THE DEVELOPMENT AND TESTING OF THE BARKIN INDEX OF MATERNAL FUNCTIONING

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Maternal functioning in the year following childbirth has exacted inadequate attention in the research literature. The negative effects of postpartum depression on mother and child have been more extensively studied. This deficit in the area of maternal functioning research is of public health significance as functional status may be a more direct measure of deleterious effects on infant development than depression status.

Functioning and factors associated with functioning during this critical time period for infant development has been primarily studied by a handful of researchers. Prior to the development of the Barkin Index of Maternal Functioning (BIMF), the Inventory of Functional Status After Childbirth (IFSAC) was the only instrument designed for the express purpose of measuring functional status. However, the IFSAC is less than ideal for measuring this important concept; its rigid definition of functional status makes it difficult for women to achieve full functional status. This precipitated the development of the BIMF.

The BIMF was developed through qualitative methods. New mother focus group discussions provided much of the content (and the framework for a new definition of functional status) that is reflected in the BIMF. This method of survey development has many advantages and helps to ensure content validity and a patient-centered product. The BIMF was also critiqued by a panel of experts in relevant fields. This work resulted in a new 20-item self-report

measure of maternal functioning. In an initial psychometric analysis, the BIMF exhibited good reliability (and validity), with a Cronbach's Alpha of 0.87.

An analysis of factors related to maternal functioning (as measured by the BIMF) in a population of women who screened positive for depressive symptoms revealed an association of functioning with depression and atypical depression. Race and atypical depression were independently associated with the BIMF in a stepwise regression analysis. The BIMF and the Gratification Checklist were also significantly and positively correlated.

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1.0   INTRODUCTION

1.1   THE CHALLENGE

Assessment of functioning in the postpartum is a topic that has been explored by a handful of researchers.[1] Their work features the Inventory of Functional Status After Childbirth (IFSAC),[2] which defines functional status as a "multidimensional concept encompassing the mother's readiness to *assume* infant-care responsibilities and *resume* self-care, household, social and community, and occupational activities."[1] While there are a number of instruments that evaluate maternal characteristics such as maternal confidence and self-efficacy, the IFSAC is the only instrument designed explicitly for the measurement of maternal functional status.[1] The IFSAC possesses some limitations, however, which make it less than ideal for the capture of functional status. The IFSAC does not measure a woman's feelings or level of satisfaction with her new role as a mother, but rather assesses role functioning from a task-oriented approach.   It is also difficult to achieve full functional status via the IFSAC due to its rigid way of defining the concept.[3]   In short, women are penalized for changing role sets, which often occur as a natural part of new motherhood.[4] While the IFSAC has provided the first means of studying functional status, an alternative measure (which improves on the limitations of the IFSAC) is necessary.

1.2 THE SIGNIFICANCE OF THE POSTPARTUM PERIOD

The postpartum period, defined for purposes of this project as the 12 months following childbirth, is a critical timeframe for the mother and child. Primipara face the challenges of incorporating the role of motherhood into their existing role set for the first time.[4] Women with more than one child have to manage the addition of an infant (and the responsibilities associated with infant care) into the family system. While the IFSAC may be flawed, its recognition of maternal functional status as a multi-dimensional concept was an astute one. In most cases, mothers are the primary caregivers and are therefore responsible for the majority of the work related to infant care tasks such as feeding, diaper changes and doctor's appointments. In many cases, mothers are attempting to take care of themselves, their infants, maintain relationships with others and manage their share of household and/or occupational activities. Perhaps the most important event of this timeframe is the development of the relationship between mother and child. During this period, infant development is particularly sensitive to the quality of maternal interaction.[5]

1.3 A COMPLICATION OF NEW MOTHERHOOD: POSTPARTUM DEPRESSION

Depression occurs in 14.5%[6] of mothers in the period following childbirth, adversely affecting both mother and child. Postpartum-depressed women do not have optimal experiences in new motherhood and have display lessened: 1) gratification in the maternal role,[7-9] 2) ability to interact with their infants[10-12] and 3) feelings of self confidence.[13,14] Not surprisingly, offspring of postpartum-depressed mothers have displayed insecure attachment,[15] diminished cognitive

performance[16] and higher incidence of temper tantrums.[17] Some of these effects have been observed in children up to 4 years in age. In short, women with PPD are coping with expanding role demands while burdened with depression and all of its associated negative effects.

1.4   FUNCTIONING AND DEPRESSION

While there are several means of quantifying depression, the same cannot be said of functioning. It is important to have the means to measure <u>both depression and functioning</u> in both PPD depressed women and women in general, because it is possible that a mother's functional status <u>is a more direct measure of deleterious effects on infant development than depression status</u>. Consider the mother who is providing good child care, despite the presence of depressive symptoms. Alternatively, a mother may not screen as depressed, and be incompetent in the role of mother. In the latter case, the mother is not depressed but not functioning well, which will certainly affect the child. <u>If functional status were established as the more direct indication of hazard to the child, the importance of capturing it could equal the importance of measuring depression in new mothers.</u>

1.5   THE PURPOSE OF THIS RESEARCH

The presented research was conducted in order to: 1) design an improved measure of maternal functioning, 2) evaluate the new measure's psychometric properties and 3) examine factors associated with functioning (as defined by the new measure).

1.6   THE ROLE OF QUALITATIVE METHODS

Qualitative methods were chosen as the data collection vehicle for the development of the Barkin Index of Maternal Functioning (BIMF) for several reasons. Focus groups have many attributes which are discussed in detail in Chapter 3. It was hypothesized that these specific properties would <u>facilitate the evolution of functioning from a clinician-defined concept to one centered on patient experience</u>. Additionally, focus groups are an excellent way of ensuring content validity.[18]

1.7   THE ROLE OF QUANTITATIVE METHODS

Once the BIMF was developed it was entered into Dr. Katherine Wisner's NIMH-funded Screening Study for Postpartum Depression. This second phase of data collection served several purposes. Firstly, it allowed the research team to observe patient response to the BIMF. Many instruments are developed but are not well received in clinical settings due to issues such as length or convoluted item wording. Second, implementation into the Screening Study allowed

for an examination of the BIMF's psychometric properties. Finally, it provided an opportunity to study factors associated with maternal functioning (as measured by the BIMF) at the baseline assessment.

1.8   PREVIEW OF CHAPTER 2

Prior to the development of the BIMF, the IFSAC was the only instrument designed specifically to measure maternal functional status. However, as mentioned, there are many instruments that assess varying aspects of new motherhood. What was previously unclear was whether or not existing assessments were actually capturing function without explicitly declaring it. For example, several instruments measure self-efficacy, which is certainly related to functioning.

A new definition of maternal functioning emerged from the focus group work and provided an important basis of comparison. According to the new mothers, a woman who: 1) has adequate social support (social support), _and is able to_ 2) take care of her own physical and mental needs (self care and psychological well-being), 3) take care of her infant (infant care), 4) attach to her infant (mother-child interaction), 5) juggle her various responsibilities (management) _and_ 6) adapt over time (adjustment) _is functioning optimally_.

This definition was used as a benchmark for prominent existing instruments; their capacity for measuring functional status _in addition to their stated primary purpose_ was evaluated in light of this new definition. The results of this content analysis and criteria for instrument selection are discussed in Chapter 2.

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2.0 A CONTENT ANALYSIS OF EXISTING MATERNAL ASSESSMENTS IN LIGHT OF A NEW DEFINITION OF MATERNAL FUNCTIONING

2.1 ABSTRACT

Assessment of maternal performance in the year following childbirth is important for a number of reasons including healthy development of the child. There exists a body of instruments that measure a range of maternal characteristics in the period after childbirth such as maternal confidence and self-efficacy. What remains unclear is whether any of these assessments can also be utilized to measure *maternal functioning* which may be a direct indication of potential hazards to the health and development of the offspring. In order to assess whether commonly used maternal assessments extend into the realm of functioning, it is necessary to first have an appropriate definition of functioning. To date, the definition serving as the basis for the Inventory of Functional Status After Childbirth (IFSAC) is the only characterization found in the literature. However, this definition has limitations, as a return to full functional status after childbirth is dependent on the *resumption* of pre-childbirth activities. It also does not account for the mother's state of mind or level of satisfaction with her changed role set. In an attempt to improve on this definition, 31 new mothers were observed in focus group settings. Their experiences in the year following childbirth informed the development of a patient-centered definition of functional status. This definition was then used to evaluate a select group of

instruments for their capacity to assess maternal functioning in addition to their stated primary purpose. While the Inventory of Functional Status after Childbirth (IFSAC) performed best against the new definition with six functional domains, none of the instruments covered all seven domains. These results are not entirely unexpected since the IFSAC is the only instrument *designed specifically* to measure functional status. All of the instruments covered at least one functional domain, which was also expected.

2.2   INTRODUCTION

A number of self-report instruments exist with the primary purpose of assessing characteristics of new mothers. The term "new mother" does not imply first birth (for the purposes of this review), but rather refers to the 12 month window after childbirth. During this critical timeframe, the infant is particularly affected by the "quality of maternal interaction".[1] Additionally, classical work by Mercer[2] proposes that maternal role attainment occurs in the year subsequent to childbirth. Recognizing the importance of this timeframe, researchers have collectively created a body of instruments that measure a range of maternal characteristics. Maternal confidence, maternal competence and feelings, expectations, gratifications, perceived self-efficacy and attachment are all constructs that have been measured by at least one instrument.

The most widely used maternal instruments have been critiqued in terms of their length, applicability and psychometric properties. It is therefore possible to ascertain from the literature which of the existing instruments might be practically applied to a clinical or research setting. What remains unclear is whether any of these instruments can be used to measure *maternal*

functioning in the first postpartum year. It is likely that instruments created to measure concepts such as competency and self-efficacy also afford some coverage of functioning.

While a number of the effects of postpartum depression on mother and child are understood, *maternal functional status has yet to be adequately explored*. It is possible that a mother's functional status is a more direct measure of deleterious effects on infant development than depression status. Typically a multi-dimensional construct, it is also conceivable that women are functioning well in certain areas and struggling in others. An example of this is a woman who directs all of her energy towards infant care but is neglecting self care or adult relationships. Ware et al.[3] state, "the goal of medical care for most patients today is to obtain a more 'effective life' and to preserve functioning and well-being." Therefore, functional status is important to capture in the postpartum period.

As previously mentioned, it is probable that some functional areas are addressed by the existing maternal assessments. However, whether or not any of the instruments provide a comprehensive assessment of functioning *in addition to their stated purpose* is unknown. In order to judge an instrument's fitness for measuring this important concept, it is necessary to first establish a definition of maternal functioning.

2.3   AIMS

The aims of this paper are: 1) to describe the development of a new patient-centered definition of maternal functioning, 2) to identify the most frequently used maternal instruments and 3) to evaluate the aforementioned instruments against the new definition of maternal functioning. The

style or approach of each instrument will also be discussed in this review. The manner in which the questions are framed and word choice are stylistic elements of an instrument.

2.3.1   Aim #1: Development of a New Definition of Maternal Functioning

The new definition of maternal functioning emerged as a result of three new-mother focus groups (N=31) that were held with the intention of tapping into a woman's perspective regarding her role as a mother. This patient-centered approach to defining maternal functional status was chosen over the more traditional "top down" method of relying primarily on the literature and clinician input.[4]   The obvious advantage of this approach is that the resultant qualitative data is based on observations of those *experiencing the condition of interest*. In this case, mothers were consulted directly regarding their experiences with functioning in the year after childbirth. The discussions were led by a trained facilitator, who asked a set of predetermined questions. Progressing from easy to more difficult, the questions were selected in order to elicit the women's concept of functioning. The final two questions of the focus groups required mothers to describe the circumstances surrounding high and low functioning periods. Colloquial, rather than formal, language was used to frame all the questions, since the groups were comprised of women with differing levels of education. By the second focus group, themes were becoming repetitive and distinct areas or domains of functioning emerged and formed an operational definition of maternal functional status. According to the new mothers, a woman who: 1) has adequate social support (social support), *and is able to* 2) take care of her own physical and mental needs (self care and psychological well-being), 3) take care of her infant (infant care), 4) attach to her infant (mother-child interaction), 5) juggle her various responsibilities (management) *and* 6) adapt over time (adjustment) *is functioning optimally.* Therefore, maternal

functional status is a composite measure of performance across the domains of self care, infant care, mother-child interaction, psychological well being (of mother), social support, management and adjustment. These domains of functioning are discussed in detail in the following section.

2.3.1.1 Defining the Domains

The mothers identified the key facets of <u>social support</u> as being 1) help from friends and family with infant care tasks (babysitting, etc), 2) adult interaction (for the mother) and 3) verbal encouragement from other adults. The early stages of motherhood can be lonely and the women emphasized the importance of interaction with other adults. They also described a particularly helpful interaction to them as one where they were praised or complimented for their parenting skills.

<u>Self care</u> refers to the mother's ability to care for her own physical and emotional needs to a degree that is beneficial for both the child and herself. Proper nourishment, attention to hygiene and physical appearance, adequate sleep and willingness to delegate are all examples of self care.

The <u>psychological well-being component</u> of motherhood includes the mother's ability to delegate, take care of her own needs (including the need for social support) and "manage the worry" related to caring for a newborn. It also encompasses the woman's state of mind in general and feelings about being a new parent. Much like the self care component, psychological well-being is built on the premise that in order to have a healthy baby, the mother must also be healthy. The women also identified the ability to trust one's own instincts as being essential to successful parenting and maternal mental health. This requires the mother to

judiciously sort through the advice and opinions of others and decide what makes sense for her and her child.

Infant care encompasses all of the physical needs of the infant (feedings, diapering, bathing, etc) as well as the decision making required to ensure a healthy future for the baby. Making medical appointments when necessary and making sure the home is "baby-proofed" are examples of decision making related to infant care.

The interaction component of motherhood is defined by the quality of communication between mother and child. Focus group participants identified the development of: 1) a mutual understanding between themselves and their infants, and 2) a routine with their baby as being closely linked to their sense of maternal self confidence. The ability to be "present in the moment" with their child was also mentioned repeatedly as being an indicator of good parenting. Women experienced satisfaction if they were able to periodically set aside other life worries and focus on their child exclusively.

Management was one of the most prominent themes in the group discussions. The addition of a child requires the mother to incorporate her new responsibilities into her previously existing set of responsibilities.[2] Several women referred to themselves as "the CEO of the household," a role which required them to manage all things related to the household and infant care. Therefore, the management component refers to the woman's ability to manage and achieve balance. Management can also include the willingness to accept trustworthy help and delegate responsibly. Another aspect of this component is the emotional piece which requires a mother to manage her own anxiety regarding her new role. Many women described an inability to relax or "manage the worry" of being a new mom. They also articulated an understanding of

the negative consequences associated with pervasive anxiety which included a diminished sex and social life, and difficulty enjoying time alone with their infant.

Adjustment, the last component of maternal functioning, refers to the mother's ability to both adapt to her new responsibilities and adjust as those responsibilities change over the infant's first year of life. These domains, comprising the new definition of maternal functioning, provide a basis of comparison for instruments currently in use.

2.3.2 Aim #2: Instrument Selection

In an effort to find the measures most relevant in the literature and also in clinical settings, "Maternal Instrument," "Maternal Measure," "Maternal Questionnaire" and "Maternal Survey" were all used as search terms (databases used: Health and Psychosocial Instruments – 1985 to March 2008, CINAHL 1982-May 2008, PsycINFO 1967 to May 2008, MEDLINE – 1970 to date). The terms "postpartum" and "infant" were used in conjunction with the four main search terms in order to eliminate instruments intended for older children and only self-report measures were considered. The source articles for each of the instruments produced by the electronic search were then manually examined for references of other potentially relevant instruments. The combined search (electronic and manual) resulted in thirty-six self-report instruments that measure *some aspect of mothering*. Many of the instruments could be categorized by topical area such as maternal problem-solving, maternal attitudes and maternal self-efficacy.

