four strategies females use to achieve better reproductive success: (1) use of reciprocity to obtain parental care; (2) family planning; (3) the selection of high quality mates; and (4) the countering of male coercion. The following two factors determine the female's ability to apply these strategies: (1) her ability to obtain and control resources and (2) the likelihood that she can rely on relatives for resources necessary for her children (Irons 1983: 175-182).

How many children a female will produce in her lifetime is dependent on her access to economic and social resources, and environmental stress. The timing between

births is an important aspect of the reproductive life history of any organism with repeated reproduction (Galdikas and Wood, 1990: 185). Birth-spacing practices that allow for an optimal amount of time between births are associated with increased reproductive success. However, due to the monthly ovulation of the female and the perpetual interest in sex of the male, humans are capable of reproducing at a faster rate than what would be considered optimal (Colinvaux 1982: 395). Today, women are able to control their fertility using a multitude of contraceptive methods however, for the majority of human evolution these methods were not available. Cross-cultural review of human birth-spacing practices and rituals including abortion, infanticide, and postpartum abstinence is evidence that reproduction control has been part of human history for a substantial period of time.

Deciding when to have a baby is the most important decision a female can make. There is a trade-off between producing many closely spaced offspring with low survival rates and producing few widely spaced offspring with high survival rates (Mulder 1992: 345). Blurton Jones and Sibly (1978) investigated this trade-off using the life history of the !Kung San, a hunter and gatherer group of the Kalahari Desert, where the mean birth interval is four years. Here they found that females maximize the number of children surviving to ten years (beyond this critical age of development the mortality rates reduce drastically) by spacing their offspring at four year intervals (Blurton-Jones and Sibly 1978: 152). Later, Blurton Jones (1989) did a follow-up study on the !Kung but this time he tested his results against the reproductive strategy of another hunter and gatherer group, the Hazda. The Hazda females had shorter birth intervals and so it was concluded that varying degrees of birth spacing are more reflective of different economic situations and sometimes having many closely spaced births may increase reproductive success even when risking higher mortality (Blurton Jones 1989: 279).

The availability of resources is an important factor in reproductive decision making. Ruth Mace (1996) studied the reproductive strategy of the Gabbra, a group of camel-keeping, nomadic pastoralists that inhabit the area east of Lake Turkana in northern Kenya. Gabbra parents make the decision to have another child when the

benefits of being able to raise and marry the child off have been weighed against the cost of feeding the child, diminishing the family herd, and harming the marriage prospect of their other children (Mace 1996: 271). Bhakta Gubhaju (1986) investigated reproduction patterns in rural Nepal and found previous birth interval the most important factor affecting infant mortality with survival of the preceding child as second most important. When all other variables were accounted for, a child born after an interval of less than eighteen months since the previous live birth has a thirty-one percent higher risk of dying during infancy than one born after an interval of one and a half to two years. Moreover, a child born after a three year interval has a lower risk of dying than one born after an interval of one and a half to two years (Gubhaju 1986: 445).

The length of the interval between the birth of one child and a subsequent birth is an indicator of the parents' investment, in particular, of the amount of time spent in breastfeeding the child (Mulder 1992: 350). Breastfeeding is the optimal form of nutrition for infants and the longer a child is breastfed the chance of survival increases. Breastfeeding can even delay a future pregnancy due to the positive association between the length of breastfeeding and amenorrhea. The return of ovulation depends on the nutritional status of the mother; the more plentiful the food supply, the sooner ovulation is likely to resume (Daly and Wilson, 1983: 328). Present day hunter and gatherer women may still rely on lactational amenorrhea to prevent pregnancy, however, as cultures become more sedentary and food resources consistently available, the effectiveness in preventing pregnancy has been reduced. This reduced effectiveness could be the major factor why, in many cultures, prolonged lactation is accompanied by long periods of sexual abstinence.

Postpartum sexual abstinence is a common practice among many different cultures. Psychiatrist Jean-Francis Saucier (1972) studied this practice in four different populations: (1) the Ashanti of southern Ghana; (2) the Tenetehara Indians of northern Brazil; (3) the Abipon of Paraguay; and (4) the Venda of the Transvaal. He found many different reasons for these practices; one of which is pregnancy avoidance (Saucier 1972: 238-240). Hassig et al. (1991) studied postpartum abstinence in four regions of Zaire. It

was determined that the purpose of postpartum abstinence is not to limit the number of births, but rather to favor the survival of the most recent child during the first two to three years of life (Hassig et al., 1991: 343). They found the child's age and economic resources the most significant factors in predicting abstinence, the older the child and the more resources available increased the probability that the woman would no longer be abstaining (Hassig et al., 1991: 346). Bertrand et al. (1990) studied fertility control in Kinshasa, Zaire and found mothers want to space births and avoid pregnancy while their youngest child is less than twenty-five months old. Postpartum abstinence was seen as one method of controlling birth, despite the fact few women practiced this tradition longer than four months (Bertrand et al. 1990: 210). Aborampah (1985) studied the Yoruba of western Nigeria and discovered a significant relationship between a desire for more children and sexual abstinence. This finding suggests that women who want a large number of children abstain from sex after childbirth for longer periods to ensure the survival of existing children (Aborampah 1985: 466).

Evolutionary theory predicts that increased resources will result in increased reproductive success. Postpartum abstinence, lactational amenorrhea, and age of menarche are fertility factors affected by increased resources. A woman's economic position and biologic history were important correlates of the length of postpartum abstinence. Poor, less urbanized women are far more likely to abstain for long periods of time than their wealthy, urbanized cohorts'. Wealthier women have greater access to food sources that provide their children with optimal nutrition thus decreasing the likelihood of infant mortality. Lactational amenorrhea, contingent on the percentage of body fat, would also be reduced in wealthier women.

The reduction in the age at menarche is another result of the increased availability of nutritional resources. Over the past century, females from Western countries have experienced menarche at an increasingly earlier age than their non-Western counterparts and a similar trend has been noted in other countries as they experience improvements in nutrition. For example, a study in China over a forty-year time interval showed a decrease in the mean age at menarche from sixteen and a half years to thirteen and a half

years (Graham et al., 1999: 257). A decrease in the age at menarche would lengthen the reproductive life span of females. Modern trends like the reduced effectiveness of lactational amenorrhea and the decrease in the age of menarche are most likely the result of environmental factors and represent human adaptability rather than genetic change (Campbell 1998: 341).

Notwithstanding the importance of nutritional resources, other resources, like time invested in childcare, are significant in maximizing reproductive success. Emotional resources are crucial for optimal child development but are ignored when discussing birth spacing. Bonding between the mother and child plays an important role in the evolution of parental care (Campbell 1998: 356). In Western countries, cultural practices often result in a small number of closely spaced children and consequently, emotional nurturing may be compromised (Anderies 1996: 244). By increasing the birth interval, parents' may be able to devote more time and energy to any one child, which would supply the child with stronger emotional stability in the future. Any additional assistance with childcare provided by relatives would allow the parents' to reproduce without compromising the existing offspring's level of emotional support.

Cross-cultural information attests to the fact that new mothers universally rely on relatives to assist them with childcare especially during the first six months postpartum. Why is assistance with childcare so important for human mothers? The need is likely the result of the infant's high demands because unlike other mammals, human infants cannot be left unattended for any length of time without posing serious risk to their survival. Human infants are born extremely helpless requiring twenty-four hour vigilance thus assistance with childcare is extremely helpful until the infant is older. According to sociobiologists Susan Essock and Michael McGuire (1989) women who receive assistance from relatives would have greater reproductive success than women who were alone would:

"Individuals who are separated from their kin, all else being equal, will be more likely than their non-separated counterparts to experience negative reproductive consequences" (pp. 105-106).

Tamas Bereckei (1998) conducted a study on Gypsy and Hungarian non-Gypsy populations to examine factors that impact fertility. He demonstrated that the degree of assistance with childcare by kinship networks is strongly predictive of fitness. Bereckei found fertility differences between Gypsy women (average 3.93 newborns) and Hungarians (average 2.32 newborns) were due to differences in the contact among close and distant relatives and the helping activities related to childcare. This example of non-parental nepotism, the provisioning of childcare assistance to relatives, resulted in increased reproductive success for the less wealthy Gypsy population. Although on average, Hungarian non-Gypsy women are wealthier, without significant help from close relatives they would have fewer resources available for reproduction (Bereczkei 1998: 295). The significance of his research is summarized in the following quote:

“Because neither low education nor low occupational status has been found to be a main cause of high Gypsy fertility, it is plausible to argue that an abundance of assistance and services in the kinship group ensures a steady and high level of reproduction” (Bereczkei 1998: 294).

Another major factor in reproductive success is environmental stress. Stresses such as overcrowding, food shortages, or social disharmony, all which may be associated with resource availability, can lead to infertility or stillbirth, or problems with child development and early death (Campbell 1998: 442). These natural fertility controls were effective in regulating the birth interval, on demand feeding together with high-energy demands and less food consumed made lactational amenorrhea a highly effective means of contraception. However, should a pregnancy occur when child survival chances are low, children are at risk of being neglected, abused, or even killed.

Brood reduction, or “differential parental solicitude” as termed by Wilson and Daly (1983), is not indiscriminant, and the deliberate killing, neglecting, and favoring of certain offspring is a global phenomenon (pp. 42-44). In his article on “The evolution of social behavior” Richard Alexander (1974) describes four situations in which such behavior might be selected: (1) during environmental changes; (2) when children are born malformed or defective; (3) when limited resources force parents to space children; and (4) when parents want to adjust the sex ratio of their children (pp. 336-355). Paul

Colinvaux (1982), a professor of Zoology, believes that it is important to understand the history of human reproductive strategies before we can assess the population ecology of today. The following quote illuminates his views on infanticide and birth spacing:

“Infanticide in humans could contribute to the survival or quality of prior offspring or to the total reproductive success of the mother in the case of deliveries that are spaced too closely, as the “brood” of humans consists of offspring from sequential births...and because continuous sexual activity in humans may lead to exceeding the number of births that would maximize the number of offspring surviving to adulthood” (Colinvaux 1982: 396).

In many cultures sons are the preferred sex but under certain conditions females have better reproductive prospects and so daughters are preferred. In the Gabbra, parental investment in boys at marriage is higher than for girls (Mace 1996: 269). To marry off a son the family must pay a brideprice and fathers might even make a profit when marrying off daughters. Among the Mukogodo of East Africa, daughters have a higher potential reproductive success than sons’ and Lee Cronk (1989) discovered evidence of female-biased parental investment. The Mukogodo mothers nursed their daughters longer than their sons and evidence from a local health clinic showed that their daughters were taken for treatment more often than their sons’ (Cronk 1989: 414). Similar findings were discovered by Margulis et al. (1993) who examined the relationship between the duration of breastfeeding and fertility among Hutterites. They found that daughters were nursed longer than sons were, which lead to a longer birth interval to the next pregnancy (Margulis et al. 1993: 41).

In some cultures, children born with birth defects or disease and have a poor chance of surviving to reproductive age are killed at birth. The Eco-men, an Australian hunter and gatherer group, practice infanticide when the conditions for survival are not favorable (Gebbie 1981: 235). Unfavorable conditions include gross fetal abnormality, having twins of whom one is weaker, and a baby born too soon after an elder sibling. Infanticide is most likely to occur shortly after the child is born, as the potential benefits are reduced as the time of weaning approaches (Lummaa et al. 1998: 196).

In traditional hunter and gatherer societies rearing two infants simultaneously is extremely difficult; nursing or carrying twins alone are impossible tasks. To alleviate the burden of caring for both children many cultures practice infanticide. When a mother of the !Kung San gives birth to twins she abandons one so she can invest all her resources in the other (Mann 1992: 373). John Kelly (1967) was the staff obstetrician in a small hospital for the Ibibio tribe of Nigeria. The women there were instructed by the village chief to kill the first twin during or shortly after its birth and any refusal to cooperate could result in being exiled from the village. Twins were considered evil for several reasons: (1) there are two bodies and one soul and one twin must be evil, (2) the mother may have had sexual relations with two different men, (3) cattle rarely have twins so God must not want humans to have them, and (4) twins could reflect an evil curse placed by an enemy (Kelly 1967: 610). Similarly, the Eco-men of Australia believe twin births represent evil spirits that embody the mother or one of the twins, or that a curse has been placed on the women by one of her enemies (Gebbie 1981: 235). Cultural myths may persist to help explain infanticide that may have originated as a means to ensure the survival of other children.

Today, most countries practice therapeutic abortion as a means of ending unwanted pregnancies. Abortions can be seen as a form of potential infanticide even though most occur during the first trimester when the fetus could not survive outside the mother's body. Recent medical technology has made it possible to detect physical and mental handicaps before the child is born. Termination of pregnancy in the third trimester is legal in a growing number of Western countries when there is substantial risk that the child would be born with serious mental or physical abnormalities (Dommergues et al., 1999: 297). Other advances in reproductive technology make it possible to manipulate genetic traits such as height and eye color and as geneticists map more genes to traits it may someday be possible that only offspring with the desired genetic combinations are born.

Human reproductive life history is characterized by factors that make reproduction a costly and unpredictable endeavor. Initially females have a greater

investment than males so selecting a high quality mate that will help with childcare is advantageous for her reproductive success. Males have more to lose by sacrificing reproductive opportunities to help rear children but insuring his offspring reach reproductive age is advantageous for his reproductive success. Providing offspring with emotional resources is just as important for adult functioning as having adequate nutrition. Increasing the amount of parental investment will naturally increase the offspring's chances for reproductive success, the trade-off being the more resources invested in one child increases their reproductive potential at the cost of investing resources in other children. Behaviors such as ritualized sexual abstinence; infanticide; therapeutic abortion; birth control mechanisms; sexual selection; and gene selection, are indeed cultural practices designed to manipulate and control reproduction, but they also reflect an innate desire to maximize reproductive success.

C. Adaptive Characteristics of Female Reproduction

Sociobiology theory, grounded in Darwinian evolution, predicts that females should distribute maternal investment so as to maximize their reproductive success. Adaptive characteristics contributing to female reproductive success are a subject matter that has generated much interest in researchers from the areas of evolutionary anthropology, evolutionary psychology, and biology. The evolutionary perspective has illuminated the understanding of several uniquely human characteristics such as concealed ovulation, continuous sexual contact between adult males and females, monthly menstruation, and long postmenopausal life spans. Events that occur in some but not all women, such as pregnancy sickness and self-motivated amenorrhea, have also benefited from an evolutionary perspective. Other related phenomena, such as postpartum depression, could be better understood with an evolutionary perspective.

Continuous sexual activity, concealed ovulation and monthly menstruation characterize the human female reproductive cycle and various hypotheses have been put forth to explain why they may have evolved. The estrus is the period of time in which ovulation takes place and in many primates it is accompanied by the swelling of the "sexual skin" (Campbell 1998: 354). The function of this swelling is apparently to act as

a visual signal to males. In humans, the estrus has been replaced by continuous sexual receptivity and proceptivity (Wilson 1975: 547). Although ovulation is concealed in human females, they are continually attractive to males. Continuous sexual activity might have evolved to secure the pair bond between males and females and reduce the fear of cuckoldry.

Beverly Strassmann (1981) hypothesizes that concealed ovulation enhanced the advantages of paternal care to subordinate males by increasing their confidence of paternity. Without conspicuous estrus it would be hard for males to exploit this physiology by emphasizing mating effort over paternal effort (Strassmann 1981: 36). Bernard Campbell (1998) hypothesized that concealed ovulation facilitates choice in sexual partners. A lack of estrus would prevent males from mating exclusively with females who are ovulating therefore humans would choose sexual partners based on other qualities. This encourages the formation of male-female pair bonds, the foundation of the nuclear family (Campbell 1998: 355).

Ovulation occurs monthly, approximately two weeks after menstruation. Menstruation takes place every twenty-eight to thirty days in higher primates, but only in humans does it amount to heavy bleeding (Campbell 1998: 355). Strassmann (1996) hypothesized that the endometrial cycles function may have evolved to save energy required to maintain the endometrium, with heavy bleeding as a side effect. Why humans have monthly endometrial cycles is yet unexplained and research into the origin and periodicity of ovarian cycling is required for complete understanding (Strassmann 1996: 163).

Perhaps the most puzzling aspect of female life history is the long postmenopausal life span. The puzzle of this uniquely human phenomenon lies in deciphering how natural selection can reproduce phenotypes that work to stop reproduction (Pavelka and Fedigan, 1991: 33). Margaret Lock (1998) has suggested that menopause, marked by declining estrogen levels, does not disadvantage aging women by reducing life expectancy therefore it is highly probable that post-reproductive women have played a biologically adaptive role since the evolution of contemporary humankind

(Lock 1998: 410). In other words, there could be an age when an increase in fitness attained through investing in grandchildren is greater than the fitness attained through direct reproduction (Hill and Hurtado, 1991: 318). Hawkes et al. (1997) proposed that these two traits might have co-evolved. Known as the "grandmother hypothesis", mothers who are assisted by the grandmother can wean their children earlier and begin another pregnancy sooner than they could without it (Hawkes et al. 1997: 560).

Menopause has negative connotations in Western societies that value youth over age and the wisdom that comes with it. The term "syndrome" is often added to this perfectly normal event in women's lives:

"The medicalization and pathologization of female reproductive biological processes that, while normal in women, are perceived as abnormal and dysfunctional when compared to the implicit standard of biological normality signified by the male body" (Stoppard 1997: 13).

Other phenomena related to pregnancy, fertility, and childbirth such as pregnancy sickness, self-motivated amenorrhea, and postpartum depression appear at first to be maladaptive traits. Cross-cultural evidence suggests that for many women extreme nausea, vomiting, food aversions, and outlandish cravings mark the first trimester of pregnancy. These symptoms describe what is commonly known as "pregnancy sickness" but Margie Profet (1992) argues that a condition as common as pregnancy sickness is unlikely to be pathological. Pregnancy sickness seems to lower the threshold on the mother's normal food aversion system which, as Profet explains, may be protecting the embryo against the maternal ingestion of teratogens (toxins that cause birth defects) and abortifacients (toxins that induce abortion) abundant in natural foods. It follows that women who experience pregnancy sickness enjoy greater reproductive success than women who do not experience it at all do (Profet 1992: 328).

Amenorrhea, the absence of menstruation and ovulation, is a result of the vast reduction in the percentage of body fat. Anorexia nervosa is recognized as a self-motivated means of reducing body fat, which will subsequently delay maturation and the ability to have children. Michele Surbey (1987) suggests that anorexia nervosa could reflect an adaptive mechanism that functions to delay ovulation and avoid reproduction

during times when the likelihood the offspring will survive is minimal. Since males are attracted to visual cues of fertility (e.g., the fullness of breasts and hips) the reduction of sexual fat serves to reduce a female's attractiveness as well as prevent conceptions. Concealed ovulation makes fertility hard to predict and when resources are low reproduction is a risky endeavor. Women who controlled their own fertility by reducing their body fat until pregnancy was desired could increase their reproductive success. Recent advances in fertility technology make it possible for all women to become pregnant however, anorexia nervosa affects have been associated with a difficulty in bringing infants to term (Bulik et al., 1999: 130). Furthermore, women who are either currently suffering or have suffered from anorexia nervosa in the past are at risk of premature birth.

Ninety-five percent of the people who suffer from anorexia nervosa are female; one to two percent of the female population between the ages of twelve and eighteen is affected (Balch and Balch, 1997: 129). Younger women have a higher reproductive value than their older counterparts and so delaying reproduction until resources are more plentiful would be adaptive (Surbey 1987: 52S). Initially, anorexia nervosa was thought to be strictly a psychological problem. However, researchers have identified several physiological components such as chemical imbalances similar to those found in individuals with clinical depression (Balch and Balch, 1997: 130). A common belief is that anorexia is the result of Western notions of thinness and beauty. There is some evidence to suggest that anorexia is not just a Western-culture-bound syndrome. Hoek et al. (1998) identified several cases of anorexia nervosa on Curacao, a Caribbean island where overweight is socially acceptable. All were young women (23 years of age or younger), Creole or Portuguese, had serious weight loss and amenorrhea (Hoek et al., 1998: 1231).

Postpartum depression (PPD) is described as a problematic and detrimental outcome of childbirth that commences during the first two months of the baby's life and occurs in fifteen percent of new mothers. Recently, several researchers have presented explanations of how postpartum depression can be an adaptive strategy. Suarez and

Gallup (1985) proposed that routine hospital practices simulate child loss and produce separation anxiety in the mother and child. The problems are exacerbated by the conflicting feeding schedules of the mother and the hospital nurses. These practices are responsible for the postpartum depression, which they hypothesized, was an adaptive response to separation anxiety (Suarez and Gallup, 1985: 282-283). Empirical evidence fails to support the view that a greater proportion of hospital births than home births leads to postpartum depression (Pop et al. 1995: 705) and postpartum depression typically does not commence until long after the mother has left the hospital.

Randy Thornhill and Bryant Furlow (1998) propose postpartum depression is a form of evolved psychological pain designed to encourage maternal withdrawal of investment from offspring, a form of passive infanticide. They predicted either mothers of low economic status or mothers of infants with low chance of survival to be the most vulnerable (Thornhill and Furlow, 1998: 346-347). Hagen (1996) (cited in Thornhill and Furlow, 1998: 349) suggests that maternal withdrawal may serve as an unconscious strategy for displaying need to a social support network by way of threatening child neglect or infanticide. To date, neither one of these proposed explanations has been examined in an independent research project. The remainder of this research project involves the investigation of three novel hypotheses, all which argue the functional significance of postpartum depression.

III. The Problem: Postpartum Depression

A. Case for an Evolutionary Adaptive Strategy

Postpartum depression commences in the first two months after childbirth and most women spontaneously recover by the fifth or sixth month although the depression can persist up to four years. Wisner and Stowe (1997) describe three major symptom groups which comprise postpartum depression: mood, physiological, and cognitive. The mood is dysphoric and includes, sadness, tearfulness, crying spells, anxiety, irritability, and a loss of interest in sex and other pleasurable activities, which sometimes includes caring for the baby. Sources of physiological dysregulation include appetite loss, sleep disturbance, retardation, fatigue, and somatic complaints. The cognitive changes are marked by feelings of guilt, worthlessness, panic, phobia, being a bad mother, indecisiveness, difficulty concentrating, and suicide ideation (Wisner and Stowe, 1997: 78). The diagnostic criteria requires that the symptoms persist for two weeks or longer, commencing at least one month postpartum so as not to be confused with the postpartum blues.

Approximately fifteen percent of new mothers are affected by postpartum depression. The amount of new mothers experiencing depression is remarkable and warrants investigation, which could explain why in the past twenty years hundreds of studies on this topic have been published in books and journals worldwide. Prevalence rates, cross-cultural comparisons, unusual case studies, demographic variables, and physiological and psychosocial correlates are the focus of the research. These studies are providing proximate explanations by answering "what" and "how" questions in regard to the etiology of postpartum depression. Research investigating proximate causes often produces contradictory results and the general consensus is that postpartum depression is a multi-factor entity and no one theory is enough to explain its occurrence. Most medical researchers focus on proximate explanations and neglect the other side, ultimate or evolutionary explanations, which attempt to answer "why" questions about origins and functions (Nesse and Williams, 1995: 7).

A full understanding of apparent flaws in the human body requires evolutionary as well as proximate explanations (Nesse and Williams, 1995: 7). Proximate explanations provide the concrete evidence of what is predicted by the evolutionary hypothesis. Ultimate explanations of human behavior predict that individuals who avoid threatening situations experience increased reproductive success. For example, the following situations could threaten the fitness of a new mother: (1) a subsequent pregnancy prior to the adequate development of the present offspring; (2) a shortage of resources provided by the social support network; and (3) a channeling of resources to the newborn infant with a low reproductive value at the expense of existing offspring or other reproductive opportunities. Using proximate explanations these predictions can test the evolutionary significance of postpartum depression. The following three novel hypotheses seek to answer "why" postpartum depression is such a widespread phenomenon.

I. Birth Spacing Hypothesis

Postpartum depression might be an adaptive mechanism that increases the interval between births by avoiding pregnancy. Adequate birth spacing is associated with improved birth outcomes and maternal recovery, mechanisms that promote better reproductive success. The idea of an optimal birth-spacing interval begs the question: "how long should parents wait between births"? Data on reproductive strategies suggests that spacing births too close together can increase infant mortality and since lengthy lactation increases infant survival, one would expect parents to delay subsequent births at least until the benefits of lactation are seriously reduced. According to Trussell and Pebley (1984), well-spaced pregnancies would also reduce maternal mortality and restricting the age of childbearing to between the ages of twenty and thirty-nine could reduce maternal mortality by as much as eleven percent in developing countries (p. 268). However, the parent-offspring conflict suggests by increasing investment in one child you decrease investment in pre-existing or potential offspring thus decreasing total reproductive success.

There are situations when additional offspring might not survive and their birth will pose serious risks to the survival of the mother and pre-existing offspring. These situations include not breastfeeding, a multiple birth, obstetrical intervention, unwanted or unplanned pregnancy, desired sex, multiparity, marital adjustment difficulties, low economic and low social resources. The “Reproductive Suppression Model” (RSM) proposed by Wasser and Barash (1983) suggests females can “optimize their lifetime reproductive success by suppressing reproduction when future conditions for survival of offspring are likely to be sufficiently better than present ones as to exceed the costs of the suppression itself” (p. 516). Postpartum depression could be an adaptive mechanism designed to delay a subsequent birth by reducing libido, encouraging self-motivated amenorrhea, and associating childbirth with mental pain.

Psychiatrist James Hamilton (1962) listed the loss of sexual responsiveness as one of the most common changes in the puerperium (pp. 102-103). An investigative study by Barrett et al. (1999) revealed that seven months after childbirth nearly two thirds of women reported a decline in the frequency of sexual intercourse (p. 187). A depressed woman would have an even more pronounced aversion to sexual intercourse. Kumar and Robson (1984) studied 227 primipara and found the frequency of sexual intercourse was reduced when the wife was depressed. However, refusing sexual activity could have a negative impact on the maternal-paternal pair bond.

In The Evolution of Desire David Buss (1994) explains that when a wife refuses her husband’s sexual advances he may suspect she is cheating on him. The continuous rejection could provoke him into a state of sexual jealousy, which in some cases could lead to murder. Sexual jealousy may have evolved in response to the threat of being cuckolded, the raising of unrelated offspring, since males who allowed them to be cuckolded would decrease their reproductive fitness. In a study among the Tiv, Soga, Gisu, Nyoro, Luyia, and Luo in Africa, of seventy homicides of wives by their husbands, forty-six percent were explicitly over sexual matters including the woman’s refusal to have sex with the husband (Buss 1994: 157). However, a reduction in libido is accompanied by other symptoms, such as the loss of appetite, sleep disturbance, fatigues,

retardation, and somatic complaints, and could signal to the husband his wife is legitimately sick. With his wife sick, the husband is less inclined to become sexually jealous because the likelihood of her being unfaithful would be diminutive. In Depression After Childbirth Katharina Dalton (1989) suggests husbands are warned because more often than not, loss of libido experienced in postpartum depression is the last of all symptoms to disappear (p. 62).

Anorexia nervosa has been linked to clinical depression (Balch and Balch, 1997: 130) and women with postpartum depression are also vulnerable to bouts of self-motivated starvation. Since anorexia nervosa reduces a woman's ability to conceive, postpartum depression could play a role in prolonging amenorrhea. Marce (1858) observed that women with prolonged psychiatric illness concurrently had prolonged amenorrhea, and that their periods resumed when they began to recover. A woman with postpartum depression often has a poor appetite coupled with an increase in weight loss, factors associated with a reduction in fertility. Childcare practices such as on-demand breastfeeding and continually carrying the infant would greatly increase the amount of stress on the woman's body thus further reducing the likelihood of ovulation.

