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TITLE: "The association between interpersonal relationships and the mental and physical health of postpartum active duty military women"

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ABSTRACT

Over 15% of the U.S. military is comprised of women and 8%-9% of servicewomen are pregnant at any given time. Military women's health impacts readiness. Past research has highlighted the importance of supportive interpersonal relationships in mitigating postpartum distress, but little research has examined active duty women, who may face challenges obtaining support. There is limited knowledge about the course or impact of various types of support. This study was meant to determine if there were critical periods when relationships or specific kinds of support were especially important for mental and physical well-being. The current study assessed 123 active duty Navy (n = 117) and Marine Corps (n = 6) women at five postpartum time points (2, 4, 6, 9, & 12 months) and used mixed model regression to determine: (1) The course of relationships; (2) The association between relationships and postpartum mental health (DVs: anxiety, depression); and (3) Postpartum physical health and functioning (DVs: fatigue, functional health/well-being, BMI, physical fitness testing). The relationship between the quality/quantity of interpersonal relationships and health outcomes was hypothesized to be strongest initially and diminish over time. Levels of postpartum depression exceeded

estimates from civilian studies with 56% of participants displaying significant symptoms of depression at two months postpartum and 22% at 12 months postpartum. While no critical time periods for relationships were identified, emotional and instrumental support were found to have a greater impact on outcomes than the quantitative properties of social networks. All relationship variables significantly decreased over time. Socioeconomic factors, including education and pay grade status, predicted psychosocial outcomes, with junior enlisted women and women with some college education or an associate's degree generally displaying poorer outcomes than other groups. Optimizing the health of servicewomen may improve workplace productivity, readiness, and retention. Elevated distress levels identified by this study suggest the need to improve the well-being of postpartum servicewomen. Increased and targeted screening for negative postpartum outcomes is crucial. An important next step is to assess and address the needs and wants of military mothers. Military leadership can then enact programs and policies to improve postpartum functioning, readiness, and retention.

THE ASSOCIATION BETWEEN INTERPERSONAL RELATIONSHIPS AND THE MENTAL AND PHYSICAL HEALTH OF POSTPARTUM ACTIVE DUTY MILITARY WOMEN

BY

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INTRODUCTION

Overview

Women in the military are a small but steadily increasing minority, growing from 12.4% of the total active duty force in 1994 to 15.0% of the total active duty force in 2001 (Department of Defense Statistical Information Analysis Division website, accessed May 11, 2009). As their numbers continue to increase, the number of pregnancies among active duty women will also increase, making military women's reproductive health issues a topic of growing importance to healthcare providers, military leaders and policy makers, and the women themselves. A number of studies have indicated a positive association between physical and mental health outcomes and interpersonal relationships in the postpartum period (Beck, 2001; Da Costa, Dritsa, Rippen, Lowensteyn, & Khalife, 2006; Da Costa, Larouche, Dritsa, & Brender, 2000; Walker, 1997). However, very few studies have assessed the role of interpersonal relationships among postpartum military women. As military women are a prototypical "working mother" population, and as their health and physical readiness are important for national security, it is critical that healthcare researchers identify factors, such as interpersonal relationships, that can positively impact mental and physical health and functioning in this population. The overarching purpose of this study was to assess the physical and mental health consequences of dimensions of interpersonal relationships among active duty women in the first year after childbirth. Ultimately, the goal was to determine whether there are "critical periods" throughout the postpartum year in which a woman's interpersonal relationships and social network are especially important for physical and mental health.

The specific goal of the current study was to assess the impact of interpersonal relationships measured at five time points (i.e., 2-, 4-, 6-, 9-, and 12- months postpartum) in the first year after childbirth, and to gauge their impact on measures of postpartum depression, anxiety, health-related quality of life, fatigue, physical fitness, and ability to return to pre-pregnancy weight. This study also assessed demographic factors which may influence self-reported social relationships. The increased quantity and quality of a woman's social network and relationships was hypothesized to be positively associated with improved mental and physical health outcomes, although it was expected that there may also be a plateau in the benefits of these relationships. Furthermore, it was hypothesized that the relationship between the quality and quantity of the woman's interpersonal relationships and physical and mental health would be especially strong in the first few months after childbirth, and would weaken over the course of the first year after childbirth. The current study used the stress-buffering and main-effects models (Cohen & Wills, 1985) of social relationships as the frameworks on which to build this investigation (see Figures 1 and 2, respectively).

The following pages provide an overview of: (1) existing theories of how interpersonal relationships impact mental and physical health; (2) past research linking interpersonal relationships and health; (3) past research assessing the role of interpersonal relationships in postpartum maternal health; (4) previous research assessing postpartum women in a military context; and (5) other relevant military research. Finally, the rationale of the current study will be explained based on the gaps in the existing literature.

Figure 1: Stress-Buffering Model of Social Support (Cohen, Gottlieb, & Underwood, 2000) Modified for the Postpartum Period