Each of the thirty-six instruments was then subject to additional review which resulted in elimination if the instrument was deemed inappropriate for the population of interest. In short, the thirty-six instruments were re-examined to insure: 1) that they were intended to measure performance in mothers with infants, 2) they were self-report instruments and 3) they had a

corresponding source article which clearly explained their purpose. Application of these additional review criteria resulted in a pool of twenty-seven eligible instruments.

The title of the source article for each of the twenty-seven instruments was then entered into SCOPUS™, a citation database for research literature which includes references dating back to 1996. The purpose of this process was to ascertain the number of times the instrument's source paper was referenced in the literature. It is important to note that referencing an instrument's source article does not necessarily indicate use of the instrument itself. In some cases, the measure's development accounts for only a portion of the source article's content.

The list of twenty-seven was then reviewed and pared down to eleven instruments that were referenced seventeen times or more from 1996 to July 31, 2008, the latter being the month during which the search was conducted. Seventeen was determined to be the threshold for inclusion after the instruments were sorted by citation frequency. This is due to the fact that the instruments clustered at and around seventeen citations were also featured in papers which systematically identified commonly used maternal assessments. Additionally, the Inventory of Functional Status After Childbirth[5], which boasts seventeen citations, is the only instrument purported to measure functional status explicitly. Therefore, this instrument could not reasonably be excluded.

Of the remaining eleven instruments, eight were identified in systematic searches performed by Beck[6] and/or Fowles and Horowitz[1]. These reviews identified instruments with published psychometric properties employed in research and primary care settings, respectively. The majority (n=6) of the final eight instruments were covered *by both review papers*. In summary, the final eight selected instruments (bolded in Table 2.1) were referenced at least seventeen times in the research literature, have published psychometric properties, and have been

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utilized in research studies, primary care settings or both. It is important to note that while these review papers also employed systematic searches to identify prominent instruments, the substance of their review was quite different. The reviews focus on applicability, reliability and validity. Their purpose was not to provide an in-depth content analysis of each instrument.

2.3.3   Aim #3: Evaluation of Selected Instruments

Subsequently, the aforementioned instruments were evaluated in light of the new definition of functioning.   Table 2.1 indicates the maternal functioning domains addressed by the eight selected instruments. A greater number of domains addressed indicates more thorough coverage of maternal functioning. Adequacy of coverage within each domain cannot be determined from the table alone, but is discussed in the review of each instrument.

Table 2.1 Coverage of Functional Domains by Selected Instruments

	Maternal Functioning Domains						
	Self Care	Infant Care	Mother-Child Interaction	Psychological Well-being	Social Support	Management	Adjustment
Instrument							
What Being the Parent of a New Baby is Like-Revised[7,8]	X	X	X	X		X	
Gratification Checklist[9,10]			X	X	X		
Infant Care Survey[11]		X					
Myself as Mother[12]			X	X		X	
My Baby[12]			X				
Feelings about the baby/How I feel about my baby now[13]			X	X			
Inventory of Functional Status after Childbirth[5]	X	X	X		X	X	X
Parenting Sense of Competence Scale[14]			X	X		X	X

2.3.3.1 What Being the Parent of a New Baby is Like-Revised (WPL-R)

The 25-item questionnaire, What Being the Parent of a Baby is Like-Revised (WPL-R)[8], evolved from its predecessor, the 7-item, What Being the Parent of a Baby is Like self-report instrument.[7] The additional 18 items added to the original WPL were conceived from open-ended questions answered by 49 mothers.[8] The instrument employs a 9-point graphic rating scale[15] with anchors such as "not easy at all" and "very easy" on either end of the scale. Of the maternal functioning domains presented in this paper, five of seven (self care, infant care, mother-child

interaction, psychological well-being and management) are *addressed to varying degrees* by the WPL-R (Table 2.1). Questions such as, "When you go out and leave the baby with someone else, how much do you have the baby on your mind during the time that you are away?" and "How easy would it be for you to leave the baby with your spouse/partner when you go out?" tap the psychological health, self care and management domains in that they evaluate the mother's ability to delegate and enjoy time away from the baby. Specific aspects of self care related to the mother's physical needs (eating, showering, exercise) were not addressed by this questionnaire. Additionally, while the question "On the whole, how stressful is your life, being the parent of a young baby and perhaps having other things to deal with?" was posed, the questionnaire does not address the mother's perception of her management of all her responsibilities. Rather, the question inquires as to her stress level after making an assumption about other responsibilities. Therefore, while aspects of self care and management are touched on, the coverage is not comprehensive in terms of measuring function. Questions such as, "How much is the baby's physical health on your mind?" and "How much do you think that you positively affect your baby's development?" fall in the infant care domain albeit from the perspective of the mother's *thoughts* regarding infant care. This questionnaire does not require the mother to grade her ability to take care of her infant's physical needs. The WPL-R poses several questions related to mother-child interaction including, "How much do you think your baby enjoys his/her interactions with you?", "How much of the time can you tell what your baby needs?", and "How well do you think you know your baby?" These three questions represent the most thorough coverage of any domain in an attempt to gauge the quality of the communication between mother and child. Social support and adjustment are not measured by the WPL-R.

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2.3.3.2 The Gratification Checklist

Created by Russell[9] and modified by Mercer[10], the *Gratification Checklist* (GRAT) requests that a mother rate her level of enjoyment on each of 14 items. The original version of the GRAT was conceived based on parents' responses to questions regarding what they enjoyed most about their new role. As with all questionnaires, it is important to consider not only the content areas but also the perspective from which the questions are asked. The GRAT begins with the statement, "Since the birth of my baby, I have enjoyed...," and requires the subject to rate their responses on a 5-point scale ("not at all" to "very much"). Mother-child interaction, social support and psychological well-being are the three domains tapped by the GRAT. The most extensive coverage belongs to the social support component as mothers are asked to what degree they have enjoyed: 1) closer family relationships, 2) increased contact with neighbors, 3) more things to discuss with mate, and 4) feeling "closer" to mate. Social support associated with specific child care tasks is not part of the GRAT. Items such as "enjoying baby's company" and "baby fun to play with" target mother-child interaction. However, mothers are not asked to grade the level of understanding between themselves and their infants, but rather their degree of enjoyment related to *specific aspects* of interaction. Lastly, the mother's psychological well-being is measured to some degree by items, "feeling of fulfillment" and "a purpose for living." Self care, infant care, management and adjustment are not addressed by the *Gratification Checklist.*

2.3.3.3 Infant Care Survey

The *Infant Care Survey* (ICS) was developed with the intention of measuring maternal self-efficacy related to infant care[11]. A Bandurian[16] concept, self-efficacy theory refers to the link between a person's belief in their ability to perform a range of tasks within a specific context and behavioral outcomes. The ICS was based on this relationship between confidence and

performance. The statement "an initial pool of 48 statements that represent usual and important infant care behaviors were written" was used to describe the item generation process.[11] There is no mention of new mother input described in the item development of the ICS. Mothers are asked to rate their confidence level from 1 ("Quite a lot") to 5 ("Very little") on 51 different infant care tasks including, "selecting baby foods," "relieving pain from teething," and "recognizing croup." The 51 infant care items are divided into six sections; health knowledge, diet knowledge, safety knowledge, health skills, diet skills and safety skills. Consequently, the only maternal functioning domain addressed by the ICS is infant care. While quite thorough in its coverage of infant care tasks, this questionnaire cannot be used to assess the other aspects of functioning in motherhood.

2.3.3.4 Myself as Mother

The *Myself as Mother*[12] scale employs a semantic differential technique[17] with the intent of evaluating a woman's concept of herself as a mother.[12] The instrument is best described by the author as consisting of "11 bipolar adjective pairs embedded within a 22-item, 7-point semantic differential scale."[12] In order to complete the scale, the mother is required to rate herself from "1" to "7" on twenty-two different adjective pairs. Examples of the pairs are: fast-slow, weak-strong, calm-excitable and moving-still. While mothers at a well-baby clinic (N=104) were involved in the testing of the instrument (factor analysis), the original survey items were selected by the investigator.[18] Higher scores on the *Myself as Mother* scale are indicative of positive maternal self-evaluations. In terms of content, the areas of maternal functioning addressed (to some degree) are mother-child interaction, psychological well-being, and management. Self care, infant care, social support and adjustment are not evaluated. Aspects of the mother's psychological health are tapped by adjective pairs: pessimistic-optimistic, weak-strong,

hopeless-hopeful, tough-fragile, mature-immature, and calm-excitable. None of the items require the mother to assess her ability to care for herself, delegate when trustworthy help is available or set boundaries which are also part of the psychological well-being component. Albeit somewhat inferred, some aspects of mother-child interaction are tapped by the following pairs: kind-cruel, hard-soft, far-near, severe-lenient and cold-hot. While subject to interpretation, these adjective pairs seem to target the mother's level of attachment ("far" vs. "near", "cold" vs. "hot") and communication style ("kind" vs. "cruel", "hard" vs. "soft", "severe" vs. "lenient"). The appropriateness of the severe-lenient item is questionable when referring to mothering an infant. Management style is assessed by items such as fast-slow, weak-strong, successful-unsuccessful, complete-incomplete and calm-excitable. While the first four target overall competency, the calm-excitable item requires the mother to rate her overall anxiety level. This instrument requires a high-level of interpretation on the part of the respondent.

2.3.3.5 My Baby

The *My Baby*[12] scale was developed in tandem with *Myself as Mother*[12] and also uses a semantic differential technique[17], though with 6 items imbedded in 21 adjective pairs[12]. *My Baby* also employs a 7-point scale and adjective pairs include clean-dirty, sweet-sour, pleasant-unpleasant, light-heavy and difficult-easy. This instrument is intended to characterize the mother's perception of her infant. As was the case with *Myself as Mother,* higher scores represent a more favorable evaluation of one's infant. The only maternal functioning domain that relates to the My Baby scale is mother-child interaction. While sweet-sour, pleasant-unpleasant, beautiful-ugly, difficult-easy and belligerent-peaceful are descriptors of the infant, a mother's positive evaluation of her baby related to these items may indicate gratification in the mothering role which is the desired result of interaction. However, this scale is limited in assessing this domain

as it doesn't directly measure the quality of communication between mother and child. A mother describing her child as being peaceful or beautiful doesn't answer the question, "How well do you and your baby understand each other?" This question embodies the key concept of the mother-child interaction component. In summary, the *My baby* scale cannot be used to assess functioning in new mothers.

2.3.3.6 How I Feel About My Baby Now Scale

The 10-item *How I Feel About My Baby Now* scale (FAB)[13] is intended as a measure of parental attachment and consequently can be filled out by the mother or father.[13] The directions instruct the respondent to indicate how they feel "right now about the baby" in regards to a series of statements including "I feel tenderly towards my baby" and "I feel unaware of my baby." The FAB is rated on a 4-point Likert scale with response choices "often," "sometimes," "rarely" and "never." The only two maternal components that apply to the FAB are mother-child interaction and psychological well-being. While statements like, "I feel tenderly towards my baby," and "I feel playful towards my baby" are obvious attempts to evaluate quality of interaction, all ten of the items on the FAB relate to some aspect of the mother – child relationship. Responses to statements such as, "I feel annoyed at my baby," "I feel drained by my baby" and "I feel unaware of my baby" may be some indication of the mother's mental health, although not in any way conclusive or diagnostic. Feeling unaware of one's infant could be a sign of apathy and poor functioning in the maternal role.

2.3.3.7 The Inventory of Functional Status After Childbirth

Derived from the role adaptive function of Roy's Adaptation Model[19] the Inventory of Functional Status After Childbirth (IFSAC)[5] was intended to measure a woman's level of functioning after giving birth.[5] It is the only instrument to date that was designed specifically to measure *functional status* during this timeframe.[20] The IFSAC was derived from its' predecessors, the IFSAC-Q and the IFSAC-MQ. The roots of the IFSAC can be traced back to the Sickness Impact Profile[21] and the postpartum literature, which formed the basis of the IFSAC-Q. While not cited as part of the initial item generation process, maternal input was sought during the refinement of the instrument. It is difficult to ascertain the degree to which the input affected the content of the IFSAC. Fawcett et al.[5] describe functional status as, "a multidimensional concept encompassing the mother's readiness to assume infant care responsibilities and resume self-care, household, social and community, and occupational activities." These five areas represent the subscales of the IFSAC. The household section begins by asking the mother to check off her responsibilities prior to giving birth and to then indicate to what level she has resumed the said responsibilities. For example, a woman who endorsed "doing dishes" would also have to indicate to what level, from 1 ("not at all") to 5 ("fully"), she had resumed this activity. Ironing, caring for pets, and cooking are other sample activities from the household section. The social and community section is similar to the household section with women endorsing their activities prior to pregnancy and then indicating their level of current involvement. Items such as "community service organizations" and "social clubs" are used to measure social functioning for this IFSAC subscale. The self care section requires the mother to respond to a series of phrases based on how their life has been during the <u>past week or two.</u> Respondents can answer "never" to "all the time" on a series of items including "take

walks" and "engage in sexual intercourse as frequently as before this pregnancy." Infant care items are prefaced with the statement, "Please circle the number that indicates to what extent you have assumed your part of the flowing aspects of the baby's care." Sample infant care items include "night feedings" and "change diapers." The occupational activities section is comprised of items such as, "Am accomplishing as much as usual in my job," and "Am doing my job as carefully and accurately as usual." Prior to answering, women must indicate their employment status (yes/no) and are instructed to respond to items as they pertain to the two previous weeks. Both subscale means and an overall mean are calculated for the IFSAC and higher scores indicate greater levels of functioning.

Since the IFSAC is the only instrument developed in accordance with its own definition of functional status, the mapping back to the maternal functioning domains presented in this paper is of particular interest. Self care, Infant Care, Mother-Child Interaction, Social Support and Adjustment are all measured to varying degrees. The psychological well-being of the mother is not measured although it can be argued that low scores in several of the other areas are indicative of impaired mental health. The IFSAC approaches self care from a physical perspective; emotional self care is not addressed. Additionally, these items seem to tap energy level rather than hygienic or emotional self care.

The coverage of infant care corresponds directly with the definition put forth in this paper which describes infant care as encompassing all of the physical needs of the infant. Decision-making regarding the baby's health and safety are not measured by the IFSAC.

The lone interaction item, "play with the baby," is part of the infant care section and is insufficient to characterize the interaction between mother and child.

Social support is measured, to a degree, by six items; community service organizations, professional organizations, religious organizations, socializing with friends, socializing with relatives and social clubs. There is no assessment of support with tasks related to infant care. Also absent is an item gauging verbal encouragement, which women in the aforementioned focus groups repeatedly identified as having a direct effect on their confidence level.

It can be argued that much of the IFSAC is based on the concepts of management and adjustment. By asking the respondent to indicate to what degree they have resumed prior responsibilities, aspects of management and adjustment are measured. However, the mother's perception of her ability to grow and adapt with the infant over time is not requested.