Postpartum depression could create an association between mental pain and childbirth thus reducing the mother's willingness to become pregnant again in the near future. In the article "Evolutionary explanations of emotions" Randolph Nesse (1990) argues people will repeat actions that made them happy in the past and avoid actions that made them sad therefore people plan their actions based on their expectations of the emotional states (p. 273). Thornhill and Thornhill (1989) compare mental pain with physical pain:

"Just as physical pain prompts an individual to avoid situations which would lead to similar injury, mental pain may cause individuals to consider more carefully circumstances which resulted in the pain and to avoid them in the future" (p. 82).

Sadness, tearfulness, crying spells, anxiety, irritability, and a loss of interest in pleasurable activities characterize the dysphoric mood of the mother with postpartum

depression. Mood often functions as a motivator therefore a woman who experiences a major depression might not be willing to repeat the same experience and thus avoid a subsequent pregnancy.

It has been hypothesized that postpartum depression is an adaptive mechanism designed to increase the birth interval by (1) reducing the desire for sexual relations; (2) encouraging amenorrhea through the suppression of appetite and increased stress; and (3) building an association between childbirth and dysphoric mood. The following nine predictions have been formulated in accordance to the birth-spacing hypothesis:

1. Postpartum depression is more common in women who cannot breastfeed.
2. Postpartum depression is more common in women with multiple births at one time (e.g., twins).
3. Postpartum depression is more common in women with obstetrical intervention.
4. Postpartum depression is more common in women with an unplanned or unwanted pregnancy.
5. Postpartum depression is more common in women when the desired sex is obtained.
6. Postpartum depression is more common in multiparous women.
7. Postpartum depression is more common in women with marital adjustment difficulties.
8. Postpartum depression is more common in women with low social resources.
9. Postpartum depression is more common in women with low economic resources.

II. Resource Acquisition Hypothesis

Postpartum depression may be an adaptive mechanism designed to procure additional resources from relatives. Resource acquisition may play an important role in infant survival for organisms like *Homo sapiens* that have high levels of infant care. The first four months postpartum is a critical period of development, the infant is highly dependent on the mother, and childcare practices affect infant survival and neurological

development (Mead and Newton, 1967: 186). For successful reproduction, the mother must meet the nutritional requirements necessary for lactation in addition to providing for her existing children. According to the kin selection theory, individuals that respond to the needs of their relatives and help to raise their kin will achieve greater reproductive success.

Childcare assistance is generally provided by the father and the grandmother, however, these relationships could be either estranged or extinguished. In short-term or uncommitted relationships the father could fear being cuckolded and either withdraw his support or abandon the mother altogether. The grandmother may be still providing for her own children, live far away, or have died. Without this necessary source of social support the mother would be forced to consider other means or risk lowered reproductive success. Mothers who receive help with the provisioning of her children can increase their fitness with shorter birth-intervals, increased offspring survivorship or both (Hawkes et al. 1997: 552). Postpartum depression could serve as a mechanism for a display of social need so the mother can maximize resource acquisition.

Weeping behavior often evokes a sympathetic response and offers of help from others (Parkes 1972: 161) and the constant sadness, tearfulness, and crying spells signal to others the new mother is having difficulty coping with the stresses of a newborn infant. Kumar and Robson (1984) found individuals who are depressed perceive their social support as being deficient. For example, they could perceive a severe deficit in instrumental and emotional support exacerbated by poor relationships with their partner and mother. Social isolation in addition to having high levels of childcare stress that may include caring for several other young offspring would further complicate the matter. It would appear as though postpartum depression may be the result of the mothers' reactions to certain environmental conditions such as housing problems, financial problems, and being isolated from relatives (Kumar and Robson, 1984: 45).

High "social" ability is what Essock and McGuire (1989) describe as the ability to maintain a social support network of kin and non-kin. They predict women with high social ability will achieve greater reproductive success (Essock and McGuire, 1989: 107).

In women with low “social” ability, i.e. single women estranged from family and friends, postpartum depression may serve to demonstrate a need to others. Women with low social ability are also more likely to obtain an abortion. Women who have had previous abortions indicate a reluctance to bear and conceive children. However, this is related to the amount of social support available to her from family, husband, or mother rather than from a lack of wanting children (Essock and McGuire, 1989: 110). Many women admit they would not have aborted their offspring if they were in more supportive, committed relationships. Research on abortion demonstrated that thirty percent of the reasons for requesting an abortion was divorce or separation (Baur et al., 1977: 405). This evidence validates the importance of social support.

Previous research suggests all women of reproductive age (16 to 45 years) are vulnerable of developing postpartum depression however very young or very old mothers could be at greater risk. Young primiparas have a greater reproductive value but they lack the resources and experience necessary to provide optimal care for the infant. Furthermore, a very young woman’s reproductive system may not be prepared for the stress of pregnancy (Trussell and Pebley, 1984: 268). Older women with several children by same man are less likely to be deserted although their reproductive systems are not as efficient as their younger counterpart and infants of older mother’s are at a greater risk of complications and mortality (Trussell and Pebley, 1984: 268).

Social support benefits both the mother and her offspring. Since helping behavior would only evolve if it increased the fitness of the helper, the ones most likely to help a mother with postpartum depression would be the father, grandparents, siblings, and other relatives. The solicitation of help through a display of sickness and the provision of help and support to relatives are viewed as adaptive behaviors (Fabrega 1998: 30). It is hypothesized that postpartum depression is adaptive psychological pain associated with a vast array of physiological symptoms designed to rouse feelings of concern and compassion in relatives, who in turn would provide social support. The following ten predictions have been formulated in accordance to the resource acquisition hypothesis:

1. Postpartum depression is more common in women who have a multiple birth.

2. Postpartum depression is more common in women who have recently attained a therapeutic abortion.
3. Postpartum depression is more common in multiparous women.
4. Postpartum depression is more common in younger (< 20 years) women.
5. Postpartum depression is more common in women with marital adjustment difficulties.
6. Postpartum depression is more common in women who are not married.
7. Postpartum depression is more common in women who are isolated from relatives (immigrant women).
8. Postpartum depression is more common in women with low social resources.
9. Postpartum depression is more common in women with low economic resources.
10. Postpartum depression is more common in women with a poor relationship with their own mother.

III. Parental Solicitude Hypothesis

Postpartum depression could be an adaptive mechanism to facilitate parental solicitude through the abuse, neglect, or abandonment of the current offspring. Parental solicitude is the investment of more resources in some offspring at the expense of other offspring to ultimately increase the fitness of the parent. This behavior could be evoked by the following situations: (1) the mother lacks sufficient resources to care for an additional child; (2) a child is born with an abnormality or disease; (3) a child is born premature or the undesired sex; (4) the father is absent or inattentive; or (5) the child is unwanted. Solnit and Stark (1961) discovered that the birth of a defective child would also be thought of as an instance of reproductive failure, which may elicit similar depressed feelings. For example, when conception result in miscarriage, stillbirth, or early infant death (e.g., sudden infant death syndrome (SIDS)) they could be considered reproductive failures often eliciting behaviors of mourning and depression.

Significant deviations such as mental retardation or congenital defects may limit or interrupt the mother's developing capacity to accept the new child who is totally

NOTE TO USERS

Page(s) not included in the original manuscript are unavailable from the author or university. The manuscript was microfilmed as received.

31

This reproduction is the best copy available.

UMI

Research suggests that postpartum depression may increase the risk of child abuse and neglect (Scott 1992: 348). Occasionally, child abuse and neglect will lead to infant death. Overpeck et al. (1998) reported that more than eighty percent of infant homicides are considered cases of fatal child abuse. In a massive review of data on 34,895,000 live births in the United States between the years 1983 and 1991, half the homicides occurred by the fourth month of life (Overpeck et al., 1998: 1214). Childbearing at an early age was strongly associated with infant homicide, particularly if the mother was multiparous. Although the authors could not say for certain, it appeared as though the mothers committed more than half of the homicides especially if it occurred early in the postpartum period. From their work on infanticide, Daly and Wilson (1988) found young mothers to be significantly more likely than older mothers to practice infanticide:

“Infanticide is primarily the recourse of young women who want to live but cannot cope with the present baby, whereas mothers who kill older children are frequently in quite a different stage of depression” (p. 79).

Older women are more likely to be in a long term, committed relationship than are younger women. However, other factors in addition to the length of relationship can contribute to the development of depression. Older women have a greater risk of producing a child with genetic abnormalities therefore a man may desert his spouse to mate with a younger female capable of rearing healthy babies. Older multipara with low resources may decide that investing resources in existing offspring is more important than spreading the resources over additional children. Baur et al. (1977) found that among married women the most demands for abortion came from those who already had one or two children (p. 404).

Postpartum depression could be an adaptive mechanism designed to facilitate parental solicitude when certain conditions lead to a low survival opportunity. The following twelve predictions have been formulated in accordance to the parental solicitude hypothesis:

1. Postpartum depression is more common in women who do not breastfeed.
2. Postpartum depression is more common in women who have a multiple birth.

3. Postpartum depression is more common when the baby is born premature.
4. Postpartum depression is more common when the baby was unplanned or unwanted.
5. Postpartum depression is more common in women whose child is the undesired sex.
6. Postpartum depression is more common when the baby is born abnormal or deformed.
7. Postpartum depression is more common in multiparous women.
8. Postpartum depression is more common in younger (< 20 years) women.
9. Postpartum depression is more common in women who have marital adjustment difficulties.
10. Postpartum depression is more common in women who are not married.
11. Postpartum depression is more common in women with low social resources.
12. Postpartum depression is more common in women with low economic resources.

TABLE 1 – A CROSS-HYPOTHESES COMPARISON OF THE PREDICTIONS

<u>Birth-Spacing</u>	<u>Resource Acquisition</u>	<u>Parental Solicitude</u>
Not Breastfeeding		Not Breastfeeding
Multiple Birth	Multiple Birth	Multiple Birth
Obstetrical Risk Factor		Premature Birth
Unwanted/Unplanned	Previous Abortion	Unplanned/Unwanted
Desired Sex		Undesired Sex
		Abnormal/Deformed
Multiparity	Multiparity	Multiparity
Marital Difficulties	Younger Age	Younger Age
	Marital Difficulties	Marital Difficulties
	Marital Status	Marital Status
	Immigrant Status	
Low Social Resources	Low Social Resources	Low Social Resources
Low Economic Resources	Low Economic Resources	Low Economic Resources
	Relationship With Mother	

IV. The Null Hypothesis

The above predictions are based explicitly on the premise that postpartum depression is an adaptive mechanism whereby it enhances the "reproductive fitness" of the mother. If postpartum depression conferred a strong and selective advantage in ancestral humans, it would be expected to be universal today and distributed at the same frequency among women of different cultures. Childcare practices of today have changed drastically from those of our hunter and gatherer ancestors. On demand breastfeeding, long birth intervals, natural childbirth and midwives, and the inseparable mother and baby unit have been replaced with breast-pumps and infant formula, short birth intervals, obstetrical intervention and physicians, and the mother and baby sleeping in separate rooms. Postpartum depression could be a non-adaptive outcome of evolutionary novel aspects of modern childcare practices.

If the predictions fail to support any of the above three hypotheses then the hypotheses must all be rejected so consequently a fourth hypothesis, the null hypothesis, would be valid. The following three predictions have been formulated in accordance to the null hypothesis:

1. Postpartum depression is not an adaptive mechanism designed to regulate birth spacing and any relationship is purely coincidental.
2. Postpartum depression is not an adaptive mechanism to increase resource acquisition and any relationship is purely coincidental.
3. Postpartum depression is not an adaptive mechanism designed to facilitate parental solicitous behavior and any relationship is purely coincidental.

IV. The Assumptions: Robustness of Postpartum Depression

FIVE ASSUMPTIONS OF POSTPARTUM DEPRESSION

- A. Postpartum depression is historically founded.
- B. Postpartum depression is biologically based.
- C. Postpartum depression is a unique entity.
- D. Postpartum depression is indiscriminant in affliction.
- E. Postpartum depression is a universal phenomenon.

A. Evidence for Historical Foundation

Childbirth related mood disorders have attracted the attention of researchers and scientists for centuries. Since the time of Hippocrates in the fourth century BC, the “wondering womb” was deemed to be the major cause of female madness and misery. Hippocrates speculated that, when the lochial discharge was suppressed, it could be carried towards the head and would result in “agitation, delirium, and an attack of mania” (Steiner 1990: 89). He was also the first person to consider the onset of lactation to be the origin of the problems that followed childbirth, which were later labeled as “milk fever”. In the seventeenth century, Sennert blamed the condition on vapors rising from the uterus to the brain (Turnbull 1969: 526). In 1875, Savage, at Guy’s hospital in London, suggested that hereditary tendency, exhaustion and anemia from numerous pregnancies, and previous neuroses and insanity’s were contributory factors (Unterman et al. 1990: 131). Savage’s thinking is not far off what contemporary researchers detect as factors associated with childbearing disorders.

Early in the nineteenth century, postpartum events were separated into two categories: (1) “puerperal”, for occurrences within six weeks and (2) “lactational”, for occurrences after six weeks (Hamilton 1962: 126). In 1858, Marce described a series of 310 women with a post-natal illness characterized by a labile mood, delirium and “transitory intellectual enfeeblement”. Marce (1858) in his Treatise on Insanity in Pregnant, Puerperal, and Lactating Women noted that there were a variety of symptoms of postpartum depression that could also be found in cases of depression not related to the puerperium. He also observed that the combination of symptoms were different from

those observed in nonpuerperal depression (Marce 1858). It was not until the twentieth century that a controversy erupted regarding the etiology of postpartum psychiatric illnesses (Hamilton 1962: 128). Some influential political groups believed there was no specific mental disorder that occurred in relation to childbirth. The category was then removed from the standard nomenclature of diseases and women were diagnosed and treated by standard psychiatric methods.

Throughout the twentieth century postpartum women with psychiatric disorders were treated according to the standard psychiatric methods based on the Kraepelinian classification system. This system appeared more valid than classifying by etiological association so women were divided into symptom-oriented categories (Hamilton, 1982: 2). Limited attention was given to childbirth related mood disorders until 1962 when British psychiatrist James Hamilton (1962) published his landmark book Postpartum Psychiatric Problems in which he supported the original views of Hippocrates and Savage; that postpartum disorders are unique syndromes with specific organic etiologies. He also maintained that the medical field had largely neglected women's health issues. Hamilton's publication sparked a renewed interest on the topic that resulted in a remarkable increase in research publications during the 1960's and 1970's. Also during this time, the feminist movement encouraged women to reclaim the childbirth experience that has been dominated by male physicians and the "medicalization of childbirth". The feminist movement dramatically increased research on women's health issues, which has been successful in assisting health care workers in diagnosing and treating patients who suffer from childbirth related disorders (Stoppard 1997: 12). By denying their existence and failing to accept these "natural occurrences" further attempts to bring recognition and identity will be impeded. According to feminist psychologist Janet Stoppard (1997):

"Women now can legitimately seek help from health professionals for premenstrual syndrome, postpartum depression, and menopausal mood problems, and health professionals can legitimately claim expertise in treatment of these 'disorders'. Thus, the naming of disorders not only legitimizes women's complaints but offers the promise of some sort of treatment to alleviate their distress" (p. 13).

This trend continued into the 1980's, despite the fact modern diagnostic systems continued to view postpartum disorders as identical to standard psychiatric illnesses. In 1980 the "Marce Society" was created for the understanding, prevention, and treatment of mental illness related to childbearing (Steiner 1990: 93). Today research on childbirth related mood disorders is being published at a significant frequency worldwide; evidence that interest has not waned in the 1990's.

B. Evidence for a Biological Basis of Postpartum Depression

Childbirth is a vital life event for most women even though reproduction increases ones vulnerability to physical and psychological disorders. The physical basis of mood disorders is not easy to determine although the notion of a physiological basis for psychological disorders has been around for some time. In 1858, Marce insisted that there must be a connection between the uterus and the brain after noting that a large proportion of psychiatric cases had difficulty producing milk. He further observed that prolonged psychiatric illness was associated with prolonged amenorrhea, and that when these patients began to recover their periods resumed (Marce 1858). Since then, hundreds of empirical studies have associated fertility and childbirth with mood disorders although the exact cause of the connection is still highly debated. Implication for a physiological causal factor stems from the notion that women are more vulnerable to depression from menarche to menopause than they are at any other time. Furthermore women seem to be more vulnerable to depression than men: "depression is a feature of females whole life span beginning with adolescence and continuing through adulthood" (Stoppard 1997: 13).

According to a recent report by Statistics Canada, depression is an extremely common disorder experienced by twice as many women than men (7.3% versus 3.7%) (Beaudet 1996: 12). The increased prevalence in women has never been completely understood but studies have suggested that hormonal factors, genetic predisposition, learned behavior of dependence, increased sexual and physical abuse, and sexual discrimination may contribute (Diket and Nolan, 1997: 545). Regardless of the cause, it remains that women are more vulnerable to depression and research suggests these

depressive episodes be linked to stages of the reproductive life span. The reproductive syndromes, some of which are widely known, have only recently been paid closer attention including; the premenstrual syndrome, antepartum depression, postpartum blues, postpartum psychosis, postpartum depression, postpartum panic disorder, postpartum obsessive compulsive disorder, postpartum post traumatic stress disorder, and the menopausal syndrome.

TABLE 2 – FROM MENARACHE TO MENOPAUSE: DEPRESSION IN WOMEN

<u>Disorder</u>	<u>Rate</u>	<u>Symptoms</u>	<u>Potential Risk Factors</u>
Premenstrual Syndrome (PMS)	20%-40%	-irritability, aggression, tension, anxiety, depression, negative mood, fluid retention, breast tenderness, food cravings, and headaches.	-older age, multiparity, hormone changes, life stress, history of PPD, family history of depression, alcohol and drug use.
Antepartum Depression (APD)	9%-16%	-negative mood, headaches, irritability, anxiety, guilt, and fatigue.	-personal or family history of depression, marital dysfunction, young age, minimal education, multiparity, life stress, low SES, anorexia nervosa, drug, and alcohol abuse.
Postpartum Blues	50%-80%	-crying spells, insomnia, depressed mood, fatigue, anxiety, headache, poor concentration, and confusion.	-rapid hormonal changes, lack of sleep, anxiety about parenting, normal postpartum discomforts.
Postpartum Depression (PPD)	5%-45%	-headaches, despondency, feelings of inadequacy, inability to cope, hopelessness, loss of interest in activities, loss of libido, thoughts of suicide, guilt, panic attacks, anxiety, phobias, nightmares, over concern or anger for the baby.	-maternity blues, family history of mood disorders, anxiety or depression during pregnancy, stressful life events, unplanned pregnancy, PMS, young age, high parity, obstetrical complications, poor relationship with mother and/or spouse, childhood sexual abuse, and hormonal changes.
Postpartum Psychosis (PPP)	0.1%-0.2%	-mental illness marked by extreme confusion, memory loss, incoherence, bizarre hallucinations, suspicions, irrational statements, preoccupation with trivia, refusal to eat, and excessive energy.	-major depression with psychotic features, bipolar disorder, schizoaffective disorder, estrogen withdrawal.
Obsessive Compulsive Disorder (OCD)	3%-5%	-occurrence of repetitive and persistent thoughts, ideas, or images of harming the baby, ritualistic behaviors or compulsions, unrealistic expectations.	-changes in gonadal hormones, previous history of OCD and PPD, and stress of new baby.
Panic Disorder	0.1%-10%	-shortness of breath, chest pain or discomfort, choking or smothering sensations, dizziness, tingling in the hands and feet, trembling and shaking, sweating, fainting, and hot and cold flashes.	-women with previous panic disorder, hormonal changes, postpartum depression, and previous miscarriage.

Post-Traumatic Stress Disorder (PTSD)	0.2%	-avoidance of childbearing, nightmares, insomnia, flashbacks, inability to breastfeed, difficulty in bonding with child, loss of libido, and profound affect on self-worth.	-childhood sexual abuse, previous miscarriage or abortion, long or complicated labor, feeling out of control, and severe, unrelieved pain.
Menopausal Syndrome	20%-70%	-sweating, heart palpitations, dizzy spells, headaches, insomnia, depression, rheumatic pains, fatigue, numbness and tingling, irritability, and weight gain.	-declining estrogen levels, life stress, physical and psychosocial changes associated with aging.

Hamilton 1962; Yalom et al., 1968; O'Hara 1986; Goodman 1990; Zuckerman et al., 1990; Brockington 1992; Chuong and Burgos 1995; Wisner et al., 1996; Diket and Nolan, 1997; Dunnewold 1997; Reynolds 1997; Spinelli 1997; Williams and Koran, 1997; Ansom 1999;

The notion that postpartum depression is "predominantly biological" and can be distinguished from other manifestations of depression on the basis of hormonal or biochemical substrates dominated the literature in the 1970's and 1980's (Ussher 1992: 135). Some of the research was focused on the role hormone levels play in postpartum depression, in particular progesterone, estrogen, prolactin, cortisol, oxytocin, thyroid, and vasopressin. Other research addressed the genetic or obstetrical contribution to depression after childbirth.

Hormonal change is frequently listed as a major risk factor for many of the childbearing disorders. Immediately following childbirth, there is a large drop in concentration of estrogen and progesterone (Nott et al., 1976: 381), which has been thought to increase emotional vulnerability. This has prompted many researchers to study the hormone changes in connection with postpartum depression. Some found no measurable difference between the hormone levels of depressed and non-depressed postpartum women. For example, O'Hara et al. (1991) studied the hormonal changes in childbearing and non-childbearing women. They found that except for two occasions (Week 36 and Day 2) in which lower levels of estradiol were measured in depressed women, there were no significant differences between the two groups on any of the assessment days. Furthermore, there were no significant differences between the groups when measured in the antepartum and postpartum periods (O'Hara et al., 1991: 71). Other researchers have isolated specific hormones and have modestly linked the changes with postpartum depression.

Prolactin is a hormone secreted during breastfeeding although little is known about the precise relationship between change in prolactin and mood in the puerperium. Lactation not only influences levels of prolactin, progesterone, estrogen, oxytocin, and cortisol but also has been associated with changes in mood state, both positive and negative (Sussman and Katz, 1988: 500). Modahl and Newton (1979) compared two types of feeding in the same mothers. During bottle-feeding, women showed significantly more stress, anxiety, depression, regression, fatigue, and guilt than during the breast-feeding condition, or when compared with other mothers not engaged in feeding (Modahl and Newton, 1979). Abou-Saleh et al. (1998) collected hormonal data from pregnant, postpartum, and non-postpartum controls. Postpartum women with current depression had significantly lower plasma prolactin levels than those without depression and those that developed depression within six to ten weeks after delivery had significantly lower plasma prolactin and significantly greater progesterone levels than those who were not depressed. Moreover, women who breastfed had significantly lower depression scores and higher plasma prolactin levels than those who did not breastfeed. Women who had previous episodes of depression had significantly greater depression scores, lower prolactin and higher thyrotrophin (TSH) levels than those who had not suffered from previous episodes of depression (Abou-Saleh et al., 1998: 472).

Misri, Sinclair, and Kuan (1997) studied fifty-one depressed primiparous women to determine the relationship between depression and cessation of breastfeeding. They observed an association between postpartum depression and the cessation of breastfeeding. They further determined that the onset of depression preceded the cessation of breastfeeding and that the mothers were unwilling to give up breastfeeding regardless of their mood (Misri et al., 1997: 1064).

Thyroid disorders have been linked to depressive disorders in both childbearing and non-childbearing women. Harris et al. (1989) studied 147 women for thyroid dysfunction and postpartum depression. They reported a higher incidence of depression in postpartum women with thyroid dysfunction and also a significantly higher incidence of thyroid dysfunction in depressed postpartum women compared with non-depressed

postpartum women (Harris et al., 1989: 247). In a prospective study of 303 women Pop et al. (1991) discovered twenty-one (7%) developed postpartum thyroid dysfunction of which thirty-eight percent were treated for depression. They concluded that thyroid dysfunction also occurred more often in women with depression than women without depression (Pop et al., 1991: 1815).

The frequently documented association between premenstrual syndrome and postpartum depression could provide evidence for a common hormonal substrate. Chuong and Burgos (1995) compared the medical histories of women with premenstrual syndrome to women without premenstrual symptoms. They found that a significant number of patients with premenstrual syndrome had a history of postpartum depression. They suggested there may be a subgroup of premenstrual syndrome which could be a variant of the affective disorder that manifests after developing postpartum depression (Chuong and Burgos, 1995: 25). Although the association of postpartum depression and premenstrual syndrome has never been demonstrated in a prospective study, retrospective studies of postpartum depression often identify premenstrual syndrome as a risk factor (Wisner and Stowe, 1997: 82). In a study of 144 self-designated premenstrual syndrome sufferers, Warner et al. (1991) found that postpartum depression and premenstrual syndrome were associated by symptom severity but not with duration of depression. This increases the likelihood of an etiological link (Warner et al., 1991: 21), although the nature of that link and the extent, to which it is physiological or psychological in origin, requires further study.

Evidence for a genetic vulnerability to postpartum depression has been provided by a few researchers. In a prospective, longitudinal study Philipps and O'Hara (1991) discovered women who have a personal and family history of depression have an increased risk of developing postpartum depression (p. 154). Susman and Katz (1988) examined four patients all diagnosed with postpartum depression. They observed that three out of the four women had family histories of affective disorder and two had first-degree relatives who suffered postpartum illnesses; because of early adoption, family data were not available for the fourth patient (Susman and Katz, 1988: 499-500). In a case

study of a twenty-nine-year-old multipara with postpartum depression Kent et al. (1996) discovered the women's mother had also suffered several episodes of postpartum depression (p. 183). In a recent Australian study, Treloar et al. (1999) examined over 800 pairs of twins for the occurrence of postpartum depression. Their results suggested modest genetic influences and they made a request for further studies to substantiate their finding (p. 653).

Obstetrical and neonatal complications have been associated with postpartum depression. Fisher et al. (1997) compared the outcome of delivery practices among 272 primiparous women. They found that women who had cesarean section deliveries were significantly more likely to experience devastating effects on mood and self-esteem. Their concentration and cognitive efficiency was diminished and they felt more irritable. Women who delivered vaginally were most likely to experience an improvement in mood and an elevation in self-esteem from late pregnancy to the early postpartum period. In general, this group reported a reduction in symptoms of depression and anxiety, they were thinking more clearly and had greater energy than they had in late pregnancy (Fisher et al. 1997: 733). Bennett and Slade (1991) found that the infants of depressed mothers had a significantly greater incidence of neonatal complications. The mothers did not perceive their infant as more difficult than the low-risk infants however they did report more concerns about the baby and themselves (Bennett and Slade, 1991: 166).

Biological research on postpartum depression has confounding results therefore no one theory is consistently supported. Some of the problems are due to the research methods employed. For example, researchers sample women at different times of the day and at various stages postpartum. The researcher may not consider breast-feeding as a factor and the consequences on hormone levels. Other factors that could effect results include seasonal variations in hormone levels, the level of sleep deprivation, and the type of medication ingested and dietary habits. Demographic variables such as maternal age are rarely ever controlled for and to further complicate the findings several different diagnostic tools may be used in the same study.

Most often the total hormone concentration is assessed rather than free, biologically active hormone levels (Hendrick et al. 1998: 98). Comparing the total hormone concentration is an effective way of detecting causal factors but this may not be the basis of the disturbance. The catalyst for depression may be in fact the degree of change in the level of individual hormones. Some women may be more sensitive to the slightest amount of change in hormone levels, and to the changes in different types of hormones. It is possible that these women are more susceptible to all childbearing disorders. For example, premenstrual syndrome, like postpartum depression, is a syndrome for which no identifiable hormonal substrate has been found although studies show that hormone levels do play some part. Hormone sensitivity could also play a role in the onset of premenstrual syndrome, which has already been linked to postpartum depression in numerous studies (e.g., Chuong and Burgos, 1995; Warner et al., 1991; Wisner and Stowe, 1997). If postpartum depression develops in women with sensitivity to hormone fluctuations, it could be worth investigating a genetic vulnerability (Hendriks et al. 1998: 98). Through the use of family studies with women with postpartum depression a genetic predisposition to hormone sensitivity could be established. To date, no studies have attempted to uncover this possibility.