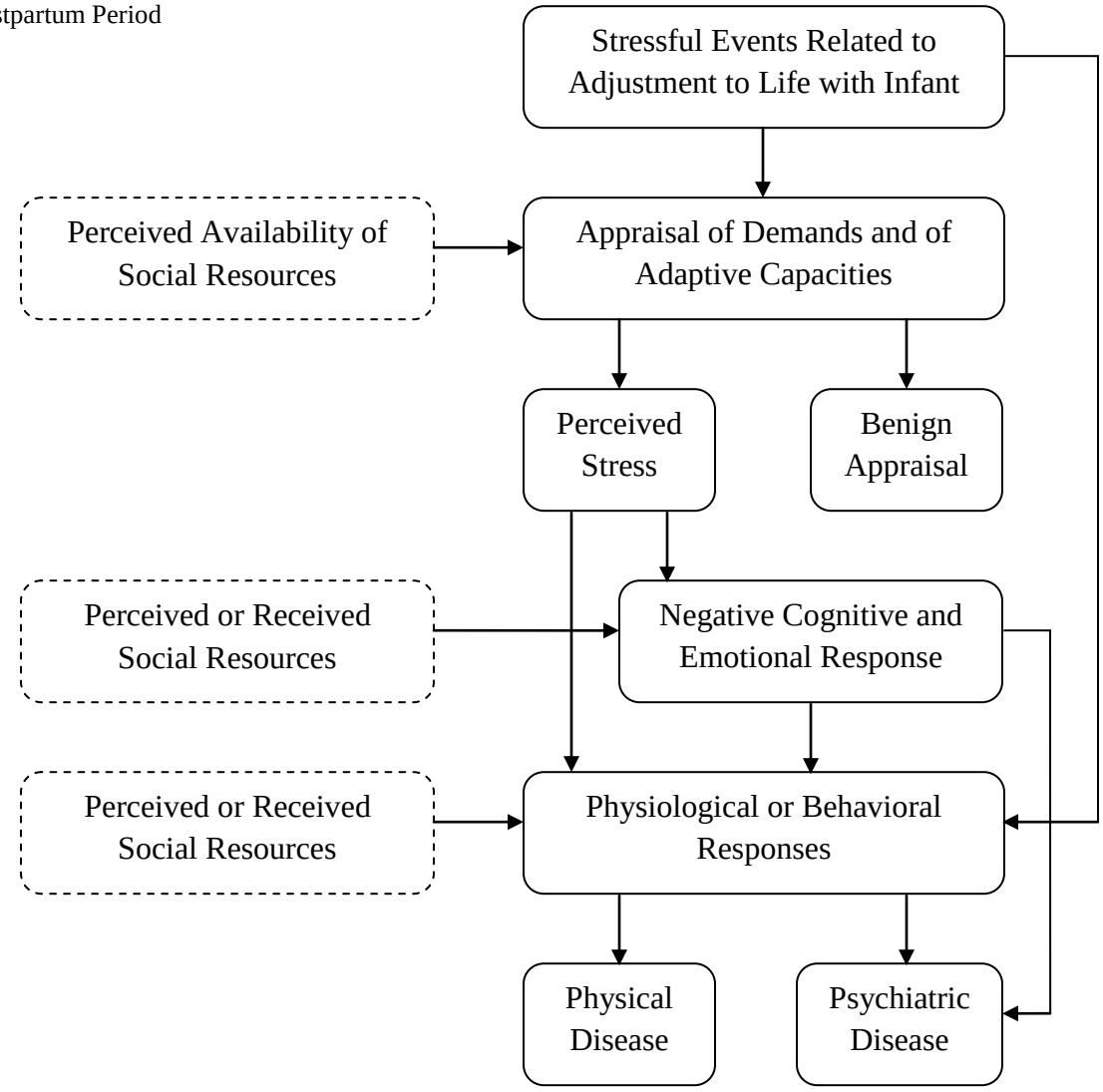
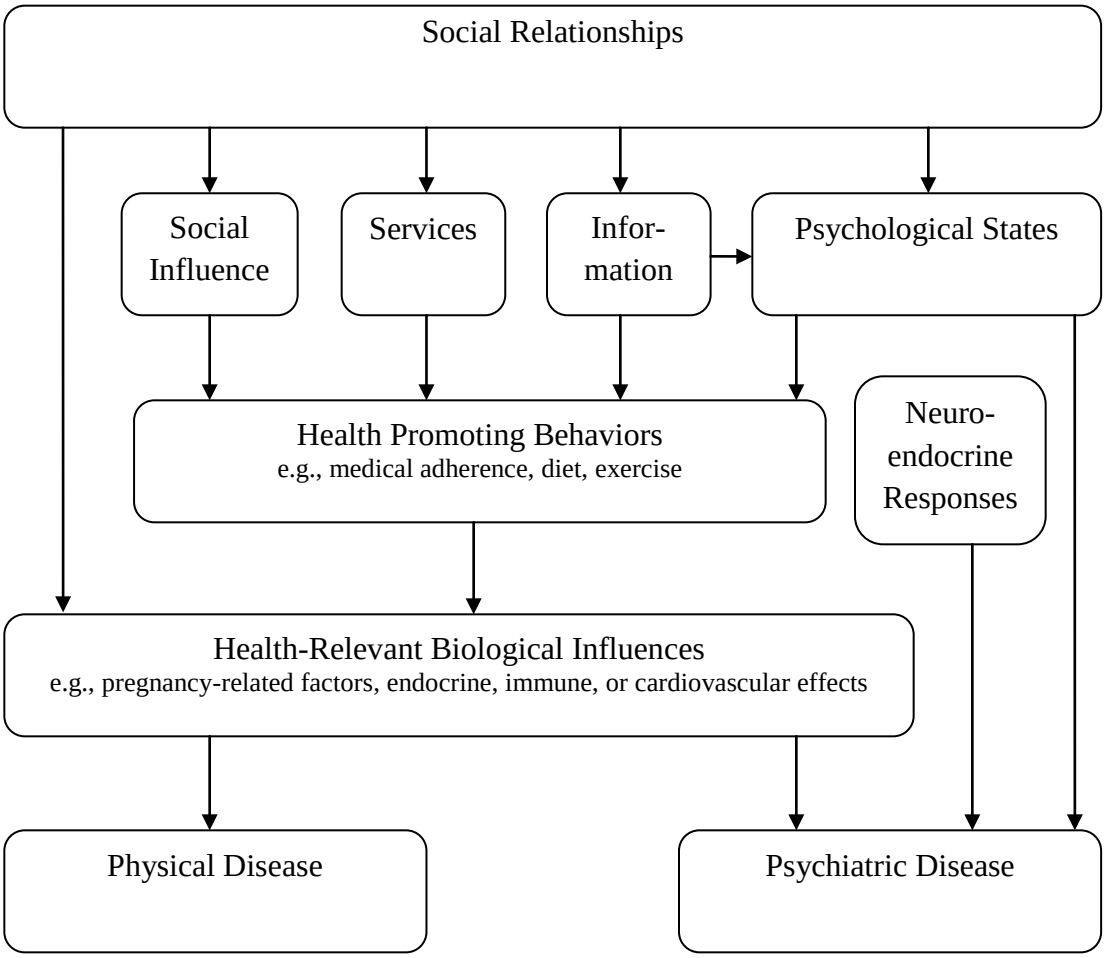


Figure 2: Main-Effects Model of Social Integration (Cohen et al., 2000) Modified for the Postpartum Period



Background

The constructs of social support and social integration: An overview

Definitions

For the purposes of this study, the term "interpersonal relationships" will be used to describe both social support and social integration. This term will be used instead of "social support" or "social integration" because both terms are used to discuss specific functions and methods in which interpersonal relationships affect health. Thus, to use either term to refer to the broad construct of the role of interpersonal relationships in mental and physical health would imply the methods and functions associated with that term, and might possibly be incorrect. Therefore, for the sake of avoiding confusion, the term "interpersonal relationships" will be used unless "social support" or "social integration" is specifically being discussed.

Social support definition. Used casually, "social support" is a deceptively simple term meant to convey the various ways in which social relationships and interactions help individuals maintain emotional and physical equilibrium. Over the years, the definition has focused on affiliative tendencies (Schachter, 1959), discrete acts of support, and support when encountering a discrete problem or stressor (Cohen & Wills, 1985). Recently, Sheldon Cohen (2004) defined social support as "a social network's provision and psychological and material resources intended to benefit an individual's ability to cope with stress" (p. 676). For the purposes of this study, Cohen's concept of social support as a "stress buffer" will be utilized (Cohen, 2004). This definition includes critical aspects of this construct including implicit identification of various types of support and the indication that social support is most necessary in the face of stressors,

which postpartum women frequently encounter. These aspects of the definition were important for the current study and will be discussed in more detail later.

Types of social support. Social support comes in various types. The most common typologies of support discussed in the literature are emotional support, instrumental support, informational support, and social companionship (Cohen & Wills, 1985). Emotional support has also been referred to as esteem support, and is defined as social support that indicates an individual is esteemed, cared for, and accepted (Cohen, 2004; Cohen & Wills, 1985). Emotional support is expected to work by communicating to the individual that he or she is valued and cared for, resulting in a subsequent boost to self-esteem. Instrumental support, sometimes referred to as "aid," is support rendered in the form of financial aid, material resources, and needed services (Cohen & Syme, 1985). For the purposes of the current study, instrumental support will be referred to as "aid." This type of support is perhaps the most tangible type of support, and also the most easily observed, simply because it usually involves the exchange of goods and services. Various studies indicate that aid may be especially important when the stressor is acute and overwhelming to the individual's sense of self-efficacy (Courtens, Stevens, Crebolder, & Philipsen, 1996; Rose, 1990), and may be most helpful if received in moderation (Glass & Maddox, 1992). Unlike aid, in which a supportive individual provides goods or services to the individual being supported, informational support involves the provision of knowledge, often about a specific problem (Cohen & Wills, 1985). This type of support allows the individual to define and learn more about the problem at hand (Cohen & Wills, 1985). Often the preferred providers of informational support are individuals in "expert" roles (Helgeson, 2003), such as health care providers

(Eriksson, Arve, & Lauri, 2006; Heh & Fu, 2003; Leahy-Warren, 2007; Sarajarvi, Haapamaki, & Paavilainen, 2006). Social companionship is the final "type" of social support and is the provision of support by spending recreational and leisure time with an individual. This type of social support is thought to work by increasing positive affect, distracting the person from thinking about stressors, and fulfilling a need for contact with others (Cohen & Syme, 1985). Of these four types, the two most commonly discussed and referred to in the literature are emotional support and aid (Cohen & Wills, 1985). For the purposes of this study, these two types of social support were referred to as "emotional support" and "aid," as these terms better coincide with the constructs assessed by the measurement instrument used in this study (see Methods section).