2.3.3.8 Parenting Sense of Competence Scale

The 17-item Parenting Sense of Competence Scale[14] largely measures the *feelings* of a new parent. There are both mother and father versions of this instrument and respondents have six answer choices, from "strongly agree" to "strongly disagree." The items are in the form of statements and are of considerable length, providing a challenge for less literate respondents. The item, "If being a mother of an infant were only more interesting, I would be motivated to do a better job as a parent" is illustrative of this point. While the majority of the items gauge the parent's state of mind, there are two items related to parent-child interaction and one item for both management and adjustment. Sample psychological well-being items include, "Being a parent makes me tense and anxious," and "I do not know why it is, but sometimes when I'm supposed to be in control, I feel more like the one being manipulated." The items, "Being a parent is manageable, and any problems are easily solved" and "Considering how long I've been a mother, I feel thoroughly familiar with this role" relate to the management and adjustment components of functioning, respectively. Items, "The problems of taking care of a baby are easy

to solve once you know how your actions affect your baby, an understanding I have acquired" and "If anyone can find the answer to what is troubling my baby, I am the one" tap aspects of the interaction between mother and child. Emotional and physical self care, infant care and social support are not part of the PCOS.

2.4   DISCUSSION

The definition presented here, in which self care, infant care, mother-child interaction, psychological well-being, social support, management and adjustment constitute the domains of maternal functioning, represents one of two instances where maternal functional status has been characterized.   The other existing definition identifies maternal functional status as, "a multidimensional concept encompassing the mother's readiness to assume infant care responsibilities and resume self-care, household, social and community, and occupational activities."[5] While there is some overlap between the two existing definitions of maternal functional status, there are also disparities. Perhaps the most important difference lies in the development of the definitions themselves.   The new definition reflects the experiences and feelings intimated during three focus groups, with a total of 31 women, where the existing definition was more heavily influenced by the literature.   So, for example, while both definitions have a self care domain, the way self care is approached is quite different.   Additionally, the mother's mental health and the quality of the interaction between mother and child are integral to the new definition of maternal functional status; this is not the case with the previous characterization. This new definition was used to assess the degree to which eight systematically selected maternal assessments were measuring function in addition to their intended purpose.

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While none of the selected instruments covered all seven functional domains, the Inventory of Functional Status After Childbirth (IFSAC) and the What Being the Parent of a New Baby is Like-Revised (WPL-R) provided the most thorough coverage, touching on six and five of the domains, respectively. The Parenting Sense of Competence Scale touched on four domains and the Myself as Mother Scale and Gratification Checklist each covered three areas. The three least comprehensive instruments were the How I Feel About My Baby Now (2 domains), the Infant Care Survey (1 domain) and the My Baby scale (1 domain), the latter being part of a larger instrument. It is important to note that ability to measure function is not an indicator of overall usefulness. An instrument may not measure functional status in its entirety and still achieve its intended primary purpose. Comprehensive measurement of maternal functioning would represent an additional benefit for each of the selected instruments, apart from the IFSAC.

The performance of the IFSAC is not surprising given its status as the only existing instrument designed to measure maternal functional status.[20] However, as discussed earlier, the IFSAC was based on a different definition of maternal functional status than the one introduced in this paper and has some limitations. The rigid definition of functional status makes it difficult for any woman to achieve full functional status[22]. Performance on the IFSAC is dependent on a woman's resumption of the roles she had prior to giving birth. The IFSAC does not take into account that a change in activity level (and type) may be necessary and even satisfactory to the woman. While caring for pets and participating in community service organizations may have been part of a women's life before giving birth, it is also possible for her to perform well in the maternal role in the absence of these activities. A redefining of one's role set is likely after the birth of a child, yet the IFSAC does not take this into consideration. A key omission from the

IFSAC is an assessment of the mother's feelings or state of mind (psychological well-being), both of which are related to functioning.

While the WPL-R involves five of the seven domains of functioning, social support and adjustment are not included in the WPL-R. A weakness of the WPL-R is the way the questions are framed and the degree of difficulty related to reading the questions. Questions, "On the whole, how stressful is your life, being the parent of a young baby and perhaps having other things to deal with?" and "How much does the baby or the baby's care come first in your thoughts, taking precedence over things you would otherwise spend time thinking about?" are two examples of questions that are worded in a confusing manner. Additionally, questions such as, "How satisfied are you with the way that you relate to your baby and your baby's needs?" seem to tap two concepts at once. This lack of clarity in item wording makes the WPL-R formidable even for the educated respondent. Overall, while the WPL-R touches on several of the relevant domains, it is framed primarily in terms of the parent's *thoughts* and is not intended as a comprehensive assessment of maternal functioning. It is plagued by the same issue of convoluted item wording is the Parenting Sense of Competence Scale (PCOS), which features questions such as, "the problems of taking care of a baby are easy to solve once you know how your actions affect your baby, an understanding I have acquired." While the PCOS taps some concepts in a straightforward manner, its overall approach may be overwhelming, especially in the case of a depressed mother. Self care, infant care and social support are not targeted by the PCOS.

The Gratification Checklist imposes little burden on the patient with only fourteen relatively straightforward items, and is currently being used in clinical settings. The GRAT focuses on the mother's *feelings* around social relationships and overall sense of satisfaction

("feeling of fulfillment") since giving birth and can arguably be considered a barometer of the mother's overall mental and emotional health. Tangible aspects of infant or self care are not measured by this instrument.

Narrowest in terms of functioning scope are the Infant Care Survey and My Baby scale, which address aspects of infant care and mother-child interaction, respectively. While not an appropriate measure of maternal functioning, the ICS is generous in its coverage of infant care tasks and is clinical in approach. The *My Baby* scale is appropriate where there is interest in characterizing the mother's evaluation of her infant.

The construct most frequently covered by this group of instruments was mother-child interaction, addressed to varying degrees by seven of eight scales. Psychological well-being, the most expansive of the domains, was involved in five of the instruments. The ICS and IFSAC, which both targeted tangible aspects of motherhood, excluded any assessment of the mother's feelings or mental state. Social support and self care, both identified as essential by the focus group participants, were included in only two of eight scales. This general omission of self care is significant, as mothers noted a direct relationship between *their health* and *their baby's well being* during the focus group discussions. The overwhelming sentiment was that being judiciously "selfish" was both necessary and beneficial to the family system as a whole. Management, which refers to a woman's ability to manage all of her responsibilities, was measured by four of the instruments.

2.5   CONCLUSIONS

This evaluation of selected instruments against a new definition of maternal functional status yielded important information. Through a multi-stage, systematic selection process, the most frequently used maternal instruments were identified. The selection process represents strength of this review process because instruments were chosen based on several criteria including their relevance to research literature and clinical settings. Because the goal of this review was to evaluate the most commonly used maternal assessments the newer, less established instruments were less likely to be chosen for review.

Subsequent to selection, a content analysis revealed the deficits of each instrument in measuring the patient-defined concept of functional status; none of the reviewed instruments covered all seven of the functional domains. While the IFSAC provided the most complete coverage, it has shortcomings. Thus, there is a need for a new measure of maternal functioning that: 1) originates from a patient-centered concept of maternal functioning, 2)is reliable and valid, 3) covers all domains of functioning, and 4) does not present unnecessary burden for the respondent. Ideally, new mother input will be sought prior to item generation, rather than later on in the development process. Mothers' experiences, supplemented by the literature and clinicians' perspectives, should serve as the basis of the measure, as they are the population experiencing the condition of interest.

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3.0 DEVELOPMENT AND TESTING OF THE BARKIN INDEX OF MATERNAL FUNCTIONING

3.1 ABSTRACT

The importance of functioning in the postpartum period is in direct proportion to the importance of new motherhood. In most cases, mothers are the primary caregivers and are therefore responsible for the majority of the work related to infant care tasks such as feeding, diaper changes and doctor's appointments. Additionally, the quality of mother-child interaction in the year following childbirth can affect child development. To date, functioning in the postpartum has exacted scarce coverage with only one instrument claiming to measure the concept explicitly. This necessitated the development of the Barkin Index of Maternal Functioning (BIMF), which was designed to measure this important concept of functioning in the year following childbirth. Three focus groups comprised of 31 new mothers (total) were held with the intention of eliciting women's concept of functioning in the postpartum; these conceptualizations served as the basis for the 20-item, self-report BIMF. The Cronbach's alpha for the BIMF was 0.87, indicating a strong inter-item agreement.

3.2 INTRODUCTION

The importance of functioning in the postpartum is in direct proportion to the importance of new motherhood. In most cases, mothers are the primary caregivers and are therefore responsible for the vast majority of the work related to infant care tasks such as feeding, diaper changes and doctor's appointments.[1] The emotional piece of mothering is equally as important to the child's development. In fact, the quality of mother-child interaction in the year following childbirth can affect child development.[2] In addition to fostering the child's physical and emotional health, a woman must also integrate infant care into her existing and possibly changing responsibilities; this existing work can relate to her occupational activities, housework, self care and maintenance of other relationships in her life. While the role of mother can be deeply satisfying, it is also laden with challenges. As with all personal challenges, an individual's level of functioning can prove an asset or a hindrance. One would expect high levels of maternal functioning to correlate with positive outcomes related to infant development. Likewise, impaired functioning in the postpartum period might impede optimal infant development.

Until recently, the Inventory of Functional Status After Childbirth (IFSAC)[3] was the only instrument with the primary purpose of measuring functional status in the postpartum.[4] Aktan[4] states of the IFSAC, "Although another tool to measure functional status after childbirth does not exist, the use of this tool without refinement may lead to questionable research findings." The rigid definition assigned to functional status is perhaps the clearest disadvantage of the IFSAC; this definition makes the return to full functional status a near impossibility for many women.[5] The IFSAC is built on the premise that women will maintain the roles they had prior to childbirth; it does not allow for flexibility in this regard. Additionally, the IFSAC is clinical in approach; it does not measure women's feelings or levels of satisfaction with the changes in their

lives since childbirth.[3,5] These characteristics may, in part, be a reflection of the methods used to develop the IFSAC. Initial item development for the IFSAC can be traced back to the Sickness Impact Profile[6] and from literature related to the postpartum experience. Maternal input was solicited on a limited basis at different points in the item refinement process. However, it is unclear to what degree the input actually influenced the content of the instrument.

The Barkin Index of Maternal Functioning (BIMF) (Appendix E) was developed as an alternative to the IFSAC in the pursuit of accurately measuring maternal functional status. Despite having a similar goal, the BIMF's development process was quite different from the IFSAC's. The BIMF is not tied to a theoretical framework, whereas the IFSAC was based on the role adaptive function of Roy's Adaptation Model[7]. Therefore, development of the BIMF was not subject to any predetermined criteria but rather driven by the perspectives of 31 new mothers collected via focus group discussions. Clinician input and the research literature played secondary and tertiary roles, respectively, in the instrument's development process; they were both necessary and helpful but did not *define the content of the instrument.*

This approach of using qualitative research as a method for constructing a survey of health status has many advantages. First, focus groups are a relatively inexpensive means for interviewing several people at once.[8] They also provide a way of accessing *participants' own meanings of health and illness*[9], which is of particular value to the task of understanding functioning in the postpartum. In short, the concept of maternal functioning measured by the BIMF is based on the experiences of new mothers. Assigning this level of significance to the views of the population experiencing the condition of interest (in this case, childbirth) helps to ensure content validity[10]. An additional benefit of focus groups is that they allow the investigators to become familiar with the language used by the study population[8], which is

particularly helpful to the item generation process. The BIMF was a benefactor of all the positive aspects of focus group methodology. That said, while the experiences of new mothers were the basis for the instrument's content, the research literature and clinician input were also influential in the development process. A more detailed description of the BIMF's development is provided in the following sections.

3.3   METHODS

3.3.1   Overview of Plan

Planning for the focus groups began in November of 2007 when the study team began to make logistical, methodological and budgetary decisions regarding the focus groups. Through this process, the study team formed inclusion/exclusion criteria, a recruiting strategy and determined that three focus group discussions would be held. Perhaps the most important methodological decision was the choice of discussion questions (Appendix D), which were constructed with the specific purpose of understanding mother's conceptualization of functioning in the postpartum. Details regarding the construction of these questions are discussed in section 3.3.6.

3.3.2   Recruitment

Recruitment took place from February 13, 2008 to March 26, 2008, subsequent to approval from the University of Pittsburgh's Institutional Review Board (IRB), in Pittsburgh, Pennsylvania. Recruiting flyers (Appendix B) were posted in local hospitals, health clinics, daycare facilities,

universities, and elementary schools and efforts to draw a diverse sample were coordinated with the University of Pittsburgh's Center for Minority Health[11]. Word of mouth was a force in the recruitment process as people would often tell friends, family or coworkers who had recently given birth about the study. As stated on the recruitment flyer, in order to be eligible to participate, women had to: 1) have given birth in the year prior to enrollment, and 2) be at least 18 years of age. Once eligibility was confirmed during a screening phone call, women chose the focus group (of three possible) that best fit their schedule, constituting a one-time, two-hour commitment. Consequently, 33 women enrolled in study, with 19 (57.6%) of them reporting that they learned about the study via word of mouth compared to 6 (18.2%) who noticed the flyer. The other 8 (24.2%) women enrolled early in the recruitment period and were not questioned as to their initial point of contact with the study. In total, 33 women enrolled and 31 participated. Two women dropped out due to child care constraints. All women received a reminder email and phone call the day prior to the discussion. Attendance was fairly similar across the three focus groups, with 11 women participating in the first session, and 10 attending both the second and third sessions. The high retention rate may be attributed in part to the opportunity for social support from other new mothers and monetary incentive as each focus group participant received a $50 gift card.

3.3.3 Logistics

The three focus groups were logistically identical, each being held from 6:30 pm to 8:30 pm at a University of Pittsburgh conference center in the last week of March 2008. Dinner and parking were provided as incentives and for the participants' convenience. The environment for focus groups is regarded as important because it sets the tone for what is hopefully an intimate,

productive discussion. In addition to providing dinner, the tables were arranged so that women were facing each other in order to promote direct communication[11]. In an effort to ensure minimal distraction, women were asked not to bring their infants to the focus groups. Despite this request, in the latter two sessions, a few of the mothers attended the discussions with their infants.

Prior to the discussion, women were asked to fill out a short anonymous demographic survey and the Center for Epidemiologic Studies Depression Scale (CES-D) in order to screen for depressive symptoms.[13] The demographic survey was comprised of eleven items, seven of which were aimed at characterizing the mother (Appendix C). These seven variables were age, race, ethnicity, marital status, employment status, education level and household income. Additionally, information regarding the age of the infant, number of other children in the household, number of adults in the household and utilization of daycare services was collected in order to gauge the maternal levels of both burden and support.

3.3.4 Demographics of Participants

Survey results indicated that most participants were married (80.7%), non-Hispanic (96.8%), and living with at least one other adult (93.5%). In terms of race, the majority of the sample was White (80.6%), 16.2% was Black and 3.2% was Asian. Participant's mean age was 30.9 years (s.d.=4.1) and infants were 6.6 months (s.d.=3.6) old on average. Additionally, 40% of women were working part-time (as opposed to full-time (36.7%) or stay-at-home mom (23.3%)), 46.7% had a post-graduate education, 41.9% had a total yearly household income in the $70,001-$100,000 range [$20,000 or less (9.7%), $20,001-30,000 (9.7%), $30,001-$50,000 (9.7%), $50,001-$70,000 (16.1%), $100,001 or more (12.9%)], 58.1% were primiparous, 54.8% were

utilizing daycare to some degree, and 26.7% had depressive symptomatology according to the Center for Epidemiologic Studies Depression Scale (CES-D) (scored ≥ 16 on the CES-D).