C. Distinctiveness of Postpartum Depression

The lack of a unified theory could be the result of controversies concerning postpartum depression as a distinct syndrome. There are two compelling reasons why defining postpartum depression as a separate entity is subject to controversy: (1) the symptoms of depression overlap the normal sequelae of childbirth and (2) the rate of postpartum depression is the same as the rate of depression in non-childbearing women of the same cohort.

Alterations in sleep, libido, energy levels, appetite, and body weight are considered normal aspects of the postpartum adjustment period but are also symptoms of a mild depression (Stowe and Nemeroff, 1995: 640). Furthermore, there is a clear overlap between the symptoms of regular depression and the somatic disturbances associated with childbirth: crying and tearfulness, irritability, anger, sleep disturbance,

fatigue, appetite changes, loss of interest, anxiety, emotional lability, feelings of doubt, and exhaustion. As a result of the similarities between postpartum depression and regular depression, postpartum depression is classified as a subset of a "Major Depressive Episode" in The Diagnostic and Statistical Manual of Mental Disorders IV (American Psychiatric Association, 1994: 386-387). However, health care professionals working in this area tend to disagree with the classification, and the volumes of research on postpartum depression is evidence for continued interest despite the lack of recognition as a distinctive diagnosis.

The majority of researchers report the prevalence rate of postpartum depression to be somewhere between ten and fifteen percent. Similar rates of depression have also been reported for women in the general population (rates which would *include* childbearing women). An eleven percent prevalence rate was reported for women between eighteen and twenty-four years of age and nine percent for women between twenty-five and forty-four years of age (Beaudet 1996: 13). Researchers who deny the existence of a separate syndrome use these rates as proof there is no difference between regular and postpartum depression. To substantiate their claims, studies that control for childbearing have produced similar rates. Cox et al. (1993) compared the rate of depression in postpartum women with control women who were matched for age, marital status, and number of children. They found no significant difference at six months (13.8% and 13.4%), but a threefold higher rate of onset was found within five weeks of childbirth (Cox et al., 1993: 27). Cooper et al. (1998) studied 483 women and concluded that rates of postpartum depression were no higher than those of the non-puerperal control women, suggesting that there "is no increased risk for non-psychotic psychiatric disorder for women in the twelve months postpartum period" (Cooper et al. 1988: 804-805). Interestingly, as women age and leave their childbearing years, the rates of clinical depression decline. Statistics Canada reported that women between the ages of forty-five and sixty-four years had a prevalence rate of six percent and only three percent of women sixty-five years and older suffer from depression (Beaudet 1996: 13).

The most effective way to investigate a basis for postpartum depression as a distinct diagnosis is to utilize a control group, consisting of either depressed non-childbearing women or postpartum women who experience episodes of depression on a regular basis. The control group could then be compared with depressed postpartum women in regards to the biological and cultural risk factors, and the severity of the symptoms. Murray et al. (1995) screened 232 postpartum and non-postpartum control women and found that postpartum but not control depression was associated with a poor relationship with the woman's own mother and greater occupational instability. Depression in control women was associated with low income, having three or more children, performing manual work and occupational dissatisfaction, but was not associated with postpartum depression (Murray et al, 1995: 595). Another comparison between postpartum and non-postpartum control women revealed that depressive episodes related to childbearing were time limited rather than chronic (O'Hara et al., 1991: 96).

In a five-year study, Cooper and Murray (1995) examined the course and recurrence of postpartum depression in two groups of primiparous women with postpartum depression: women who were depressed for the first time, and women whose depression was a recurrence of a previous affective disorder. They found that women with a previous affective disorder were at risk for further non-postpartum depression but not postpartum depression, and that women who were depressed for the first time were at an increased risk for postpartum depression but not non-postpartum depression (Cooper and Murray, 1995: 194). Finally, Bell et al. (1993) found that women with postpartum depression who had no previous psychiatric history or a history of postpartum depression only, had a significantly better prognosis than women with postpartum depression who have had a non-puerperal previous affective disorder (pp. 69-70). These findings suggest a specific nosologic reference for the concept of postpartum depression.

The distinctiveness and etiology of postpartum depression has implications for how it is treated. If one believes that biological factors specific to childbirth are the cause, then there is no reason to assume traditional psychological or pharmacological

treatments will be effective (Whiffen 1992: 505). Dean and Kendell (1981) studied treatments given to two groups of women: women with postpartum depression and control women with non-puerperal depression. They observed that significantly more women in the control group responded to tricyclic antidepressants (p. 133). A study by Gregoire et al. (1996) reported estrogen supplementation significantly reduced postpartum depressive symptoms. In a double-blind placebo controlled study of sixty-one women with postpartum depression, eighty percent of the women receiving an estrogen patch had Edinburgh Postnatal Depression Scale (EPDS) scores under the threshold for major depression after three months of treatment, compared with the thirty-one percent of the placebo receiving group (Gregoire et al., 1996: 932).

Postpartum depression seems to remit at a faster rate than nonpostpartum depression, the symptoms are milder, and postpartum depression is often found in women with no previous episodes of depression (Whiffen 1991: 162). Nevertheless, whether or not postpartum depression and regular depression are two distinct entities, the fact remains that many women succumb to depression following childbirth. Boyce and Stubbs (1994) outline five reasons why postpartum depression should be treated independently: (1) the onset of postpartum depression occurs within a defined period of time; (2) the first few months are crucial for the woman, the baby, and the family; (3) when left untreated, postpartum depression may become a chronic condition; (4) risk factors specific to postpartum depression have been identified; and (5) it makes health care workers aware of the unique experiences of childbirth (pp. 471-472).

D. Indiscriminant Nature: Psychosocial and Demographic Correlates

Most researchers do agree postpartum depression is a multifactorial phenomenon with no single isolated cause. If postpartum depression were associated with demographic and psychosocial factors exclusively then all women would potentially be at risk of developing postpartum depression. In the 1990's the notion that postpartum depression is the result of demographic and psychosocial factors rather than strictly the result of biological and physiological factors has dominated the research literature. These causal factors may include the mother's parity; maternal age; marital status; employment

status; education status; socioeconomic status; immigrant status; social support network; housing; occupation; and child care stress. Similar to the biological research on hormones, these factors are found to be significant in some but not all studies.

A meta-analysis by O'Hara and Swain (1996) revealed that the strongest predictors of postpartum depression were psychosocial: a poor marital relationship; low social support; and stressful life events (p. 46). Boyce, Hickie, and Parker (1991) suggested there are two types of depression: melancholic depression and endogenous, nonmelancholic depression. Melancholic depression is a biologically determined illness in which psychosocial risk factors play little role. By contrast, nonmelancholic depression is thought to be determined more by psychosocial and personality factors. Personality factors such as an inability to cope with life-stress, low self-esteem level, and poor self-confidence have been associated with postpartum depression. Postpartum depression is considered a nonmelancholic depression resulting from the following three different interpersonal factors: (1) dysfunctional parenting; (2) dysfunctional interpersonal relationships; and (3) a personality style of high interpersonal sensitivity (Boyce et al. 1991: 245-247).

Personal experience with dysfunctional parenting may predispose a new mother to postpartum depression. Researchers have found that a poor relationship with her mother is associated with depression. Trad (1995) suggested the mother's mental representations of childhood experience with her own caregiver may serve as a blueprint for the way she interacts with her infant and may play a role in the etiology of postpartum depression. For example, negative representations of her own childhood experience may impede a mother's ability to envision a positive relationship with her child (Trad 1995: 128). Murray et al. (1995) found women with postpartum depression and not the control women reported problematic relations with their mother. They concluded that the relationship between the women and her mother is an important factor in the development of postpartum depression (Murray et al., 1995: 599). Unterman et al. 1990 found women who were either separated from their parents or received poor emotional

support in childhood had a significantly higher incidence of postpartum depression (p. 135).

Kumar and Robson (1984) reported early separation from their mothers did not predispose the women in their sample to postpartum depression although current problems in the mother-daughter relationship showed a link (p. 42). Not all studies found this to be the case. Dimitrovsky et al. (1986) tested fifty-four primiparous women for depression, four to eight weeks postpartum. They discovered a poor marital relationship was associated with postpartum depression but not a poor relationship with her mother. However, they could not verify whether the poor relationship with the husband lead to the depression or the depression lead the women to view their marriage in a negative light (Dimitrovsky et al., 1986: 217).

Dysfunctional interpersonal relationships may increase a new mother's vulnerability to postpartum depression. Women who have problems with interpersonal relationships could experience a compromised level of social support, the exchange of social resources between individuals. Logsdon et al. (1994) tested 105 primiparous women for depression and views on social support using the Postpartum Support Questionnaire (PSQ). They found that perceived postpartum closeness to the spouse was related to postpartum depression. The scores indicated that when support is rated as more important in the postpartum period, depression increases (Logsdon et al., 1994: 454).

Collins et al. (1993) conceptualized social support as one or more of the following: (1) emotional support through expressions of caring and esteem; (2) informational support through advice and guidance; and (3) instrumental support through tangible goods or assistance with tasks. They interviewed 129 economically disadvantaged women at eight weeks postpartum and discovered the amount of support received, quality of support received, and social network resources were largely independent from each other. Having a social support network available to expend in times of need is an important aspect of ones general health and well being. Women with more social support during pregnancy delivered babies with higher birth weights and instrumental support predicted postpartum depression more consistently than did

emotional support (Collin et al., 1991: 1253-1254). Terry et al. (1996) compared depressive symptoms with the mechanisms women used to cope with stressful situations. Family support was the best relief for childcare stress (e.g., infant fussiness) and relatives are in the best position to provide new mothers with assistance and support (Terry et al., 1996: 229).

When considering social support and postpartum depression, the total amount of support is not as important as the *perceived* amount. Kumar and Robson (1984) found women with postpartum depression had only perceived the available social support as being deficient (p. 41). Logsdon et al. (1994) discovered that the sum of differences in support expected/received was not related to depression but that the measure of deviation in support expected/received multiplied by the importance of support was predictive of depression (pp.454). Collins et al. (1993) found ethnic differences in the way social support was interpreted and used and this raises questions about the potentially important role of culture in determining how social support is given, received, or appraised (p. 1255). Kumar (1994) suggested that if postpartum depression were exclusively a psychosocial dysfunction then one would expect to find significant differences between cultures in rates of occurrence, the timing after childbirth, and the associated risk factors (p. 253). The cross-cultural evidence for postpartum depression exemplifies that this is not the case.

E. Postpartum Depression as a Universal Phenomenon

In their landmark cross-cultural study on postpartum depression, Gwen Stern and Laurence Kruckman (1983) reviewed four ethnographic works of literature on childbirth and found little evidence of postpartum depression in non-Western settings. They suggested the rate of postpartum depression in North America may represent a “culture-bound” syndrome, the result of a lack of social support and the structuring of postpartum events such as: mandatory rest and seclusion, social recognition of role transition, and instrumental support and help for the new mother (Stern and Kruckman, 1983: 1028). Kraus and Redman (1986) reported that “most families idealize the joys of parenthood and do not recognize or validate the incredible new stresses the infant brings” (p. 66).

Gruen (1990) summarized North American cultural expectations: "birth and parenting come naturally, with minimal discomfort, and that most people adjust easily to the changes" (p. 262). Postpartum depression could result from the anxiety and guilt felt by the mother because she feels a though she is not experiencing the culturally expected emotional bliss (Kraus and Redman, 1986: 67). In Kipsigis, a rural African community, Sara Harkness (1987) researched women who had recently given birth and found no evidence of postpartum depression:

"The data reviewed here suggest that there are marked differences in the extent to which postpartum depression is recognized at the cultural level, and that the presence or absence of certain culturally based circumstances may play a central role in the etiology of this disorder among individual women. At least in its characteristic Western forms, postpartum depression appears to be a culture-bound syndrome" (p. 207).

In a critical review of the literature on transcultural aspects of postpartum psychiatric illness, Kumar (1994) noted the scarcity of studies conducted outside Western Europe and North America, and commented on the similarities between the rates of postpartum depression in the few reported cross-cultural comparative studies. Similar results were revealed in a meta-analysis by O'Hara and Swain (1996) who found neither the number of days postpartum the study was conducted nor the country in which the assessment took place significantly predicted the prevalence estimates (p. 1327). However, not all studies support a universal incidence rate of postpartum depression. Kit et al. (1997) measured 154 Malaysian women, six weeks postpartum, for depression. They reported an incidence rate of four percent, low in comparison to most studies. The authors suggest the low rate could be the result of underdiagnosis by physicians ignorant to this condition. However in Malaysia, the postnatal confinement practice of *pantang larang*, are still adhered to by sixty-four percent of new mothers, which could be the real reason for the low incidence rate (Kit et al., 1997: 89).

The amount of help a new mother receives during the postpartum period is largely dependent on cultural practices. Malaysian women receive extra help during *pantang larang* in addition to following rules that restrict behaviors such as going outside, being

blown by the wind, eating cold food and having sexual intercourse (Kit et al., 1997: 85). Similar practices are found in other parts of Asia, Europe, and Africa. In China, dubbed "doing the month", the mother receives extra attention from her family, and must adhere to strict rules concerning behavior such as avoiding washing the hair, eating raw or cold foods, being blown by wind, going outside when it is cold, and having sexual intercourse (Pillsbury 1978: 12). Hispanic women observe "la cuarentena", a period of time during which they rest, receive help with housework and childcare, and avoid certain foods (McElroy 1991: 256). Among the Ibibio of Nigeria, for two to three months postpartum, the mother and her baby are placed in a hut termed the "fattening room" where they are cared for by the baby's grandmother (Kelly 1967: 611-612). In Kipsigis, Kenya, her mother, her mother-in-law, and her neighbors give the new mother, a "soloita", assistance for at least a month (Harkness 1987: 199).

These postpartum rituals may pose problems for cross-cultural comparisons of postpartum depression using similar measures. In their study, Watson and Evans (1986) used three different measures to compare depression in three populations of postpartum women: Bengali, English speaking immigrants, and indigenous. They found agreement between the measures used and little difference in the psychological symptoms experienced in the varying cultures (Watson and Evans, 1986: 874). Shimizu and Kaplan (1987) studied fifty women from Japan and the U.S.A. diagnosed with postpartum depression using the Pitt (1968) Depression Scale. They found no differences in depression scores although regression equations showed significant differences in the factors contributing to depression. They found the risk factors significant for American women; breastfeeding, greater need for support, future work plan, greater isolation, stressful life events, and younger age, were different than for Japanese women; traditional female role concepts and family role concepts (Shimizu and Kaplan, 1987: 27).

Regardless of which cultural setting a woman gives birth, adjusting to the child care responsibilities is very stressful for new mothers. Cultural rituals that increase the amount of assistance for the mother can improve her postpartum mental health and it follows that any improvement in the mental health of the mother will have positive

effects on her ability to perform childcare responsibilities and consequently increase her reproductive success. Western countries are blamed for the medicalisation of childbirth, this coupled with a lack of postpartum rituals and customs to help the new mother is said to be the root cause of postpartum depression. Many countries have specific customs associated with the early months postpartum. These findings suggest the importance of social support in the postpartum period. Kelly (1967) concluded that these postpartum customs might protect against postpartum depression (p. 611). Stern and Kruckman (1983) proposed that a relationship exist between cross-cultural strategies which serve to mobilize social support to the new mother and her postpartum mental health (p. 1036). In other words, these customs and rituals may have originated as a means of reducing the symptoms of postpartum depression. If postpartum depression is indeed a universal phenomenon, these rules, which restrict certain behaviors, could in fact be cultural adaptations used to protect against postpartum depression.

V. **Research Methodology**

A. *The Adaptationist Approach*

The fundamental assumption of evolutionary theories is that the phenomenon in question provided a selective advantage, which increased the reproductive success of those who experienced it. The ideal method of testing the selective advantage is by determining whether thousands of years ago our ancestors who displayed the experienced better reproductive success. Unfortunately this method is impossible. However evolutionists can test their theories by generating adaptation hypotheses that test modern day functional significance. The adaptation hypotheses serve to identify the selective forces responsible for preserving the phenomenon under investigation (Thornhill and Thornhill, 1989: 78).

The objective of this research project is to evaluate whether postpartum depression is an adaptive phenomenon. Three distinct hypotheses have been proposed along with several predictions. Information collected from quantitative and qualitative sources will be used to evaluate the predictions. To date, no previous research on postpartum depression has evaluated reproductive success, therefore indirect evidence will be generated from previous cross-sectional, quantitative and qualitative research studies on thousands of women of all ages, ethnicity, religion, parity, socioeconomic backgrounds, marital arrangements, education levels, and occupations. The rich supply of information provided by these studies will provide an invaluable perceptiveness into the nature of postpartum depression, insights impossible to derive from data collected in the traditional ways of conducting surveys and interviews.

B. *Mixed Methodologies*

“The idea of combining qualitative and quantitative approaches in a single study owes much to past discussions about mixing methods, linking paradigms to methods, and combining research designs in all phases of a study” (Creswell 1994: 174).

There are two types of research designs used in the social sciences: qualitative and quantitative. Quantitative research turns words and phrases into statistics and probabilities and the focus of attention are on aggregates rather than on individuals. The

data collection methods of quantitative research are experiments and surveys. Quantitative methods use a deductive form of logic wherein theories and hypotheses are tested in a cause-and-effect order. Concepts, variables, and hypotheses are chosen before the study begins and remain fixed throughout the study (Creswell 1994: 152). Qualitative research on the other hand is inductive; the researcher focuses on the individual from which concepts and theories are built. The data collection methods of qualitative research are observations, interviews, documents, and visual materials. Qualitative methods provide rich "context-bound" information, which lead to patterns or theories that help explain a phenomenon (Creswell 1994: 160). Evolutionary theorists use both qualitative and quantitative research methods and there are advantages and disadvantages of both.

The concept of "triangulation" was based on the assumption that an inherent bias in data sources, methods or researchers will be neutralized when multiple methods are used (Creswell 1994: 174). Triangulation is the converging of findings and the elaboration of results that can uncover contradictions and paradoxes, and extend the scope of the inquiry. In a mixed-methodological design study the researcher collects both qualitative and quantitative data. Both themes and statistical data are then presented in the same study (Creswell 1994: 184).

Nursing researcher Cheryl Beck (1997) has used both qualitative and quantitative methods in her research on postpartum depression. These methods cannot only be used sequentially but also interchangeably and is dependent on the state of the knowledge in the area under investigation (Beck 1997: 266). Quantitative and qualitative research conducted over the past three decades has provided a rich supply of information and knowledge on postpartum depression. To maximize the use of existing knowledge, the mixed-methodological design appeared the most appropriate method.

When methodologies are mixed there often is one research method that is utilized more so than the other. Creswell (1994) calls this the "dominant-less dominant design" (p. 194). The dominant design is the quantitative phase with emphases on quantitative methodology and statistical analysis, which includes the presentation of theory,

hypotheses, predictions, and assumptions. There is a reduced emphasis on qualitative methodology and results, the less dominant design. Qualitative results will be used to elaborate and enhance the findings of the quantitative results.

Meta-analysis is used for exploratory or confirmatory research seeking to test well-articulated hypothesis (Cook 1994: 305). It is also the most suitable way to collect and analyze a large amount of data in a relatively short period of time. It is quantitative in design and uses statistical evidence to support or refute the predictions derived from hypotheses. One disadvantage in using meta-analysis is that relevant ideas and conclusions by the researcher cannot be documented in a statistical or numerical format and are therefore unnoticed. Furthermore, the descriptive information that accompanies the data provides important insights about whatever program or process is being studied (Cook 1994: 293). To avoid this loss of vital information a qualitative, phenomenological study of the unnumbered, written contents was conducted. The phenomenological stage was added to enrich the database generated by the meta-analysis.

C. Quantitative Method: Meta-Analysis

“A meta-analysis is an observational study and must be conducted with considerable care. The meta-analyst must investigate and attempt to control potential threats to validity that arise in non-experimental research” (Thomas Cook 1994: 10).

Meta-analysis has been compared to conducting empirical research in which the data are treated quantitatively. It is similar to designing a survey except that the units of analysis are summary statistics from studies rather than individuals. From each study, summary statistics are extracted and coded, similar to the coding of individual responses to questions in a survey. Surveys can accumulate a great deal of information in a relatively quick and inexpensive manner, however, information able to be generalized is typically not derived from a single effort at data collection, whether it is from a survey, an ethnographic report, a laboratory experiment, or a field experiment. Nearly all experiments, for example, take place within a restricted population of persons from a small number of cities, factories, hospitals or wherever. A single study can explore a

single explanatory theory or a set of theories although it is unlikely that a single study could be used to explain a phenomenon, much less support a new theory (Cook 1994: 2).

In meta-analysis the investigator gathers together all the studies relevant to an issue and then constructs at least one indicator of the relationship under investigation from each of the studies. These study level indicators are then used (much as observations from individual respondents are used in surveys, correlation studies, or experiments) to compute the mean, standard deviations, and more complex statistics. For the purposes of this research project, only descriptive statistics (e.g., means, ranges, standard deviations, and correlation's) will be applied to the data, therefore no further analysis of different meta-analysis techniques is necessary. As a result it may be more accurate to call this a composite analysis as composites are interested in testing hypotheses by looking at patterns of descriptors emerging from the analyses (Rosenthal 1987: 90). However, the methods employed in selecting studies, organizing the database, and comparing, analyzing, and evaluating the data are standard techniques used in meta-analysis and so the quantitative portion will be referred to as a meta-analysis.

The sampling stage of the meta-analysis is analogous to survey sampling in primary research. To search out the studies for the sample, the online computer abstracting service "Clavis" was put to use providing abstracts from the areas of psychology, sociology, anthropology, and biology. Abstract databases *PSYCHLIT* and *MEDLINE* yielded the largest number of studies. Keywords such as "postpartum depression", "postnatal depression", "childbirth", "mother-child interactions", "postpartum mood disorders", "postpartum activities" and "human birth" were used to trace the articles. The list of references at the end of key research reports was examined to track additional references. To establish universality, studies were collected from as many different countries as possible. For convenience, sampling was limited to studies published in journals available at the University of Calgary Library, the Medical Library, or through inter-library loans.

To minimize any generational biases, the search included the years 1964 to 1999. Quantitative research on postpartum depression has only been conducted since the early

part of the 1960's. Depression inventories used to measure the incidence of postpartum depression have not changed significantly therefore the comparison between studies in the 1960's and the 1990's would be valid. Furthermore, the presence of significant increases or decreases in incidence over the past thirty-five year's, would require an explanation beyond the initial objectives of this research project.

A first draft sample of 157 studies was generated by the initial search. Implementing a procedure called "stratifying" the number was reduced to include the studies that met the first set of criteria. (See Appendix A.) The following criteria generated the first sample: (a) the study used a quantitative research design; (b) the study was published since 1968; (c) the study had a sample size of fifty subjects or greater; (d) the study was published in the English language; and (e) the study defined postpartum depression as an entity distinguishable from the postpartum blues, postpartum psychosis and other postpartum disorders. Studies were omitted from the sample based on the following criteria: (a) the study used a qualitative research design; (b) the study tested measures of postpartum depression; (c) the study failed to use primary data; and (d) the study failed to research postpartum depression exclusively. Eighty-four studies were excluded for the following reasons: sixteen were published in a language other than English, although most of the studies presented data on Western populations, fourteen studies focused on the postpartum blues or postpartum psychosis, thirteen focused on other conditions (i.e. childhood sexual abuse, obsessive compulsive disorder, birthing practices) and their association with postpartum depression, eleven studies were literature reviews using secondary data, nine were case studies, nine were of a qualitative research design, seven had sample sizes smaller than fifty, and five studies involved the evaluation of new measures of postpartum depression.

A sample of seventy-three studies was retrieved. These remaining studies were further reduced in accordance to the second set of criteria: (a) the primary goal of the study is to investigate the association between postpartum depression and demographic, psychosocial, and hormonal, genetic, and obstetrical variables; (b) depression is assessed at least one month postpartum to avoid confounding with the postpartum blues; and (c)

depression is assessed employing a standardized measure (interview, self-report, or both) with high validity and reliability. (See Appendix A.) Studies were omitted according to the following criteria: (a) the study examined primipara exclusively; (b) the study failed to report all significant and nonsignificant findings; and (c) the study was limited to a hospital-based study. There was no limit on the studies length although no study exceeded four years in duration and the longest study included in the sample was two years.

Twenty-nine (18.5%) of the 157 studies in the first sample draft met all the sample criteria. (See Annotated Bibliography for Meta-Analysis). Forty-four studies were omitted for failing to meet the criteria: thirteen excluded multipara from the sample, eleven only examined one dimension of postpartum depression; ten failed to use a standardized measure of depression; six studies were hospital-based, and four studies measured postpartum depression within one month postpartum.

As a starting point, meta-analysis assumes there are a number of well-designed studies that address the same question using similar outcome measures although the measurements are rarely standardized across different studies (Cook 1994: 293). The more homogenous the sample of studies is, the stronger the validity of the results and methodologically inferior studies should be excluded. To test the homogeneity of the studies, the following methodological variables were extracted and scored: sample size, sampling, research design, type of postpartum depression measurement and instruments, data collection, data collection times, and the expertise of the author(s). The scoring for sample size was 1 = 50 to 100 subjects, 2 = 101 to 500 subjects, and 3 = 501 or more. Sampling was scored as 1 = convenience, 2 = matched with control, and 3 = random. The research design was scored as 1 = retrospective and 2 = prospective. Postpartum depression measurement was scored as 1 = self-report or unstructured interview, 2 = semi-structured interview, or 3 = triangulation of both self-report and semi-structured interview. The scoring for data collection ranged from 1 = untrained data collectors/self-report, 2 = trained data collectors, and 3 = trained data collectors blind to mother's diagnosis. The data collection times were scored as 1 = 1 to 3 months postpartum, 2 = 3

to 6 months postpartum, and 3 = more than 6 months postpartum. The criterion of first author expertise was scored as a 1 = Masters is the highest degree, 2 = Ph.D. or M.D. is the highest degree, and a 3 = Ph.D. or M.D. is the highest degree plus the first author has published multiple studies.

The homogeneity scores ranged from ten to sixteen ($M=13$, SD 1.8). (See Appendix B.) The results produced no outliers hence there were no exclusions based on methodological inferiority. Most studies included a rate of depression however it is important to recognize the distinction between prevalence and incidence rates. The prevalence rate is in reference to the total number of cases in the postpartum period, while the incidence rate denotes only those cases that developed after childbirth. To determine the incidence rate, women depressed in the antepartum period are excluded from the postpartum study. Only studies with a prospective research design can control for antepartum depression.

D. Quantitative Data Analysis

The purpose of the data analysis in research synthesis is to organize the information about studies and their findings to reveal patterns (Cook 1994: 305). A total of thirty-two biological and cultural variables were assessed for their potentiality as risk factors of postpartum depression. (See Appendix E.) The variables were derived from studies used in the meta-analysis and were reflective of the predictions stated under the hypotheses outlined in chapter three. They were organized into two sections: the biological variables; hormonal, genetic and obstetrical, and the cultural variables: psychosocial and demographic. The twenty-nine studies in the meta-analysis published significant and non-significant findings based on a wide range of probabilities ($p<0.00001$ to $p<0.07$). The results for each variable tested were recorded in the following manner; a score of one was given for a non-significant finding and a score of two was given when the finding was significant. The average score for each variable was recorded (M).