The definition of social support discussed above is sometimes also referred to as "functional support (Barrera, 1986)," in which the support provided serves a specific function for the individual, usually within the context of a specific problem or stressor. As discussed above, different types of support may serve different functions. However, not all types of support may be helpful in all situations. Cutrona and Russell (1990) hypothesized that the "function" of the support had to meet the need associated with the stressor. This "matching theory" posits that social support will only be helpful if the support matches the need. For example, emotional support may be very helpful after the death of a loved one, but may be significantly less helpful alleviating an individual's transportation concerns. In addition, different people within an individual's social support network may confer different types of support (Cohen & Wills, 1985). As mentioned previously, a health care provider may be a significant source of informational support. However, this individual may provide little or no emotional support or social

companionship. In addition, given the current definition, an individual needs a specific problem or stressor for the supportive individual to provide support to manage. Cohen's stress-buffering construct does not address the effects of an individual's social network on functioning and health under "non-stressful" conditions. The construct of *social integration,* or *embeddedness,* better explains the effects of interpersonal connections within a network.

Social integration. Sometimes confused with social support, social integration, also referred to as *embeddedness,* is narrowly defined as the degree to which an individual fulfills multiple roles within his or her social community, or *network* (Cohen, 2004). Social integration is also more broadly defined as the number of people and the roles they fill within an individual's network (Cohen, 2004). For the purposes of this study, the broader definition of social integration will be used. The assessment of support as a function of an individual's social network and the degree to which the individual is integrated in the network is termed *structural support* (Barrera, 1986; Cohen & Wills, 1985). The assessment of structural support usually involves assessing the number of people in an individual's social network, the social roles that those people fill (e.g. husband, employer, son or daughter, minister), or the roles that the individual fills within his or her network. The assessment of structural support does not include an assessment of how these network members provide support (for example emotional support versus informational support), or whether they are available to help the individual during stressful times.

Structural support is thought to impact health independently of stress. Specifically, it is thought that structural support acts via a *main-effects model* (See Figure

2; Cohen & Wills, 1985). This model posits that social embeddedness is directly related to health: The more people are integrated within a network, the healthier they will be. If this model is true, the number of people within an individual's network and the degree to which they fulfill multiple roles will be positively related to the health of the individual, and there will be no interactions of stress and health (unless an individual's network changes due to the stressor). It is thought that social integration protects health by increasing positive interactions, which may increase positive affect. In addition, individuals with large networks and many roles within these networks may be encouraged to take care of themselves by a sense of responsibility to other network-members. Finally, other network members may actively encourage healthy behaviors (Cohen & Pressman, 2004).

Negative Effects of Interpersonal Relationships

It is important to mention that social relationships and interactions can be harmful to an individual's health. The negative interactions model hypothesizes that the negative interactions an individual has with others in one's social network can harm the individual's health. The possible mechanism by which this occurs is the negative interaction, or conflict, appraised as stressful by the individual, which in turn leads to the negative physiological effects associated with stress (Seeman & McEwen, 1996). This idea has been supported by research, including several studies that have indicated that interpersonal conflict is associated with a weakened immune system (Cohen et al., 1998), harmful neuroendocrine responses (Seeman & McEwen, 1996), and increased cardiovascular reactivity (Seeman, 2000). Over time, and in the event of multiple repeated negative interactions, these physiological effects may result in long-term health

problems (Smith, 1992). Hence, the negative interactions model focuses on the possible harmful consequences of negative social interactions.

Potential Mechanisms

There have been a number of underlying mechanisms implicated in the relationship between social support and integration and physical and mental health. Although these mechanisms can potentially stand alone as mediators of this relationship, they appear to be interconnected in ways that are not yet well-understood (Cohen, 2004). As noted by Barrera (1986), many of the relationships between possible mechanisms are bi-directional, making it difficult to discern if there is a single underlying mechanism between interpersonal relationships and health.

Proposed mechanisms include psychological appraisal processes, physiological stress processes, and health behaviors. Psychological processes are thought to influence the perception of stress. If an individual perceives that they have the necessary resources available to overcome a stressor, they may perceive the stressor as less concerning (Cohen & Wills, 1985). In addition, integration in social networks may increase regular experiences of positive affect, further bolstering resilience and coping reserves (Cohen, 1988). Physiological processes may also act in the relationship between social support and health. Uchino (2006) reviewed possible physiologic mechanisms and found that cardiovascular mechanisms, neuroendocrine mechanisms, and immune inflammatory mechanisms have all been convincingly implicated in the relationship of social support and health. Finally, health behavior is another means by which social support and integration may act to influence health. An individual's social network can influence one's desire to change harmful health behaviors (Matto, Miller, & Spera, 2007), or

increase the likelihood of engaging in such harmful behaviors in the first place (van Roosmalen & McDaniel, 1989). Individuals may also provide support for health behavior change by providing motivational encouragement (Gabriele, Walker, Gill, Harber, & Fisher, 2005) or material resources (Thornton et al., 2006) needed to engage in health behaviors.

Although these three mechanisms may seem independent of one another, there is considerable overlap between physiological, psychological, and behavioral processes. For example, physiological stress processes may be partially mediated by psychological appraisals of the stressfulness of the situation, but physiological states (for example pain or fatigue) may also influence mood and likelihood of engaging in certain behaviors. The directionality of many of these relationships is still not well understood. Nonetheless, as demonstrated above, social support and integration have been shown to both positively and negatively impact physical and psychological health.

Social Support in the Military

The military lifestyle can make a service member's social network different from that of a civilian. Military personnel are subject to frequent relocations, extended absences from family members, and rigid social striation while in the military environment. More specifically, Navy personnel, like most of the individuals in this study, are subject to frequent sea rotations, meaning that they are often away from family on a ship for six months or more at a time. Many Naval duty assignments also involve sleeping and working in close or confined quarters with little privacy, adding another unique and interesting component to Navy social networks. All military personnel, including sailors, may also spend weeks or months away from home doing mandatory

military training in non-deployed settings. On a more positive note, active duty service members also know that they will have a ready-built community wherever they go, that they have an important bond with other service members, and that support systems and programs are in place to help ensure that the military lifestyle is less stressful than it otherwise might be. The military lifestyle may enable and encourage service members to develop alternate sources of social support, and develop unique social networks. Currently, the nature of the "typical" social network of a service member is unknown, as there have been few formal research studies of social support and social networks in the military. One purpose of the current study was to elucidate the social networks of a unique population of military women, and better understand how social support and integration affect health in this population.