3.3.5   Opening Remarks and Confidentiality

The focus groups commenced with carefully prepared dialogue from the facilitator. The opening remarks were meant to both comfort and inform the participants as to the importance of their contributions. The facilitator explained that the purpose of the discussion was to better understand women's experiences in the year following childbirth and that this information would be used to design a new measure of maternal functioning. This approach of placing participants' contributions in context was successful in the Portland Men's Study, where Focus groups served as a resource for the development of a survey of health behavior;[8] a study of men at risk for acquired immune deficiency syndrome (AIDS). Men were willing to participate because the focus groups afforded them the chance to both voice their own personal concerns and to "do something positive about the HIV epidemic."[8]

Participants were encouraged to express their views openly, without worrying about disagreeing with members of the group. Logistics such as the length of the discussion and roles of the facilitator and note taker were also reviewed. Immediate data are provided to the study team by a note taker, who may also capture some of the participant's non-verbal cues. The facilitator also explained that the discussion would be audio-taped and later transcribed for purposes of analysis. Therefore, women were instructed to use first names only, which were placed on name tents in front of them, so as to protect confidentiality. Women were assured that while their statements might be quoted in the development documentation of the functional measure, specific names would not be connected to the dialogue. Finally, women were given a

chance to ask questions or voice any concerns. In general, the women appeared comfortable and ready to begin the discussions.

3.3.6   Discussion Topics

A strength of focus groups as a vehicle for data collection lies in their semi-structured nature. While the participants can venture into uncharted topical territories, the discussions should be guided by the research questions of interest.[14] The questions chosen for the focus groups were selected carefully and in accordance with group process, which dictates that the questions progress from easy ("ice-breakers") to more demanding as the participants become more comfortable and prone to self-disclosure (Appendix C).[15] Mothers were initially asked to discuss the responsibilities associated with new motherhood and the changes that have occurred since giving birth (Appendix C, questions 1 & 2). These questions allowed for factual answers, even if the mother chose to reveal more in her response. The third question, "Describe what a good mom looks like," was an attempt to access the women's conceptualization of a high-functioning mother. In developing these questions, conversational language was favored over the more formal/academic terms, "high functioning" and "low functioning," as a comfortable atmosphere is integral to a focus group's success.[12] For the last two questions, mothers were asked to describe the circumstances surrounding high functioning and low functioning time periods (Appendix C, questions 4 & 5). These questions were asked to gain insight into how each woman characterized her own functioning.

3.3.7   Participant Response

In general, the discussions were robust and flowing, with few periods of silence. The women talked freely to each other throughout, and required little probing from the facilitator. The women welcomed the opportunity to commiserate with other new mothers.   Lack of self-disclosure was not an issue as women discussed everything from feelings of inadequacy, depression, struggles with body image and breastfeeding, pumping breast milk in the workplace, lack of sex drive, loss of identity, lack of social support and management of abusive instincts toward their infant. All the prescribed questions were answered and often the discussion was led into unforeseen territory by the participants themselves. There was a repetition of themes across all three focus groups which provided evidence of the generalizability of the findings. Many of the themes, such as the importance of self care, were constant across race and education level. For example, Caucasian and African-American women alike felt that while becoming less selfish was necessary to motherhood, tending to oneself (physically and emotionally) was equally important. Women with different levels of education seemed to agree that "managing the worry" associated with infant care was also a key ingredient to functioning. The women seemed to feel that pervasive anxiety (related to new motherhood) affected both their quality of life and the quality of mother-child interaction.

At the conclusion of each focus group, the facilitator and note-taker discussed the pertinent themes of the discussions as well as their general impressions. These "wrap-up" sessions were also tape-recorded.

3.3.8 Coding of the Data and Formulation of Survey Questions

The recorded conversations were professionally transcribed and returned to the study team in the form of text files. Initially, codes were created in order to characterize the major themes of the discussions. Each piece of conversation was then assigned a code based on emotive tone and content. Statements with similar codes were then gathered together and survey items were formed. A total of seven codes were identified in the text analysis; these codes translated directly into functional areas. Social support, management, mother-child interaction, infant care, self care, adjustment and psychological well-being (of mother) are both the analysis codes and the functional categories that comprise a new definition of maternal functional status.

As mentioned earlier, the importance of social support was a recurrent theme throughout the discussions:

> To build that confidence. I think it can come within you, but I feel like a pediatrician who really like -- I know my pediatrician, she's almost like a cheerleader. I feel like she was when she was like a teenager. She just sits there and goes go, go, you're doing great. Look of this beautiful baby. She's made of milk. And I'm like oh my god, I'm okay. I'm doing this right. And then you need like your mom or, you know, someone else who's gone through it. And we -- as I said, I never hung around -- I didn't have any cousins who were little. They were all my age. So I didn't have any idea. So you need to build like this group of people around you who all say you're doing awesome no matter what you're doing. You know --

Therefore, this statement (and similarly-themed statements) was coded as "social support" and lent itself to the formulation of Item #9 (Appendix D), "I am getting enough encouragement from other people."

The participants also discussed a substantial increase in their overall level of responsibility:

> I agree. I think it's sort of -- it's not just time management. I feel like I'm managing everything now. Like, you know, and then if I want something done, I'm the one that's responsible for delegating that. You know, would you please. Well, why am I the one who knows that the baby needs to be fed and -- you know, and the trash needs to be taken out and everything. That's really

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been a major shift, I think, since the baby's come home. I feel like now, you know, I'm in charge of everything and then if I want to somebody to do something else, I have to make sure that that happens.

The CEO of the household. And suddenly your husband and even outsiders or family members look to you saying when are things happening. You're supposed to be planning everything now.

These types of comments were coded as "management" and translated into survey Item #17, "I am able to take care of my baby and my other responsibilities."

When asked for examples of high functioning periods women often cited instances when they were able to remain focused on their child exclusively:

I think for me being in a good place means that I can appreciate those little moments where you're just having that happy interaction or you notice the new skill that they just learned and you're able to just sort of soak in that moment and not be thinking about the laundry that isn't done or about the homework that you haven't done or whatever it is. You have that appreciation and can be in the moment with your child. I mean that's a sign that it's okay.

This sentiment was common and was the impetus for Item #5, "I am able to relax and enjoy time with my baby." This comment was categorized as "mother-child interaction."

Infant care, perhaps the most obvious responsibility of new motherhood is described by one of the participants:

Health and well-being of the children.

Okay. And what does that entail to have health and well-being?

Feeding them. Keeping them clean. Changing diapers. Calming temper tantrums. I have more than one you can tell. Basically that's it. Doctor's appointments.

There were many accounts of the tasks that comprise infant care; this dialogue translated in to question #12, "I am taking good care of my baby's physical needs (feedings, changing diapers, doctor's appointments)."

Women in each of the three groups discussed the need to take care of themselves in order to remain a healthy mother. One aspect of self care for the mothers was occasionally taking time for themselves. However, this aspect of self care was often accompanied by feelings of guilt.

> I get such guilt about taking time -- like taking time for myself, I get such a guilt trip and I don't know why. Like I think am I in this tub too long. Do I need to get out and go see what's going on. I actually hid in my car the other day to paint my toenails because I said, I said I'm going -- because he will not leave me alone. If I am in that house, it is my responsibility for these kids. I said I have to go to the store. And I took my nail polish and I sat in the car in the garage and painted my toenails because if I was inside that house, it would have been my responsibility.

> When you're in the middle of it, it's so hard to see. And I think that's the most important thing for a mom is just to take care of herself.

Coded as "self care," this comment and others resembling it served as the basis for Item #11, "I take a little time each week to do something for myself."

> Some of the women felt that they became acclimated to motherhood as time passed:

> I have a 10-month old. I feel like as you get older, as they get older, I think it starts getting slightly easier. And I guess because they start becoming a little bit more independent.

> I think you start reclaiming things too because you do get so sick of being in that pattern that you start -- okay, well, now the baby is taking a nap at this time and I can do this.

> Yeah. And it's a learned -- it's definitely learned.

> And you're more comfortable with them too. At first you don't know what to do with them.

Statements of this genre were coded as "adjustment," and contributed to the development of question #19, "As time goes on, I am getting better at taking care of my baby."

Perhaps one of the strongest themes throughout the discussions was the connection between the mother's mental and physical health and effective mothering.

> The thing that was most helpful to me that anyone said to me when I was really -- I had a very bad case of postpartum depression and it was all getting a little scary. But -- and I was really debating about whether to go on medication because I was breastfeeding and, you know, blah, blah, blah and the nurse practitioner said to me the most important thing this child needs is a healthy mother. Healthy, happy mother. Everything else is just icing on the cake from that. But if you aren't taking care of yourself, you can't take care of this child. And it was such a relief on so many levels to know that, you know, it's okay if I go take that bath if that's what I need to do. It's okay if I have to give this baby some formula. It's okay if I have to take medication to take care of myself because that all works to the end of being a good mother.

(Inaudible) breast milk is the best --

I mean that almost -- that literally almost killed me.

For you to not be healthy and not be able to physically and mentally be there 100 percent for your kid, give up the breast milk. Everybody's lived on formula for hundreds of years. There's no reason why they can't do it now.

.   When you're in the middle of it, it's so hard to see. And I think that's the most important thing for a mom is just to take care of herself.

This piece of conversation piece was one of many that were assigned multiple codes as it touches

on aspects of infant care, self care and psychological well-being. Due to its emotive tone (and

content), it was given a primary code of "psychological well-being." Survey questions #3, #10,

#11 and #13 were also influenced by this rich dialogue.

3.3.9   Expert Review Panel

Upon formulation of the first draft of the instrument, an expert panel was assembled for the

purposes of critiquing the instrument. The panel was comprised of eleven professionals, each

with a medical degree, a doctoral degree or both. Each of the panel members had expertise in *at*

least one of the following areas: survey design, qualitative data analysis, psychiatry, women's

health and reproductive health. A draft of the instrument and its development documentation

was provided prior to a meeting held on July 16, 2008 where the reviewers discussed the

strengths and weaknesses of the instrument. This meeting resulted in a re-wording of several

survey items and a movement towards a seventh grade reading level. Due to its composition

(experts in women's health, psychiatry and survey design participated), the panel was mindful of

the target population and aided in eliminating complicated item wording. There was also

substantial discussion regarding how this maternal functioning instrument compared (in terms of

content) to general measures of functioning. This process provided assurance that the relevant

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domains of functioning were present in the focus group work and the resulting instrument.

Additionally, a time delimiter was added to the instrument's instructions, "Please **circle the**

number that best represents how you have felt **over the past two weeks.** Please try to answer

each question as honestly as possible as your responses will help us to better understand the

postpartum experience.**"** The addition of the two-week timeframe was intended to make the

instrument more viable in clinical settings. No survey items or domains were added or removed

as a result of the expert panel.

A copy of the Barkin Index of Maternal Functioning (BIMF) along with scoring

instructions can be found in Appendix E. In short, a total score is generated from summing the

20 items (after reverse-coding of items 16 & 18). The BIMF total score ranges from 0-120 and

the instrument takes 5-10 minutes to complete.

3.3.10 Correspondence between Items and Functional Areas

Several of the BIMF's survey items correspond to more than one functional area. The item to

functional area mapping is included below. It is important to note that the functional areas are

not intended to serve as subscales. Subscales cannot be formally established until a factor

analysis has been conducted.

Functional Area	BIMF Item
Self care	2, 11, 13
Infant care	12, 14
Mother-Child Interaction	4, 5, 15
Psychological Well-being	1, 2, 3, 5, 7, 10, 11, 16, 18, 20
Social Support	6, 8, 9

Management	7, 11, 13, 14, 17, 18
Adjustment	17, 19

3.3.11 The Role of the Literature

While focus groups are being used more frequently as a method for constructing quality of life surveys[8], many of the existing instruments were developed using a "top-down" approach.[10] In other words, research literature and clinician input determined much of the instruments' framework and content. The danger inherent in this approach lies in its neglect of patient experience, which poses a threat to content validity.[10] However, the research literature can serve as a valuable benchmark for information gleaned from focus groups. While the focus group work in this paper resulted in a novel way of both defining and measuring maternal functional status, there was some conceptual overlap with the existing literature. For example, Logsdon et al.[1] define the key components of mothering as: 1) Maternal-Infant Interaction, 2) Caretaking of Infant, 3) Providing Health Care for the Child, and 4) Finding Gratification in the Mothering Role. These components are analogous to the mother-child interaction and infant care domains presented in this paper. Additionally, Fawcett et al.[3] describe maternal functional status as "a multidimensional concept encompassing the mother's readiness to assume infant care responsibilities and resume self-care, household, social and community, and occupational activities."[5] Infant care, self care and social aspects are also measured by the BIMF, albeit via a different approach. While the two definitions of maternal functional status have similarities in terms of domain names, the coverage of those domains remains distinct. Nevertheless, the postpartum literature provided a useful basis of comparison for the focus group data. In short,

there were no major contextual domains discussed in the literature that were absent from the focus group discussions that were the impetus for development of the BIMF.

3.3.12 Evaluation of the Survey

In order to fully determine the value of an instrument, its psychometric properties must be examined. Content validity was achieved for the BIMF via the focus groups and expert critique. However, reliability and construct validity are also important to establish. In order to further develop the BIMF's psychometric portfolio the BIMF was administered to all women receiving a baseline assessment as part of a NIMH-funded Screening Study for postpartum depression from October 1, 2008 to March 27, 2009. All women receiving baseline assessments had scored ≥ 10 on the Edinburgh Postnatal Depression Scale[16], indicating the presence of depressive symptomatology. The six months of data collection yielded 112 BIMF assessments. Of the 112 collected, 109 surveys were completed in their entirety. The psychometric analysis provided below was based on the 109 completed BIMFs. On average, women were 29 years old, primarily white (72.5%) and Non-Hispanic (97.3%). Infants were 6.6 weeks old, on average, at the time of the baseline assessment. The mean BIMF total score for the 109 women was 81.4 (s.d.=17.1).

3.3.12.1   Distribution of Responses to Items

The response distributions for each of the 20 items are displayed in Table 3.1. The means for items 2 (1.50), 8 (2.90) and 11 (2.23) indicate that, on average, women do not feel rested, may

not be getting enough adult interaction and are lacking time for themselves. Only one woman endorsed "strongly agree" for item 2 ("I feel rested.").

Women tended to endorse higher response categories for items 12 ("I am taking good care of my baby's physical needs"), 14 ("I make good decisions about my baby's health and well being" and 19 ("As time goes on, I am getting better at taking care of my baby"). This indicates that the needs of the infant are top priority. In fact, 83.5% of the women endorsed "strongly agree" for item 12. Likewise, no one endorsed response categories 0 (strongly disagree), 1 or 2 for the same question. Most women (66.1%) "strongly agreed" that they were making good decisions about their baby's health and well-being. The response to items 12, 14, 19 points to a strong emphasis on infant care, while the responses to items 2, 8 and 11 may underscore a deficit in maternal self care.