E. Qualitative Method: Phenomenological Review

The quantitative method is ideal for taking large amounts of information from a representative sample and deducing it to generalized knowledge statements, which are used to support or refute hypotheses. The drawback is the loss of valuable information not recorded in a numerical or statistical manner. This includes any information not quantified such as accounts of the researchers and participants in quantitative research, qualitative research, and case studies. Other vital information is lost when information is aggregated. For example, information about individual subject's age or parity is lost when the statistical analysis is based on averages. Demographic information associated with the length of a depressive episode is impossible to determine when data collected at various times are compared. Fortunately, many researchers document findings they feel are significant and worth mentioning and although their insights have no effect on the aggregate data, a phenomenological review of the sample could reveal relevant findings that would otherwise be discarded. Phenomenology emphasizes direct observation of phenomena and to describe it in words rather than numbers. Part of the humanistic tradition that emphasizes the common experience of all human beings, phenomenology is ideal for taking these insights, opinions, and ideas and deriving from them meaningful themes (Bernard 1997: 14-15). These themes would be representative of the original sample and can be used in conjunction with a meta-analysis to provide additional information to support or refute the predictions.

The twenty-nine studies from the database were included in the qualitative research sample. These documents were purposefully selected based on their potential to provide information necessary to support or refute the three hypotheses stated in chapter one. No attempt was made to randomly select the documents. Seven studies previously omitted from the meta-analysis were included in the phenomenological review. (See Annotated Bibliography for Phenomenological Review). Their inclusion was based on the following criteria: (a) the study used a qualitative or quantitative research design; (b) the study had been published since 1968; (c) the study was published in the English language; (d) the study treated postpartum depression as a unique entity; (e) the study

was published in a reputable journal; and (f) the study focussed on relevant variables and their relationship to postpartum depression. (See Appendix A.) A total of thirty-six studies were reviewed in this portion of the thesis. All demographic, methodological, hormonal, genetic, obstetrical, and psychosocial information relevant to the assumptions, predictions, or hypotheses was documented in a notebook.

The studies were reviewed a minimum of three times. The first reading was completed to (1) generate a ground level understanding of how the researcher operationalized postpartum depression (e.g., how postpartum depression is defined and measured); and (2) determine whether biological or cultural variables were important and what research questions were addressed. The second reading generated tangible data documented in a notebook. Within the notebook answers to the following five questions were documented: (1) what were the researchers comments on the significant findings; (2) what were some serendipitous results noted by the researcher, (3) what did the researcher suggest for further studies; (4) what were the strong points of the study according to the researcher; and (5) what were the weak points of the study according to the researcher. The answers were documented in the original quotation of the researcher. The third reading (and any additional ones) was treated as a safety net used to catch any additional points of interest that might have been overlooked. The final reading helped to solidify the validity of the information previously documented. This step proved to be invaluable as a much deeper understanding of the research was attained after several readings.

E. Qualitative Data Analysis

The contents of the notebook were analyzed for any apparent themes. The statements were organized according to relevance to the research project and relatedness to each other. By arranging several statements on one topic the themes became apparent. Each theme is based on a collection of similar ideas, opinions, and conclusions of the researchers. Many of them reflected information that was not addressed in the meta-analysis. The themes will be compared with the results from the meta-analysis. Not all of the themes were directly related to the three hypotheses. Some themes were important

for other aspects of the meta-analysis. For example, a few studies mentioned limitations of the findings based on the instrument used to measure postpartum depression. This theme is relevant to the limitations of this thesis.

F. Limitations of Methodology

The ultimate goal of social science research is to make valid claims in regards to the phenomenon under investigation. Whether qualitative or quantitative, the accuracy of the measure, data, and outcome of the research affect validity (Bernard 1997: 38). In phenomenology, the validity of the research is dependent on the truthfulness of the respondents. In meta-analysis, the validity is dependent on the utility of the instruments used in the testing of postpartum depression and on the massed assumption of the scientific community that a construct and its measure are valid (Bernard 1997: 43). Both types of research methodology are vulnerable to researcher biases.

Whether postpartum depression is perceived as a biological or social phenomenon will impact how postpartum depression is operationalized and what research methods are used. For example, a researcher may have personal biases concerning the etiology of postpartum depression, which will effect the outcome of the study. A feminist may argue that postpartum depression is no different than any other depression and that “disorders” such as postpartum depression, premenstrual syndrome, and menopausal syndrome is a fallacy, a man-made misconception of reality, and a way of keeping women down (out of the work force). The researcher may choose an unstructured interview with open-ended questions. On the other hand, a researcher who has a bias towards stay at home moms could try to demonstrate that women who return to work are more vulnerable and conclude that postpartum depression is the result of women working. The researcher may chose a self-report style measure with close-ended questions. Since many researchers enter studies with preconceived notions about the results, conflicting theories emerge concerning the etiology, prevalence, risk factors, and outcomes, theories that contribute to keeping the enigma of postpartum depression alive.

The findings of a meta-analytic review can be distorted if only published studies are included, where a publication bias may favor significant results (Strube and

Hartmann, 1983: 24). Researcher biases may occur in the article selection procedure. In meta-analysis, the results from individual studies are aggregated, analogous to the responses from individual subjects in traditional studies. However, traditional research designs are more random and unbiased in the subject selection procedure. The meta-analysis is biased and not random in that the sample must meet several predetermined criteria before being selected. Another potential problem concerns the completeness and accuracy of results presented in written reports. The meta-analysis can provide precise, accurate results only to the extent that precise, accurate results can be retrieved. One would expect that the findings reported in published journals to be accurate, although just like sampling individuals, the manner in which results are reported has been known to be a bit misleading.

The legitimacy of phenomenology is dependent upon the accuracy of the researcher's anecdotes and comment's, and on the clarity of the ideas and themes derived from them. Unlike private one-on-one interviews or confidential questionnaires, the statements derived from the studies are available to the public, which may increase their validity. However, qualitative data are also vulnerable to researcher biases and some information may be purposively omitted if it was contradictory to what the researcher is attempting to demonstrate. The following steps were taken to minimize threats to validity: (1) studies were included based on their homogeneity, not their conclusions; (2) a large number (N=29; N=36) of studies by researchers of various backgrounds were included to minimize operational biases; (3) the studies used several different instruments to measure depression, which would minimize testing effects; and (4) to support or refute the predictions, data are derived from a combination of qualitative and quantitative research, on over fourteen thousand women, of various social and ethnic backgrounds.

VI. Research Results

A. The Database

"The predictive use of meta-analysis establishes plausible hypothesis, it does not actually test them. However, if used cautiously, an accumulated database can provide the foundation for considerable exploration of a theories uncharted domain...Theory development and application will proceed most effectively by using all the information contained in accumulated research" (Maccoby and Jacklin, 1974).

A total of twenty-nine studies comprised the sample for this meta-analysis. All studies were published in a reputable journal in the English language. The style of research design included thirteen prospective studies (44.8%) and sixteen retrospective studies (55.2%). The prospective studies which controlled for antepartum depression reported an incidence rate which ranged from 3.4% to 17.5% ($M=9.6\%$, $SD\ 5\%$). The prevalence rate ranged from 3.4% to 45% ($M=17\%$, $SD\ 10\%$). The following research variables were recorded for each study: year; population; sample size; sampling style; research design; diagnostic method; data collection time; data collectors, and expertise of authors. To test for the presence of research effects, the correlation coefficient ('r') was computed for each research variable and prevalence rate. (See Appendix B.) There was a non-significant, negative correlation between research design and prevalence rate (-0.3). The studies were published between the years 1968 and 1998. One study (3.4%) was from the 1960's; there were none from the 1970's; five (17%) from the 1980's; and twenty-three from the 1990's (79.3%). There was a non-significant, positive correlation between the year and prevalence rate demonstrating there were no generation effects in this sample of studies. The location of research spanned sixteen countries: eight (27.5%) from North America; eight (27.5%) from the United Kingdom; four (13%) from Europe; three (10%) from the Middle East; three (10%) from Asia; two (6.9%) from Africa; and one (3.4%) from Australia. The studies were divided into two groups: group one included developed countries Canada, U.S.A., U.K., Europe Australia, Israel, South Africa and Japan and group two included less developed countries Dubai, Fiji,

Taiwan, and Nigeria. There was a positive, non-significant correlation between the location of study and the prevalence rate (0.19).

TABLE 3 – LOCATION OF STUDIES AND PREVALENCE RATE (N=27)

Canada (N=2)	5.1%	Nigeria (N=1)	14%
United States of America (N=4)	21.6%	South Africa (N=1)	27.2%
United Kingdom (N=6)	18.2%	Dubai (N=1)	15.8%
Ireland (N=1)	11%	Israel (N=2)	13.9%
Sweden (N=1)	14.5%	Japan (N=1)	12.1%
Finland (N=1)	19.4%	Taiwan (N=2)	45.0%
Switzerland (N=1)	10.2%	Fiji (N=1)	9%
Portugal (N=1)	13.1%	Australia (N=1)	15.4%

Eleven different rating instruments were used in the measurement of postpartum depression. (See Appendix G.) The methods of data collection varied between twenty self-report (70%); five-interview style (17%); and four triangulation (13%). There was a non-significant, negative correlation between diagnostic method and prevalence rate (-0.2). The postpartum interval in which the study took place ranged from four to one hundred and four weeks ($M=15.6$, SD 20.2). There was a non-significant, positive correlation between data collection time and prevalence rate (0.09). The sample size ranged from eighty-one to 2375 ($M=469.9$, SD 498.5). There was a non-significant, negative correlation between sample size and prevalence rate (-0.2). The sampling methods included convenience (64%), matched with control (23%), and random (13%). There was a non-significant, positive correlation between sampling and prevalence rate (0.04). There was a non-significant, positive correlation for both the method of data collection (0.21) and authors expertise (0.22). These findings suggest there are no research effects that could bias the results of the meta-analysis.

TABLE 4 – RESEARCH EFFECTS (N=28)

Variable	r^*
Year of Publication	0.07 (NS)
Population of Study	0.19 (NS)
Sample Size	-0.2 (NS)
Sampling Style	0.04 (NS)
Research Design	-0.3 (NS)
Diagnostic Method	-0.2 (NS)
Data Collection Time	0.09 (NS)
Data Collectors	0.21 (NS)
Expertise of Authors	-0.22 (NS)
Homogeneity Score	-0.05 (NS)
*Correlation Coefficient	

Statistical information was collected from a combined total of 13,627 subjects. The following demographic characteristics of the subjects were extracted from the studies: average age; marital status; parity; socioeconomic status; education status; employment status, and immigration status. The correlation coefficient was determined for individual demographic characteristics and the prevalence rate. (See Appendix D.) There was a significant, negative correlation between average age and prevalence rate (-0.76). There was a significant, negative correlation between percent married and prevalence rate (-0.48). There was a significant, positive correlation between percentage of primipara and prevalence rate (0.56). The socioeconomic status (SES) was divided into five groups of subjects: group one comprised low SES, group two comprised low to middle SES, group three comprised middle SES, group four comprised middle to high SES, and group five comprised high SES. There was a significant, negative correlation between the SES group and prevalence rate (-0.75). There was a significant, negative correlation between average years of education and prevalence rate (-0.54). There was a significant, negative correlation between percentage of employment and prevalence rate (-0.47).

TABLE 5 –DEMOGRAPHIC EFFECTS (N=30)

Variable	r*	CI**
Average Age	-0.76	.45-.85
Marital Status	-0.48	.05-.67
Primiparity	0.56	.17-.73
SES	-0.75	.45-.85
Education	-0.54	.17-.73
Employment	-0.47	.05-.67

***Correlation Coefficient**

****95% Confidence Interval**

The risk factors associated with postpartum depression were divided into two groups of variables: biological; hormonal, obstetrical, and genetic variables and cultural; psychosocial and demographic variables. (See Appendix E.) A score of 1 was given to non-significant findings and 2 to significant findings. A mean (*M*) score was calculated and the scores were used to divide the variables into three groups: high risk factors ($M > 1.6$); moderate risk factors ($M = 1.4-1.6$); and low risk factors ($M < 1.4$). (See Appendix F.)

A family history of depression and a history of premenstrual tension were found to be significant risk factors in the four ($M=2$) studies that investigated these issues. Eight of eleven studies ($M=1.73$) found a personal history of depression to be significant. Five of eight studies ($M=1.75$) found antepartum depression to be a significant risk factor. Postpartum blues were a significant risk factor in five of six studies ($M=1.83$). Breastfeeding was not significant in three studies ($M=1$) while three of six studies ($M=1.5$) found bottle feeding a significant risk. Seven of thirteen studies ($M=1.54$) found obstetric risk factors to be significant and two of four studies ($M=1.5$) found prematurity a significant risk. The significance of a family history of postpartum depression, personal history of postpartum depression, and multiple birth was not reported by any of the studies in the meta-analysis.

The majority of studies found age not to be a significant risk: in twenty-five studies three ($M=1.13$) found being twenty years old or younger significant and two ($M=1.09$) found being thirty years old or older significant. Parity was not significant in the majority of studies: in twenty-two studies, two ($M=1.1$) found primiparity significant and five studies ($M=1.2$) found multiparity significant. Previous abortion was significant in one of two studies ($M=1.5$) and whether the pregnancy was planned or desired was significant in three of six studies ($M=1.5$). The undesired sex of the infant was only significant in one of six studies ($M=1.17$). Desired sex was not investigated as a risk factor in any of the studies. Abnormal or deformed infant was not significant in the one study which reported this finding ($M=1$). Childcare stress was significant in six of seven studies ($M=1.86$). Marital status was significant in five of twelve studies ($M=1.4$) and in the two studies which addressed polygamous marriages, one ($M=1.5$) found significance. The length of the relationship was significant in one of three studies ($M=1.3$) and marital adjustment was significant in twelve of thirteen studies ($M=1.9$). Social support was significant in ten of ten studies ($M=2$) and relationship with mother was significant in two of four studies ($M=1.5$). Religious observance was significant in one of two studies ($M=1.5$).

Six of nine studies ($M=1.67$) found immigrant status a significant risk factor. Socioeconomic status was a significant factor in seven of fourteen studies ($M=1.5$) and financial problems were significant in four of five studies ($M=1.8$). Housing difficulties were a significant risk in two of four ($M=1.5$) studies. Maternal occupational status was significant in three of four ($M=1.75$) studies and the one study addressing paternal occupation status found significance ($M=2$). Maternal unemployment was significant in six of twelve studies ($M=1.5$) and in five of fourteen studies ($M=1.36$) educational status was significant.

TABLE 6 – FACTORS ASSOCIATED WITH POSTPARTUM DEPRESSION

High Risk Factor ($M > 1.6$)	Type	Mean*
Family History of Depression (N=4)	Genetic	2
Premenstrual Tension (N=4)	Hormonal	2
Social Support (N=10)	Psychosocial	2
Paternal Occupation (N=1)	Demographic	2
Marital Adjustment (N=13)	Psychosocial	1.9
Childcare Stress (N=7)	Psychosocial	1.86
Postpartum Blues (N=6)	Hormonal	1.83
Financial Difficulties (N=5)	Psychosocial	1.8
Antepartum Depression (N=8)	Hormonal	1.75
Maternal Occupation (N=4)	Demographic	1.75
Personal History of Depression (N=11)	Genetic	1.73
Immigrant Status (N=9)	Demographic	1.6
Moderate Risk Factor ($M = 1.4-1.6$)	Type	Mean*
Obstetrical Intervention (N=13)	Obstetrical	1.54
Not Breastfeeding (N=6)	Hormonal	1.5
Previous Abortion (N=2)	Psychosocial	1.5
Unwanted/Unplanned Pregnancy (N=6)	Psychosocial	1.5
Polygamy (N=2)	Demographic	1.5
Religious Observance (N=2)	Psychosocial	1.5
Relationship with Mother (N=4)	Psychosocial	1.5
Socioeconomic Status (N=14)	Demographic	1.5
Housing Difficulties (N=5)	Psychosocial	1.5
Maternal Unemployment (N=12)	Demographic	1.5
Marital Status (N=12)	Demographic	1.4
Low Risk Factor ($M = < 1.4$)	Type	Mean*
Educational Status (N=14)	Demographic	1.36
Length of Relationship (N=3)	Psychosocial	1.3
Premature Birth (N=4)	Obstetrical	1.25
Multiparity (N=22)	Demographic	1.2
Undesired Sex (N=6)	Psychosocial	1.17
Younger than 20 years (N=25)	Demographic	1.13
Primiparity (N=22)	Demographic	1.1
Older than 30 years (N=25)	Demographic	1.09
Breastfeeding (N=3)	Hormonal	1
Abnormal/Deformed (N=1)	Psychosocial	1

Unreported Risk Factors

Family History of Postpartum Depression (N=0)	Genetic	NA
Personal History of Postpartum Depression (N=0)	Genetic	NA
Multiple Birth (N=0)	Obstetrical	NA
Desired Sex (N=0)	Psychosocial	NA

*Non-significant = 1, Significant = 2

B. Qualitative Review

Thirty-six studies were included in the phenomenological review. Seven theme clusters based on issues central to the classification and etiology of postpartum depression were extracted: social support; consequences; duration, childcare stress and the vulnerability of multipara; cultural contingencies; etiological concerns and etiological components.

TABLE 7 – THEMATIC RESPONSES IN THE STUDY OF POSTPARTUM DEPRESSION

Theme	Elements
Social Support	Support provided by the father, grandmother, relatives, and community.
Consequences	Delaying future births and persistent depression.
Duration	Factors associated with the length of depressive episodes.
Childcare Stress	Problems associated with providing maternal care to more than one child.
Cultural Contingencies	The sensitivity of depression scales to other cultures; expectations, and prevalence.
Etiological Concerns	The comparison of PPD with depression at other times in the female life span.
Biological Components	The hormonal, genetic, and psychosocial components of PPD.

Theme One: The Importance of Social Support

The most important element in the development of postpartum depression is the social support network of the mother. The social support network is comprised of the father, the maternal grandmother and other relatives, friends and members of the community. "Social support" can be conceptualized as emotional support, informational support, and instrumental support. A compromised social support network increases the mother's vulnerability in developing postpartum depression.

The provisioning of instrumental and emotional support by the father is a vital aspect of maternal well being. Postpartum women are especially sensitive to the how much help they receive and how much interest their partner shows. It appears women not in supportive, committed relationships are at a greater risk of developing depression. Moreover, a troubled relationship in the antepartum could be a warning signal. In a

Canadian study, Gotlib, Whiffen, Wallace, and Mount (1991) examined the role of psychosocial variables in the onset of depression one-month postpartum and stated:

“Our findings corroborated such results (postpartum depression is related to marital conflict and a lack of spousal support) and, furthermore, suggest that marital discord precedes the onset of postpartum depression” (p. 128). (Information in parentheses added).

Their results were confirmed by a group of Finnish physicians, Viinamaki, Niskanen, Pesonen, and Saarikoski (1997) who investigated depression in mothers two-years after childbirth:

“Those with continuing mental-health problems had had more problems in their relationship with their partners already during pregnancy and also after delivery, than those who remained mentally healthy” (p. 218).

Both a poor marital relationship (Paykel et al. 1980) and being unmarried (Fegetter et al., 1981) were reflective of an increased vulnerability to postpartum depression. Single women most likely must provide the instrumental and emotional support themselves and additional children would increase the burden. A Swedish study by Bagedahl-Strindlund and Borjesson (1998) demonstrated this:

“We found that the depressed women were single with more than one child...emphasizing that life stress and an absence of social support are important factors in the development of postpartum depression” (p. 275).

In addition to the support provided by the partner, the mother's own mother has a vital role in postpartum assistance. The knowledge and experience of the maternal grandmother is a resource invaluable to the new mother. Presuming her own children have surpassed the stage constant maternal care is required the maternal grandmother would be available to help. Women from all cultures rely on the support of their mother during pregnancy and the postpartum period. Nahas, Hillege and Amasheh (1999) studied postpartum depression among Middle Eastern Migrant women in Australia and found:

“Traditionally, the mother of a pregnant women is also culturally esteemed and her role both prenatally and postnatally is indispensable” (p. 66).

Women who have a poor relationship with their mother could have a more difficult time adjusting to a maternal role than women with good relationships do. This difficulty could put them at risk for developing postpartum depression:

“Childbirth reminds pregnant women of their relationship with their own mothers. It is possible that a problematic relationship with her mother complicates a new mother’s adaptation to parenthood” (Viinamaki et al., 1997: 218).

The measurement of social support is highly ambiguous insofar as what one woman perceives as sufficient support may be gravely lacking to another. This ambiguity makes it hard to decipher whether a lack of support causes depression or the depression causes the women to perceive her support as deficient. In South Africa, Spangenberg and Pieters (1991) compared related factors in depressed and non-depressed postpartum women:

“The subjective experience of insufficient social support seems to be a meaningful factor in postpartum depression – be it as cause or result” (p. 163).

Women who have moved far away from their family and friends, who do not know many people, and have limited access to additional support may find the postpartum period very challenging. These situations exemplify the importance of social support. Even if the relationship with her partner is healthy, when he is gone to work the mother is left to cope with the child alone and this can be very stressful. Glasser et al. (1998) compared recent and veteran Russian immigrants with Israeli-born postpartum women:

“In the present study, veteran Russian immigrants were more similar to Israeli-born subjects with respect to PPD rates, suggesting that recent immigration may have a greater impact than country of origin” (p. 160).

Swiss researchers Righetti-Veltema et al. (1998) illuminated the possible difficulty immigrant women who have recently given birth may encounter:

“A considerable proportion of the Geneva population is composed of immigrants who are likely to encounter problems such as separation from their family, cultural changes, adaptation difficulties, isolation, and loneliness” (p. 175).

Nahas and Amashen (1999) who studied postpartum depression among Jordanian Australian women reported similar findings:

“When women migrate to Australia with their husbands, the new life they experience is that of isolation and loneliness...When family and kinship support were lacking, they needed other forms of support from the nurses and midwives” (p. 44).

Women with postpartum depression may unwittingly attract attention to the mother, which then could lead to an increase in social support. Becker (1998) studied the affects of postpartum depression among Fijian women and noted that all women are at risk:

“Women with *na tadoka ni vasucu* not only embody resistance to the relative powerlessness they experience with respect to their postpartum convalescence being abridged, but all postpartum women embody this potential and, thereby, gain access to material and emotional resources during a vulnerable time” (p. 436).

Theme Two: The Consequences of Postpartum Depression

The mother and infant dyad could be adversely affected by postpartum depression although not much is known about long-term consequences because research in this area is usually limited to prevention and recovery. Notwithstanding the importance of this type of research, it may limit the discovery of other consequences. For example, postpartum depression can have a profound affect on the mother's desire to become pregnant again. The changes in sexual desire that characterize all types of depression become pronounced in postpartum women. A reduction in libido may be directly related to her fear of becoming pregnant although in research this is rarely acknowledge

by the mother and studies consistently fail to report any relationship. The following two quotes address the issue of birth spacing is and how postpartum depression, whether obvious or not, can play a role in the timing of subsequent births. Australian researchers Astbury et al. (1994) investigated postpartum depression in women nine months after the birth of their child:

“No women who was depressed had become pregnant again by the time of the survey, and over two-thirds of those who were depressed were uncertain about having another child, or were unable to do so. This latter association was likely to be a consequence rather than a cause of depression and the variable was not included in the model building” (p. 180).

In a two-year postpartum follow-up study Viinamaki et al. (1997) also discovered that depression had an affect on the occurrence of a subsequent pregnancy:

“However, 11/12 subjects (92%) with continuing mental-health problems had not become pregnant again” (p. 217).

Women who planned their pregnancy could be less vulnerable to postpartum depression. Without the necessary resources, an unplanned birth can be extremely difficult on both parents and signifies the importance of strategic planning:

“Difficulties adjusting to parenthood and feelings of entrapment are prominent in postnatal depression and are likely to be greater if the baby was not planned” (Warner et al., 1996: 610).

The above research suggests that depressed women would execute more control in regards to their next pregnancy. However, despite the negative reaction to childbirth there was no evidence to suggest the existing child be in danger of neglect or abuse. One researcher commented that any overt hostility towards the infant was rare (Pitt 1968: 1327). For the most part, depressed mothers are equally nurturing towards their infants as their non-depressed counterparts.

Theme Three: The Duration of Postpartum Depression

The duration of postpartum depression is highly variable although it is assumed to remit after three or four months. It is considered that during this time the mother has had time to adjust both hormonally and socially. In fact, some researchers view the depression a normal aspect of adjusting to the stress of childcare. Righettei-Veltema et al. (1998) accentuate this position in the following statement from their postpartum study:

“We think that three months after childbirth, a new equilibrium in the family should be attained. At this interval, all family members have had sufficient time to adjust reciprocally and depression can no longer be considered as part of an adaptive process” (p. 170).

Nevertheless, postpartum depression often persists for longer than four months and could possibly last up to two years or longer. British physician Pitt (1968) who researched postpartum women at eight weeks and one-year intervals was surprised at his own findings:

“Despite the apparent mildness of the depression, 43 percent seemed *not to have improved after a year*” (p. 1332). (Italics added).

The infant’s extreme vulnerability and dependence could contribute to the depression. The inability to interpret infant cries, the fear of risking the infant’s health, or the fear of sudden infant death syndrome (SIDS) could bring undue stress to the mother until she is more familiar with her infants personality and health status. In a two-year follow-up study, Australian researchers Small, Astbury, Brown, and Lumley (1994) discovered that depression subsided when the child was older:

“Mothering was seen as especially demanding in the first year. The most commonly mentioned reason for feeling less depressed at follow-up was that the child was older” (p. 477).

Theme Four: Childcare Stress and the Vulnerability of the Multiparous Mother

Childcare stress is one of the risk factors in developing postpartum depression therefore women with more than one child to care for would be at an increased risk of depression than women with only one child. In addition to increased childcare stress there are other factors associated with multiparity. For example, lavishing time and attention on the newborn may cause the mother to worry about her other children feeling left out or even jealous as Pitt (1968) discovered:

“Multiparas were concerned with the older children’s jealousy of the infant” (p. 1327).

The anxiety caused by worrying would make it even harder for depressed multipara to cope. Cheryl Beck (1996) discovered that troubled relationships with older children might result:

“Multiparas participating in this study thought that detrimental relationships materialized with their older children because they could not cope with more than one child at a time” (p. 103).

In addition to time constraints, additional children also increase the amount of economic resources necessary to provide for the family. If a lack of economic resources is a factor in postpartum depression then low-income mothers with two or more children could be more vulnerable to depression than women who are more financially sound. In a community sample, Canadian researchers Phyllis Zelkowitz and Tamara Milet (1995) found depressed multipara who were not working to be at risk:

“...a second child may pose greater financial burdens” (p. 85).

The difficulties were increased for immigrant women:

“If this group includes recent immigrants who lack social supports, the second child may be the first to be born in Canada, requiring the mother to cope with her increased family responsibilities without the assistance of relatives and friends” (Zelkowitz and Milet, 1995: 85).

Multipara face economic and time restraints to a greater degree than primipara do, which could result in a higher vulnerability to depression. Righetti-Veltema et al. (1998) discovered that these restraints might effect multipara in the antepartum period impacting their ability to prepare for the newborn:

“Depressed mothers less often participated in a prenatal preparation, probably because of the social and economical factors mentioned previously but also presumably because of the increased incidence of multiparity in this group” (p. 175).

Theme Five: Cultural Contingencies and Methodological Concerns

The testing instruments used to diagnose postpartum depression are derived from Western ideas of disease and illness therefore when researching puerperal disorders in other cultures there may be a discrepancy in symptoms and risk factors. Kumar (1994) suggested that should postpartum depression be exclusively psychosocial then one could expect to find significant differences between cultures in rates of occurrence, the timing after childbirth, and the associated risk factors (p. 253). On the other hand, if postpartum depression were exclusively physiological, one could expect similar patterns in rates of occurrence, timing after childbirth, and associated risk factors. Furthermore, because every culture holds their own definition of depression, testing instruments may not be effective in all settings.