For the purposes of the current study, both the stress buffering hypothesis and the main-effects model were used as frameworks with which to understand the relationships between interpersonal relationships and postpartum mental and physical health. The stress buffering hypothesis was selected for the current study as the most appropriate model by which to understand the relationships of social support and health when dealing with a specific stressor, as both military life and the postpartum period are often stressful. In addition, given the population used for the current study, it was important to assess the qualities of the participants' social networks, as military personnel often develop unique social networks and may experience social integration in a qualitatively different manner than those outside the military. The main-effects model was selected to assess and understand participants' social networks as it provides comprehensive hypotheses about the relationships between social network qualities and health (see Figure 2). The measure

used to assess interpersonal relationships in this study, the Norbeck Social Support Questionnaire, measures both social support and social integration, and assesses variables such as loss and the type of people in an individual's network, both important and possibly unique aspects of the social networks of military personnel.

Interpersonal Relationships and Postpartum Health

Challenges Associated with the Postpartum Period

The postpartum period is a period of significant physical and psychological changes for the mother (Ruchala & Halstead, 1994), and many of these changes are moderately to significantly stressful (Affonso & Mayberry, 1990; Arizmendi & Affonso, 1987). The American Psychiatric Association (APA) characterizes the postpartum period as "unique with respect to the degree of neuroendocrine alterations and psychosocial adjustments" (APA, 2000, p. 423). These unique physical stressors are most significant in the formally-defined post-partum period, which is defined as the first six weeks after birth (Witt & Franzblau, 2006), in which the reproductive system returns to a "pre-pregnant state." However, after those first six weeks many of those stressors continue, and it is perhaps not surprising that one year after giving birth approximately one in ten women may still be experiencing significant symptoms of distress related to pregnancy, childbirth, and the adjustment that occurs after bringing an infant home (Romito, Saurel-Cubizolles, & Lelong, 1999). For the purpose of this study, the postpartum period was defined as the first year after childbirth, as many women continue to adjust to motherhood for the duration of a year. In addition, it is especially important that active duty Navy women, a primary population of interest in this study, have successfully resolved any postpartum mental or physical health issues within one year after birth, as

they may be deployed to combat zones one year after childbirth (Department of the Navy, 2003). Postpartum Marine women may be deployed six months after childbirth (Department of the Navy, 2004) and thus branch of service differences may also imply differing impacts of a significant stressor (i.e., deployment), in addition to the other stressors postpartum women experience (see Appendix A, Table 46, for a timeline of critical periods during the first postpartum year, and Appendix B, Table 47, for military branch-specific policies affecting post-partum female servicemembers). These perceived stressors may be wide-ranging and pervasive, and may involve significant behavioral (Walker & Wilging, 2000), physical (Witt & Franzblau, 2006) and psychological changes (Hung, 2007).

One of the primary stressors associated with pregnancy and the postpartum period is the experience of childbirth. Approximately 23% of women in late pregnancy express moderate to severe fear related to labor and childbirth (Areskog, Uddenberg, & Kjessler, 1981), and reported feelings of pain, anxiety, and even panic are common during the childbirth experience (Waldenstrom, Borg, Olsson, Skold, & Wall, 1996). In addition, a startling one-third of women report traumatic childbirth experiences that met *DSM-IV-TR* criteria for a traumatic event (Soet, Brack, & DiIorio, 2003). Soet and colleagues found that the event variables associated with traumatic childbirth included severity of pain, increased feelings of powerlessness, increased medical intervention, and length of labor. The stress associated with traumatic childbirth does not always end shortly after birth. Post-traumatic stress disorder due to childbirth experiences that met *DSM-IV-TR* criteria for a traumatic event has a prevalence of about 2.8% to 5.6% six weeks after childbirth, a number which diminishes to about 1.5% (Olde, van der Hart, Kleber, & van Son, 2006)

six months after childbirth, and 0.9% 11 months after childbirth (Soderquist, Wijma, & Wijma, 2006). One longitudinal study found that childbirth-related PTSD only diminished from 1.3% at three months after childbirth to 0.9% 11 months after childbirth. The experience of childbirth constitutes a significant and possibly traumatic ongoing stressor that affects a large proportion of postpartum women.

In addition to possible psychological trauma related to childbirth, the postpartum mother experiences significant physical changes as her body attempts to adjust to a lactating or pre-pregnant state. The majority of these physical changes occur within the first six weeks after childbirth (Witt & Franzblau, 2006). During this period of time, the female reproductive tract returns to pre-pregnancy status, although there are structural changes in some areas due to pregnancy and childbirth. When the ovaries resume normal function is largely dependent on the mother's decision whether or not to breastfeed; Women who choose to breastfeed experience delayed ovulation and menstruation, whereas those who choose to bottle feed usually resume menstruation by 12 weeks after delivery. Despite a woman's decision to breastfeed or bottle feed, the breasts are initially engorged with milk after childbirth, and can often become sore and irritated. During this time, the mother's body is also experiencing a number of hormonal changes, including changes in levels of estrogen, progesterone, prolactin, cortisol, oxytocin, thyroid hormones, and vasopressin (Hendrick, Altshuler, & Suri, 1998). These normal hormonal changes can also affect the mother's mood and ability to cope with the life changes associated with having a new baby.

A number of physical complications can occur as a result of pregnancy and childbirth. Women may experience physical complications during pregnancy, including

gestational diabetes, preeclampsia, placenta previa, placental abruption, and anemia, and these complications may have lasting effects (Adams et al., 1993; Ramachenderan, Bradford, & McLean, 2008). Women who deliver vaginally may experience cutting or tearing of the perineum, and the site of the incision or tear may be sore and inflamed for several weeks after childbirth. Damage to this area may result in difficult bowel and bladder elimination and painful sexual intercourse. Women who undergo Caesarean sections often have pain at the site of the incision and must be careful to not irritate the site for several weeks after the surgery. This concern may limit the woman's ability to engage in physical activity, or even routine household activities. The surgery site and any vaginal incisions/tears may also become infected, possibly leading to severe systemic infections. Postpartum women may also experience endometritis, inflammation of the inner lining of the uterus, urinary tract infections, and mastitis, inflammation of the mammary glands (Witt & Franzblau, 2006). These physical complications constitute additional stressors on the postpartum mother.

In addition to the physical changes that occur after childbirth, and the possible trauma of childbirth itself, postpartum women often must make significant and stressful lifestyle adjustments. Parents of infants are typically sleep-deprived due to erratic infant sleep schedules which typically do not stabilize until the second or third month after childbirth (Horiuchi & Nishihara, 1999). If the mother chooses to breastfeed, she must be able to feed the infant or pump every two to three hours. Diapers must be changed, and the infant must be comforted and cleaned. Working parents who are unable to stay at home past designated maternity or paternity leave must coordinate childcare. Sick infants must be taken to the doctor, as well as cared for medically. These new demands

require that parents significantly alter their schedules regularly and maintain flexibility. Difficulties adjusting to parenthood are common, as any new parent will attest. However, the distress associated with the postpartum period can vary in a number of different aspects. The following section will discuss the various disturbances and disorders associated with the postpartum period, and the commonality of these problems.

Epidemiology of Postpartum Distress and Disturbance

Mental health problems associated with the postpartum period. As mentioned previously, a number of women encounter challenges and experience psychological distress and disturbance during the postpartum period. However, only a minority of these women actually develop diagnosable psychological disorders. Nonetheless, many women experience less severe psychological disturbance during the postpartum period.