Table 3.1 Distribution of Responses to Items (n=109)

Item	0 %	1 %	2 %	3 %	4 %	5 %	6 %	Mean (SD)
1	2.75	2.75	4.59	9.17	21.10	22.02	37.61	4.60(1.53)
2	27.52	24.77	26.61	15.60	3.67	.92	.92	1.50(1.28)
3	4.59	4.59	4.59	6.42	9.17	15.60	55.05	4.80(1.78)
4	1.83	1.83	5.50	13.76	17.43	26.61	33.03	4.60(1.46)
5	1.83	2.75	13.76	16.51	26.61	13.76	24.77	4.04(1.55)
6	1.83	8.26	5.50	7.34	12.84	15.60	48.62	4.62(1.75)
7	5.50	3.67	4.59	2.75	14.68	21.10	47.71	4.71(1.75)
8	10.09	14.68	18.35	20.18	16.51	10.09	10.09	2.90(1.78)
9	4.59	6.42	17.43	22.94	8.26	20.18	20.18	3.65(1.78)
10	.92	2.75	5.50	6.42	11.01	22.94	50.46	4.94(1.43)
11	23.85	14.68	21.10	17.43	8.26	7.34	7.34	2.23(1.85)
12	0.00	0.00	0.00	.92	4.59	11.01	83.49	5.77(0.57)
13	4.59	15.60	13.76	16.51	15.60	13.76	20.18	3.45(1.88)
14	0.00	0.00	.92	2.75	7.34	22.94	66.06	5.50(0.82)
15	2.75	4.59	3.67	11.93	24.77	22.02	30.28	4.39(1.56)
16	15.60	14.68	9.17	11.93	20.18	12.84	15.60	3.07(2.06)
17	1.83	11.93	8.26	16.51	23.85	16.51	21.10	3.82 (1.70)
18	14.68	19.27	9.17	19.27	16.51	11.01	10.09	2.77(1.92)
19	0.00	.92	.92	7.34	16.51	24.77	49.54	5.12(1.09)
20	2.75	1.83	5.50	7.34	16.51	27.52	38.53	4.70(1.50)

0=Strongly Disagree, 6=Strongly Agree

Item Key:
1. I am m a good mother.
2. I feel rested.
3. I am comfortable with the way I've chosen to feed my baby.
4. My baby and I understand each other.
5. I am able to relax and enjoy time with my baby.
6. There are people in my life that I can trust to care for my baby.
7. I am comfortable allowing a trusted friend or relative to care for my baby.
8. I am getting enough adult interaction.
9. I am getting enough encouragement from other people.
10. I trust my instincts when it comes to taking care of my baby.
11. I take a little time each week to do something for myself.
12. I am taking good care of my baby's physical needs.
13. I am taking good care of my physical needs.
14. I make good decisions about my baby's health and well being.
15. My baby and I are getting into a routine.
16. I worry about how other people judge me (as a mother).
17. I am able to take care of my baby and my other responsibilities.
18. Anxiety or worry often interferes with my mothering ability.
19. As time goes on, I am getting better at taking care of my baby.
20. I am satisfied with the job I am doing as a new mother.

3.3.12.2 Item Correlations

Table 3.2 provides item-item correlations for all 20 items of the BIMF. A summary of Table 3.2, Table 3.3 identifies item pairs that have Pearson correlation coefficients over 0.50. Items "I am a good mother" and "I am satisfied with the job I am doing as a new mother" were positively correlated (r=.71). Adjustment ("As time goes on, I am getting better at taking care of my baby") and satisfaction ("I am satisfied with the job I am doing as a new mother") were also positively correlated (r=.67). As seen in Table 3.3, item 4, "My baby and I understand each other," had correlations >.50 with BIMF items 5 (relax), 10 (trust instincts), 15 (routine) and 19 (adjustment). The correlations between items 4 (understanding) and 5 (relax) & 10 (trust instincts) hint at an association between a *mutual understanding* and the mother being able to *relax* and *trust her instincts*.

Table 3.2 Inter-item correlations (n=109)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	.23	.26	.51	.36	.30	.26	.24	.46	.46	.23	.34	.38	.43	.40	.07	.42	.29	.57	.71
2		1	.10	.24	.33	.21	.12	.29	.29	.18	.26	-.03	.26	.07	.04	-.09	.27	.11	.10	.24
3			1	.39	.46	.12	.09	.08	.23	.31	.17	.29	.32	.12	.37	.04	.30	.07	.33	.36
4				1	.56	.13	.13	.11	.18	.58	.13	.35	.30	.44	.52	.06	.40	.17	.52	.61
5					1	.29	.20	.29	.27	.40	.23	.26	.37	.33	.41	.10	.42	.20	.41	.42
6						1	.71	.33	.39	.14	.27	.23	.20	.13	.20	-.01	.30	.15	.30	.26
7							1	.33	.41	.16	.11	.31	.30	.25	.17	.10	.14	.25	.37	.33
8								1	.49	.16	.39	.11	.43	.20	.18	.28	.21	.18	.24	.26
9									1	.34	.32	.21	.45	.16	.27	.19	.19	.32	.37	.45
10										1	.11	.32	.27	.49	.48	.10	.42	.20	.61	.63
11											1	.08	.35	.02	.29	.15	.21	-.02	.13	.13
12												1	.21	.48	.42	-.11	.19	.04	.28	.32
13													1	.23	.35	.17	.47	.21	.35	.48
14														1	.53	.09	.29	.10	.48	.48
15															1	.05	.28	.14	.50	.50
16																1	-.03	.18	.16	.13
17																	1	.05	.34	.41
18																		1	.21	.33
19																			1	.67
20																				1

Table 3.3 Item-Item Correlation Summary

R > .70		
		r=
I am a good mother.	I am satisfied with the job I am doing as a new mother.	.71
There are people in my life that I can trust to care for my baby.	I am comfortable allowing a trusted friend or relative to care for my baby.	.71
R > .60		
		r=
My baby and I understand each other.	I am satisfied with the job I am doing as a new mother.	.61
I trust my instincts when it comes to taking care of my baby.	As time goes on, I am getting better at taking care of my baby.	.61
I trust my instincts when it comes to taking care of my baby.	I am satisfied with the job I am doing as a new mother.	.63
As time goes on, I am getting better at taking care of my baby.	I am satisfied with the job I am doing as a new mother.	.67
R > .50		
		r=
I am a good mother.	My baby and I understand each other.	.51
I am a good mother.	As time goes on, I am getting better at taking care of my baby.	.57
My baby and I understand each other.	I am able to relax and enjoy time with my baby.	.56
My baby and I understand each other.	I trust my instincts when it comes to taking care of my baby.	.58
My baby and I understand each other.	My baby and I are getting into a routine.	.52
My baby and I understand each other.	As time goes on, I am getting better at taking care of my baby.	.52
I make good decisions about my baby's health and well being.	My baby and I are getting into a routine.	.53

3.3.12.3   Item-Total Correlations

In order to examine the strength of the relationship between each item and the BIMF total, item-total correlation coefficients were examined. These correlations can be found in Table 3.4**.** Items 1 ("I am a good mother"), 19 ("As time goes on, I am getting better at taking care of my baby") and 20 ("I am satisfied with the job I am doing as a new mother") each had correlations (with the BIMF total score) that were 0.69 or greater.

Table 3.4 Item-Total Correlations

Item	Item-Total Correlation	p-value
1	0.69681	<.0001
2	0.38434	<.0001
3	0.48931	<.0001
4	0.62519	<.0001
5	0.65048	<.0001
6	0.52589	<.0001
7	0.52662	<.0001
8	0.55666	<.0001
9	0.65618	<.0001
10	0.63007	<.0001
11	0.44577	<.0001
12	0.40902	<.0001
13	0.66324	<.0001
14	0.50377	<.0001
15	0.61124	<.0001
16	0.28576	<.0026
17	0.56193	<.0001
18	0.40498	<.0001
19	0.68668	<.0001
20	0.76581	<.0001

3.3.12.4   Internal Reliability

Cronbach's alpha[17] for the 20-item BIMF was 0.87, indicating a strong inter-item agreement. In order to determine whether any of the twenty BIMF items should be removed, the Coefficient Alphas with item deleted were examined. The alphas under all twenty item-deleted scenarios were 0.86 or greater, indicating that removing BIMF items was not beneficial to the overall Cronbach's Alpha. These alphas can be found in Table 3.5**.**

Table 3.5 Coefficient Alphas with Item Deleted

Item	Alpha
1	0.858422
2	0.869210
3	0.867264
4	0.861369
5	0.860224
6	0.865568
7	0.865523
8	0.864318
9	0.859792
10	0.861242
11	0.869539
12	0.869277
13	0.859511
14	0.866707
15	0.861766
16	0.878609
17	0.863868
18	0.871848
19	0.861068
20	0.855817

3.3.12.5   Construct validity

It is important to observe how the BIMF relates to other relevant variables. The Gratification

Checklist (GRAT)[18], the Hamilton-17 (HAM-17)[19], the 12-item Short-Form Health Survey (SF-

12)[20], and the Global Assessment Scale (GAS)[21] were also collected at the baseline assessment to

measure gratification in the mothering role, depressive symptoms, health functioning and

clinician-rated general functioning, respectively. Table 3.4 displays the Pearson correlation

coefficients for the BIMF total score and the aforementioned variables. Correlations with the

mother's age and baby's age (at baseline) are also displayed.   The positive, significant

association between the BIMF and the GRAT (p<.0001) is to be expected as they are both

maternal assessments and there is some thematic overlap. The BIMF is also significantly, yet

negatively correlated with the HAM-17. This is also not surprising as you would expect the

HAM-17 score to decrease (indicating lesser depressive symptoms) as the BIMF total score

increased (indicating improved functioning). There is also a positive, significant association

(p<.0001) between the BIMF and SF-12 mental functioning; this is also to be expected.

Mother's age at baseline is negatively associated (r=.-.127) with the BIMF total score. Though

insignificant, this would indicate that as functioning scores increased, the mother's age

decreased.   This negative association could be due to a difference in: 1) the way younger

mothers rate perceived function or 2) number of other children.

Table 3.6 Correlation of the BIMF Total Score with Selected Variables

	Gratification Checklist total score	HAM-D 17	SF-12 Physical	SF-12 Mental	Global Assessment of Functioning Score	Mother's Age	Baby's Age
BIMF total							
r=	0.55649	-0.20970	0.08159	0.39493	0.16313	-0.12683	0.02713
p=	<.0001	0.0326	0.4294	<.0001	0.1016	0.2050	0.7794
N=	92	104	96	96	104	100	109

3.4   DISCUSSION

The Barkin Index of Maternal Functioning is one of two existing instruments that explicitly

measures *maternal functional status* explicitly. The BIMF was developed from information

garnered during three focus group discussions, one expert review panel and the literature. The

focus groups collectively consisted of six hours of conversation and were intended to collect and

assimilate women's thoughts on functioning in new motherhood, which was defined as the 12 months following childbirth. Changes in the mother's role set since childbirth[18], individual conceptualizations of a "good mother," and circumstances surrounding high and low functioning periods were the main research topics of interest. These three focus groups were successful according to several key parameters. The major research questions (Appendix D) were covered extensively in each of the three discussions and the women required little probing on the part of the facilitator. There was an overwhelming willingness to disclose personal details; this may have been a reflection of the women's need to share their frustrations (and joys) with other mothers. In general, facilitators are trained to handle groups that are less than forthcoming with conversation and to gently encourage participation from timid group members[12]; these skills were rarely put to use in the new mother focus groups. Often, focus group members will speak exclusively to the facilitator rather than communicating directly with the other participants. However, this is not ideal as, "focus groups are characterized by the interaction of group participants *with each other* as well as with the researcher/moderator, and it is this collection of this kind of interactive data that distinguishes the focus group from the one-to-one interview".[9,22,23] Again, this did not apply to the new mothers, where direct communication was the standard. The attendance was also excellent with 31 of 33 enrolled women participating. In short, the focus groups produced rich discussion which served as the basis for the 20-item BIMF.

While qualitative data analysis was the primary source for the initial item development, the BIMF was the beneficiary of extensive expert input. As mentioned earlier, those with expertise in the areas of survey design, qualitative data analysis, psychiatry, women's health and reproductive health critiqued the first draft of the instrument. In addition to providing valuable input on item-wording, the group discussed the implications for the clinical application of the

instrument. There was also a role for the research literature. That is, the research literature was reviewed to ensure that no major contextual domains were missing from the new instrument. The focus group work captured the major themes in the literature.

The BIMF provides an alternative to the Inventory of Functional Status After Childbirth (IFSAC) for measuring maternal functional status. While charged with the same purpose, the two instruments have distinct properties; the IFSAC is more clinical in approach and does not measure feelings[3] or women's levels of satisfaction[5]. The IFSAC is tied to a theoretical framework[7], where the BIMF was borne of a grass roots approach, with women's range of experiences serving as the instrument's framework. The BIMF reflects the new mother's conceptualization of functioning in motherhood. It is not based on a clinical construct of the concept. This approach of measuring functional status is a flexible one that allows for changes in women's roles since giving birth. It also attempts to measure personal satisfaction (Appendix E, question # 20) in the mothering role. While BIMF includes items that gauge social support, it does not specifically address spousal support. This was intentional, as the BIMF is intended as a measure of functioning for all women regardless of marital status.

 Focus groups also provide insight into the type of language being used by the research subjects; this helps to eliminate convoluted item-wording.   The expert review panel also provided suggestions that were critical to improving (and simplifying) the survey's language.

The BIMF covers a broad range of functional areas (self care, infant care, mother-child interaction, psychological well-being (of mother), social support, management, adjustment) which emerged as a result of the discussions. This new application of maternal functional status is a full-bodied construct where the physical and mental health of the mother is essential to optimal functioning. It is important to note that despite its breadth, the BIMF does not measure

any one of the functional areas in great depth. For example, there are instruments dedicated exclusively to the measurement of infant care or mother-child interaction. However, the BIMF addresses these concepts in a general sense.

A potential limitation in the design of the maternal focus groups was their heterogeniety across race and depression status, factors that might influence women's postpartum experience. In general, homogeneity within a focus group promotes open discussion.[24] Ideally, focus group planners should try to anticipate factors that could inhibit discussion. For example, HIV status (among other factors) was considered when researchers from the Portland Men's Study were constructing focus groups.[8] Researchers received information from key informants in the gay male community regarding HIV seropostive men. Their assertion was that these men might feel more comfortable sharing their experiences with other seropositive men.

Initial maternal focus group plans included the following four groups: 1) Non-Depressed African-American Women, 2) Depressed African-American Women, 3) Non-Depressed Caucasian Women, and 4) Depressed Caucasian women. The rationale for this plan was that depressed women may have felt uncomfortable discussing their experiences with depression free women. Race was also thought to be a potentially inhibiting factor. However, practical constraints such as the inability to identify and treat depressed women, prevented the execution of this plan. However, in general, this limitation did not suppress conversation in the three discussions. In fact, some of the most vocal participants were women who admitted to having postpartum depression. In the case of race, the lack of homogeneity might have had some effect. Of the five African American participants, two of the women were rather reserved and required some encouragement from the facilitator, which was atypical for these particular focus groups. Once encouraged, one of the two women became increasingly less reserved and willing to share

her experiences.   It is important to note, however, that the themes of her experiences were not unlike the other women in the group.

An examination of the BIMF's psychometric properties revealed adequate reliability (Cronbach's Alpha=.87) and construct validity. The BIMF was significantly (and positively) correlated with the GRAT and the SF-12 Mental Functioning scales, which is consistent with how one would expect the measures to interact.   Also not surprising was the significant and negative association with the Ham-D-17; one would expect depression to decrease as maternal functioning increases.

It is important to note that the BIMF was developed based on the experiences of a partially depressed population, as 26.7% of the focus group participants screened as depressed. The psychometric analysis, however, was based on a population in which 100% of the women screened as having postpartum depression. It would be interesting to see if the psychometric results were similar after testing on a non-depressed group of women.   While this initial psychometric analysis shows great promise, the BIMF should be tested in other populations in an attempt to verify the results.

In summary, the BIMF was based on qualitative data (collected via focus groups) and expert input. This approach allots the heaviest weight to the experiences of the study population. Upon review of the initial draft version, professionals with expertise in related areas helped to further shape the qualitative data into a survey appropriate for new mothers. The language used by the BIMF was chosen with particular awareness of the target audience; this eliminates the issue of convoluted item-wording which plagues many questionnaires. Most importantly, the instrument is *based on the mothers' concepts of functioning* in the postpartum; this gives it a

unique advantage in the quest of characterizing functional status. The BIMF is appropriate for a

7th grade reading level (and above), and takes about 5 minutes to complete.