Eleven different measures of depression were utilized in the twenty-nine studies of the meta-analysis. (See Appendix G.) These measures are based on Western definitions of depression and even though a few are designed specifically for postpartum women (e.g., PDS; EPDS) most tests are designed for use in the general population (e.g., BDI, SADS). Becks Depression Inventory (BDI) is a twenty-one item, self-report style instrument designed to measure depression in the general population. Whiffen (1988) found that the BDI is insensitive in Western settings due to postpartum women “normalizing” their experience based on cultural expectation (p. 369). Chung-Hey Chen (1996) found the BDI to be culturally sensitive in China:

“The cognitive and somatic symptoms are socially recognized and accepted signals of illness, and therefore play an important sick-role in the illness behavior of the Chinese” (pp. 110-111).

The Edinburgh Postnatal Depression Scale (EPDS) is a ten-item, self-report style designed to diagnose postpartum depression. Glasser and al. (1998) found significant differences between two cultural groups of postpartum women:

“While the significant difference between PPD rates of Israel-born and Russian new immigrant subjects indicates that caution must be used in generalizing results, it may also highlight the sensitivity of the EPDS in identifying subpopulations at increased risk (p. 160).

The testing style varies between a self-report style, a semi-structured interview, or triangulation. Triangulation, the combination of a self-report style questionnaire and a semi-structured interview, delivers the most accurate assessment and reduces testing effects. Self-report style questionnaires are considered to produce the most inaccurate measure because subjects can misrepresent their own conditions. Becks Depression Inventory (BDI) is often used in prospective studies in which the same measure is used at every testing intervals. A drop in scores could indicate a retest effect in which scores drop as a function of retaking the measure:

“The possibility of retest effects for the BDI also accentuates the importance of an independent interview assessment of the severity of depression symptoms” (O’Hara et al., 1984: 168).

The BDI is more economical than an interview and the score can be used for easy comparisons between groups. However, the yes or no answer style of the self-report questionnaire could leave women feeling as though their real experiences were not being heard:

“Three women added comments on the questionnaires themselves. The spontaneous writing probably reflects a frustration with the ability of the BDI to get at the symptoms” (Ugarriza 1995: 28).

Some researchers suspect subjects over-report symptoms on self-report style questionnaires, which could artificially increase the rate of depression. However, it was also discovered that investigators whose interviews cover a long period of time typically report higher rates of postpartum depression (Gotlib et al. 1989: 272). Understanding postpartum depression may require stricter research methods and Canadian researchers Gotlib, Whiffen, Mount, Milne, and Cordy (1989) agree:

“If significant advances are to be made in this area, therefore, it seems imperative that investigators agree on a common operationalization of postpartum depression” (p. 272).

The availability of social support and what is perceived as sufficient and insufficient is very much dependant on the cultural context. In Jordan, postpartum women are accustomed to high levels of social support. Nahas and Amashen (1999) reported that postpartum depression is unknown to Jordanian immigrants because in their culture an enormous amount of support from relatives is available throughout the whole postpartum experience. They came to the following conclusion regarding social support:

“This study showed that factors influencing this phenomenon are varied and culturally situated” (p. 44).

The Japanese practice of “Satogaeri” is a time when a pregnant or parturient woman returns to her family and receives help from her own mother. Tamaki, Murata, and Okano (1997) investigated postpartum depression among Japanese mothers using the EPDS. The lack of interviews confounded their capacity to assess the relationship between depression and psychosocial factors however they feel that a Western lifestyle and the absence of Satogaeri may play a role:

“The prevalence of postpartum depression in Japan is lower than in Europe or North America, perhaps because of cultural and socio-psychological factors. However, with the increasing Westernization of lifestyles in Japan, socio-psychological factors that affect women are likely to be Westernized and, consequently, the prevalence of postpartum depression can be expected to increase to the level in Europe or North America” (Tamaki et al., 1997: 97).

The reaction of individuals to certain types of disease and illness are often culturally determined. In North America parenting is viewed a natural progression from childbirth and that stress in the postpartum is hidden in the culturally idealized joy of motherhood. In Fiji *na tadoka ni vasucu* meaning “the flu of childbirth” is brought on by physical and emotional stresses exacerbated by a lack of social support. The basis of depression is seen as a result of “social failings” rather than the unnatural response of the individual:

“In this sense, *na tadoka ni vasucu*, when it does occur is a potentially vivid marker of social failings. Even in its absence, the potential threat of *na tadoka ni vasucu* organizes moral narratives about care and interpersonal relationships. Therefore, in this sociosomatic dialectic, the social milieu precipitates and organizes the somatic response of *na tadoka ni vasucu*, and the somatic manifestations of *na tadoka ni vasucu* mobilize a set of social and moral responses” (Becker 1998: 437).

Stuchbery, Matthey, and Barnett (1998) compared the social supports in Vietnamese, Arabic, and Anglo-Celtic mothers. They found that postpartum depression was related to the cultural expectations of support from her mother, or other available female relatives:

“Culture does generate expectations of support and may even contribute to a woman’s expectations of self-reliance and her subsequent feelings of failure” (Stuchbery et al., 1998: 489).

Theme Six: Etiology of Postpartum Depression and other Depressive Episodes

In current Diagnostic and Statistical Manuals, postpartum depression is not classified as an entity distinguishable from major depressive episodes. Symptoms and risk factors, which differ from those found with depression at other times in women’s life, are identified as rationale for a distinct diagnosis. Pitt (1968) labeled postpartum depression “atypical” after reviewing the symptoms of thirty depressed women:

"It (postpartum depression) is atypical either because of the prominence of neurotic symptoms, such as anxiety, irritability and phobias, overshadowing the depression, or because some features are opposite to those of classical depression, e.g. worsening at the end of the day rather than the beginning of the day, early rather than late insomnia" (p. 1330). (Information in parentheses added).

Whiffen and Gotlib (1993) compared a sample of postpartum depressed women with a non-postpartum depressed group and two non-depressed controlled groups. Their findings suggest that there is little to distinguish postpartum from non-postpartum depression beyond differences in symptom severity:

"The presenting symptoms of postpartum and nonpostpartum depressed women were different. Although the most commonly reported symptoms were the same in the two groups, the postpartum depressed women reported lower levels of anxiety, agitation, insomnia, and somatic symptoms" (Whiffen and Gotlib, 1993: 491).

Watson, Elliot, Rugg, and Brough (1984) interviewed 128 women both during pregnancy and the first postpartum year. They found that a personal and family history of depression, and life stress were factors in the development of postpartum depression, which are similar to those related to regular depression:

"This study suggests that there is little to distinguish groups of women with affective disorder in the puerperium from groups experiencing it at other times" (Watson et al. 1984: 461).

A personal and family history may predispose some but for many women the postpartum period represents the first time in their life to ever experience depression. Bryan et al. (1999) found significant associations between postpartum depression and young maternal age, single marital status, hyperemesis gravidarum, tobacco or illegal drug use during pregnancy, history of substance abuse, high utilization of emergency services and previous affective disorder. Many of the women were depressed for the very first time in their lives:

“Depression is a chronic illness with periods of remission and recurrence. The emotional and physiologic changes of late pregnancy and the postpartum period as well as the new demands of motherhood may be sufficient triggers for the new onset of a depressive episode that would be classified as postpartum depression” (Bryan et al. 1999: 356).

Quantitative data reveal that women are depressed during pregnancy and postpartum at similar rates. A common assumption is that women depressed during pregnancy are at an increased risk of developing postpartum depression although comments from researchers in the area indicate that this is in fact not the case:

“It is interesting that all but two of the diagnosed cases of postpartum depression were not depressed during pregnancy” (O’Hara et al., 1984: 166).

Nigerian researchers Aderibigbe, Guerje, and Omigbodun reported similar findings:

“Even though there was an overlap between prenatal and postnatal morbidity’s, most patients tended to have *either* prenatal or postnatal morbidity” (p. 648). (*Italics added*).

Canadian researchers Gotlib et al. (1989) screened 360 women before and after delivery. They discovered different factors were associated with depression at these two times:

“Our results indicate that different variables are associated with depression diagnosed at these two times...if postpartum and pregnancy depressions are differentially related to sociodemographic variables, it is also possible that they may be associated with different psychological or etiological factors” (Gotlib et al., 1989: 273).

Israeli researchers Fisch et al. (1997) found similar results:

“We also believe that our study underlies the concept that postnatal depression is, at least in some women, a specific disorder, not equivalent to depression in the prenatal period: factors contributing to the emergence of one do not necessarily influence the other, and women who are depressed during pregnancy do not seem to be necessarily depressed postnatally (Fisch et al., 1997: 553).

Theme Seven: The Biological Components of Postpartum Depression

Thus far, the physiological basis of postpartum depression has not yet been determined. Most researchers agree on the multifaceted nature of postpartum depression confounding the chance of isolating a single cause. However, this does not reduce the significance of findings that do detect a link between hormonal and genetic influences. Many studies have correlated postpartum depression with premenstrual syndrome. The symptom profiles are very similar and could indicate that women who suffer from both disorders may be hypersensitive to sudden changes in hormone levels. Spangenberg and Pieters (1991) commented on their discovery:

“The present findings suggest that women with a history of premenstrual tension could be at greater risk to develop postpartum depression...the results of the present findings point out the important role of psychosocial and hormonal factors in postpartum depression” (p. 163).

Many studies reported a personal history of depression as a risk factor in developing postpartum depression. A personal history could reflect a genetic vulnerability to depression:

“There are many other factors...which may contribute to depression. Those we found were previous history of psychiatric disorder, occurrence of postpartum blues, and younger age” (Paykel et al., 1980: 345).

The occurrence of depression among first-degree relatives could indicate a genetic influence. On the other hand, social influences, which are usually similar in families, could impact its development. Disentangling social learning from a genetic contribution is often an impossible task in mental health research:

“Number of previous depressions and depression in first-degree relatives were the two significant vulnerability factors...Certainly the family history data suggest a social learning or genetic contribution from the family” (O’Hara et al., 1984: 169).

Other researchers support the idea that postpartum depression may be more psychosocial than genetic:

The findings of this study suggest that the causes of postnatal depression are more likely to be in the psychosocial aspects of the puerperium, and perhaps the mother's own predisposition in terms of personality and background, rather than in the hormonal and other physical changes associated with childbirth itself" (Nott 1987: 527).

VII. Discussion

The robustness of postpartum depression was based on five assumptions: historical relevance; unique entity; a physiological basis; indiscriminant nature; and universality. An extensive literature review provided the necessary evidence to support the assumptions. The development of noteworthy psychological changes following childbirth was first documented by Hippocrates in the fourth century BC. Unfortunately there has been very little historical data added to Hippocrates' work, most likely the result of childbirth being a woman's issue not deemed worthy of serious study rather than because of its rate of occurrence. It appears as though in the last thirty years researchers have been trying to make up for lost time with hundreds of studies published on postpartum depression, not to mention everything else between menarche and menopause. Besides the affirmation of the assumptions, the lack of research effects is an important consideration. The following discussion will focus on the quantitative and qualitative results, unfettered by biases in the research.

A. Analyzing the Predictions

The major objective of this research project was to investigate three novel hypotheses of postpartum depression: birth spacing hypothesis, resource acquisition hypothesis, and parental solicitude hypothesis. These hypotheses shared a common theme; postpartum depression is an evolutionary adaptive strategy designed to maximize reproductive success. From each hypothesis stemmed a series of testable predictions. Utilizing quantitative and qualitative research data, the predictions served to test the validity of the hypothesis. (See Table 5, Table 6 and Table 7.)

A total of seventeen predictions or "risk factors" were derived from the hypotheses and tested in the meta-analysis. Five predictions were common to all three hypotheses; four predictions were common to two hypotheses, and eight predictions applied to only one hypothesis. The risk factors common to all three included multiple birth, multiparity, marital adjustment difficulties, low social resources, and low economic resources. These factors share a common denominator: increased life stress. An increase in life stress is a common characteristic in women with either regular or postpartum

depression. Stress is also an internal indicator that alerts us when situations are overwhelming to activate our fight or flight response mechanism. In other words, stressful situations cause the sufferer to alter their behavior in ways that will reduce the stress. All three hypotheses are based on the notion that the depression will result in adaptive behavioral responses.

Multiple Birth (Obstetrical)

A multiple birth would drastically increase the level of stress for a new mother. To ensure the survival of her offspring she would likely want to delay another pregnancy, acquire more resources, or abandon one or all of them until her situation improved. There was no evidence available from the meta-analysis on multiple birth as a potential risk factor. Most studies purposively excluded multiple birth mothers from the sample. In a sample of over 1000 women Kendall et al. (1981) found a twin birth was not associated with an increase in psychiatric admission in the puerperium. However, twin births may be too rare for statistically significant differences to emerge (p. 348). In a case study by Altman et al. (1997) postpartum depression was reported in a thirty-two year old mother of four-month-old twins. In addition to extreme weight loss (25-pounds below her preconception weight) she had other signs of severe depression (e.g., withdrawal; inability to care for the infants; and sleeping most of the day and night) (p. 1727). Only these two studies provided any information on multiple births and postpartum depression. As a result there was not enough information to prove or disprove this prediction.

Multiparity (Demographic)

To ensure the survival of their existing offspring multiparous women would want to delay or avoid a subsequent pregnancy, acquire as much assistance as possible, or neglect or abandon the current offspring by channeling resources to her older offspring. Multiparity was a low risk factor in the meta-analysis. Primiparity was also a low risk factor. However there were five studies that found multiparity to be a significant risk and only two found primiparity to be a significant risk. In the phenomenological review one of the themes was “childcare stress” relating to problems associated with providing

maternal care to more than one child. Childcare stress was also found to be a high risk factor in the meta-analysis. In studies that controlled for parity, the rates of depression were the same as those that include multipara (Kumar and Robson, 1984; Cooper and Murray, 1995). When primiparity was correlated with prevalence rate the result was moderately significant indicating that a slightly higher prevalence rate was found in samples with more primipara. However, this demographic effect may be confounded by other variables associated with primiparity such as younger age and low economic resources.

Marital Adjustment Difficulties (Psychosocial)

A woman with marital adjustment difficulties is at an increase risk for abuse and abandonment therefore it may be wise for her to avoid or delay pregnancy with her current partner, elicit extra assistance from relatives, abandon the offspring from her current partner in hopes of attracting a new mate. Marital adjustment difficulties were found to be a high risk factor in the meta-analysis. In the phenomenological review one of the themes was "social support" and the perceived helpfulness of the partner was a major factor in the development of postpartum depression. Paternal occupation was also a high risk factor in the meta-analysis. Women whose partner has an occupation that prevents them from being available to help out or is a low-income or unstable occupation would be at risk of increased life stress.

Low Social Resources (Psychosocial)

Low social resources increase childcare stress therefore women in this situation may be wise to avoid or delay pregnancy, elicit additional help from outside sources, or abandon or neglect her offspring until more resources are available. Low social resources were found to be a high risk factor in the meta-analysis. In the phenomenological review one of the themes was "social support" emphasizing the importance of a reliable social support network.

Low Economic Resources (Psychosocial)

Similar to social resources, low economic resources put the new mother in a vulnerable position or whether to delay another birth, elicit outside support, or abandon

or neglect the current offspring. Financial difficulties were a high risk factor in the meta-analysis. Socioeconomic status (SES) was found to be moderate risk factor in the meta-analysis. Financial difficulties and SES are related albeit mutually exclusive entities. The perception of financial difficulties is highly individual; women of high SES may perceive a situation as financially difficult whereas a woman of low SES may perceive a situation as economically stable. Furthermore, there is plenty of evidence that postpartum depression affects women of all SES backgrounds. Socioeconomic status was moderately correlated with prevalence rate indicating that a higher prevalence rate was found in lower SES samples. This demographic effect verifies the prediction that less economic resources could increase the risk of postpartum depression.

Not breastfeeding, unwanted or unplanned pregnancy, younger age, and marital status were predictions common in two of the three hypotheses. Not breastfeeding and unwanted or unplanned pregnancy were common to both the birth-spacing and parental solicitude hypotheses. Younger age and marital status were common to both the resource acquisition and parental solicitude hypotheses.

Not Breastfeeding (Hormonal)

Infants benefit greatly from breast milk at a high nutritional cost to the mother. Malnourished mothers may be less successful breastfeeding because of diminished quantity or quality of breast milk. The close spacing of two births may result in poorer survival chances for both children so the birth spacing hypothesis predicts women who cannot breastfeed are at risk of postpartum depression. The parental solicitude hypothesis predicted that depressed women choose not to breastfeed as a form of reducing maternal investment in the child. Not breastfeeding was found to be a moderate risk factor in the meta-analysis. Breastfeeding was found to be a low risk factor.

Unwanted or Unplanned Pregnancy (Psychosocial)

An unwanted or unplanned pregnancy would cause the mother to either avoid a subsequent pregnancy (birth spacing) or neglect or abandon the newborn (parental solicitude). Unwanted or unplanned pregnancy would not be a prediction for resource acquisition because it is indicative of how the mother feels towards the pregnancy rather

than the state of her resource base. Unwanted or unplanned pregnancy was found to be a moderate risk factor in the meta-analysis. Warner et al. (1996) reported feelings of being overwhelmed, common in depression, are greater when the pregnancy was unplanned. Women with unwanted pregnancies are also prone to depression during pregnancy, which could lead to fetal abuse. Kent et al. (1996) studied five cases of fetal abuse. The pregnancy was either unplanned or undesired and termination was considered in all cases. Lack of appetite, motivation, and suicide ideation along with drug and alcohol abuse were ever-present symptoms of depression. The women also suffered from relationship difficulties and two of them eventually separated from their partner. In most cases after the birth the women bonded with their child, without any subsequent problems (p. 184).

Younger Age (< 20 years) (Demographic)

Assuming that a younger woman would have less economic resources than an older woman has, she would also have less life experience to prepare her for childcare. This would render the younger women more needy of outside assistance (resource acquisition). At the same time, a younger woman has more reproductive years in the future than her older counterparts. However, a younger woman with a child is less attractive to a high resource male than a younger woman with no children. Abandonment or neglect would be less detrimental to her reproductive success than to an older woman (parental solicitude). Younger age was found to be a low risk factor in the meta-analysis. This finding could be more reflective of methodology rather than lack of association. Although an average age was reported, studies rarely controlled for specific age groups. A study by Jones et al. (1980) controlled for age and found mothers eighteen years and younger showed less maternal responsiveness than their older counterparts. There was a moderately significant association between average age and prevalence rate indicating that a higher prevalence rate was found when the samples average age was lower. This demographic effect provides support for this prediction.

Marital Status (Demographic)

Single women would be more resource poor than their married counterparts. Single women lack the support of both a committed partner and his relatives. Without a

committed relationship single women may be at greater risk of desertion. Paternity confidence may also be reduced in a non-committed relationship. Furthermore, single women have less financial resources than married women have. Single women would more likely require additional resources (resource acquisition). Since most males do not want to rear another mans offspring, a single woman with a child is less likely to attract a desirable mate than a single woman with no child. Single women may perceive themselves as being better off without the child (parental solicitude). Marital status was found to be a moderate risk factor in the meta-analysis. A moderately significant correlation was found between marital status and prevalence rate indicating that the rate of depression increased as the percent married in the sample decreased. This demographic effect supports this prediction although the result could be confounded by other factors associated with single women such as low social and economic resources.

The remaining eight predictions were unique to one hypothesis including obstetrical intervention and desired sex (birth spacing); previous abortion, immigrant status, and relationship with mother (resource acquisition); and premature birth, undesired sex, and abnormal/deformed birth (parental solicitude).

Obstetrical Intervention (Obstetrical)

Women that require obstetrical intervention (e.g., cesarean section) may be at an increase of maternal death. These women may be better off to avoid a subsequent pregnancy than put their lives in danger. Although with today's medical technology maternal death is extremely rare historically reproduction was a risky endeavor. Women whose birth required extra medical attention could increase their reproductive success by avoiding another pregnancy and investing their resources in existing offspring. Obstetrical intervention was found to be a moderate risk factor in the meta-analysis.

Desired Sex

Women whose offspring is the desired sex may wish to delay or avoid a subsequent pregnancy for the health of their newborn. Unsurprisingly, desired sex was not investigated as a risk factor in the meta-analysis. Since researchers view depression as a negative reaction to childbirth the "desired sex" would not be considered in an

investigation. On the contrary “undesired sex” was investigated and found to be a low risk factor in the meta-analysis.

Previous Abortion (Psychosocial)

Women who perceive their social support as inadequate are more likely obtain an abortion than women who are satisfied with their level of support. Other factors such as young age, single, and low SES or older age, multiparity, and marital adjustment difficulties are also important when deciding to terminate a pregnancy. Women who choose to abort may do so not because of a lack of desire for children rather they wish to delay childbirth until their situation improves. Previous abortion was found to be a moderate risk factor in the meta-analysis. Although women who have previously aborted and then decide to continue a pregnancy may do so because their situation has improved, they could still be vulnerable to depression if their perception of adequate social support has not changed.

Immigrant Status (Demographic)

Immigrant women who are isolated from relatives would require other means of assistance which would increase their risk of postpartum depression. Immigrant status was found to be a high risk factor in the meta-analysis. In the “social support” theme isolation and loneliness were factors in the depression experienced by immigrant mothers. Some women had never heard of postpartum depression before they moved away and experienced depression for the first time in the postpartum period.

Relationship with Mother (Psychosocial)

The “grandmother hypothesis” assumes that grandmothers can increase their reproductive success by investing resources in their grandchildren rather than continuing their own reproduction. A healthy relationship between mother and daughter is necessary for this exchange of social resources to occur. Relationship with mother was found to be a moderate risk factor in the meta-analysis. Aside from the father, the maternal grandmother would be the most important provider of assistance and a strained relationship would force the mother to rely on other sources.

Premature Birth (Obstetrical)

Premature birth is a leading cause of death in children. Valuable resources that could be invested in existing or future offspring may be wasted on a high-risk infant. Women who give birth to premature infants could increase their reproductive success through neglect or abandonment of the infant. Premature birth was found to be a low risk factor in the meta-analysis. However, the information was limited as researchers often eliminated mothers of premature or low birth weight infants from their sample.

Undesired Sex (Psychosocial)

In some situations the sex of the infant may be a determinant of its reproductive value. Women who give birth to an infant whose sex is of low reproductive value could increase their reproductive success through neglect or abandonment of the infant. Undesired sex was found to be a low risk factor in the meta-analysis.

Abnormal or Deformed Birth (Obstetrical)

Women who give birth to an abnormal or deformed infant may wish to neglect or abandon the infant deemed a reproductive failure. Work by Solnit and Stark (1961) and Suarez and Gallup (1985) suggests that depression and emotional withdrawal is a natural response to the birth of a defective child. Abnormal or deformed birth was found to be a low risk factor in the meta-analysis. This result was obtained from only one study (Pitt 1968) that reported this finding. As with multiple and premature birth, women with abnormal or deformed infants are excluded from the sample. In one case report, a woman wanted to terminate her pregnancy because of her age and concerns about fetal abnormalities (Kent et al. 1996: 183). She gave birth to a normal infant and bonding followed.

B. Analyzing the Hypotheses

I. Birth Spacing Hypothesis

The birth spacing hypothesis proposes that postpartum depression may reflect an adaptive strategy to increase the length of the interval between births by avoiding pregnancy. If postpartum depression is an effective birth spacing mechanism it is assumed that the depression would persist for a significant period of time to allow for

effective birth spacing. Evidence for prolonged depression was found in a number of studies. Pitt (1968) discovered depression to persist for over a year in forty-three percent of the diagnosed women. Feggetter et al. (1981) tested 820 women at one year postpartum and reported a twenty- percent prevalence rate. Nott (1987) found the number of depressed woman to be greater at nine months than at three and this increase continued at fifteen months (p. 526). Small et al. (1994) compared forty-five depressed women with forty-five nondepressed women at nine months postpartum. Two years later the depressed women were more likely to still be depressed (p. 476). Kumar and Robson (1984) found women who had become depressed for the first time continued to experience psychological problems for up to four years after childbirth (p. 35). According to the birth-spacing hypothesis it is predicted that a higher incidence of depression would be found in women not breastfeeding, with a multiple birth; obstetrical risk factors; unwanted or unplanned pregnancy; several offspring; marital adjustment difficulties; low social resources; and low economic resources.

TABLE 8 - BIRTH SPACING HYPOTHESIS

Not Breastfeeding	Moderate
Multiple Birth	NA*
Obstetrical Intervention	Moderate*
Unwanted/Unplanned	Moderate**
Desired Sex	NA*
Multiparity	Low**
Marital Adjustment Difficulties	High**
Low Social Resources	High**
Low Economic Resources	High**
*Insufficient Evidence	
**Phenomenological Evidence	

There is strong supporting evidence for the birth-spacing hypothesis. The quantitative and qualitative data supported most of the predictions and while there was insufficient evidence to prove that multiple birth and desired sex increased depression they could not be falsified. The theme "consequences of postpartum depression" provided the most compelling evidence. At nine months postpartum, Astbury et al. (1994) discovered that not one of the depressed women had become pregnant again and the majority of them were uncertain about having another child. As predicted by the birth-spacing hypothesis, the psychosocial consequences of current depression were related to what the women perceived as the causes. Her retrospective construction of the

birthing experience will affect her current and future behavior, including her plans for subsequent pregnancies (Astbury et al., 1994: 183). Similarly, at two-years postpartum Viinamaki et al. (1997) found that ninety-two percent of the depressed women were still not pregnant. The same study also found poor financial situation and a conflict relationship with spouse to be important risk factors (p. 218).

II. Resource Acquisition Hypothesis

The resource acquisition hypothesis states that postpartum depression may have evolved as an adaptive response designed to procure additional helping resources from relatives. This hypothesis predicts that women with compromised levels of social support to be more susceptible to postpartum depression. Compared to other primates, human infants are born premature and require at least another six months of growth before they are at the same developmental stage as their distant cousins. The first six months postpartum are an extremely vulnerable period in which the mother requires additional support. Women who receive additional help during this time could increase their reproductive success by ensuring infant survival.

Close contact with the main caregiver helps the infant develop both emotionally and physically. Most cases of postpartum depression commence between one and two months postpartum and may last till at least six months postpartum, which correlates with the period of time infants are most vulnerable to sudden infant death syndrome (SIDS). The leading cause of postneonatal death is SIDS of which ninety percent of the cases occur in infants under six months of age (Cordner and Willinger, 1995: 18). The exact cause of SIDS is still unknown but it appears to be related to breathing apnea. It has been postulated that infant children must acquire breathing skills and this is accomplished by lots of close physical contact with the mother or caregiver. Constant physical contact could be overwhelming for the mother who may require additional support.

The resource acquisition hypothesis assumes that postpartum depression persists for at least six months or until this critical stage of infant development has passed. In the research effects, the timing of study did not have a significant impact on the prevalence rate. (See Table 4.) Rates at three months were not higher than rates at six months. It is

assumed that the depression spontaneously remits when the infant is healthy and normal development is taking place. In a two-year follow-up study, Small et al. (1994) found that women felt a sense of relief and their depression lifted when the child was older.

According to the resource acquisition hypothesis it is predicted that depression will be more common in women with a multiple birth; a previous abortion, several offspring; a younger age; marital adjustment difficulties; single status; immigrant status; low social resources; and low economic resources.

TABLE 9 - RESOURCE ACQUISITION HYPOTHESIS

Multiple Birth	NA*
Previous Abortion	Moderate
Multiparity	Low**
Younger Age	Low**
Marital Adjustment Difficulties	High**
Marital Status	Moderate**
Immigrant Status	High**
Low Social Resources	High**
Low Economic Resources	High**
Relationship with Mother	Moderate**

*Insufficient Evidence

**Phenomenological Evidence

There is strong quantitative and qualitative evidence supporting the resource acquisition hypothesis. One of the themes "the importance of social support" depicted the mother's social support network as the most important factor in postpartum depression. The two most important caregivers are the partner and maternal grandmother, both who have a genetic interest in the survival of the infant and if one or both of these relationships were strained the mother would have to rely on the help of other relatives or close friends. Social support would be further compromised for immigrant women removed from family and friends.