Approximately 55% of postpartum women may experience “maternity blues,” also known as “baby blues” (Reck, Stehle, Reinig, & Mundt, 2009), although figures may range from 20% to 80% (Riecher-Rossler, 1997, as cited in Reck, et al., 2009), depending on measurement instruments and definitions utilized. This common condition is characterized by symptoms of mildly depressed mood, tearfulness, mood fluctuations, irritability, anxiety, fatigue, and increased emotional sensitivity. Generally, these symptoms start three or four days after childbirth, and last no more than a week, often resolving by the tenth postnatal day (Epperson, 1999). Although this condition is associated with an increased risk of postpartum depressive and anxiety disorders, a larger percentage of women who experience “baby blues” do not develop a subsequent anxiety or mood disorder. Similarly, not all women who develop a postpartum mood or anxiety disorder experience maternity blues (Reck et al., 2009).

Postpartum mood disorders are defined by the *DSM-IV-TR* (APA, 2000) as mood episodes, including major depressive episodes, manic episodes, or mixed episodes, that start within four weeks after childbirth. The postpartum onset specifier can be added to major depressive disorder, bipolar I or II disorder, or brief psychotic disorder. Some research has demonstrated that women may be more vulnerable to mood episodes during the postpartum period due to the hormonal changes (APA, 2000) and changes in neuroendocrine responses (Wisner & Stowe, 1997). To support this hypothesis, women with a history of premenstrual dysphoric disorder (PMDD), and women with a history of depressive and mood symptoms while taking oral contraceptive have been shown to be at increased risk for postpartum depression (Bloch, Rotenberg, Koren, & Klein, 2005). The DSM also cites significant psychosocial stressors during the postpartum period as another reason for increased risk of developing mood disorders after childbirth (APA, 2000). However, few psychosocial risk factors have been consistently shown to be associated with postpartum mood disorders. Insufficient interpersonal relationships, and especially inadequate social support provided by the spouse, as well as a personal or family history of psychological disorders, have been among the few consistent predictors of postpartum mood disturbance and disorder (Seyfried & Marcus, 2003). In particular, mood disorders that occur during pregnancy often predict mood disorders and disturbance after childbirth (Misri & Joe, 2008), making it especially important that healthcare providers assess maternal mental health throughout the perinatal period. Several studies have noted that active duty military women may have unique risk factors for postpartum mood disorders, due to risk factors unique to military life, such as temporary and long-term separations from one's support system (for example, extended family), a stressful and busy career,

and the experience of being a minority at work (Appolonio & Fingerhut, 2008; O'Boyle, Magann, Ricks, Doyle, & Morrison, 2005).

Postpartum depression. Postpartum depression is the most prevalent mood disorder occurring during the postpartum period, in part because it is the most prevalent mood disorder throughout the lifespan (APA, 2000). According to a 2005 review article (Gavin et al., 2005), the point prevalence of major depressive disorder with postpartum onset among postpartum women has been found by various studies to range from 1.0% to 5.6%. If minor depression (APA, 2000, p. 777) is included in analysis, point prevalence ranges from 6.5% to 12.9%. The point prevalence of major and minor depression appear to peak during the third month, and again during the seventh month postpartum, before stabilizing around 6.5% between the eighth and twelfth month after childbirth. As many as 19.2% of mothers may experience major or minor depression during the first three months after childbirth (Gavin et al., 2005). Military women may be at increased risk for major depression, with a prevalence of about 19% of active duty women meeting criteria (Appolonio & Fingerhut, 2008; O'Boyle et al., 2005), possibly due to unique additional risk factors discussed earlier.

Unfortunately, for many women the impact of postpartum depression can be devastating. The symptoms of postpartum depressive episodes do not differ appreciably from depressive episodes during other times in life. These symptoms may include sadness, loss of interest in normally enjoyed activities, excessive or inappropriate guilt, low energy and feelings of lethargy, poor concentration, changes in appetite and sleep, psychomotor slowing or agitation, and thoughts of death or suicide (APA, 2000). However, the contents of the thoughts associated with the depressive episode are often

different in new mothers. For example, a new mother may ruminate on her lack of feelings of love towards her infant, or on her ambivalence towards her infant. Given the high expectations of happiness and joy often associated with a new birth, these feelings can be extremely confusing and distressing for the mother, compounding feelings of depression and inadequacy (Beck, 1992). Postpartum depression can also negatively affect mother-infant attachment by negatively affecting maternal interactive behavior, infant interactive behavior, and dyadic interactive behavior (Beck, 1995). Perhaps as a result of these impaired communication styles (Tronick & Weinberg, 1997), infants of mothers with postpartum depression are more difficult to soothe, make fewer vocalizations, and display fewer positive facial expressions when compared to infants of non-depressed mothers (Field et al., 1988). Even at the age of four, the children of mothers who had postpartum depression when the children were infants displayed poorer cognitive performance and significant intellectual deficits than children whose mothers did not suffer from postpartum depression (Cogill, Caplan, Alexandra, Robson, & Kumar, 1986). Although postpartum depression is the most common psychological disorder during the postpartum period, there are significant consequences for both mother and infant.

Postpartum mania and psychosis. Postpartum mania can also cause significant disruption in the period after childbirth. Sometimes called the "baby pinks," symptoms of postpartum mania may include elation, grandiosity, decreased need for sleep, pressured speech, racing thoughts, increased distractibility, an increase in goal-directed activity, and increased involvement in potentially problematic pleasurable activities (APA, 2000, p. 362). To qualify as a manic episode, at least three of these symptoms

must endure for a week, and elated or persistently elevated mood must be a prominent feature. Women may also experience hypomanic episodes in the postpartum period, which feature less severe manic symptoms over a shorter period of time (at least four days; APA, 2000, p. 368). The postpartum period incurs significant risk of mania and hypomania: Women are at a 23-fold increased risk of hospitalization due to symptoms of bipolar disorder during the postpartum period (Munk-Olsen, Laursen, Pedersen, Mors, & Mortensen, 2006). Women with a history of bipolar disorder may be especially prone to psychiatric disturbance. In one study, 26% of women with a previous diagnosis of bipolar disorder experienced postpartum psychosis (Jones & Craddock, 2001). Postpartum onset does appear to influence the course of bipolar disorder. When compared to women with non-postpartum onset bipolar disorder, women with postpartum-onset bipolar disorder display fewer excited episodes (manic or hypomanic episodes), and fewer mood episodes in general (Serretti, Olgiati, & Colombo, 2006). Unfortunately, epidemiological data on postpartum-onset bipolar disorder is not readily available. Few studies have attempted to ascertain the actual prevalence of postpartum-onset mania or hypomania, and especially mania without psychosis. As a result, there is little knowledge about the consequences of postpartum-onset mania or hypomania on the mother, on the infant, and on mother-infant interactions and behavioral, emotional, and cognitive outcomes.