3.5   LITERATURE CITED

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4.0   FACTORS ASSOCIATED WITH MATERNAL FUNCTIONING IN A SAMPLE

OF 109 WOMEN EXHIBITING SYMPTOMS OF POSTPARTUM DEPRESSION

4.1   ABSTRACT

Maternal functioning in the early postpartum has thus far been scantily covered. This is problematic, as a mother's functioning has the potential to affect not only the mother-infant dyad, but the entire family system. The Barkin Index of Maternal Functioning (BIMF) provides a patient-centered alternative to measurement of function in the 12 months following childbirth. The BIMF was implemented into a study of women with symptoms of postpartum depression so that its relationships with other key variables could be further examined. At the baseline assessment, maternal functioning was found to be correlated with depression and atypical depression. Stepwise regression analyses revealed race and atypical depression to be predictors of maternal functioning.

4.2   INTRODUCTION

Traditionally, maternal functional status has not been a heavily explored area of study.[1] Information that is available regarding its properties and associations with other variables has been garnered from the work of a select few researchers. While others have contributed, McVeigh, Tulman, Fawcett (and colleagues) are responsible for the bulk of research in this area.[2]

4.2.1   Correlates of Maternal Functioning as Measured by the Inventory of Functional Status After Childbirth: The New South Wales Study

In order to investigate changes of functional status after childbirth and factors associated with functioning, a convenience sample of 200 Australian women who had experienced normal pregnancies, labors, deliveries and had delivered healthy singleton infants between 37 and 42 weeks gestation were surveyed.[1] Women were invited to participate if they were between 20-35 years old and were attending maternal-child health centers or immunization clinics in New South Wales, Australia. Time, parity, social support and anxiety were all factors associated with functional status.

4.2.1.1 Time

The Inventory of Functional Status After Childbirth (IFSAC) was administered at 6 weeks, 3 months and 6 months post-delivery.[1] Total mean IFSAC scores increased as time progressed. However, despite a significant increase in the IFSAC grand mean from 3 to 6 months, none of the mothers had achieved full functional status (according to criteria set forth by the developers of the IFSAC) by 6 months. It is important to note that presence of depression was not assessed

as part of the study. Therefore, it is difficult to anticipate how depression might have affected the functioning trajectory.

This relationship between time and functional status found in the New South Wales Study is partially supported by Tulman, Fawcett (and colleagues) who measured functional status at 3 weeks, 6 weeks, 3 months and 6 months postpartum and found that total IFSAC scores steadily increased from 3 weeks to 6 months.[3] Posthoc contrasts revealed that the improvement was significant between 3 and 6 weeks and 6 weeks and 3 months. However, there was no statistically significant improvement in the total IFSAC score between 3 and 6 months. Again, depression was not assessed as part of the study.

4.2.1.2 Parity

Results from the New South Wales study also describe an association between parity and functional status.[4] Specifically, primapara had significantly lower total mean IFSAC scores at 3 and 6 months than multipara; there were no significant differences in functional status based on parity at 6 weeks. These results must be interpreted with caution, due to the manner in which the IFSAC measures functional status. As mentioned earlier, high performance ratings on the IFSAC are contingent on a woman's resumption of her pre-childbirth roles. There is some suggestion in the literature that primipara receive more social support immediately following childbirth relative to multipara.[5] This possible advantage in social support may allow primipara to share the role demands of motherhood, which could affectively lower total IFSAC functioning scores.

4.2.1.3 Social Support

Social support was measured via the Support Behavior Inventory (SBI).[6] This instrument was employed to assess "partner," "other," and total social support.

Satisfaction from support from partner was significantly correlated with infant care (at six weeks), self-care (at three months), and social and community activities (at six months). Social support from others was not significantly associated with any of the IFSAC subscales.

While no significant relationship was found between the total social support score and the total mean IFSAC score at any of the time points, total social support was correlated with the self-care and social and community subscales at 6 months postpartum.[4]

4.2.1.4 Anxiety

Maternal anxiety was assessed by the Spielberger State Anxiety Inventory[7], which captures how respondents feel 'right now'. A significant, inverse relationship was identified between total functional status and maternal anxiety at 6 weeks, 3 months and 6 months postpartum.[8]

4.2.2   Other Correlates of Functional Status

4.2.2.1 Satisfaction with level of stamina and well-being, Sleep pattern at night, Perceived lack of support following childbirth

In a study similar to the New South Wales Study, 200 mothers living in Victoria, Australia between the ages of 20-35 were surveyed at 6 weeks postpartum regarding their functional status.[9] Inclusion criteria was similar to the New South Wales study in that mothers had been attending maternal child health centers and experienced normal pregnancies, deliveries and had delivered healthy infants. Women with histories of psychiatric disorders were excluded. In

addition to the IFSAC, mothers were required to complete a background data sheet which included requests for some standard demographic information as well as information specific to the experience of motherhood. Maternal age, parity, satisfaction with level of stamina and well-being, lack of support following childbirth, baby's sleep pattern at night, and baby feeding method were entered as independent variables in a stepwise regression analysis predicting the IFSAC grand mean. Satisfaction with level of stamina and well-being, baby sleep pattern at night, and perceived lack of support following childbirth were identified as predictor variables, together explaining 43% of the variance in functional status.

4.2.2.2 Fatigue

Fatigue levels as measured by the Fatigue Continuum Form (FCF)[10] and maternal functional status were observed in a convenience sample of 109 active-duty military women.[11] In order to participate, women had to: 1) be serving on active military duty, 2) have delivered a single, healthy, term infant and 3) be considered healthy (e.g. no intravenous antibiotics or eclampsia, postpartum hemoglobin > 10). Participant age ranged from 18 to 38 years old. Fatigue levels were collected before hospital discharge (time 1), at the 2-week well-child appointment (time 2), and at the 6-week postpartum visit (time 3). Maternal functional status was collected at 6 weeks only. Fatigue and functional status were significantly ($p<.05$) yet weakly correlated ($r=.233$) at 6 weeks postpartum. This indicates that higher levels of fatigue are associated with diminished functioning.

4.2.2.3 Depression

In a study by Posmontier,[12] functional status was compared in women with and without postpartum depression, as determined by the Postpartum Depression Screening Scale[13].

Functional status was found to be negatively correlated with PPD in all areas except infant care. Lower household, social and personal functioning was correlated with PPD and multiple regression analysis revealed PPD to be a predictor of lower overall IFSAC scores. This lack of a predictive relationship between PPD and infant care functioning is supported by evidence that even while burdened by depressive symptoms, women continue to afford good infant (physical care).[14-16]

4.2.3   A New Measure of Maternal Functioning: The Barkin Index of Maternal Functioning

The IFSAC provides a way to assess both overall and domain-specific functioning in the postpartum period. It has also allowed researchers to begin exploring the relationship between functioning and other variables of interest. However, the IFSAC has some characteristics which impede its ability to adequately measure maternal functioning. Specifically, a return to full functional status according to the IFSAC is inextricably linked to a woman's resumption of pre-childbirth activities. This is a faulty assumption as women often experience changes in their role set after giving birth[17] and changed priorities are not synonymous with poor functioning. Additionally, the IFSAC possesses a task-oriented approach; it does not take into account levels of satisfaction nor does it measure feelings. It has been suggested in the literature that the definition on which the IFSAC is based makes it difficult for women to return to full functional status.[2] This suggestion is partially substantiated by the McVeigh study in which none of the women achieved full functional status by 6 months postpartum.[2]

The Barkin Index of Maternal Functioning (BIMF) was developed as a vehicle for further exploring functional status in the first year postpartum. A 20-item self report measure, the BIMF

is based on a patient-centered definition of maternal functional status. Specifically, three new-mother focus groups were held in order to elicit women's experiences regarding functioning in the 12 months following childbirth. These experiences, in addition to expert input and literature review were the basis for the BIMF. The 20 items are summed to produce a total score, which ranges from 0-120. Greater numbers are associated with higher levels of functioning. The Cronbach's alpha[18] for the BIMF was 0.87, indicating a strong inter-item agreement.

4.2.4   Purpose of this study

Designed from a grass roots approach, the BIMF reflects functioning from the perspective of new mothers. It is important to understand how this new instrument performs in context. Likewise, it is important to understand how maternal functioning, as characterized by the BIMF, relates to other variables of interest. The NIMH-funded Screening Study (for postpartum depression), based out of the University of Pittsburgh Medical Center, provided a forum for the study of the new measure's characteristics.

The Gratification Checklist (GRAT)[17], also collected at baseline, is not a measure of function, but of gratification in the maternal role; this instrument has been used as a proxy measure of function in the past. The GRAT requires the mother to rate her level of enjoyment from '1' (not at all) to '5' (very much) on each of 14 items[17] and focuses on the quality of familial and social relationships connected to the mother. For example, the mother is asked to what degree she is feeling closer to her mate. The mother is also asked to what degree she is experiencing fulfillment and "a purpose for living."[17] Such items tap aspects of the mother's mental and emotional health.

While the GRAT was not designed with the intention of measuring maternal functional status, it has been used in that capacity. The lack of an attractive alternative for measuring the concept may have led researchers and clinicians to use the GRAT out of context. The Screening Study provides an opportunity to simultaneously examine the GRAT and the BIMF in terms of their associations with variables of interest.

4.3   METHODS

4.3.1   Implementation of the BIMF into the Screening Study for Postpartum Depression

The Screening Study includes a baseline assessment of women who: 1) are at least 18 years of age, 2) have given birth within the 12 weeks prior, 3) are English-speaking and 4) have scored $\geq$ 10 on the Edinburgh Postnatal Depression Scale (EPDS).[19] Women are diagnostically evaluated at the baseline assessment via the Structured Clinical Interview for DSM-IV (SCID).[20]

Other assessments collected at baseline are measures of depression (Structured Interview Guide for the Hamilton Depression Rating Scale, (SIGH-ADS)),[21] global functioning (Global Assessment Scale, (GAS)),[22] social functioning (SF-12)[23] and gratification in the maternal role (GRAT)[17]. Demographic information is collected during the screening process which precedes the baseline assessment. The Screening Study is a total of 5 years in length with a 3.6 year subject accrual period. Recruitment began on March 26, 2006.

Subsequent to University of Pittsburgh Institutional Review Board approval, the BIMF was included in the Screening Study baseline assessment packet.   BIMF implementation

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occurred in year three of the Screening Study's recruitment period. Data collection was conducted from October 1, 2008 to March 27, 2009 during which time 109 completed BIMFs were obtained.

4.3.2 Specific Aims

4.3.2.1 Aim #1

To explore, via bivariate analysis, which sociodemographic and clinical variables are associated with maternal functioning (as measured by the BIMF). Special attention will be paid to the relationship between ***maternal functioning and depression*** (as measured by the 17-item Hamilton-D which is collected as part of the SIGH-ADS). ***We hypothesize that maternal functioning and depression will be significantly and inversely related.***

4.3.2.2 Aim #2

To determine which sociodemographic and clinical variables are independently associated with maternal functioning via stepwise regression.

4.3.2.3 Aim #3

To explore, via bivariate analysis, which sociodemographic and clinical variables are associated with gratification in the maternal role (as measured by the GRAT).

4.3.2.4 Aim #4

To determine which sociodemographic and clinical variables are independently associated with gratification in the maternal role via stepwise regression.

4.3.2.5 Aim #5

To explore the association between maternal functioning and maternal gratification. Due to the fact that they are both assessments intended for the postpartum period, **_we hypothesize that maternal functioning and maternal gratification will be significantly and positively correlated._**

4.3.3   Variables of Interest

4.3.3.1 Sociodemographic variables

The demographic variables included in this analysis were race, Hispanic ethnicity, marital status, education level, type of medical insurance, age of mother (at baseline) and age of baby (at baseline). Analysis variables were chosen based on availability and appropriateness.

4.3.3.2 Maternal Functioning: The Barkin Index of Maternal Functioning (BIMF)

Maternal functioning was assessed via the Barkin Index of Maternal Functioning (BIMF), a 20-item self report measure designed to assess functioning during first year postpartum. The measure consists of a series of statements that the respondent is asked to rate on a Likert scale[24] from 0 "Strongly Disagree" to 6 "Strongly Agree." The BIMF addresses functional domains such as self care, infant care, social support, management, adjustment and psychological well-being (pertaining to the mother). The BIMF's 20 items are summed to form a total score which ranges from 0-120. Larger scores indicate higher levels of functioning. The BIMF has demonstrated adequate internal consistency reliability with a Cronbach's alpha of .87.

4.3.3.3 Gratification in the Maternal Role: The Gratification Checklist (GRAT)

Gratification in maternal role was measured by the Gratification Checklist (GRAT), a 14-item self-report measure designed to quantify gratification/satisfaction in the maternal role. The GRAT begins with the statement, "Since the birth of my baby, I have enjoyed...," and requires the subject to rate their responses to a series of statements on a 5-point scale ("not at all" to "very much"). Sample items include "Pride in my baby's development" and "Enjoy baby's company." Also explored by the GRAT are the mother's relationships with her mate, relatives and neighbors in the period following childbirth. The GRAT total score is a summation of the 14 items which ranges from 14-70. Larger scores are indicative of greater maternal gratification. Internal consistency for the GRAT ranges from .77 to .85.[25]

4.3.3.4 Depression: Hamilton Depression Rating Scale (HAM-D-17)

The Hamilton Depression Rating Scale[26] was captured as part of the clinician-administered Structured Interview Guide for the Hamilton Depression Rating Scale (SIGH-ADS). The HAM-D-17 is used to assess severity of depression and includes the following constructs: mood, anhedonia, social withdrawal, guilt, sleep, energy, anxiety, somatic symptoms, agitation, insight, psychomotor retardation and suicidality. Higher scores on the HAM-D-17 denote greater severity of depression. The psychometric properties of the HAM-D-17 have been established by multiple studies.[27]

4.3.3.5 Atypical Depression (Atypical)

Atypical Depression was also assessed via the Structured Interview Guide for the Hamilton Depression Rating Scale (SIGH-ADS). The scale is comprised of eight items including social withdrawal, weight gain, appetite increase, increased eating, carbohydrate craving or eating,

hypersomnia, fatigability and diurnal variation. The atypical total ranges from 0-26 with higher scores indicating greater severity of atypical depression.

4.3.3.6 Bipolar Diagnosis

Bipolar Diagnosis was determined by the SCID[20] at the Screening Study's baseline assessment.

4.3.4   Analytic Approach

The analyses presented are based on the 109 women who completed baseline assessments as part of the National Institute of Mental Health-funded Screening Study during the six-month timeframe beginning October 1, 2008 and ending March 27, 2009. Identical analytical approaches were employed for the BIMF and the GRAT.

4.3.4.1 Aims 1 & 3

Bivariate analyses were performed in order to examine which sociodemographic and clinical variables were associated with maternal functioning and gratification in the maternal role. Associations between the maternal functioning and maternal gratification total scores and two-level categorical variables were examined using the Wilcoxon Rank Sum Test. Associations for variables with three or more levels were tested via the Kruskal-Wallis. In order to explore the relationships between maternal functioning, maternal gratification and other continuous variables, Pearson correlation coefficients were generated.

4.3.4.2 Aims 2 & 4

Exploratory stepwise regression was performed in order to identify factors independently associated with maternal functioning and maternal gratification. All variables that were examined in the bivariate analysis were also included as covariates in the regression models. The variables remaining in the final models were all significant at the 0.1500 level, which was also the threshold for variable entry.

4.3.4.3 Aim 5

A Pearson correlation coefficient was generated to explore the association between maternal functioning (BIMF) and maternal gratification (GRAT).