Immigrant women away from family and friends may miss the postpartum rituals common in several cultures. These rituals may have evolved as culturally adaptive strategies for the prevention of postpartum depression. The crux of the resource acquisition hypothesis is that the depression persists as a means of attracting attention and concern for the mother. Moreover, any mother who perceives her social support network as inadequate is vulnerable. The most compelling evidence for this came from a study by Becker (1998) who reported that all women in Fiji are at risk of developing *na tadoka ni vasucu*, a syndrome that automatically elicits care and an opportunity for the women to

request community and family support (p. 436). Postpartum depression is seen as a cry for help in a time when the mother is overwhelmed by her additional responsibilities.

III. Parental Solicitude Hypothesis

The parental solicitude hypothesis states that postpartum depression may have evolved as a mechanism designed to reduce maternal investment when the infant is unwanted and the chances of survival are low. The female could increase her reproductive success by rejecting her current offspring and delaying childbirth until more appropriate circumstances arise. This hypothesis assumes that postpartum depression persists during the first few months postpartum and then spontaneously remits. Evidence for this comes from several studies including a study by Cox et al. (1993) compared the rates of depression between postpartum and control women. They found no significant difference at six months, but a threefold increase at five weeks postpartum. According to the parental solicitude hypothesis it is predicted that postpartum depression be more common in women not breastfeeding; with a multiple birth, a premature birth, an unwanted or unplanned birth, undesired sex, abnormal or deformed birth, several offspring, and marital adjustment difficulties; in younger women; low social resources, and low economic resources.

TABLE 10 - PARENTAL SOLICITUDE HYPOTHESIS

Not Breastfeeding	Moderate
Multiple Birth	NA*
Premature Birth	Low*
Unwanted/Unplanned	Moderate
Undesired Sex	Low
Abnormal/Deformed	Low*
Multiparity	Low**
Younger Age	Low**
Marital Adjustment Difficulties	High**
Marital Status	Moderate
Low Social Resources	High**
Low Economic Resources	High**
*Insufficient Evidence	
**Phenomenological Evidence	

The evidence provided by the quantitative and qualitative data did not provide strong support for the parental solicitude hypothesis. The hypothesis predicts that psychosocial and obstetrical factors predict the reproductive value of the offspring that should be neglected and abandoned by the mother if her reproductive success is at risk by

continuing to provide resources to an infant of low value. The depression is seen as an adaptive response designed to withdraw maternal support. Stein et al. (1991) discovered that there was no direct relationship between depression and maternal withdrawal. Their results further indicated that reduced maternal warmth was not associated with depression but with marital and social difficulties (Stein et al., 1991: 51). Charone-Sossin and Sossin (1987) have proposed an alternative "adaptive depression", which is important to the success of the relationship between the mother and her handicapped child. They suggest that the depression serve as a healing mechanism designed to help the women resolve her feelings of disappointment in her newborn child. Depression was seen as something the women could overcome rather than cripple her ability to be a good mother (pp.157-158). This is evidence against the parental solicitude hypothesis, which premises that depression serves to severe the relationship between the mother and her handicapped child rather than accommodates it.

C. Impact of Postpartum Depression on Child Development

The impact of on child development is an important consideration when analyzing postpartum depressions adaptive qualities. The birth-spacing and resource acquisition hypotheses both consider postpartum depression an adaptive response to childbirth with a positive outcome: the health and wellbeing of the infant. Conversely, the parental solicitude hypothesis considers postpartum depression an adaptive response with a negative outcome: the demise and death of the infant. So far the effect on child development has not been considered in any of the above discussion.

The parental solicitude hypothesis predicts that the mother intends to harm the child through maternal neglect. Jennings et al. (1999) found that thoughts of harming the infant to be common in depressed mothers. Fear of being alone with the child was experienced in twenty-five percent and inability to care by eleven percent of their sample. Some women even moved in temporarily with their mother and father (Jennings et al., 1999: 26). However, despite their thoughts, none of the mothers actually harmed the child in any way. Pitt (1968) found that overt hostility was rare among mothers with postpartum depression. Kent et al. (1996) reviewed several cases of abuse towards the

fetus (e.g., punching the abdomen in response to fetal movement) in depressed women, but once the abuse ceased upon the infant's birth. Kumar and Robson (1984) noted depressed mothers at three months postpartum were more likely to express feelings of dislike or detachment in relation to their infants they were not, however, more physically aggressive (hitting, slapping, shaking their babies) (p.42).

Postpartum psychosis has been related to acting on violent thoughts but postpartum depression has not. A women suffering from psychosis is unclear about her the reality of thoughts although a women with depression can clearly tell her thoughts are wrong and not to be acted on. On the other hand, women with postpartum depression continue to nurture and care for their infants in ways not unlike to their non-depressed counterparts. Moreover, there was no evidence to suggest that women with postpartum depression were at a greater risk of developing psychosis. The lack of evidence that postpartum depression reduces maternal investment eliminates the parental solicitude hypothesis.

A negative affect on child development would weaken the birth spacing and resource acquisition hypotheses. Some long-term studies have suggested postpartum depression to have a negative affect on child development and correlated postpartum depression with an increased incidence of psychological disturbance, impaired cognitive and language development. In a five year prospective, longitudinal study, Sinclair and Murray (1998) found both postpartum and recent maternal depression were associated with significantly raised levels of child disturbance, particularly among boys and those from lower social class families. Children of depressed mothers have been shown to have less positive affect and poorer cognitive performances than the infants of mothers who were not depressed (Whiffen and Gotlib 1989). However, Murray (1992) found postpartum depression had no effect on the child's general cognitive and language development (p. 557). In a four and a half year follow-up study of postpartum depressed women and their child Philipps and O'Hara (1991) found postpartum depression was related to subsequent depression but not child problems (p.153).

D. Implications for Future Research

In medical and social science research only proximate explanations for postpartum depression have been considered. As a result, many of the predictions used to test the hypotheses could not be validated because there was not enough data. For factors such as multiple birth, premature birth, obstetrical intervention, unwanted or unplanned pregnancy, desired sex, and abnormal or deformed birth there was insufficient data for verification. Aberrant conditions surrounding the childbirth often result in exclusion from studies of postpartum depression. Moreover, factors such as desired sex and previous abortion would not be deemed important when seeking proximate explanations for postpartum depression. Future research on postpartum depression could do comparative studies on multiple versus singleton births; high risk versus low risk births; desired versus undesired sex; previous abortion versus no previous abortion; and abnormal versus normal offspring.

Another major limitation was the lack of control for the demographic factors related to the predictions such as maternal age; and marital status and paternity confidence. Although most studies reported the average age of participants, the maternal age was not controlled for; the researchers did not categorize their subjects by age. Although statistical analysis was performed on the demographic data, there was a lack of sensitivity to produce any age effects on selected aspects of postpartum depression. Jones et al. (1980) demonstrated that age is an important factor in maternal responsiveness and must be accounted for, manipulated or controlled in future studies (p. 583). Most studies reported the marital status of the subjects and some studies controlled for marital status, nevertheless whether or not the cohabiting partner was the biological father went unreported. If paternity confidence and risk of desertion were high risk factors then single women or multiparous women with offspring sired by different partners may be more susceptible to depression than married multiparous women with offspring from the same partner. To date, no research on postpartum depression has addressed these issues.

To date, there has not been any research on the long-term effects of postpartum depression on reproduction. A closer examination of the reproductive strategies of women who have suffered from postpartum depression would shed light on the birth spacing, resource acquisition, and parental solicitude hypotheses. If it was determined that women with postpartum depression had longer birth intervals than women without depression the birth spacing hypothesis could explain this phenomenon. Similarly, if it was determined that women with postpartum depression acquire more social support than women without depression the resource acquisition hypothesis could explain this phenomenon. Women that neglect or abandon their infants are usually required to undergo extensive psychiatric testing. Evidence suggests these women are suffering from postpartum psychosis, a much more serious outcome of childbirth than depression. If women with postpartum depression were proven to bring undue harm to their infants then the parental solicitude hypothesis could explain this phenomenon. Fortunately this is not the case, as women with depression have not been found to be abusive mothers.

Regardless of the outcome, depression is a situation that forces the sufferer to evaluate their present situation and make the appropriate changes. Whether that is avoiding reproduction or acquiring additional help, the changes should benefit the mother, which would subsequently benefit her offspring as well. Longitudinal studies that plot the reproductive life history of modern postpartum depression sufferers are necessary to determine whether or not postpartum depression increases reproductive success.

VIII. Conclusion

Human reproduction is a risky and unpredictable endeavor. A lack of obvious displays of estrus coupled with a continuous interest in sex complicates attempts to control reproduction. Besides pregnancy and lactation being metabolically draining, it was not too long ago that maternal deaths were a common occurrence. Compared to other primates, human infants are born extremely helpless requiring non-stop vigilance during the first six months postpartum. The first six months postpartum is also a vulnerable time for the mothers; postpartum depression, a poorly understood phenomenon that affects approximately fifteen percent of new mothers, is most common during this period.

Postpartum depression could be an adaptive mechanism designed to increase the reproductive success in women who experience it. If postpartum depression conferred a strong and consistent selective advantage on ancestral humans, it would be expected to occur in cultures all over the world. An abundant supply of cross-cultural evidence demonstrates that postpartum depression is more than a Western "culture-bound" syndrome resulting from the "medicalization of childbirth". Postpartum depression has been detected at similar rates in women from various cultures throughout the world.

Postpartum depression has recently attracted the attention of many researchers in the area of woman's health. The focus is on the proximate mechanisms, researching the "what's" and "how's" by examining biological and cultural factors associated with postpartum depression. Biological theories have implicated genetic predisposition, change in hormone levels, and obstetrical intervention. Cultural theories have implicated social support, age, marital status, SES, education, employment, and immigrant status. Although no one theory has satisfactorily been able to explain its occurrence, evolutionary theory can use proximate mechanisms to support the predictions answering why postpartum depression exists in contemporary populations.

Three hypotheses were proposed to test the adaptive nature of postpartum depression: birth spacing, resource acquisition, and parental solicitude. The birth spacing hypothesis proposed that postpartum depression could be a mechanism designed to

prolong the interval between births and thus provide an advantage over women with more closely spaced births. Postpartum depression would facilitate birth spacing by reducing sexual desire, by promoting self-inflicted amenorrhea, and by creating an association between mental pain and childbearing. The resource acquisition hypothesis proposed that postpartum depression could be a mechanism designed to solicit help from relatives and thus provide an advantage over women with less help. Postpartum depression would facilitate resource acquisition with the mother appearing ill and unable to cope. The weeping behavior would evoke sympathetic responses and offers of help from others. The parental solicitude hypothesis proposes that postpartum depression could be a mechanism designed to reduce maternal investment in undesirable offspring or when the chances of offspring survival are severely reduced, and thus provide an advantage over women who continue to invest resources in low value offspring. Postpartum depression would facilitate parental solicitude by disrupting the bonding and feelings of attachment between the mother and her offspring.

A critical review of quantitative and qualitative data provided the evidence necessary to validate the predictions generated from each hypothesis. The birth-spacing hypothesis predicted depression to be found when spacing children would increase the offspring's survival by investing more resources in them. A lack of evidence for some of the predictions confounded the soundness of the argument. Regardless, the predictions that could be proven attested the fact that birth spacing was an outcome of postpartum depression. Phenomenological evidence from three sources implicated postpartum depression in the delaying of subsequent births.

The resource acquisition hypothesis predicted depression to be found when social resources were compromised. Social support is more subjective making it difficult to quantify like you could a birth interval. Nevertheless, predictions of the resource acquisition were validated by the data. Phenomenological evidence strongly supported the importance of social support during the postpartum period. Whether real or perceived, women who lack social support in the postpartum period are at a greater risk of depression. Although the hypothesis assumes that depression attracts attention to the

sufferer, only one study gave direct evidence that postpartum depression does increase social support.

The parental solicitude hypothesis predicted depression to be found when the mother could improve her fitness by rejecting her offspring. The evidence suggested that this in fact was not the case. Depressed mothers did not show any implicit signs of reduced maternal investment via a reduction in breastfeeding or attentiveness nor was there any evidence of overt abuse. Based on the moderate association between premature births and depression, and the low association between abnormal or deformed infants and depression and undesired sex and depression, it can be assumed that mothers of less desirable children do not experience depression at a rate higher than mothers of genetically perfect offspring.

Postpartum depression is historically based, unique, and universal with an etiology comprised of biological and cultural variables which to date have not been agreed upon by researchers working in the area. Prevalence rates have remained stable over time (the past 30 years), from culture to culture, from researcher to researcher, all the while utilizing several different testing instruments. Investigating whether this robust phenomenon is an evolutionary adaptive strategy or the result of cultural conditions has been the purpose of this research project. Evidence brought forth through a combination of quantitative and qualitative data supports two of three adaptive hypotheses although further research is necessary to solidify these arguments.

Bibliography

- Aborampah, O. 1985. "Determinants of breast-feeding and postpartum sexual abstinence: Analysis of a sample of Yoruba women, western Nigeria". *Journal of Biosocial Science* 17: 461-469.
- Abou-Saleh, M., and Ghubash, R. 1997. "The prevalence of early postpartum psychiatric morbidity in Dubai: A transcultural perspective". *Acta Psychiatrica Scandinavica* 95: 428-432.
- Alexander, R. 1974. "The evolution of social behavior". *Annual Review of Ecology and Systematics* 5: 325-383.
- Altman, C. Osborn, L., and Smith, R. 1997. "Managed care clinical corner: Postpartum depression". *The American Journal of Managed Care* 3(2): 1727-1729.
- American Psychiatric Association: diagnostic and statistical manual of mental disorders. Fourth Edition. 1994. Washington, DC: American Psychiatry Press.
- Anderies, J. 1996. "An adaptive model for predicting !Kung reproductive performance: A stochastic dynamic programming approach". *Ethology and Sociobiology* 17: 221-245.
- Ansom, O. 1999. "Exploring the bio-psycho-social approach to premenstrual experiences". *Social Science and Medicine* 49: 67-80.
- Applebaum, H. (ed). 1987. Perspectives in Cultural Anthropology. Albany: State University of New York Press.
- Balch, J. and Balch, P. Prescription for Nutritional Healing. New York: Avery Publishing Group.
- Barrett, G., Pendry, E., Peacock, J., Victor, C., Thakar, R., and Manyonda, I. 1999. "Women's sexuality after childbirth: A pilot study". *Archives of Sexual Behavior* 28(2): 179-191.
- Baur, B., Gigon, U., and Fischer, B. 1977. "Contraception and Abortion". In Emotion and Reproduction Volume 20A by L. Carenza and L. Zichella (eds.) pp. 403-407. New York: Academic Press.
- Beaudet, M. 1996. "Depression". *Statistics Canada: Health Reports* 7(4): 11-24.
- Beck, A., Ward, C., Mendelson, M., Mock, J., and Erbaugh, J. 1961. "An inventory for measuring depression". *Archives of General Psychiatry* 4: 561-571.

Beck, C. 1997. "Developing a research program using qualitative and quantitative approaches". *Nursing Outlook* 45: 265-269.

Bell, A., Land, N., Milne, S., and Hassanyeh, F. 1993. "Long-term outcome of postpartum psychiatric illness requiring admission". *Journal of Affective Disorders* 31: 67-70.

Bennet, D., and P. Slade. 1991. "Infants born at risk: Consequences for maternal postpartum adjustment". *British Journal of Medical Psychology* 64: 159-172. (voided)

Berezkei, T. 1998. "Kinship network, direct childcare, and fertility among Hungarians and Gypsies". *Evolution and Human Behavior* 19: 283-298.

Bernard, H. 1997. Research Methods in Anthropology. London: AltaMira Press.

Bertrand, J., Chirhamolekwa, C., Djunghu, B., Chibalonza, K., and Mahama, K. 1990. "Postpartum events and fertility control in Kinshasa, Zaire". *Journal of Biosocial Science* 22: 197-211.

Blurton-Jones, N. 1989. The costs of children and the adaptive scheduling of births: towards a sociobiological perspective on demography. In The sociobiology of sexual and reproductive strategies by A Rasa, Vogel, C., and Volland, E. (eds.) pp. 265-282. London: Chapman and Hall.

Blurton-Jones, N. and Sibly, R. 1978. "Testing adaptiveness of culturally determined behavior: Do bushman women maximize their reproductive success by spacing births widely and foraging seldom?" In Society for Study of Human Behavior Symposium 18: Human Behavior and Adaptation by (eds.) pp. 135-158. London: Taylor and Francis.

Boyce, P., and Hickie, I., and Parker, G. 1991. "Parents, partners, or personality? Risk factors for postnatal depression". *Journal of Affective Disorders* 21: 245-255.

Boyce, P., and Stubbs, J. 1994. "The importance of postnatal depression". *The Medical Journal of Australia* 161: 471-472.

Bulik, C., Sullivan, P., Fear, J., Pickering, A., Dawn, A., and McCullin, M. 1999. "Fertility and reproduction in women with anorexia nervosa: A controlled study". *Journal of Clinical Psychiatry* 60(2): 130-135.

Buss, D. 1994. The Evolution of Desire. New York: Basic Books.

Campbell, B. 1998. Human Evolution. New York: Aldine de Gruyter.

Charone-Sossin, J. and Sossin, M. 1987. "Depressive reactions to the birth of a handicapped child". In Women and Depression: A Life Span Perspective. Springer Series: Focus on Women Volume II by R. Formanek and A. Gurian (eds.) pp. 132-146. New York: Springer Publication Company.

Chuong, C., and Burgos, D. 1995. "Medical history in women with premenstrual syndrome". *Journal of Psychosomatic Obstetrics and Gynecology* 16: 21-27.

Colinvaux, P. 1982. "Towards a clutch theory of history: Fitness niche, and clutch of *Homo Sapiens*". *Journal of Ecology* 70: 393-412.

Cook, T. 1994. Meta-Analysis for Explanation. New York: Russell Sage Foundation.

Cooper, P., Murray, L., and Chapman, G. 1993. "Psychosocial factors associated with the early termination of breast-feeding". *Journal of Psychometric Research* 37(2): 171-176.

Cooper, P., and Murray, L. 1995. "Course and recurrence of postnatal depression: Evidence for the specificity of the diagnostic concept". *British Journal of Psychiatry* 166: 191-195.

Cordner, S. and Willinger, M. 1995. "The definition of the sudden infant death syndrome". In Sudden Infant Death Syndrome: New Trends in the 1990's by T. Rognum (ed.) pp. 17-20. Oslo: Scandinavian University Press.

Cosmides, L., Tooby, J., and Barkow, J. 1992. "Introduction: Evolutionary psychology and conceptual integration". In: The Adapted Mind by J. Barkow, L. Cosmides, and J. Tooby (eds.). Oxford: Oxford University Press.

Cox, J., Holden, J., and Sagovsky, R. 1987. "Detection of postnatal depression: Development of the 10-item Edinburgh postnatal depression scale". *British Journal of Psychiatry* 150: 782-786.

Cox, J., Murray, D., and Chapman, G. 1993. "A controlled study of the onset, duration, and prevalence of postpartum depression". *British Journal of Psychiatry* 163: 27-31.

Creswell, J. (1994). Research Design: Qualitative and Quantitative Approaches. London: Sage Publications.

Cronk, L. 1989. "Low socioeconomic status and female-biased parental investment: The Mukogodo example". *American Anthropologist* 91(2): 414-429.

- Dalton, K. 1989. Depression after Childbirth. Oxford: Oxford University Press.
- Daly, M. and Wilson, M. 1983. Sex, Evolution, and Behavior. Belmont, CA: Wadsworth Publishing Company.
- Daly, M. and Wilson, M. 1988. Homicide. Hawthorne, NY: Aldine de Gruyter.
- Dean, C., and Kendell, R. 1981. "The symptomatology of puerperal illnesses". *British Journal of Psychiatry* 139: 128-135.
- Demaue, L. 1989. "The role of adaptation and selection in psychohistorical evolution". *The Journal of Psychohistory* 16(4): 355-389.
- Digby, L. 1995. "Infant care, infanticide, and female reproductive strategies in polygynous groups of common marmosets (*Callithrix jacchus*)". *Behavioral Ecology and Sociobiology* 35: 51-60.
- Diket, A., and Nolan, T. 1997. "Anxiety and depression: Diagnosis and treatment during pregnancy". *Obstetrics and Gynecology Clinics of North America* 24(3): 535-558.
- Dimitrovsky, L., Perez-Hirshberg, M., and Itskowitz, R. 1986. "Depression during and following pregnancy: Quality of family relationships". *The Journal of Psychology* 121(3): 213-218.
- Dommergues, M., Benachi, A., Benifla, J., des Noettes, R., and Dumez, Y. 1999. "The reasons for termination of pregnancy in the third trimester". *British Journal of Obstetrics and Gynecology* 106: 297-303.
- Dunnewold, A. 1997. Evaluation and Treatment of Postpartum Emotional Disorders. Sarasota, FL: Professional Resource Press.
- Endicott, J. and Spitzer, R. 1978. "A diagnostic interview". *Archives of General Psychiatry* 35: 837-844.
- Essock, S. and McGuire, M. "Social and reproductive histories of depressed and anxious women". In Sociobiology and the Social Sciences by R. Bell and N. Bell (eds.) pp. 105-118. Texas: Texas Tech University Press.
- Evans, R. 1996. "Hatching asynchrony and survival of insurance offspring in an obligate brood reducing species, the American white pelican". *Behavioral Ecology and Sociobiology* 39: 203-209.

- Fabrega, Jr., H. 1997. "Earliest phases in the evolution of sickness and healing". *Medical Anthropology Quarterly* 11(1): 26-55.
- Fisher, J., Astbury, J., and Smith, A. 1997. "Adverse psychological impact of operative obstetric interventions: a prospective longitudinal study". *Australian and New Zealand Journal of Psychiatry* 31: 728-738.
- Galdikas, B. and Wood, J. 1990. "Birth spacing patterns in humans and apes". *American Journal of Physical Anthropology* 83: 185-191.
- Gebbie, D. 1981. Reproductive Anthropology-Descent through women. New York: John Wiley & Sons.
- Gitlin, M., and Pasnau, R. 1989. "Psychiatric syndromes linked to reproductive function in women: A review of current knowledge". *American Journal of Psychiatry* 146(11): 1413-1422.
- Goldberg, D., Cooper, B., Eastwood, M., Kenward, H., and Shepherd, M. 1970. "A standardized psychiatric interview for use in community surveys". *British Journal of Prevalence and Social Medicine* 24: 18-23.
- Goodman, M. 1990. "The biomedical study of menopause". In The Meanings of Menopause: Historical, Medical, and Clinical Perspectives by R. Formanek (ed.) pp.133-155. Hillsdale, NJ: The Analytic Press.
- Gould, S. J. 1977. Ontogeny and Phylogeny. Cambridge, MA: Harvard University Press.
- Graham, M., Larsen, U., and Xiping, X. 1999. "Secular trends in age at menarche in China: A case study of two rural countries in Anhui province". *Journal of Biosocial Science* 31: 257-267.
- Gray, J. 1985. Primate Sociobiology. New Haven, CN: Human Relation Area Files, Inc.
- Gray, S. 1984. "Comparison of effects of breastfeeding practices on birth spacing in three societies: Nomadic Turkana, Gainj, and Quechua". *Journal of Biological Sciences* 26: 69-90.
- Gregoire, A., Cohen, L., Robertson, L. 1996. "Transdermal oestrogen for treatment of severe postpartum depression. *Lancet* 347: 930-933.
- Gruen, D. 1990. "Postpartum depression: A debilitating yet often unassessed problem". *Health and Social Work* 15(4): 261-270.

Gubhaju, B. 1986. "Effect of birth spacing on infant and child mortality in rural Nepal". *Journal of Biosocial Science* 18: 435-447.

Hames, R. 1992. "Time allocation". In Evolutionary Ecology and Human Behavior by E. Smith and B. Winterhalder. (eds.). New York: Aldine de Gruyter.

Hamilton, J.A. 1962. Postpartum psychiatric problems. Saint Louis: The C. V. Mosby Company.

Hamilton, J.A. 1982. "The identity of postpartum psychosis". In Motherhood and Mental Illness by I. Brockington and R. Kumar (eds.) pp.1-17. London: Academic Press.

Hamilton, W. D. 1964. "The genetical evolution of social behavior, parts 1, 2". *Journal of Theoretical Biology* 12: 12-45.

Harkness, S. 1987. "The cultural mediation of postpartum depression". *Medical Anthropology Quarterly*, 195-209.

Harris, B., Fung, H., Johns, S., Kologlu, M., Bhatti, R., McGregor, A., Richards, C., and Hall, R. 1989. "Transient post-partum thyroid dysfunction and postnatal depression". *Journal of Affective Disorders* 17: 243-249.

Hassig, S., Bertrand, J., Djunghu, B., Kinzoni, M., and Mangani, N. 1991. "Duration and correlates of postpartum abstinence in four sites in Zaire". *Social Science and Medicine* 32(3): 343-347.

Hawkes, K., J.F. O'Connell, and N.G. Blurton Jones. 1997. "Hazda women's time allocation, offspring provisioning, and the evolution of long postmenopausal life spans". *Current Anthropology* 38(4): 551-577.

Hendrik, V., Altshuler, L., and Suri, R. 1998. "Hormonal changes in the postpartum and implications for postpartum depression". *Psychosomatics* 39(2): 93-101.

Hill, K. and Hurtado, A. 1991. "The evolution of premature reproductive senescence and menopause in human females: An evaluation of the "Grandmother Hypothesis"". *Human Nature* 2(4): 313-321.

Hoek, H., van Harten, P., van Hoeken, D., and Susser, E. 1998. "Lack of relation between culture and anorexia nervosa-results of an incidence study on Curacao". *The New England Journal of Medicine* 331(17): 1231-1232.

Holte, A. 1989. "The Norwegian Menopause project: A six-year prospective follow-up of psychosocial and biological indicators of health, symptoms and quality of life in normal women. Unpublished research paper. Department of Behavioral Sciences in Medicine, Oslo, Norway.

Hrdy, S. 1981. The woman that never evolved. London: Harvard University Press.

Irons, W. 1983. "Human female reproductive strategies". In Social Behavior of Female Vertebrates by S. Wasser (ed.) pp. 169-213. New York: Academic Press.

Jayarsee, R. 1990. "Breastfeeding and postpartum amenorrhea among tribals of Coimbatore". *The Eastern Anthropologist* 44(3): 279-286.

Jennings, K., Ross, S., Popper, S., and Elmore, M. 1999. "Thoughts of harming infants in depressed and nondepressed mothers". *Journal of Affective Disorders* 54: 21-28

Jones, F., Green, V., and Krauss, D. 1980. "Maternal responsiveness of primiparous mothers during the postpartum period: Age differences". *Pediatrics* 65(3): 579-584.

Kellner, R. 1987. "A symptom questionnaire". *Journal of Clinical Psychiatry* 48(7): 268-274.

Kelly, J. 1967. "The influences of native customs on obstetrics in Nigeria". *Obstetrics and Gynecology* 30(4): 608-612.

Kendall, R., Rennie, D., Clarke, J., and Dean, C. 1981. "The social and obstetric correlates of psychiatric admission in the puerperium". *Psychological Medicine* 11: 341-350.

Kent, L., Laidlaw, J., and Brockington, I. 1996. "Fetal abuse". *Child Abuse and Neglect* 21(2): 181-186.

Kit, L., Janet, G., and Jegasothy, R. 1997. "Incidence of postnatal depression in Malaysian women". *Journal of Obstetrics and Gynaecology Reserves* 23(1): 85-89.

Kraus, M. and Redman, E. 1986. "Postpartum depression: An interactional view". *Journal of Marital and Family Therapy* 12(1): 63-74.

Kumar, R. 1994. "Postnatal mental illness: A transcultural perspective". *Social Psychiatry and Psychiatric Epidemiology* 29: 250-264.

Lavender, T. and Wilkinshaw, S. 1998. "Can midwives reduce postpartum psychological morbidity? A randomized trial". *Birth* 25(4): 215-219.