In comparison to the lack of research literature on postpartum-onset manic or hypomanic episodes, there have been significant amounts of research assessing postpartum psychotic episodes. Postpartum psychotic episodes primarily occur during mood episodes, with 1% to 2% of postpartum women displaying a mood disorder with

psychotic features (Klempner, 2008). However, one study in the Netherlands found that 30% of postpartum women who admitted to inpatient care for psychosis experienced psychosis without affective symptoms (Klompenhouwer & van Hulst, 1991). Bipolar disorder appears to be especially associated with postpartum psychosis with an onset within four weeks of childbirth. Up to 95% of women with early-onset postpartum psychosis also met Research Diagnostic Criteria for a bipolar disorder five years after the reference postpartum psychotic episode (Wisner, Peindl, & Hanusa, 1995). Furthermore, lithium, which is typically used to treat bipolar disorder, is an effective prophylaxis for postpartum psychosis (Sit, Rothschild, & Wisner, 2006). Postpartum psychosis is considered a psychiatric emergency due to 17-fold increased risk of maternal suicide (Pfuhlmann, Stoeber, & Beckmann, 2002), as well as the increased possibility of infant neglect and harm (Sit et al., 2006). As many of 4% of women with postpartum psychosis commit infanticide (Parry, 1995), and inpatient hospitalization of the mother is recommended due to the high risk of suicide and infanticide (Spinelli, 2009). Much of the increased risk to the infant is due to maternal delusions and hallucinations that encourage the mother to believe the infant is evil and must be destroyed. Mothers who believe that their infants are evil are more likely to neglect or harm the infant than mothers with different psychotic themes (Chandra, Bhargavaraman, Raghunandan, & Shaligram, 2006). Despite this increased risk, postpartum psychosis may actually be less harmful to maternal-infant interactions than postpartum depression. In at least one study conducted in a supervised inpatient setting, mothers with postpartum psychosis displayed more positive mother-infant interactions than mothers with postpartum depression (Noorlander, Bergink, & van den Berg, 2008). At this time, there is limited research on

the long-term effects of postpartum psychosis on infant and child development. As with postpartum bipolar disorder, little is known about the long-term impact of postpartum psychosis. In addition, there is no available research assessing postpartum mania and psychosis among military women, possibly due to the fact that individuals with severe psychiatric conditions are usually separated from the military.

Postpartum anxiety. Postpartum anxiety is another common mental health issue associated with the period of time after childbirth. Although there is no postpartum anxiety specifier in the *DSM-IV-TR* (APA, 2000), the same physiological and psychosocial stressors that place postpartum, women at increased risk for mood disorders also places them at increased risk for increased anxiety and anxiety disorders (Ross & McLean, 2006). In many cases, increased anxiety and mood disturbance co-varies, leading some to wonder if postpartum anxiety can be better classified as a feature of a mood disorder (Ross, Gilbert Evans, Sellers, & Romach, 2003). This covariance has led some to argue that postpartum anxiety should be assessed, either to identify postpartum depression, or to mitigate excessive and disturbing anxiety (Miller, Pallant, & Negri, 2006). The prevalence of increased and problematic anxiety that does not meet the criteria for an anxiety disorder varies between 8.7% and 27.9% depending on definitions and measurement instruments used (Britton, 2005; Stuart, Couser, Schilder, O'Hara, & Gorman, 1998; Wenzel, Haugen, Jackson, & Robinson, 2003), and appears to increase over the course of the postpartum year (Stuart et al., 1998). There is some evidence that active duty military women experience increased general anxiety when compared to their non-military peers. On the anxiety and insecurity subscale of the Postpartum Depression Screening Scale (PDSS; Beck & Gable, 2000), a study of military women revealed an

average score of 10.26 (±3.33) (Rychnovsky, 2007), whereas a similar sample of civilian mothers produced a score of 2.21 (±0.86) on the same subscale (Clemmens, Driscoll, & Beck, 2004). These subsyndromal levels of anxiety may include symptoms of fatigue or changes in energy levels, restlessness, irritability, sleep disturbance, excessive worry, muscle tension, poor concentration, and periods of acute anxiety, possibly bordering on panic (APA, 2000). Risk factors for increased anxiety at one month postpartum include a psychiatric history, a history of depressed mood, medical or social stressful life events, an unplanned pregnancy, non-attendance at prenatal classes, a longer postpartum hospital stay, and perceived stress and increased measured stress during the postpartum hospital stay. Factors that may protect a mother from anxiety at one month after childbirth include maternal education, household income, feelings of mastery, and satisfaction with interpersonal relationships (Britton, 2008).

Levels of anxiety that meet criteria for an anxiety disorder are more rare, but also more disruptive than anxiety symptoms that do not meet criteria for a mental disorder. Estimates of the prevalence of anxiety disorders occurring during the postpartum period range from 4.8% to 16.3% of postpartum women (Reck et al., 2009; Wenzel, Haugen, Jackson, & Brendle, 2005). The most common postpartum anxiety disorder is generalized anxiety disorder, with approximately 8% of women meeting DSM-IV-TR criteria, and 3.4% of the sample reporting a postpartum onset of GAD (Wenzel et al., 2005). Social phobia (4.1% of postpartum women, 2.7% with postpartum onset), obsessive compulsive disorder (2.7% of postpartum women, 2.0% with postpartum onset), and panic disorder (1.4% of postpartum women, 0.7% with postpartum onset) are the next most commonly occurring anxiety disorders in the postpartum period. In

Wenzel and colleagues' study (2005), only generalized anxiety disorder is significantly elevated in postpartum women when compared to non-postpartum women with similar demographic characteristics. However, other studies have found that the prevalence of obsessive compulsive disorder may also be elevated in postpartum women (Altshuler, Hendrick, & Cohen, 2000). Therefore, it appears that childbirth incurs additional risk for developing or exacerbating generalized anxiety disorder and obsessive compulsive disorder (Ross & McLean, 2006). There were no available studies of anxiety disorders in postpartum military women, so it is unknown if military women are at increased risk. As with postpartum depression, postpartum anxiety can have long-standing affects on maternal-infant interactions and infant development. Many of these effects are similar, potentially because postpartum depression and anxiety tend to co-occur (Ross et al., 2003). As a result, few studies have assessed the independent contribution of postpartum anxiety on infant and child development. Of the few that have assessed the effects of anxiety, one found that maternal anxiety was associated with increased infant crying and fussing at six weeks postpartum (Miller, Barr, & Eaton, 1993). Maternal anxiety has also been prospectively associated with infant colic (Carey, 1968). In a more longitudinal study, maternal postpartum feelings of anxiety and despair were significantly predictive of lower standardized test scores when the children reach ages eleven or twelve (Galler et al., 2004).

Health-Related Problems Associated with the Postpartum Period

In addition to the increased risk for mental health problems during the postpartum period, physical health may also suffer. During the postpartum period, women may experience significant fatigue, poorer health-related quality of life, difficulty

losing weight gained during pregnancy, and poorer physical fitness. Many of these problems are caused or compounded by the significant physical and psychological demands during the postpartum period. These physical health complaints can ultimately result in functional limitations and increased emotional distress in postpartum women (Webb et al., 2008). Because active duty women are "working mothers," whose jobs often require significant mental and physical stamina, and whose military readiness is contingent upon a certain level of physical and mental health, ability to return to a baseline level of functioning is especially important. The complaints discussed below should be assessed and the woman should receive necessary support and treatment.

Fatigue. Fatigue is one of the most common complaints of postpartum women. Depending on research criteria used, 15-76% of women report clinically significant fatigue during the postpartum period (Cheng & Li, 2008). Fatigue is typically reported early in the postpartum period. As many as 70% of women report clinically significant fatigue at one to two weeks postpartum when compared to non-pregnant women. Forty-percent of these women continue to report significant fatigue at 12 to 14 weeks postpartum (Affonso, Lovett, Paul, & Sheptak, 1990). Military women may report similar or lower levels of fatigue. Almost 80% of military women report moderate to high levels of fatigue while still hospitalized after childbirth, and about 54% report moderate to high levels of fatigue at two weeks postpartum (Rychnovsky, 2007). For some women, fatigue becomes less of a complaint as the postpartum year goes on. One study found postpartum fatigue to be the second most common complaint at one month postpartum, with a decrease in importance over the third, sixth, ninth, and twelfth month postpartum (Gjerdingen, Froberg, Chaloner, & McGovern, 1993). For many women,

however, clinically significant fatigue does not "self-resolve" around six weeks as previously thought, but can continue to affect the woman even one to two years after childbirth (Troy, 2003).