4.3.5   Power

Power calculations were conducted for both the Wilcoxon Rank Sum test and Pearson Correlation Coefficients <u>assuming 80% power and an alpha of 0.05.</u> Three power calculations were performed for the Wilcoxon Rank Sum Test, assuming different population splits between n_1 and n_2. The results are displayed in Table 4.1.

Table 4.1 Power Calculation Scenarios

	N1	N2	α	Power	Effect size
Wilcoxon #1	54	55	.05	.80	.54
Wilcoxon #2	65	44	.05	.80	.54
Wilcoxon #3	76	33	.05	.80	.58
Correlation	109	---	.05	.80	R1=.26

4.4   RESULTS

4.4.1   Sample Characteristics

The baseline characteristics of the sample of 109 women are displayed in Table 4.2. In terms of race and ethnicity, the sample was primarily White (72.48%) and Non-Hispanic (97.25%). When asked for their marital status, 41.28% of the women indicated that they were married compared to 58.72% who were not married. Public insurance was being utilized by 55.05% of the sample, while 43.12% were using private insurance. Only two (1.83%) of the women were uninsured. The most frequently occurring level of education was "Some college or trade" at 40.37%. The percentage of women in the lowest ("< High School") and highest ("Degree(s) beyond college") categories of education were fairly even at 8.26% and 9.17%, respectively. The proportion of women in the H.S. Diploma or GED category (22.02%) was comparable to the

proportion having a College Degree (20.18%). A substantial percentage of the sample was diagnosed as being bipolar (34.86%), relative to 65.14% without the disorder.

On average, mothers were 29.0 years old (s.d.=5.9) at baseline and babies were 6.6 weeks old (s.d.=1.7). There was little variation in the baby's age at baseline, as women who hadn't completed a home visit by 12 weeks postpartum were generally excluded from the study. The mean HAM-D-17 score of 13.5 (s.d.= 4.3) does not signify an extremely depressed population which is reflective of the Screening Study's inclusion criteria. An EPDS[17] score ≥ 10, allowed women in the mild range of true major depression to be included in the study. Additionally, the mean Atypical Depression score was 5.3 (s.d.=3.0).

Mean maternal functioning as measured by the BIMF was 81.4 (s.d.=17.1) and total scores ranged from 30 to 116. This means that a total score of 30 represents *the lowest functioning woma*n in the sample population, whereas the *highest functioning woman* received a score of 116. On average, women scored 49.6 (s.d.=9.0) on the GRAT. Larger total scores on the GRAT indicate greater gratification in the maternal role; the GRAT ranged from 29-69 in this sample. Histograms for both the BIMF and the GRAT can be found in Appendix F and G, respectively.

Table 4.2 Characteristics of 109 Patients with Completed Baseline BIMF Assessments

Baseline Characteristics	% of Subjects	
Race		
White	72.48	
Non-White	27.52	
Hispanic		
Yes	2.75	
No	97.25	
Marital Status		
Married	41.28	
Not Married	58.72	
Education		
< HS	8.26	
HS diploma or GED	22.02	
Some college or trade	40.37	
College degree	20.18	
Degree(s) beyond college	9.17	
Bipolar		
Yes	34.86	
No	65.14	
Insurance		
Private	43.12	
Public	55.05	
Uninsured	1.83	
	Mean (SD)	Median (range)
Mother's age (at home visit, years)	29.0(5.9)	28.9(18.6-43.0)
Baby's age (at home visit, weeks)	6.6(1.7)	6.3(4.3-12.9)
Barkin Index of Maternal Functioning	81.4(17.1)	84.0(30-116)
Gratification Checklist	49.6(9.0)	50.0(29-69)
Ham-D-17	13.5(4.3)	13.0(4.0-23.0)
Atypical	5.3(3.0)	5.0(0-17.0)

Abbreviations: HAM-D-17 = 17-item Hamilton Depression Rating Scale

4.4.2   Aim 1: Which sociodemographic and clinical variables are associated with maternal functioning?

As seen in Table 4.3, the BIMF was significantly correlated with the HAM-D-17 (r=-0.21, p=.0326) and Atypical Depression (r=-0.25, p=0.0100). This negative correlation between maternal functioning (BIMF) and depression (HAM-D-17), indicates that as maternal functioning increases, depressive symptoms decrease; the same holds true for atypical depression

The bivariate analysis of this relationship supports the hypothesis that maternal functioning and depression are associated.

4.4.3 Aim 3: Which sociodemographic and clinical variables are associated with gratification in the maternal role?

As seen in Table 4.3, maternal gratification was significantly correlated with the HAM-D-17 and atypical depression. As with the BIMF, as GRAT scores increase, depressive symptoms decrease (r=-0.32, p=0.0017). The same holds true for the relationship between atypical depression and maternal gratification (-0.31, p=0.0029).

Table 4.3 Factors Associated with Maternal Functioning (BIMF) and Maternal Gratification (GRAT)

		BIMF				GRAT		
Factor	N	Mean	SD	p	N	Mean	SD	p
Race				0.2982				0.1419
White	79	80.40	17.58		68	48.93	9.17	
Non-White	30	84.20	15.85		24	51.42	8.45	
Hispanic				0.2532				0.8412
Yes	3	92.00	16.09		2	50.50	13.43	
No	106	81.12	17.14		90	49.56	9.00	
Marital Status				0.2243				0.9812
Married	45	80.04	13.70		40	49.70	9.30	
Not Married	64	82.40	19.23		52	49.50	8.90	
Education				0.2219				0.4873
< HS	9	91.78	10.17		6	51.17	3.06	
HS diploma or GED	24	82.58	17.00		23	49.70	9.19	
Some college or trade	44	80.50	19.42		34	47.50	9.18	
College degree	22	77.86	15.60		20	51.50	10.12	
Degree(s) beyond college	10	81.20	13.40		9	51.78	7.70	
Bipolar				0.2381				0.2530
Yes	38	78.30	19.28		30	47.70	8.37	
No	71	83.10	15.76		62	50.48	9.23	
Insurance				0.0638				0.3443
Private	47	78.72	14.25		42	50.20	9.19	
Public	60	83.80	19.12		48	49.35	8.94	
Uninsured	2	73.50	0.71		2	42.00	5.66	
	N	r	p		N	r	p	
Mother's age	100	-0.13	0.2050		86	-0.09	0.4034	
Baby's age	109	0.03	0.7794		92	0.11	0.2869	
Ham-D-17	104	-0.21	0.0326		91	-0.32	0.0017	
Atypical Score	107	-0.25	0.0100		91	-0.31	0.0029	

Abbreviations: HAM-D-17 = 17-item Hamilton Depression Rating Scale

4.4.4   Aim 2: Which sociodemographic and clinical variables are independently associated with maternal functioning?

Race and atypical depression were each significantly and independently associated with the BIMF (as seen in Table 4.4). White women reported considerably worse maternal functioning than non-white women. Atypical depression symptoms decrease with increased maternal functioning.

4.4.5   Aim 4: Which sociodemographic and clinical variables are independently associated with gratification in the maternal role?

Race, depression (HAM-D-17) and atypical depression were found to be independently associated with the GRAT (as seen in Table 4.4). White race was associated with lessened gratification in the maternal role. Severity of depression (as measured by the HAM-D-17) and atypical depression decreases with increased maternal functioning.

Table 4.4 Factors Independently Associated with Maternal Functioning (BIMF) and Maternal Gratification (GRAT)

	BIMF R^2=.1362		GRAT R^2=0.2089	
Factor	β	p	β	p
White (ref: non-white)	-7.42	0.0547	-4.02	0.0564
HAM-D-17			-0.50	0.0264
Atypical	-1.80	0.0012	-0.76	0.0125

4.4.6   Aim 5: Are maternal functioning and maternal gratification correlated?

An additional Pearson correlation coefficient was produced for the association between the BIMF and the GRAT to gauge overlap between the two maternal assessments. This coefficient (r=0.55649, p=<.0001) signifies a highly significant, positive correlation between maternal functioning and maternal gratification.

4.5   DISCUSSION

Until recently, the Inventory of Functional Status after Childbirth[5] was the only means of measuring maternal functional status.[2] The Barkin Index of Maternal Functioning affords a clinically applicable, patient-centered alternative for measuring this important concept.   The Screening Study for postpartum depression provided an opportunity to study the new measure's characteristics and associations with other variables. Data regarding gratification in the maternal role (GRAT) was also collected at baseline. This is significant because the GRAT has been used as a proxy measure of maternal functioning in past research studies. In short, the Screening Study allowed for the simultaneous analysis of factors related to maternal functioning and maternal gratification.

The bivariate analysis of the BIMF revealed associations with depression and atypical depression. Maternal gratification (GRAT) was also associated with depression and atypical depression in the bivariate analysis. The negative, significant correlation between the BIMF and the HAM-D-17 is not surprising as depressive symptoms have been linked to decreased maternal functioning in the literature.[12] Due to the thematic overlap between the BIMF and the GRAT, the relationship between maternal gratification and depression also makes intuitive sense.

Race and atypical depression were revealed to be independently and significantly associated with maternal functioning via stepwise regression analysis. Likewise, race and atypical depression were identified as predictors of maternal gratification; depression was also a predictor variable of gratification in the maternal role. In the case of the Screening Study, atypical depression is measured by eight items including (but not limited to) weight gain, increased appetite, hypersomnia and fatigability. Atypical depression was determined by the presence of hypersomnia (oversleeping) and hyperphagia (overeating) exclusively in the

National Comorbidity Survey.[29] Other definitions of atypical depression, including the Columbia Criteria[30] also gauge the presence of overeating and oversleeping. Given that fact that atypical depression is largely an assessment of these reversed vegetative symptoms, it is difficult to explain the relationship between maternal functioning and atypical depression and maternal gratification and atypical depression. One possibility is that the sleep behaviors assessed by the 8-item atypical depression scale are indicative of functioning.

Depression (HAM-D-17) was found to be independently associated with maternal gratification only; it was not found to be predictive of maternal functioning. Additionally, the correlation between maternal gratification and depression was stronger than the correlation between maternal functioning and depression in the bivariate analysis. It is possible that the items on the GRAT such as "Feeling of fulfillment" and "A purpose for living" are more closely related to depression than the items on the BIMF, which assesses the mother's psychological well-being from a different perspective. BIMF Items such as, "I am comfortable allowing a trusted friend or relative to care for my baby" and "I worry about how other people judge me as a mother" indirectly assess aspects of the mother's psychological well-being through her management of the role demands of motherhood.

There are a variety of potential reasons for the observed relationship between white race and diminished maternal functioning and gratification. A disparity in expectation level (between whites and non-whites) regarding one's own performance in the maternal role could account for the association. Differences in defining sociodemographic characteristics such as marital status and education might also contribute to the observed effect of race on functioning and gratification.

4.5.1　Strengths and Limitations

The depressed population studied in this analysis of factors related to maternal depression (and maternal gratification) represents both strength and a limitation. The availability of depression data allowed for the further substantiation of the work by Posmontier, who found depression to be predictive of lower IFSAC scores.[12] Both maternal functioning *and maternal gratification* were inversely related to depression in this analysis.

Possible associations between maternal functioning and variables such as bipolar diagnosis and atypical depression were explored in this analysis. This represents the first time (to the best of the author's knowledge) that an association was reported between maternal functioning and atypical depression.

This study helped to further the understanding of factors related to maternal functioning as assessed by a new, patient-centered instrument, in a depressed population. While a substantial 14.5% of women suffer from postpartum depression[31], these results are still not generalizable to the entire childbearing population. The characteristics that typify depressed women may have influenced the relationships observed between maternal functioning and other key variables in this study.

Finally, the presented results are capable of neither supporting nor refuting functional status as a correlate of time, fatigue, social support, anxiety or parity as previous studies have. These data were not systematically collected as part of the baseline Screening Study assessment. Because each of these variables has the potential to contribute to the understanding of maternal functioning, they should be collected in future studies.

4.5.2   Conclusions

This study provided some initial evidence of a relationship between maternal functioning (and gratification) and atypical depression. Atypical depression was associated with both maternal variables in the bivariate and multivariate analyses. More specifically, improved maternal functioning (and gratification) was associated with a decrease in atypical symptoms. The present study represents the first time the relationship between atypical depression and maternal functioning has been explored. Future research should include attempts to replicate these findings regarding atypical depression. If it proves to be strongly related to maternal functioning, clinicians could begin administering the BIMF to all women diagnosed with atypical depression.

Future analyses featuring the BIMF should include variables such as parity, social support and fatigue as these variables have been correlated with maternal functioning (as measured by the IFSAC) in the past. Time has also been linked to maternal functioning in previous studies. It is also important to understand how the BIMF behaves over time and in different patient populations.

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5.0   DISCUSSION

5.1   SUMMARY OF FINDINGS

Much valuable information was garnered from this dissertation project. The content analysis of existing maternal assessments described in Chapter 2 *further affirmed* the necessity of the Barkin Index of Maternal Functioning. We learned that each of the prominent existing assessments captured at least one domain of functioning and that none addressed all six domains. Not surprisingly, the Inventory of Functional Status After Childbirth[1] provided the most thorough coverage, tapping six of seven domains. This also served as confirmation that the IFSAC was indeed the best means of measuring maternal functional status prior to the development of the BIMF.

The focus group work resulted in: 1) a new definition of maternal functioning and 2) the first draft of the 20-item BIMF. The discussions themselves were rich in information and successful by every means of judging focus groups. The emergent themes, which helped to form the BIMF items, are covered extensively in Chapter 3.

A psychometric analysis of the BIMF indicated adequate reliability and validity. The mean BIMF score was 81.4 (s.d.=17.1) in a sample of 109 women with Edinburgh Postnatal Depression Scale[2] scores greater than or equal to 10. Bivariate analysis revealed the BIMF to be associated with depression, atypical depression and mental functioning. Race and atypical depression were independently associated with maternal functioning (BIMF).

5.2   STRENGTHS

There are several strengths inherent in the presented research. The development of a new measure of functioning <u>addresses a major void in the literature</u> as does the correlative analysis presented in Chapter 4.

Qualitative methods are often used to elicit *participants' own meanings of health and illness;*[3] this was the case with the BIMF, which was based on a concept of functioning defined by new mothers. Additionally, the BIMF was the beneficiary of expert critique, which further ensured content validity and strengthened its psychometric portfolio.

The implementation into the Screening Study allowed for the examination of the BIMF's characteristics and relationships with other variables. This represents the first time the relationship between maternal functioning and variables such as bipolar diagnosis, atypical depression, education level, mental functioning and physical functioning have been studied in a depressed population.

5.3   LIMITATIONS

The BIMF's psychometric properties have only been studied in one population. To become further established as a reliable and valid measure, the BIMF will need to be studied in other patient populations.

The relationship between maternal functioning (as measured by the BIMF) and several sociodemographic and clinical variables was examined in the quantitative analysis presented in Chapter 4. However, several key variables were not available and were consequently excluded

from the analysis. Parity, total household income and employment status (of the mother) should be included in future studies of maternal functioning. Parity provides information regarding additional burden on the mother and income is an indicator of available resources.

As with the psychometric analysis, the bivariate and regression analyses should be conducted in various populations. A next logical step would be to investigate the relationship between key characteristics such as marital status, race, parity and maternal functioning *in a non-depressed population*.

5.4   CONCLUSION

The understanding of functioning in the postpartum period has been furthered through the development of the BIMF. Many important themes emerged as a result of the new-mother focus group discussions and the dialogue provided invaluable insight into womens' perceptions of functioning. Through the implementation into the Screening Study, we learned that the BIMF was well-received by patients and therefore applicable to a clinical setting. Additionally, an initial examination of reliability and validity supports the BIMF's potential to become the primary means for measuring functional status.