- Livingood, A., Daen, P., and Smith, B. 1983. "The depressed mother as a source of stimulation for her infant". *Journal of Clinical Psychology* 39(3): 369-375.
- Lock, M. (1998). "Menopause: Lessons from Anthropology". *Psychosomatic Medicine* 60: 410-419.
- Logsdon, C., McBride, A., and Birkimer, J. 1994. "Social support and postpartum depression". *Research in Health and Nursing* 17: 449-457.
- Lummaa, V., Vuorisalo, T., Barr, R., and Lehtonen, L. 1998. "Why cry? Adaptive significance of intensive crying in human infants". *Evolution and Human Behavior* 19: 193-202.
- Maccoby, E. and Jacklin, C. 1974. The Psychology of Sex Differences. California: Stanford University Press.
- Mace, A. 1996. "When to have another baby: A dynamic model of reproductive decision-making and evidence from Gabbra pastoralists". *Ethology and Sociobiology* 17: 263-274.
- Mann, J. 1992. "Nurturance or negligence: Maternal psychology and behavioral preference among preterm twins". In The Adapted Mind by J. Barkow, L. Cosmides, and J. Tooby, (eds.) pp. 367-390. Oxford: Oxford University Press.
- Mappes, J., Mappes, T., and Lappalainen, T. 1997. "Unequal maternal investment in offspring quality in relation to predation risk". *Evolutionary Ecology* 11: 237-243.
- Marce, L. 1858. Traite de la folie des femmes enceintes, des nouvelles accouchees et des nourrices. Paris: J. B. Baillier et Fils.
- Margulis, S., Altmann, J., and Ober, C. 1993. "Sex-biased lactational duration in a human population and its reproductive costs". *Behavioral Ecology and Sociobiology* 32: 41-45.
- McElroy, A. 1991. "Biocultural models in studies of human health and adaptation". *Medical Anthropology Quarterly* 243-265.
- Mead, M. and Newton, N. 1967. "Pregnancy, childbirth, and outcome: A review of patterns of culture and future research needs. In Childbearing - Its Social and Psychological Aspects by S. Richardson and A. Guttmacher (eds.) pp. 147-244. The Wilkins and Wilkins Company.

- Millis, J., and Kornblith, P. 1992. "Fragile beginnings: Identification and treatment of postpartum disorders". *Health and Social Work* 17(3): 192-199.
- Misri, S., Sinclair, D., and Kuan, A. 1997. "Breast-feeding and postpartum depression: Is there a relationship"? *Canadian Journal of Psychiatry* 42: 1061-1065.
- Modahl, C., and Newton, N. 1979. "Mood state differences between breast and bottle feeding mothers". In Emotion and Reproduction Volume 20A by L. Carenza and L. Zichella (eds.). New York: Academic Press.
- Montagu, A. 1961. "Neonatal and infant immaturity in man". *Journal of the American Medical Association* 178: 56-57.
- Mulder, M. 1992. "Reproductive decisions". In Evolutionary Ecology and Human Behavior by E. Smith and B. Winterhalder (eds.) pp. 339-374. New York: Aldine de Gruyter.
- Murray, D., Cox, J., Chapman, G., and Jones, P. 1995. "Childbirth: Life event or start of long-term difficulty"? *British Journal of Psychiatry* 166: 595-600.
- Murray, L. 1992. "The impact of postnatal depression on infant development". *Journal of Child Psychology and Psychiatry* 33, 543-561.
- Nesse, R. 1990. "Evolutionary explanations of emotions". *Human Nature* 1(3): 261-289.
- Nesse, R. and Williams, G. 1996. Why We Get Sick. New York: Vintage Books.
- Nott, P., Franklin, M., Armitage, C. and Gelder, M. 1976. "Hormonal changes and mood in the puerperium". *British Journal of Psychiatry* 128: 379-383.
- O'Hara, M.W. 1986. "Social support, life-events, and depression during pregnancy and the puerineum". *Archives of General Psychiatry* 43: 569-576.
- O'Hara, M., Lewis, D., Schlechte, J., and Varner, M. 1991. "Controlled prospective study of postpartum mood disorders: Psychological, environmental, and hormonal variables". *Journal of Abnormal Psychology* 100(1): 63-73.
- Overpeck, M., Brenner, R., Trumble, A., Trifiletti, L., and Berendes, H. 1998. "Risk factors for infant homicide in the United States". *The New England Journal of Medicine* 339(17): 1211-1216.

- Parkes, C. 1972. Bereavement: Studies of Grief in Adult Life. New York: International Universities Press.
- Pavelka, M. and Fedigan, L. 1991. "Menopause: A comparative life history perspective". *Yearbook of Physical Anthropology* 34: 13-38.
- Peacock, N. 1991. "An evolutionary perspective on the patterning of maternal investment in pregnancy". *Human Nature* 2(4): 351-385.
- Phillips, L. and O'Hara, M. 1991. "Prospective study of postpartum depression: 4 1/2-year follow-up of women and children". *Journal of Abnormal Psychology* 100(2): 151-155.
- Pillsbury, B. 1978. "'Doing the month': Confinement and convalescence of Chinese women after childbirth". *Social Science and Medicine* 12: 11-22.
- Piyasil, V. 1998. "Anxiety and depression in teenage mothers: A comparative study". *Journal of the Medical Association of Thailand* 81(2): 125-129.
- Pop, V., de Rooy, H., Vader, H., van der Heide, D., van Son, M., Komproe, I., Essed, G., and de Geus, C. 1991. "Postpartum thyroid dysfunction and depression in an unselected population". *The New England Journal of Medicine* 324(25): 1815-1816.
- Pop, V., Wijnen, H., van Montfort, N., Essed, G., de Geus, C., vanSon, N., and Komproe, 1995. "Blues and depression during early puerperium: home versus hospital deliveries". *British Journal of Obstetrics and Gynecology* 102: 701-706.
- Profet, M. 1992. "Pregnancy sickness as adaptation: A deterrent to maternal ingestion of teratogens". In The Adapted Mind by J. Barkow, L. Cosmides, and J. Tooby (eds.) pp. 327-365. Oxford: Oxford University Press.
- Radloff, L. 1977. "The CES-D scale: A self-report depression scale for research in the general population". *Applied Psychological Measurement* 1(3): 385-401.
- Raskin, A., Schulterbrandt, J., Reatig, N., Chase, C., and McKeon, J. 1970. "Differential response to chlorpromazine, imipramine, and placebo". *Archives of General Psychiatry* 23: 164-173.
- Reynolds, L. 1997. "Post-traumatic stress disorder after childbirth: The phenomenon of traumatic birth". *Canadian Medical Association Journal* 156: 831-835.

- Richerson, P. and Boyd, R. 1992. "Cultural inheritance and evolutionary ecology". In Evolutionary Ecology and Human Behavior by E. Smith and B. Winterhalder (eds.) pp. 61-94. New York: Aldine de Gruyter.
- Rosenthal, R. 1987. Judgement Studies: Design, Analysis, and Meta-Analysis. Cambridge: Cambridge University Press.
- Saucier, J. 1972. "Correlates of the long postpartum taboo: A cross-cultural study". *Current Anthropology* 13(2): 238-258.
- Scott, D. 1992. "Early identification of maternal depression as a strategy in the prevention of child abuse". *Child Abuse and Neglect* 16: 345-358.
- Seguin, L., Potvin, L., St.-Senis, M., and Loiselle, J. 1995. "Chronic stressors, social support, and depression during pregnancy". *Obstetrics and Gynecology* 85(4): 583-589.
- Sinclair, D. and Murray, L. 1998. "Effects of postnatal depression on children's adjustment to school. Teacher Reports". *British Journal of Psychiatry* 172: 58-63.
- Solnit, A. and Stark, M. 1961. "Mourning and the birth of a defective child". *Psychoanalytical Study of Children* 16 523-537.
- Spitzer, R., Endicott, J., and Robins, E. 1978. "Research diagnostic criteria". *Archives of General Psychiatry* 35: 773-782.
- Stein, A., Gath, D., Bucher, J., Bond, A., Day, A., and Cooper, P. 1991. "The relationship between postnatal depression and mother-child interaction". *British Journal of Psychiatry* 158: 46-52.
- Steiner, M. 1990. "Postpartum psychiatric disorders". *Canadian Journal of Psychiatry* 35: 89-95.
- Stern, G. and Kruckman, L. 1983. "Multi-disciplinary perspectives on postpartum depression: An anthropological critique". *Social Science and Medicine* 17(15): 1027-1041.
- Stoppard, J. 1997. "Women's bodies, their lives, and depression". In Body Talk: The Material and Discursive Regulation of Sexuality, Madness, and Reproduction by J. Ussher (ed.) pp.10-32. London: Routledge.
- Strassmann, B. 1981. "Sexual selection, paternal care, and concealed ovulation in humans". *Ethnology and Sociobiology* 2: 31-40.

- Strassmann, B. 1996. "Energy economy in the evolution of menstruation". *Evolutionary Anthropology* 5(5) 157-164.
- Suarez, S. and Gallup, Jr., G. 1985. "Depression as a response to reproductive failure". *Journal of Social and Biological Structure* 279-287.
- Surbey, M. 1987. "Anorexia nervosa, amenorrhea, and adaptation". *Ethology and Sociobiology* 8,47S-61S.
- Susman, V., and Katz, J. 1988. "Weaning and depression: Another postpartum complication". *American Journal of Psychiatry* 145(4): 498-501.
- Terry, D., Matocchi, L., and Hynes, G. 1996. "Depressive symptomatology in new mothers: A stress and coping perspective". *Journal of Abnormal Psychology* 105(2): 220-231.
- Thornhill, R. and Furlow, B. 1998. "Stress and human reproductive behavior: attractiveness, women's sexual development, postpartum depression, and baby's cry". *Advances in the Study of Behavior* 27: 319-369.
- Thornhill, R. and Thornhill, N. 1989. "The evolution of psychological pain". In Sociobiology and the Social Sciences by R. Bell and N. Bell (eds.) pp.73-103. Lubbock, TX: Texas Tech University Press.
- Tooby, J. and Cosmides, L. 1992. "The psychological foundations of culture". In The Adapted Mind by J. Barkow, L. Cosmides, and J. Tooby (eds.) pp.19-136. Oxford: Oxford University Press.
- Trad, P. 1995. "Using maternal representational patterns to evaluate postpartum depression". *American Journal of Psychotherapy* 49(1): 128-148.
- Treloar, S., Martin, N., Bucholz, K., Madden, P., and Heath, A. 1999. "Genetic influences on postnatal depressive symptoms: Findings from an Australian twin sample". *Psychological Medicine* 29(3): 645-654.
- Trevathan, W. 1987. Human birth: An Evolutionary Perspective. New York: Aldine de Gruyter.
- Trivers, R. 1972. "Parental investment and sexual selection". In Sexual Selection and the Descent of Man 1871-1771 by B. Campbell (ed.) pp. 136-179. Chicago: Aldine Publishing Co.

- Trivers, R. 1985. Social Evolution. Menlo Park, CA: The Benjamin/Cummings Publishing Company, Inc.
- Trussell, J. and Pebley, A. (1984). *Studies in Family Planning* 15: 267-280.
- Turnbull, J. 1969. "Mental illness in the puerperium". *Canadian Psychiatric Association Journal* 14: 525-526.
- Unterman, R., Posner, N., and Williams, K. 1990. "Postpartum depressive disorders: Changing trends". *Birth* 17: 131-137.
- Ussher, J. 1992. "Research and theory related to female reproduction: Implications for clinical psychology". *The British Psychological Society* 31: 129-151.
- Warner, P., Bancroft, J., Dixon, A. and Hampson, M. 1991. "The relationship between perimenstrual depressive mood and depressive illness". *Journal of Affective Disorders* 23: 9-23.
- Wasser, S.K., and Barash, D.P. 1983. "Reproduction suppression among female mammals: Implications for biomedicine and sexual selection theory". *The Quarterly Review of Biology* 58, 513-538.
- Watson, E. and Evans, S. 1986. "An example of cross-cultural measurement of psychological symptoms in postpartum mothers". *Social Science and Medicine* 23(9): 869-874.
- Whiffen, V. 1988. "Screening for postpartum depression: A methodological note". *Journal of Clinical Psychology* 44: 367-371.
- Whiffen, V. 1991. "The comparison of postpartum with nonpostpartum depression: A rose by any other name". *Journal of Psychiatric Neuroscience* 16(3): 160-165.
- Whiffen, V. 1992. "Postpartum depression: A distinct diagnosis"? *Clinical Psychology Review* 12: 485-508.
- Whiffen, V., and Gotlib, I. 1989. "Infants of postpartum depressed mothers: Temperament and cognitive status". *Journal of Abnormal Psychology* 98: 274-279.
- Williams, G. 1974. Adaptation and Natural Selection: A Critique of Some Current Evolutionary Thought. Princeton, NJ: Princeton University Press.
- Williams, K., and Koran, L. 1997. "Obsessive-compulsive disorder in pregnancy, the puerperium, and the premenstruum". *Journal of Clinical Psychiatry* 58(7): 330-334.

Wilson, E. O. 1975. Sociobiology: The New Synthesis. Cambridge MA: Belknap Press of Harvard University Press.

Wing, J., Cooper, J., and Sartorius, N. 1974. Description and Classification of Psychiatric Symptoms. Cambridge: Cambridge University Press.

Wisner, K., Peindl, K., and Hanusa, B. 1996. "Effects of childbearing on the natural history of panic disorder with comorbid mood disorder". *Journal of Affective Disorders* 41: 173-180.

Wisner, K., and Stowe, Z. 1997. "Psychobiology of postpartum mood disorders". *Seminars in Reproductive Endocrinology* 15(1): 77-88.

Wittenberger, J. 1981. Animal Social Behavior. Belmont, CA: Wadsworth Publishing Company.

Yalom, I., Lunde, D., Moos, R., and Hamburg, D. 1968. "Postpartum blues syndrome". *Archives of General Psychiatry* 18: 16-27.

Zung, W. 1964. "A self-rating depression scale". *Archives of General Psychiatry* 12(1): 63-68.

Annotated Bibliography for Meta-Analysis

Aderibigbe, Y., Gureje, O., and Omigbodun, O. 1993. "Postnatal emotional disorders in Nigerian women: A study of antecedents and associations". *British Journal of Psychiatry* 163: 645-650.

Subjects: $N = 162$, tested during pregnancy and at 6 to 8 weeks postpartum. **Sampling:** Subjects were recruited from the antenatal clinic at the University College Hospital, Ibadan (Nigeria). **Measures:** C-GHQ/PAS; semi-structured interview. **Prevalence Rate:** 14%. **Significant Risk Factors:** (1) Relationship difficulties; (2) Childcare stress; and (3) Marriage difficulties. **Non-significant Risk Factors:** (1) Polygamy; (2) Age; (3) Parity; (4) Obstetrical intervention; (5) Sex of infant; and (6) Antepartum depression.

Astbury, J., Brown, S., Lunley, J., and Small, R. 1994. "Birth events, birth experience and social differences in postnatal depression". *Australian Journal of Public Health* 18(2): 176-184.

Subjects: $N = 799$, tested eight to nine months postpartum. **Sampling:** Subjects were a representative sample from the state of Victoria (Australia). **Measures:** EPDS (13 or more). **Prevalence Rate:** 15.4%. **Significant Risk Factors:** (1) Assisted delivery; (2) Bottle-feeding; (3) Personality factors; (4) Single status; (5) Immigrant status; and (6) childcare stresses. **Non-significant Risk Factors:** (1) Multiparous women over the age of 34 years; (2) Housing; (3) Financial income; and (4) Maternal education.

Augusto, A., Kumar, R., Calheiros, J., Matos, E., and Figueiredo, E. 1996. "Postnatal depression in an urban area of Portugal: Comparison of childbearing women and matched controls". *Psychological Medicine* 26: 135-141.

Subjects: $N = 352$, tested between 9 to 20 weeks postpartum. **Sampling:** Subjects were randomly selected and living in urban Portugal. **Measures:** EPDS (13 or more), Zung scale. **Prevalence Rate:** 13.1%. **Significant Risk Factors:** (1) Multiparity; (2) Low SES; (3) Maternal occupation; (4) Education; (5) Housing; and (6) Somatic complaints. **Non-significant Risk Factors:** (1) Age and (2) Somatic symptoms.

Bagedahl-Strindlund, M. and Borjesson, K. 1998. "Postnatal depression: a hidden illness". *Acta Psychiatrica Scandinavica* 98: 272-275.

Subjects: $N = 309$, tested at three months postpartum. **Sampling:** Subjects were recruited from the Wells Baby Clinics (WBCs) in Stockholm (Sweden). **Measures:** EPDS (12 or more). **Prevalence Rate:** 14.5%. **Significant Risk Factors:** (1) Single status and (2) Multiparity. **Non-significant Risk Factors:** (1) Age, (2) Swedish origin, and (3) Immigrant status.

Ballard, C., Davis, R., Cullen, P., Mohan, R., and Dean, C. 1994. "Prevalence of postnatal morbidity in mothers and fathers". *British Journal of Psychiatry* 164: 782-788.

Subjects: $N = 200$, tested at 6 weeks and 6 months postpartum. **Sampling:** Subjects were recruited from the Walsgrave Maternity Hospital in Coventry (UK). **Measures:** EPDS (13 or more). **Prevalence Rate:** 25.7% (at 6 months). **Significant Risk Factors:** (1) Unemployment; (2) Low SES; (3) Maternal age older than 30 years; (4) Previous miscarriage; and (5) Previous abortion. **Non-significant Risk Factors:** None reported.

Becker, A. 1998. "Postpartum illness in Fiji: A sociosomatic perspective". *Psychosomatic Medicine* 60: 431-438.

Subjects: $N = 82$, tested in the initial postpartum days and again at 2 to 5 months postpartum. **Sampling:** Subjects recruited were 85 consecutive births at the Sigatoka District Hospital in Nadroga (Fiji). **Measures:** Kellner Symptom Questionnaire, semistructured ethnographic interview. **Prevalence Rate:** 9%. **Significant Risk Factors:** (1) Perceived inadequate social support; (2) Childcare stress; and (3) Relationship difficulties. **Non-significant Risk Factors:** None reported.

Chen, C. 1996. "Postpartum depression among adolescent mothers and adult mothers". *Kaohsiung Journal of Medical Science* 12: 104-113.

Subjects: $N = 77$ adolescents and $N = 151$ adults, tested at 6 weeks postpartum. **Sampling:** Subjects were recruited from the postpartum clinics of two teaching hospitals and a private clinic located in Kaohsiung (Taiwan). **Measures:** BDI. **Prevalence Rate:** 61% adolescents and 37.7% adults. **Significant Risk Factors:** (1) Personality factors; (2) Education; (3) Younger age; (4) Occupation; (5) Low SES; (6) Low social support; and (7) Childcare stress. **Non-significant Risk Factors:** (1) Somatic disturbances.

Feggetter, G., Cooper, P., and Gath, D. 1981. "Non-psychotic psychiatric disorders in women one year after childbirth". *Journal of Psychosomatic Research* 25(5): 369-372.

Subjects: $N = 820$, tested one year postpartum. **Sampling:** Subjects were recruited from Child Health Clinics in Oxford (UK). **Measures:** GHQ. **Prevalence Rate:** 19.7%. **Significant Risk Factors:** (1) Younger age; (2) Single status; (3) Marriage difficulties; (3) Low SES; (4) History of psychiatric disorder; and (5) Childcare stress. **Non-significant Risk Factors:** (1) Parity and (2) Unemployment.

Fisch, R., Tadmor, O., Dankner, R., and Diamant, Y. 1997. "Postnatal depression: A prospective study of its prevalence, incidence and psychosocial determinants in an Israeli sample". *Journal of Obstetrical and Gynecological Research* 23(6): 547-554.

Subjects: $N = 327$, tested on the first or second postpartum day and between 6 and 12 weeks postpartum. **Sampling:** Subjects recruited from the maternity department of Shaare Zedek Medical Center (Israel). **Measures:** EPDS (score of 10 or 13). **Prevalence Rate:** 5.2% (13 score) and 12.4% (10 score). **Significant Risk Factors:** (1) Maternal age of 29 or older; (2) Unplanned pregnancy; (3) Desired sex; (4) Perceived help from spouse; (5) Marital satisfaction; (6) Religious observance; (7) Psychiatric history; (8) Immigration status; and (9) timing of pregnancy. **Non-significant Risk Factors:** (1) SES status; (2) Housing; (3) Education; (4) Parity; and (5) Childcare stress.

Ghubash, R. and Abou-Saleh, M. 1997. "Postpartum psychiatric illness in Arab culture: prevalence and psychosocial correlates". *British Journal of Psychiatry* 171: 65-68.

Subjects: $N = 95$, tested at day 2, at day 7, and week 8. **Sampling:** Subjects were selected from the New Dubai Hospital, Dubai, United Arab Emirates (Dubai). **Measures:** PSE (Interview). **Prevalence Rate:** 15.8% (8 weeks postpartum). **Significant Risk Factors:** (1) Marital difficulties; (2) History of psychiatric disorder; (3) Primiparity; (4) Infant risk factors; (5) Polygamy; (6) Unwanted pregnancy/baby; and (7) Postpartum blues. **Non-significant Risk Factors:** (1) Age.

Glasser, S., Barell, V., Shoham, A., Ziv, A., Boyko, V., Lusky, A., and Hart, S. 1998. "Prospective study of postpartum depression in an Israeli cohort: prevalence, incidence and demographic risk factors". *Journal of Psychosomatic Obstetrics and Gynecology* 19: 155-164.

Subjects: $N = 288$, tested during pregnancy and at 6 weeks postpartum. **Sampling:** Subjects were selected from the central coastal area of Israel, a lower SES population (Israel). **Measures:** EPDS (10 or more) and structured interview. **Prevalence Rate:** 22.6%. **Significant Risk Factors:** (1) Immigrant status. **Non-significant Risk Factors:** (1) Age; (2) Parity; (3) Education; (4) Employment; and (5) Religious identification.

Gotlib, I., Whiffen, V., Mount, J., Milne, K., and Cordy, N. 1989. "Prevalence rates and demographic characteristics associated with depression in pregnancy and the postpartum". *Journal of Consulting and Clinical Psychology* 57(2): 269-274.

Subjects: $N = 295$, tested during pregnancy and one month postpartum. **Sampling:** Subjects were recruited during pregnancy both through the obstetrics department of a large, urban hospital and from the private practices of more than 15 physicians (Canada). **Measures:** BDI and SADS (semi-structured interview). **Prevalence Rate:** 6.8%. **Incidence Rate:** 3.4%. **Significant Risk Factors:** (1) Unemployment. **Non-significant Risk Factors:** (1) Age; (2) Education; (3) Parity; and (4) Occupation.

Gotlib, I., Whiffen, V., Wallace, P., and Mount, J. 1991. "Prospective investigation of postpartum depression: Factors involved in onset and recovery". *Journal of Abnormal Psychology* 100(2): 122-132.

Subjects: $N = 655$, tested during pregnancy and at 4 weeks postpartum. **Sampling:** Subjects were recruited during pregnancy both through the obstetrics department of a large, urban hospital and from the private practices of physicians (Canada). **Measures:** BDI and SADS (semi-structured interview). **Incidence Rate:** 4.9%. **Significant Risk Factors:** (1) Stress during pregnancy; (2) Marital satisfaction; (3) Negative perception of own childhood; and (4) Childcare stress. **Non-significant Risk Factors:** (1) Age; (2) Length of relationship; (3) Education; (4) Marital status; (5) Employment; (6) Parity; and (7) Personality factors.

Green, J., Coupland, V., and Kitzinger, J. 1990. "Expectations, experiences, and psychological outcomes of childbirth: A prospective study of 825 women". *Birth* 17(1): 15-24.

Subjects: $N = 710$, tested twice during pregnancy and at 6 weeks postpartum. **Sampling:** Subjects were recruited from four National Health Service districts in Southeast England (UK). **Measures:** EWB based on the EPDS. **Prevalence Rate:** 9%. **Significant Risk Factors:** (1) Antepartum depression and (2) Cesarean section. **Non-significant Risk Factors:** (1) Parity; (2) Obstetrical intervention;

Hall, L., Kotch, J., Browne, D., and Rayens, M. 1996. "Self-esteem as a mediator of the effects of stressors and social resources on depressive symptoms in postpartum mothers". *Nursing Research* 45(4): 231-238.

Subjects: $N = 738$, tested 1 to 2 months postpartum. **Sampling:** Subjects were recruited from 37 North Carolina counties and 5 contiguous counties in South Carolina (USA). **Measures:** CES-D. **Prevalence Rate:** 42%. **Significant Risk Factors:** (1) Education; (2) Multiparity; (3) Low SES;

(4) Infant social risk; and (5) Quality of social network ties. **Non-significant Risk Factors:** (1) Age; (2) Infant risk; and (3) Quality of social relationships.

Hobfoll, S., Ritter, C., Lavin, J., Hulsizer, M., and Cameron, R. 1995. "Depression prevalence and incidence among inner-city pregnant and postpartum women". *Journal of Consulting and Clinical Psychology* 63(3): 445-453.

Subjects: $N = 192$, tested twice during pregnancy and at 7 to 9 weeks postpartum. **Sampling:** Subjects were recruited over a 2.5 year period from among the patient population at three obstetrics clinics for low-income women located in a mid-sized, mid-western city (USA). **Measures:** SADS/BDI; semistructured interview. **Point Prevalence Rate:** 23.4%. **Significant Risk Factors:** (1) Antepartum depression and (2) Single status. **Non-significant Risk Factors:** (1) Ethnicity, (2) Age, (3) Education, (4) SES, and (5) Employment.

Lane, A., Keville, R., Morris, M., Kinsella, A., Turner, M., and Barry, S. 1997. "Postnatal depression and elation among mothers and their partners: Prevalence and predictors". *British Journal of Psychiatry* 171: 550-555.

Subjects: $N = 370$, tested at 3 days and 6 weeks postpartum. **Sampling:** Subjects were recruited from computerised labour ward diaries at the Coombe Women's Hospital. Mothers were excluded if their infant had major congenital abnormalities (Ireland). **Measures:** EPDS (13 or more). **Prevalence Rate:** 11%. **Significant Risk Factors:** (1) Postpartum blues, (2) Unplanned pregnancy, (3) Single status, (4) Unemployment, (5) Education, and (6) Bottle-feeding. **Non-significant Risk Factors:** (1) Parity, (2) Age, (3) Assisted delivery, (4) Obstetrical complications, and (5) History of psychiatric problems.

O'Hara, M., Neunaber, D., and Zekoski, E. 1984. "Prospective study of postpartum depression: Prevalence, course, and predictive factors". *Journal of Abnormal Psychology* 93(2): 158-171.

Subjects: $N = 99$, tested in the second trimester and 6 months postpartum. **Sampling:** Subjects were recruited from a public obstetrics and gynecology clinic and two private practices at the University of Iowa Hospitals and Clinics (USA). **Measures:** SADS and RDC (diagnostic interview). **Prevalence Rate:** 12%. **Significant Risk Factors:** (1) History of psychiatric disorder in first degree relatives, (2) Life stress, (3) Obstetric risk factors, (4) Childcare stress, and (5) Antepartum depression. **Non-significant Risk Factors:** (1) SES, (2) Employment, (3) Length of relationship, and (4) Age.

Paykel, E., Emms, E., Fletcher, J., and Rassaby, E. 1980. "Life events and social support in puerperal depression". *British Journal of Psychiatry* 136: 339-346.

Subjects: $N = 120$, tested at 6 weeks postpartum. **Sampling:** Subjects were recruited from the post-natal clinics of two London hospitals (UK). **Measures:** Raskin Three Area Files (Interview). **Prevalence Rate:** 20%. **Significant Risk Factors:** (1) History of psychiatric disorder, (2) Younger age, (3) Postpartum blues, (4) Poor marital relationship, (5) Lack of spousal support, (6) Housing, and (7) Stressful pregnancy and obstetric risk factors. **Non-significant Risk Factors:** (1) Parity, (2) Unemployment, (3) Marital status, (4) SES, (5) Poor relationship with own mother during childhood, (6) Length of relationship, (7) Social support, (8) Financial problems, (9) Planned pregnancy, (10) Undesired sex, and (11) Breastfeeding.