Factors associated with postpartum fatigue include factors related to delivery, for example blood loss, length of labor, and type of delivery (Milligan, 1989), as well as other physical factors such as maternal anemia, hormone changes, wound healing, breastfeeding, and physical pain or discomfort (Troy, 2003). Psychosocial factors associated with postpartum fatigue include lack of social support (especially from the mother's partner), disturbed sleep, depression, and multigravid status. Additional fatigue is associated with returning to outside-the-home employment, and managing additional roles (Gardner & Campbell, 1991; Milligan, 1989; Troy, 2003). Postpartum fatigue has significant consequences, including limiting the mother's functional status and ability to care for herself and others (Corwin & Arbour, 2007). It has also been prospectively linked to depression (Corwin, Brownstead, Barton, Heckard, & Morin, 2005), which as discussed previously can have significant negative effects on maternal and infant health and well-being. Finally, feeling as though one has enough energy to accomplish what one wants to accomplish is a component of an individual's quality of life, and as discussed below, postpartum fatigue may be part of a larger problem of impaired health-related quality of life.

Functional health and well-being. Functional health and well-being is defined as an individual's satisfaction with their ability to function in the domains of life that affect or are affected by the individual's health status and perceived health status (Wilson & Cleary, 1995). Postpartum women often report decreases in various aspects of functional

health and well-being, and may have many physical complaints (Cheng & Li, 2008; Gjerdingen et al., 1993). However, not all women report significantly decreased health and well-being, and many rate their self-perceived health as "good" or "very good"(Cheng & Li, 2008). In a study of working postpartum women assessed five weeks after childbirth, women scored slightly but significantly worse (lower) than women nationally on the physical health component, but slightly and significantly better (higher) than women nationally on the mental health component (McGovern et al., 2006). In the same sample of women measured at 11 weeks postpartum, the women scored slightly and significantly better (higher) than the national sample on both physical health and mental health components (McGovern et al., 2007). Those women who report physical health problems that result in poor self-perceived functional health and well-being often experience significant debilitation that may negatively impact their ability to provide effective infant care (Tarkka, Paunonen, & Laippala, 1999; Turner, Boyle, & O'Rourke, 2003), which may result in poor infant physical health that may persist up to three years postpartum (Kahn, Zuckerman, Bauchner, Homer, & Wise, 2002). In addition, employed women with poor self-perceived physical health also reported more functional limitation, including employment limitations (Webb et al., 2008), and more illness days away from work (Gjerdingen & Center, 2003). Although most postpartum women report generally "good" or "very good" self-perceived health, and score about average on measures of health-related quality-of-life, the consequences of poor perceived physical health and health-related quality-of-life are significantly problematic enough to assess these variables in postpartum military women. There were no available studies assessing functional health and well-being in military women.

Impaired physical fitness in the postpartum period. During pregnancy it can be challenging to maintain physical fitness. Especially during the latter months of a pregnancy, women tend to exercise with less frequency than prior to pregnancy or earlier in the pregnancy (Artal, 1992), and tend to engage in less resistance training and cardiovascular training during pregnancy when compared to normal training patterns (Beilock, Feltz, & Pivarnik, 2001). Current guidelines (Artal & O'Toole, 2003) promote physical activity during normal and healthy pregnancies, but state that pregnant woman should not engage in physical activity above moderate intensity, and should not exercise for extended (greater than 45 minutes) periods of time unless they ensure adequate thermoregulation and hydration. Pregnant women are advised not to exercise longer than 60 minutes at a time. Generally, women experiencing normal and health pregnancies are encouraged to maintain or improve physical fitness. However, there are a number of situations in which aerobic physical activity during pregnancy is absolutely contraindicated, such as pregnancy-induced hypertension, ruptured membranes, or placenta previa. Woman are advised to consult their obstetrician before engaging in aerobic physical activity during pregnancy if they have a number of other physical conditions, such as severe anemia, poorly controlled preeclampsia, or a history of an extremely sedentary lifestyle (Artal & O'Toole, 2003). As pregnancy progresses, it can also become increasingly uncomfortable to engage in physical activity due to joint pain, fatigue, back pain, and women may express increased concerns about injury or possible risk to the baby (Evenson, Moos, Carrier, & Siega-Riz, 2009). These pregnancy-associated challenges related to engagement in physical activity may negatively impact physical fitness, resulting in noticeable deficits in physical abilities during the postpartum

period (Treuth, Butte, & Puyau, 2005). Military women are not immune from these effects. Army women experienced a mean 40-point decrease in Army Physical Fitness Test (APFT) scores when they were assessed at six months postpartum and scores were compared with the most recent pre-pregnancy APFT scores. Only 19% were able to score as well or better than they had on the pre-pregnancy APFT (Weina, 2006). Navy and Marine Corps women are also given physical readiness tests (PRTs) at six months postpartum, and are expected to be able to pass this physically rigorous test despite some of the pregnancy-induced deficits in physical fitness. This short time period may place significant additional stress on the mother, and in the sample of Army women studied by Weina (2006), only 17% believed six months was enough time to return to pre-pregnancy physical condition. Despite these challenges, physical fitness is considered an integral part of military readiness, and it is important to identify factors associated with increased ability to return to physical fitness in the time allotted by the military.

Challenges returning to pre-pregnancy body weight. One of the most common laments of postpartum women is the difficulty they experience losing weight gained during pregnancy. Although the American College of Obstetricians and Gynecologists recommends that normal weight women with a body mass index between 20.0 and 24.9 kilograms per meter^2 gain between 25 and 35 pounds during a singleton pregnancy, almost 42% of normal weight women gain more than the recommended 35 pounds (Chu, Callaghan, Bish, & D'Angelo, 2009). This excess weight gain is associated with difficulty losing pregnancy-related weight gain even 15 years after childbirth (Amorim, Rossner, Neovius, Lourenco, & Linne, 2007), indicating that many women have a very difficult time returning to pre-pregnancy body weight. Many women also gain additional

weight during the postpartum period (Harris, Ellison, & Clement, 1999). Although military women may gain similar amounts of weight, they are required to meet stringent military weight standards six months after childbirth or they may be placed on military-required weight control programs. Like mandated physical fitness testing, this weight requirement may impart significant pressure to lose weight on postpartum military women. In order to lose weight to meet weight standards, military personnel may engage in unhealthy weight loss behaviors such as vomiting or fasting (Lauder, Williams, Campbell, Davis, & Sherman, 1999; McNulty, 2001), although this behavior has not been specifically assessed in postpartum military women, the pressure associated with meeting weight standards may result in this behavior even among this population. Perhaps more commonly, postpartum military women may experience significant stress associated with weight requirements without any associated unhealthy weight loss behaviors. Despite the stress many service members associate with weight requirements, maintaining body weight at a normal or lower level is considered a significant component of military readiness, and it is important to identify factors which may better allow the postpartum military women to return to pre-pregnancy body weight. Outside of the military, supportive interpersonal relationships have been shown to predict ability to lose weight gain associated with pregnancy (Harris et al., 1999).