The bivariate analysis discussed in Chapter 4, helped to further substantiate evidence of an association between depression and functioning.[4] Atypical depression was associated with maternal functioning in both the bivariate and multivariate analysis. This is the first time an association has been explored between maternal functioning and atypical depression. If the result regarding atypical depression and functioning is confirmed in future analyses, the detection of atypical symptoms should be followed by a BIMF screening.

5.5   FUTURE STUDIES

Functioning in the postpartum has received inadequate attention to date. Consequently, there is much left to learn about it and its relationships with other key variables. The following ideas for future research feature the BIMF as the vehicle for capturing maternal functional status.

Research Question #1: How does maternal functioning behave *over time* in a depressed sample?

While this dissertation project focused on factors associated with the BIMF at baseline, the measure is being collected at all four Screening Study timepoints. I would like to look at change in maternal functioning over the course of the Screening study; the four timepoints are baseline, 3 months, 6 months and 12 months. Change in functional status over time has never been studied in a population exhibiting depressive symptoms.

Research Question #2: Does the BIMF prove reliable and valid in other populations?

The BIMF exhibited good initial reliability and validity. However, in order to further establish the BIMF's psychometric properties, it would be prudent to examine the BIMF in different populations. There is an opportunity to do this as the BIMF is being collected in a population of women on Methadone Maintenance Therapy, where maternal role functioning is assessed at one month postpartum.

Research Question #3: Does functional status predict negative child outcomes?

It is possible that a mother's functional status is a more direct measure of deleterious effects on infant development than depression status. If functional status were established as the more direct indication of hazard to the child, the importance of capturing it could equal or exceed the importance of measuring depression in new mothers. Therefore, the long term goal (in regards to the study of maternal functioning) should be to directly examine functioning as a predictor of negative child outcomes.

5.6   CLINICAL SIGNIFICANCE

The BIMF provides a way for researchers and clinicians to <u>identify women who are struggling</u> <u>with the adjustment to motherhood.</u> While there are several means of assessing depressive symptoms, functioning has exacted less attention. Additionally, while there is some evidence of a relationship between depression and functioning,[4] they are not interchangeable concepts. A mother could screen as not being depressed, and be incompetent in the role of mother. In this case the child would most certainly be affected despite the absence of a diagnosis. The BIMF is brief and clearly-worded. Patient and clinician feedback has been quite positive throughout the BIMF data collection process; mothers' seem to personally identify with the questions on this instrument. If the Screening Study is any indication, the BIMF is amenable to clinical settings and presents minimal subject burden.

5.7   PUBLIC HEALTH SIGNIFICANCE

Several studies have demonstrated the negative effects of *postpartum depression* on the offspring of affected mothers.[5-7] It is also possible that a mother's functional status <u>is a more direct</u> <u>measure of deleterious effects on infant development than depression status</u>. If functional status were established as the more direct indication of hazard to the child, the importance of capturing it could equal or exceed the importance of measuring depression in new mothers. In short, the ability to capture functional status would arm clinicians with the ability to identify mothers that were struggling with the adjustment to motherhood even in the absence of depressive symptoms.

If such women were identified and offered support, their children might be spared potentially harmful consequences.

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RECRUITING POSTER

Have you recently given birth?

We want to hear your thoughts on new motherhood!!

<u>If you are:</u>
1)<u>At least</u> 18 years old
2)And have given birth within the past year

You may be eligible to participate in

Focus Group Discussions
<u>regarding your role as a new mom:</u>

This study will take approximately 2 hours of your time and will be held in a private conference room at a University of Pittsburgh Medical Center facility. Mothers will receive a $50 Giant Eagle gift card for participating.

If you are interested in participating, please call (412) 383-6759.

APPENDIX C

DEMOGRAPHIC SURVEY FOR FOCUS GROUP PARTICIPANTS

Please do not write your name on this survey. Thank you.   Date: _____

What is your age (in years)?   _____

What age is your infant (in months)?   _____

How many children do you have (***including*** your infant)?   _____

How many adults (***including you***) live in your household?   _____

Please circle the appropriate response.

Which **best describes** your race (Circle all that apply)?
1) White
2) Black or African American
3) Asian
4) American Indian or Alaskan Native
5) Native Hawaiian or Other Pacific Islander

Are you Hispanic?
1)Yes
2) No

What is your marital status (circle appropriate response)?
1) Married
2) Single
3) Living with partner

Which ***best describes*** your employment status?
 1) Employed full-time
 2) Employed part-time
 3) Unemployed
 4) Stay at home mom

What ***best describes*** your level of education?
1) Less than high school
2) High School Diploma or GED
3) Associate Degree/Technical Degree
4) College Diploma
5) Post-Graduate Degree

Do you utilize any type of day care service?
1) Yes
2) No
3) Does Not Apply-Infant too young.

Which best describes your total (yearly) household income?
1) $20,000 or less
2) $20,001–$30,000
3) $30,001–$50,000
4) $50,001–$70,000
5) $70,001–$100,000
6) $100,001 or more

APPENDIX D

FOCUS GROUP QUESTIONS

Least
Demanding

1. What responsibilities would you say are associated with being a new mom?

2. Since giving birth, what areas of your life would you say have changed the most? This can include *any* area of your life.

     PROBE: How have you felt about these changes?

3. Now that we've talked a little bit about the responsibilities of being a new mom, I want to ask your opinion on what qualities and skills are necessary to being a good mom? Describe what a "good mom" looks like.

4. Have there been times that you have felt comfortable and confident in your new role? Like you were "getting the hang of it" or "functioning well?" *Can you describe the circumstances surrounding this feeling?*

Most
Demanding

5. Have there been times that you have felt like you are not functioning as well or are struggling with your new role? *Can you describe the circumstances surrounding this feeling?*

BARKIN INDEX OF MATERNAL FUNCTIONING

Instructions for Scoring the BIMF:

The BIMF score is the summation of twenty questions. Before summing the 20 items, questions

16 &18 need to be reverse-coded.

Re-code questions 16 and 18 as follows:

A response of "0" should be set to 6, a response of "1"=5, "2"=4, "3"=3, "4"=2, "5"=1, "6"=0

After resetting the values, the twenty questions should be summed. The range for the BIMF is 0-

120, where lower scores indicate impaired function.

Barkin Index of Maternal Functioning

ID: _____   Date: ___ / ___ / _____   Visit: _____

Please **circle the number** that best represents how you have felt **over the past two weeks**. Please try to answer each question as honestly as possible as your responses will help us better understand the postpartum experience.

|	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1. I am a good mother.	0	1	2	3	4	5	6
2. I feel rested.	0	1	2	3	4	5	6
3. I am comfortable with the way I've chosen to feed my baby (either bottle or breast, or both).	0	1	2	3	4	5	6
4. My baby and I understand each other.	0	1	2	3	4	5	6
5. I am able to relax and enjoy time with my baby.	0	1	2	3	4	5	6
6. There are people in my life that I can trust to care for my baby when I need a break.	0	1	2	3	4	5	6
7. *I am comfortable* allowing a trusted friend or relative to care for my baby (can include baby's father or partner).	0	1	2	3	4	5	6
8. I am getting enough adult interaction.	0	1	2	3	4	5	6
9. I am getting enough encouragement from other people.	0	1	2	3	4	5	6
10. I trust my own feelings (instincts) when it comes to taking care of my baby.	0	1	2	3	4	5	6
11. I take a little time each week to do something for myself.	0	1	2	3	4	5	6
12. I am taking good care of my baby's physical needs (feedings, changing diapers, doctor's appointments).	0	1	2	3	4	5	6
13. I am taking good care of my physical needs (eating, showering, etc).	0	1	2	3	4	5	6
14. I make good decisions about my baby's health and well being.	0	1	2	3	4	5	6
15. My baby and I are getting into a routine.	0	1	2	3	4	5	6
16. I worry about how other people judge me (as a mother).	0	1	2	3	4	5	6
17. I am able to take care of my baby _and_ my other responsibilities.	0	1	2	3	4	5	6
18. Anxiety or worry often interferes with my mothering ability.	0	1	2	3	4	5	6
19. *As time goes on*, I am getting better at taking care of my baby.	0	1	2	3	4	5	6
20. I am *satisfied* with the job I am doing as a new mother.	0	1	2	3	4	5	6

APPENDIX F

DISTRIBUTION OF BIMF SCORES AT BASELINE

Mean =81.42
Std. Dev. =17.136
N =109
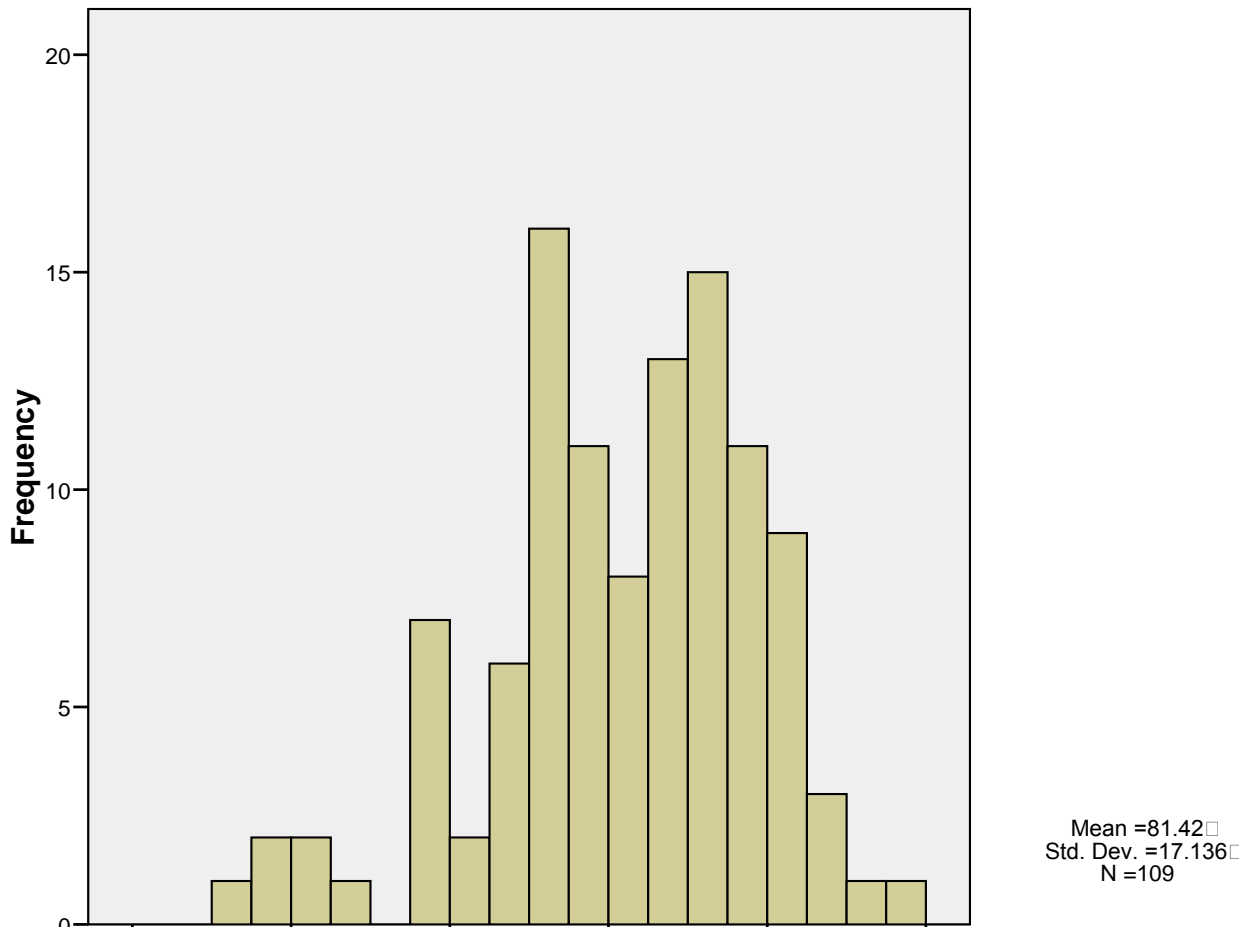
APPENDIX G

DISTRIBUTION OF GRAT SCORES AT BASELINE

Mean =49.58
Std. Dev. =9.008
N =92
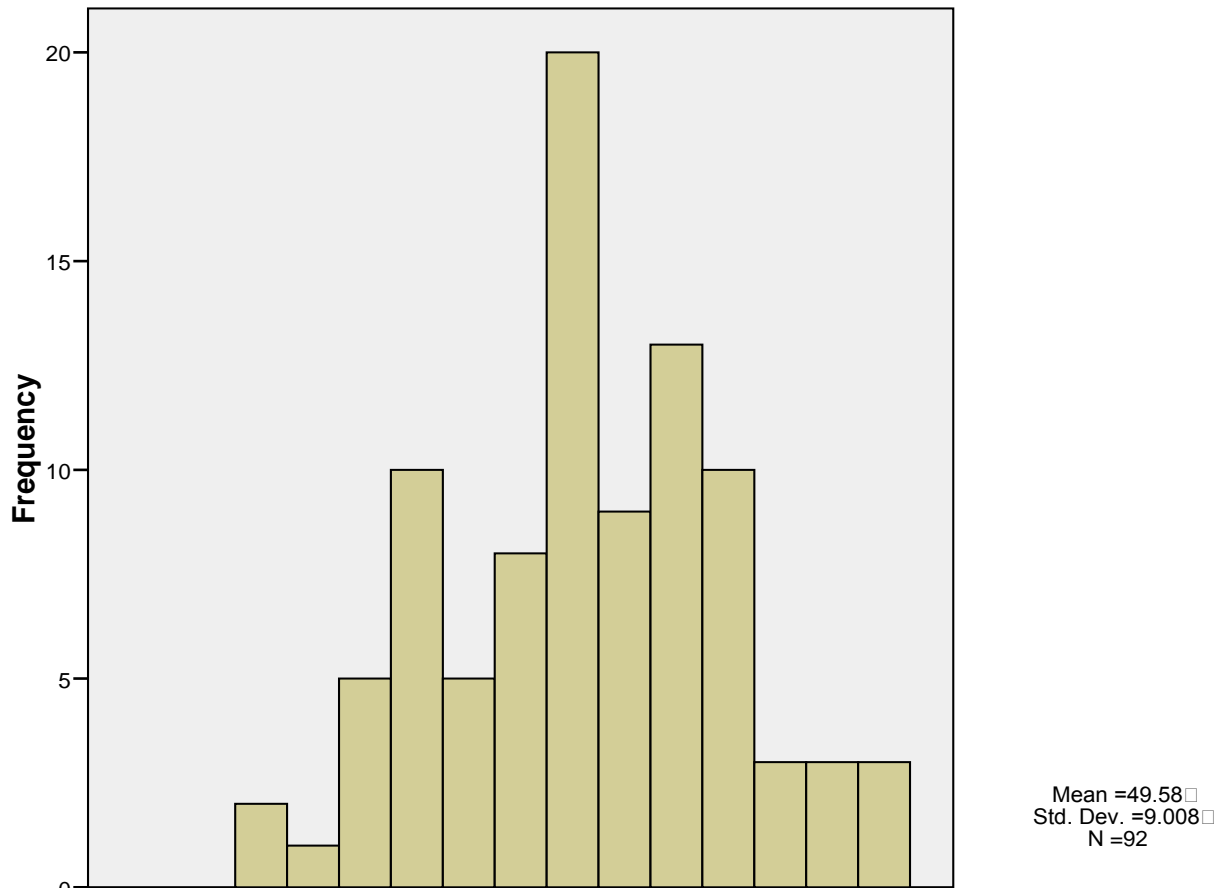
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