Pitt, B. 1968. "Atypical" depression following childbirth". *British Journal of Psychiatry* 114: 1325-1335.

Subjects: $N = 305$, tested during pregnancy and 6 to 8 weeks postpartum. **Sampling:** Subjects recruited from the London Hospital for a National Health Service survey (UK). **Measures:** Pitt Depression Questionnaire (Interview). **Incidence Rate:** 10.8%. **Significant Risk Factors:** (1) Length of relationship, (2) Financial problems, (3) History of premenstrual syndrome, (4) Maternity blues, (5) Personality factors, and (6) Somatic symptoms. **Non-significant Risk Factors:** (1) Age, (2) Housing, (3) Finances, (4) SES, (5) Planned pregnancy, (6) Premature/abnormal infant, (7) Sex of infant, (8) History of psychiatric disorder, (9) Antenatal depression, (10) Breastfeeding, (11) Parity, (12) Obstetrical complications, and (13) Endocrine factors.

Righetti-Veltema, M., Conne-Perreard, E., Bousquet, A., and Manzano, J. 1998. "Risk factors and predictive signs of postpartum depression". *Journal of Affective Disorders* 49: 167-180.

Subjects: $N = 570$, tested during pregnancy and three months postpartum. **Sampling:** Subjects were from Geneva and were representative of various socioeconomic classes and of low and high-risk pregnancies (Switzerland). **Measures:** EPDS (12 or over). **Prevalence Rate:** 10.2%. **Significant Risk Factors:** (1) Multiparity; (2) Antepartum depression; (3) Postpartum blues; (4) Low SES; (5) Financial difficulties; (6) Life stress; (7) Infant stress; (8) Immigrant status; and (9) Quality of relationships. **Non-significant Risk Factors:** (1) Unplanned pregnancy; (2) Obstetrical complications and pre-mature birth; (3) Sex of infant; (4) Age; and (5) Marital status.

Spangenberg, J. and Pieters, H. 1991. "Factors related to postpartum depression". *South African Journal of Psychology* 21(3): 159-165.

Subjects: $N = 81$, tested between two weeks and six months postpartum. **Sampling:** Subjects were recruited from urban and rural areas of Stellenbosch (South Africa). **Measures:** BDI and Visual Analogue Scale (VAS). **Prevalence Rate:** 27.2%. **Significant Risk Factors:** (1) Satisfaction with social support; (2) Marital satisfaction; and (3) Premenstrual syndrome. **Non-significant Risk Factors:** (1) Age; (2) Parity; (3) History of psychiatric illness; (4) Cesarean section; (5) Pre-mature birth; and (6) Perceived social network.

Tamaki, R., Murata, M., and Okano, T. 1997. "Risk factors for postpartum depression in Japan". *Psychiatry and Clinical Neurosciences* 51: 93-98.

Subjects: $N = 627$, tested during pregnancy and at 1, 3, and 4 months postpartum. **Sampling:** Subjects were recruited from the Shiroko Clinic in Suzuka, Mie Prefecture (Japan). **Measures:** EPDS (13 or over) and STAIS (State-Trait Anxiety Inventory State Test). **Prevalence Rate:** 12.1%. **Significant Risk Factors:** (1) Pre-mature birth; (2) Childcare stress; (3) Obstetric risk factors; (4) Primiparity; and (5) Life stress. **Non-significance:** (1) Parity; (2) Age; (3) Satogaeri; (4) Delivery style; (5) Birth weight; (6) Sex of infant; (7) Cooperation of spouse; and (8) Family structure.

Ugarriza, D. 1995. "A descriptive study of postpartum depression". *Perspectives in Psychiatric Care* 31(3): 25-29.

Subjects: $N = 102$, tested twice in the prepartum period and twice in the postpartum period. **Sampling:** Subjects were recruited during childbirth education classes from four non-profit community hospitals in a large southeastern city (USA). **Measures:** BDI. **Prevalence Rate:** 8%. **Significant Risk Factors:** None reported. **Non-significant Risk Factors:** (1) Age; (2) Marital status; (3) Ethnicity; and (4) Parity.

Viinamaki, H., Niskanen, L., Pesonen, P., and Saarikoski, S. 1997. "Evolution of postpartum mental health". *Journal of Psychosomatic Obstetrics and Gynecology* 18: 213-219.

Subjects: $N = 139$, tested 4 to 8 weeks and 2 years postpartum. **Sampling:** Subjects were recruited from a maternity center in Kuopio, Eastern Finland. **Measures:** Zung's 20-item rating scale and a 12-item GHQ (General Health Questionnaire). **Prevalence Rate:** 28.1% (4 to 8 weeks) and 19.4% (2 years postpartum). **Significant Risk Factors:** (1) Financial problems; (2) Inadequate social support; (3) History of psychiatric illness; (4) Alcohol abuse; (5) Smoking; (6) Poor relationship with partner; and (7) Life stress. **Non-significant Risk Factors:** (1) Age; (2) Marital status; (3) Education; (4) Previous abortion; (5) Postpartum blues; and (6) Breastfeeding.

Warner, P., Appleby, L., Whitton, A., and Faragher, B. 1996. "Demographic and obstetric risk factors for postnatal psychiatric morbidity". *British Journal of Psychiatry* 168: 607-611.

Subjects: $N = 2375$, tested 6 to 8 weeks postpartum. **Sampling:** Subjects were recruited from postnatal wards on two maternity units in south Manchester. **Measures:** EPDS (13 or more). **Prevalence Rate:** 11.8%. **Significant Risk Factors:** (1) Unplanned pregnancy; (2) Bottle-feeding; (3) Maternal unemployment; and (4) Paternal unemployment. **Non-significant Risk Factors:** (1) Complications of pregnancy; (2) Neonatal illness; (3) Age; (4) Single status; and (5) Multiparity.

Watson, J., Elliot, S., Rugg, A., and Brough, D. "Psychiatric disorder in pregnancy and the first postnatal year". *British Journal of Psychiatry* 144: 453-462.

Subjects: $N = 128$, tested during pregnancy and 6 weeks postpartum. **Sampling:** Subjects were recruited from an antenatal clinic in south London (UK). **Measures:** semi-structured interview (Goldberg et al., 1970). **Prevalence Rate:** 23%. **Incidence Rate:** 16%. **Significant Risk Factors:** (1) Dissatisfied with partner; (2) History of psychiatric disorder; (3) Antepartum depression; and (4) Family psychiatric history. **Non-significant Risk Factors:** (1) SES; (2) Marital status; and (3) Parity.

Whiffen, V. and Gotlib, I. 1993. "Comparison of postpartum and non-postpartum depression: Clinical presentation, psychiatric history, and psychosocial functioning". *Journal of Consulting and Clinical Psychology* 61(3): 485-494.

Subjects: $N = 900$, tested during pregnancy and at 1 and 6 months postpartum. **Sampling:** Subjects were recruited during pregnancy through the obstetrics department of a large urban hospital (Canada). **Measures:** BDI and SADS (interview). **Prevalence Rate:** Not reported. **Significant Risk Factors:** (1) Marital difficulties and (2) History of psychiatric disorder. **Non-significant Risk Factors:** (1) Age; (2) Parity (3) Education; and (4) Employment.

Zelkowitz, P. and Milet, T. 1995. "Screening for postpartum depression in a community sample". *Canadian Journal of Psychiatry* 40(2): 80-86.

Subjects: $N = 1559$, tested during 6 to 8 weeks postpartum. **Sampling:** Subjects were recruited from two community health care centers (Canada). **Measures:** EPDS (10 or 12 points). **Prevalence Rate:** 6.2% (10 point) and 3.4% (12 point). **Significant Risk Factors:** (1) Employment; (2) Low SES; (3) Multiparity; (4) Occupation; and (5) Immigrant status. **Non-significant Risk Factors:** (1) Age; (2) Paternal education; and (3) Sex of infant.

Annotated Bibliography for Phenomenological Review

Beck, C. 1996. Postpartum depressed mothers' experiences interacting with their children. *Nursing Research* 45(2): 98-104.

Subjects: $N = 12$. **Sampling:** Purposive sample; all 12 mothers had been diagnosed as having postpartum depression and were currently being treated for it by a therapist or a psychiatrist. **Measures:** Phenomenological research method. **Themes:** (1) Depression took over the mothers' minds and bodies preventing them from reaching out to their infants; (2) Overwhelmed by responsibility and feeling unable to cope; (3) Erect walls being yourself and the baby; (4) A lack of desire to play with the baby; (5) Guilt and irrational thoughts about the baby; (6) Uncontrollable anger towards the child; (7) Concerned about the relationship with older children; (8) Feelings of loss; and (9) Minimizing negative effects on the children.

Bryan, T., Georgiopoulos, A., Harms, R., Huxsahl, J., Larson, D., and Yawn, B. 1999. "Incidence of postpartum depression in Olmsted County, Minnesota". *Journal of Reproductive Medicine*, 351-358.

Subjects: $N = 403$. **Sampling:** Using outpatient and hospital medical records, all documented symptoms and diagnoses of depression, drug therapy for depression and variables previously associated with depression were reported. **Prevalence Rate:** 3.7%. **Significant Risk Factors:** (1) Young maternal age; (2) Single marital status; (3) Hyperemesis gravidarium; (4) Tobacco or illegal drug use during pregnancy; (5) History of substance abuse; (6) High utilization of emergency department services; and (7) Previous affective disorders.

Nahas, V. and Amashen, N. 1999. "Culture care meanings and experiences of postpartum depression among Jordanian Australian women: A transcultural study". *Journal of Transcultural Nursing* 10 (1): 37-45.

Subjects: $N = 22$. **Sampling:** A purposive sample of Jordanian women diagnosed with depression and living in Sidney. **Measures:** Ethnonursing research method and data analysis. **Themes:** (1) Care means strong family support and kinship during the postpartum period; (2) Care is carrying out and fulfilling traditional gender roles as mother and wife; and (3) care is preservation of Jordanian childbearing customs as expressed in the celebration of the birth of the baby.

Nahas, V. and Hillege, S. 1999. "Postpartum depression: The lived experiences of Middle Eastern migrant women in Australia". *Journal of Nurse-Midwifery* 44(1): 65-74.

Subjects: $N = 45$. **Sampling:** A purposive sample of Middle Eastern women living in Sidney all diagnosed with postpartum depression. **Measures:** A phenomenological research design with unstructured interviews. **Themes:** (1) Loneliness from isolation and lack of support; (2) Helplessness, feeling overwhelmed with the responsibilities if wife and mother; (3) Fear of failure; (4) Insufficient knowledge about postpartum depression; and (5) Learning to cope with the depression.

Nott, P. 1987. "Extent, timing, and persistence of emotional disorders following childbirth". *British Journal of Psychiatry* 151: 523-527.

Subjects: $N = 200$, tested at 3, 9, and 15 months postpartum. **Sampling:** Subjects were obtained from the birth books of five Southampton group practices. **Measures:** GHQ-30 and SPI. **Prevalence Rate:** 18.5%, 28%, and 31% (at 3, 9, and 15 months respectfully).

Small, R., Astbury, J., Brown, S., and Lumley, J. 1994. "Depression after childbirth: Does social context matter"? *The Medical Journal of Australia* 161(17): 473-477.

Subjects: $N = 45$ subjects and $N = 45$ controls, tested at 8-9 months postpartum. **Sampling:** Subjects were obtained from a previous study by Small et al. **Measures:** EPDS (score > 12). **Significant Risk Factors:** (1) Less instrumental and emotional support from partner; (2) Less support overall; (3) More negative life events; (4) Poorer health; and (5) Childcare stress.

Stuchbery, M., Matthey, S., and Barnett, B. 1998. "Postnatal depression and social supports in Vietnamese, Arabic, and Anglo-Celtic mothers". *Social Psychiatric Epidemiology* 33: 483-490.

Subjects: $N = 105$ Anglo-Celtic; 113 Vietnamese; and 98 Arabic women, tested at 6 weeks postpartum. **Sampling:** Women were recruited from antenatal clinics at four public hospitals in South Western Sydney. **Measures:** EPDS. **Significant Risk Factors:** (1) Perceived need for more social support; (2) Poor quality relationship with partner; and (3) Perceived need for more help from partner.

Appendix A

Inclusion Criteria for Meta-Analysis

1. Quantitative research design.
2. Publication date 1968 or after.
3. Inclusion of sample greater than 50 subjects.
4. Published in the English language.
5. Postpartum depression is operationalized as an entity distinguishable from other disorders of the pueriperium.
6. Primary goal is to investigate the demographic, psychosocial, hormonal, genetic, and obstetrical variables related to postpartum depression.
7. Depression is assessed at least one month postpartum.
8. Depression is assessed using a standardized measure with high validity and reliability.

Exclusion Criteria for Meta-Analysis

1. Case studies.
2. Analysis of testing instruments.
3. Failed to use primary data.
4. Failed to focus exclusively on postpartum depression.
5. Excluded multiparous women from the sample.
6. Failed to report all significant and non-significant findings.
7. Research was limited to an inpatient hospital-based study.

Inclusion Criteria for Phenomenological Review

1. A qualitative or quantitative research design was implemented.
2. Publication date 1965 or later.
3. Published in the English language.
4. Postpartum depression was treated as a unique entity.
5. Study was published in a reputable journal.
6. The study focused on relevant variables and their relationship to postpartum depression.

Appendix B (N=29)

Homogeneity Scores and Research Effects

STUDY	YEAR	POP	SS	SA	RD	DM	CT	DC	AE	SCORE	RATE
ADE	1993	2	2	2	2	3	1	2	3	15	14%
AST	1994	1	3	1	1	1	3	1	2	12	15.40%
AUG	1996	1	3	1	1	1	2	1	3	12	13.10%
BAG	1998	1	3	2	1	1	1	2	2	12	14.50%
BAL	1994	1	2	2	1	1	3	1	3	13	25.70%
BEC	1998	2	1	1	1	3	2	1	3	12	9%
CHE	1996	2	2	1	1	1	1	1	3	10	45%
FEG	1981	1	3	3	1	2	3	2	2	16	19.70%
FIS	1997	1	3	3	2	1	1	1	2	13	12.40%
GHU	1997	2	1	1	2	2	1	2	3	12	15.80%
GLA	1998	1	3	2	2	3	1	2	2	15	22.60%
GOT	1989	1	3	1	2	3	1	1	3	14	6.80%
GOT	1991	1	3	1	2	3	1	1	3	14	4.90%
GRE	1990	1	3	1	2	1	1	3	3	14	9%
HAL	1996	1	3	1	1	1	1	2	3	12	42%
HOB	1995	1	2	1	2	3	1	3	3	15	23.40%
LAN	1997	1	3	1	1	1	1	1	2	10	11%
OHA	1984	1	1	1	2	2	3	3	3	15	12%
PAY	1980	1	2	3	1	2	1	2	3	14	20%
PIT	1968	1	3	2	2	2	1	2	2	14	10.80%
RIG	1998	1	3	3	2	1	2	1	3	15	10.20%
SPA	1991	1	1	2	1	1	3	2	3	13	27.20%
TAM	1997	1	3	1	2	1	2	1	3	13	12.10%
UGA	1995	1	2	1	2	1	1	1	2	10	8%
VII	1997	1	2	1	2	1	3	1	3	13	19.40%
WAR	1996	1	3	1	1	1	1	1	2	10	11.80%
WAT	1984	1	2	1	2	2	1	3	2	13	23%
WHI	1993	1	3	2	2	3	1	2	3	16	NA
ZEL	1995	1	3	1	1	1	1	1	2	10	3.40%
MEAN		1.14	2.45	1.52	1.55	1.69	1.55	1.62	2.62	13	
S.D.		0.35	0.74	0.74	0.51	0.85	0.83	0.73	0.49	1.83	
r	0.066	0.19	-0.2	0.04	-0.3	-0.2	0.09	0.21	0.22	-0.05	

POP = Population of Study

SS = Sample Size

SA = Sampling Style

RD = Research Design

DM = Diagnostic Method

CT = Data Collection Time

DC = Data Collectors

AE = Expertise of Author(s)

*See Appendix C for Legend of Research Effects Variables

Appendix C

Homogeneity Scoring Sheet

Population

- 1 = Developed Country
- 2 = Under Developed Country

Sample Size

- 1 = 50-100 subjects
- 2 = 101-500 subjects
- 3 = 501 or higher subjects

Sampling Style

- 1 = Convenience
- 2 = Matched with Control
- 3 = Random

Research Design

- 1 = Retrospective
- 2 = Prospective

Diagnostic Measurement

- 1 = Self-Report or Unstructured Interview
- 2 = Semi-Structured Interview
- 3 = Triangulation

Data Collection

- 1 = Untrained Data Collectors/Self-Report
- 2 = Trained Data Collectors
- 3 = Trained Collectors Blind to Condition

Data Collection Times

- 1 = 1-3 months postpartum
- 2 = 3-6 months postpartum
- 3 = 6 or more months postpartum

Author Expertise

- 1 = Masters is the highest degree held
- 2 = Ph.D. or M.D. is the highest degree held
- 3 = Ph.D. or M.D. is the highest degree plus the first author has published multiple studies.

Appendix D (N=30)

Demographic Characteristics

STUDY	YEAR	SS	PR (%)	AGE	MS (%)	PP (%)	SES	ED (%)	EM (%)
ADE	1993	162	14	28.5	79	NA	NA	10.5	NA
AST	1994	799	15.4	NA	86	37	4	12	NA
AUG	1996	352	16.1	NA	NA	NA	NA	NA	NA
BAG	1998	309	14.5	28.2	94	46	3	NA	NA
BAL	1994	200	25.7	28.8	100	NA	2	NA	NA
BEC	1998	82	9	28	67	22	NA	NA	NA
CHE	1996	77	61	17.5	NA	91	1	11	18
CHE	1996	151	37.7	29	NA	49	2	12.5	58
FEG	1981	820	19.7	27	91.5	49.4	3	NA	24.3
FIS	1997	327	12.4	28.9	100	20.7	4	13.6	NA
GHU	1997	95	15.8	29.5	NA	NA	4	NA	19
GLA	1998	288	22.6	28	98.3	27.4	NA	12	NA
GOT	1989	295	6.8	27.8	NA	49.8	3	13	80
GOT	1991	655	4.9	28.3	98	NA	NA	14.5	34
GRE	1990	710	9	27.05	95	39	3	12	NA
HAL	1996	738	42	21.9	45.4	59	1	12	31.9
HOB	1995	192	23.4	24.5	58.3	32.5	1	13	32.3
LAN	1997	370	11	28.9	87	46	5	13	61
OHA	1984	99	12	26.5	100	50	NA	15.1	NA
PAY	1980	120	20	26	NA	NA	NA	NA	NA
PIT	1968	305	10.8	27	100	NA	NA	NA	NA
RIG	1998	570	10.2	30.2	82	50.7	3	NA	NA
SPA	1991	81	27.2	27.4	100	NA	NA	NA	NA
TAM	1997	627	12.1	27.6	100	56.4	NA	NA	NA
UGA	1995	102	8	NA	NA	60	NA	NA	NA
VII	1997	139	19.4	29	95	NA	NA	NA	NA
WAR	1996	2375	11.8	28	85.2	46	4	NA	44.8
WAT	1984	128	23	26.4	82	38	3	NA	NA
WHI	1993	900	NA	28.3	98	NA	NA	14.5	34
ZEL	1995	1559	3.4	30.2	100	42.3	NA	14.6	59.7
TOTAL		13627							
MEAN		469.9	17.8931	27.35	88.7696	45.61	2.875	12.8867	41.4167
S.D.		498.5	12.1873	2.61089	14.6945	15.4242	1.20416	1.36636	19.3542
r				-0.7605	-0.482	0.56005	-0.7474	-0.543	-0.4706

SS = Sample Size

PR (%) = Prevalence Rate

AGE = Average Age

MS (%) = Marriage Rate

SES = Average Socioeconomic Status

ED (%) = Education Rate

EM (%) = Employment Rate

PP (%) = Primiparity Rate

Appendix E

Risk Factors Associated with Postpartum Depression

BIOLOGICAL

Hormonal

PMS – History of Premenstrual Syndrome

APD – Antepartum Depression

PPB – Postpartum Blues

BF – Breastfeeding

NBF – Not Breastfeeding

Genetic

GHD – Family History of Depression

PHD – Personal History of Depression

FHP – Family history of Postpartum Depression

PHP – Personal History of Postpartum Depression

Obstetrical

ORF – Obstetric Risk Factors

PM – Premature Birth

MB – Multiple Birth

A/D – Abnormal or Deformed Birth

CULTURAL

Demographic

<20 – Under 20 Years of Age

>30 – Over 30 Years of Age

PP – Primiparity

MP – Multiparity

MS – Marital Status

PG – Polygamous Marriage

IMG – Immigrant Status

SES – Socioeconomic Status

UEM – Unemployment

EDS – Educational Status

Psychosocial

P/D – Infant Planned or Desired

PA – Previous Abortion

SEX – Sex of Infant

CS – Childcare Stress

MA – Marital Adjustment

LR – Length of Relationship

SS – Social Support

RM – Relationship with Mother

FP – Financial Problems

HD – Housing Difficulties

MO – Maternal Occupational Status

PO – Paternal Occupational Status

REL – Religious Observance

Appendix F

Risk Factors Associated with Postpartum Depression

Study	FII	PH	APD	PMS	PPB	IBF	NHF	<10	>30	OMF	PM	PP	MP	P/D	A/D	PA	SEX	CCS	NIS	MA	PG	LR	SS	RM	IMG	SES	PP	IID	MO	PD	UEN	EDS	REL
68/PTT	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1						2				1	2	1					
80/PAY	2				2	1	1	2		2	1	1	1	1	1	1	1		1	2	2			2	1		1	1	2				
81/PEG	2							2				1	1					2	2	2						2							
84/OHA	2	2	2					1	1	2								2				1				1							
84/WAT	2	2	2								1	1	1	1	1	1			1	2						1							
89/GOT								1	1			1	1																				
90/GRE				2						2		1	1																				
91/GOT				2				1	1			1	1					2	1	2				2									
91/SPA	1			2				1	1			1	1							2													
93/ADH				1				1	1			1	1				1	2		2	1												
93/WHI				2				1	1			1	1							2													
94/AST								1	1			1	1					2	2							2	1						
94/BAL								2		2						2																	
95/HOB				2				1	1										2								2						
95/ROA								1	1			1	1						1														
96/ZEL								1	1			1	2				1										2						
96/AUG								1	1			1	2														2						
96/CHIE								2																									
96/IAL								1	1			1	2																				
96/WAR								1	1			1	1																				
97/FIS	2								2			1	1																				
97/KHU	2							1	1			2	1				2	1															
97/LAN	1							2	1			1	1						2														
97/TAM								1	1			2	2	1			1	2															
97/VH	2							1	1										1	2													
98/BAG								1	1			1	2						2														
98/BEC																																	
98/GLA								1	1			1	1																				
98/RIG								1	1			2	1	2	1			1	1	2													
M	2	1	7	1	7	2	1	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Non-significant = 1, Significant = 2

*See Appendix E for Index of Risk Factors

Appendix G

Rating Instruments Used in the Measurement of Postpartum Depression

- A. **Becks Depression Inventory (BDI)** – A 21-item instrument designed to measure the severity of a broad spectrum of attitudes and depressive symptoms. Each category describes a specific behavioral manifestation of depression and consists of a graded series of 4 to 5 evaluative statements (Beck et al., 1961).
- B. **Edinburgh Postnatal Depression Scale (EPDS)** – A 10-item, self-report scale specifically validated for use with childbearing women. The items refer to depressed mood, anxiety, guilt, and suicidal ideation. The measure does not include somatic symptoms assumed to be a normal part of the postpartum adjustment such as insomnia; weight loss; and appetite changes (Cox et al., 1987).
- C. **Center for Epidemiological Studies (CES-D)** – The CES-D scale is a short self-report scale designed to measure depressive symptomatology in the general population. The items of the scale are symptoms associated with depression, which have been used in previously validated longer scales. The 20-item scale is composed of the following four factors: (1) Depressed affect (blues, depressed, lonely, cry sad); (2) Positive affect (good, hopeful, happy, enjoy); (3) Somatic and retarded activity (bothered, appetite, effort, sleep, get going); and (4) Interpersonal (unfriendly, dislike) (Radloff 1977).
- D. **The General Health Questionnaire (GHQ)** – A standardized psychiatric interview, which is suitable for use in community surveys, and which is geared to the measurement of change in the mental state. The psychiatric interview includes questions regarding the following symptoms: somatic symptoms; fatigue; sleep disturbance; irritability; lack of concentration; depression; anxiety and worry; phobias; obsessions and compulsions; and depersonalization (Goldberg et al., 1970).
- E. **The Pitt Depression Questionnaire (PDQ)** – Pitt developed this questionnaire specifically for postpartum women. The criteria for the presence of PPD are: (1) Subjects should describe depressive symptoms; (2) These symptoms should have developed since delivery; (3) These symptoms should be unusual in their experience and to some extent disabling; and (4) The symptoms should have persisted for more than two weeks (Pitt 1968).
- F. **Present State Examination (PSE)** – The PSE is a semi-structured interview style psychiatric assessment. The objective is to assess the 'present mental state' of adult patients suffering from one of the neuroses or functional psychosis. The symptoms are based on Western European ideas of psychiatric illness which includes: worry; tension; pain; fatigue; restlessness; anxiety; delusions; concentration difficulties; loss of interest; thought disorders; depressed mood; changes in appetite, sleep, and libido; guilt; irritability; suicidal ideation; and substance abuse. (Wing et al., 1974).
- G. **Raskin Three Area Depression Scale** – The severity of depression rating was completed after detailed information on symptoms which had been obtained in a semi-structures interview, the Clinical Interview for Depression. The scale range 3-15, is derived by summing separate 1-5 ratings for three aspects of depression: (1) Verbal report, including depressed feelings, worthlessness, pessimism, suicidal thoughts; (2) Observed depressed appearance at interview; and (3) Secondary symptoms of depression, including insomnia, anorexia, gastrointestinal symptoms, and poor concentration (Raskin et al., 1970).
- H. **Research Diagnostic Criteria (RDC)** – The RDC was developed to enable investigators to select relatively homogenous groups of subjects who meet specified diagnostic criteria. There are 25 major diagnostic categories and there are both inclusion and exclusion criteria. The specific criteria refer to symptoms, signs, duration or course of illness, or levels of severity of impairment (Spitzer, Endicott, and Robins, 1978).
- I. **The Schedule for Affective Disorders and Schizophrenia (SADS)** – SADS was developed in conjunction with the development of the RDC in an effort to reduce information variance in both the descriptive and diagnostic evaluation of a subject. This semi-structured interview evaluation is organized into two parts: (1) Part 1 is designed to generate a detailed description of the subjects current episode or condition as well as functioning during the week prior to the interview and (2) Part 2 is primarily for describing past psychiatric disturbance (Endicott and Spitzer, 1978).
- J. **The Symptom Questionnaire (SQ)** – The SQ is a yes/no questionnaire with brief and simple items. It contains state scales of depression, anxiety, anger-hostility, and somatic symptoms and was developed from earlier versions for clinical research. The scales have been extensively validated and is suitable for the measurement of distress and hostility in research and as a checklist in clinical work (Kellner 1987).
- K. **Zung's Self-Rating Depression Scale (SRDS)** – Zung developed this scale for assessing depression in patients whose primary diagnoses were that of a depressive disorder with the following conditions: (1) Should be all inclusive with respect to the symptoms of the illness, (2) It should be short and simple, (3) It should be quantitative in nature rather than qualitative, and (4) It should be self-administered. In the scale, patients are asked to rate each of the 20-items as to how it applied to them. The 20-items were based on characteristics of depressive disorders (Zung 1964).