Social Support and Integration During the Postpartum Period

As discussed previously, research has long demonstrated that sufficient social support and integration are linked to physiological markers of well-being as well as health outcomes (Uchino, Cacioppo, & Kiecolt-Glaser, 1996), and social support is thought to buffer the negative impact of stress on physical and mental health (Cohen &

Wills, 1985). Pregnancy and the postpartum period both involve significant stressors and concerns for the expectant mother (Arizmendi & Affonso, 1987). It is thus perhaps not surprising that sufficient social support can mitigate some of the stress associated with the perinatal and postpartum period, as indicated by improved mental and physical health. However, few studies have looked at the impact of social support and integration on these factors over time, and even fewer have assessed these factors in postpartum military women, revealing large gaps in the literature.

Studies in military women seem to indicate that military women report higher levels of postpartum depression than civilian women (O'Boyle et al., 2005), indicating that it may be important to bolster factors associated with postpartum mental health. In civilian samples, adequate social support and integration has been associated with improved mental health outcomes. Women who report higher levels of social support and integration are also less likely to report symptoms of postpartum depression (Beck, 2001) and anxiety, including birth-related PTSD (Cigoli, Gilli, & Saita, 2006). Research has also indicated that general psychological distress is associated with poor perceived quality or quantity of interpersonal relationships (Romito et al., 1999), and no available research has assessed the role of interpersonal relationships in postpartum mental health outcomes among military women, indicating that there is a gap in the literature

Another area of insufficiency in the literature concerns the physical readiness and health of postpartum military women. Active duty women are given six weeks of maternity leave, but after that time they are generally expected to be able to return to full duty. In addition, Marine women may be deployed six months after childbirth, and Navy women may be deployed one year after childbirth, further underlining the importance of

physical health. As such, it is important for postpartum military women to ensure physical health and readiness. A number of factors may influence this ability, including fatigue and poor functional health and well-being. In addition, the Department of Defense considers physical fitness and lack of overweight and obesity as important facets of military readiness. Research in civilian populations has demonstrated that lack of social support is associated with fatigue (McGovern et al., 2007) and poor perceived functional health and well-being (Da Costa et al., 2006). In addition, lack of social support is also associated with difficulty losing weight gained during pregnancy (Harris et al., 1999). Finally, postpartum status and lack of social integration during this time may make it difficult to engage in the physical activity necessary to return to previous fitness levels (Albright, Maddock, & Nigg, 2005). One study found that it took at much as 27 months to return to previous fitness levels (Treuth et al., 2005), although military women are expected to take physical readiness tests within six months of giving birth. These factors further highlight the potential importance of interpersonal relationships in the ability of postpartum servicewomen to return to duty while retaining physical health and readiness.

The current study used the Norbeck Social Support Questionnaire to assess both functional social support and structural social support (integration). Emotional support and aid were assessed as components of functional social support. The number of people in participants' networks was assessed as a component of structural social support (integration). Finally, total functional support was assessed as a variable that combined measures of functional and structural support. In general, it was hypothesized that both structural and functional support would be especially critical for postpartum mental

health and physical functioning in the first few months after childbirth, and the importance of social support and integration would diminish as the postpartum year progressed. This study also indirectly assessed the main-effects model and the stress buffering hypothesis. It was assumed that the number of individuals reported in the network would provide a measure of social integration unrelated to any particular stressors. NSSQ items assessing emotional and aid (or instrumental support) are asked in a way that implies a specific need for help. In essence, these items ask whether or not people would be available in the event of a stressor. These items provided an assessment of the stress-buffering effects of the individual's network, and provided an informal assessment of the stress buffering hypothesis. Although the purpose of this study was not to test the main-effects or stress buffering models in this population, this study provided an assessment of the physical and mental health effects related to these different aspects of social support and integration.

Study Rationale

Women in the military are a minority population functioning in a unique social context. Postpartum women in the military may be especially exposed to the stressors associated with childbearing in an extremely male-dominated and stereotypically masculine occupational environment. However, postpartum military women are also integral to the units they serve, and in a broader sense are integral to the continued defense of the nation. Thus, given the stressors to which they are exposed, as well as the importance of retaining these women and facilitating their physical and mental health and readiness, it was important to identify factors within the environment which may be modified to facilitate mental and physical health. Research has already demonstrated the

importance of social support for the mental and physical health of postpartum women. However, past research falls short in several ways. First, very few studies have assessed social support and integration longitudinally throughout the first year after childbirth. Second, few studies have assessed the relationships between social support and integration and various aspects of mental and physical health. Third, even fewer studies have assessed these variables in postpartum military women, and no available studies longitudinally assessed these variables in this population for an entire year after childbirth. One year may be an especially critical endpoint in this population because all military women may be deployed one year after childbirth, and therefore physical and mental health and readiness must be assured at that point.

This study is important for several reasons. First, as discussed, there are a number of existing gaps in the literature, and this study attempted to answer some of the questions not currently answered by existing research. Second, the health and well-being of the population utilized for this study is especially important for national defense. Third, there are significant negative consequences associated with impaired postpartum mental or physical health, and these consequences may impact not only the mother, but also her infant and others in the family. Finally, because social support and integration are modifiable environmental factors, it is important to understand the mechanisms of these constructs so that support networks may be created or women may be assisted in seeking support from existing networks. The results of this study might especially help health care providers better identify women in need of interpersonal relationships, and direct these women to appropriate resources to ultimately improve their mental and physical health and well-being.

Novel Contributions of this Study

This study was unique for a number of reasons. Although other studies have assessed postpartum mental health and physical health over time, few studies have gathered and analyzed data at five time points, or have followed up as much as one year after childbirth. This component allowed change over time to be reported, and also helped to gain a better understanding of the course of postpartum mental and physical health issues. The second novel contribution of this study was the use of social support and integration as independent variables. Several studies discussed previously have demonstrated that social support and integration are important for the mental and physical health of postpartum mothers. However, few have specifically assessed these constructs as the primary independent variables, have looked at various types and aspects of social support and integration (for example, emotional support versus aid), or have looked at interpersonal relationships over time. No studies available assessed the "course" of interpersonal relationships over the first year postpartum, or have attempted to determine if there is a "critical period" in which interpersonal relationships are especially important for mental and physical health, which were primary aims of this study. Finally, this study was unique because the population assessed is a group of postpartum active duty military women. There have been several studies of postpartum military women, but few have assessed women longitudinally, few have assessed interpersonal relationships as a primary variable, and no available studies assessed postpartum mental and physical health over the course of the entire first year after childbirth. Active duty military women are working mothers who are expected to be physically and mentally ready to leave their child for possibly dangerous combat duty as early as six months after childbirth (in the

case of Marine women). There is significant pressure to be physically and mentally ready, and in many ways the functioning of these women is critical for unit functioning (as each service member fills a critical role in his or her workplace), and therefore critical for national defense. As such, it is in the best interests of the nation that factors associated with mental and physical health, such as social support and integration, be better understood so that they can be bolstered for the benefit of the service member and society. Ultimately, very few studies have utilized the ambitious longitudinal design in postpartum women, used social support and integration as the primary independent variables, or have assessed postpartum military women with the depth and breadth of the current study, making it an important research project for the benefit of military women and postpartum women everywhere.

METHODS

Research Design and Methods

Overview

The current study used a longitudinal, descriptive design to assess postpartum mood and functioning in a sample of active duty Navy and Marine Corps women. Physiological and psychological factors were assessed once prenatally and at five time points (i.e., 2-, 4-, 6-, 9-, and 12- months postpartum) during the first year after childbirth. Each assessment took between 30 and 60 minutes, and consisted primarily of assessment of weight and height, a blood draw (on the first assessment), and completion of several self-report measures. This study used a convenience sample recruited from a large military medical organization located on the West Coast, and data collection was completed Fall 2009. All participants were female service members in the active duty Navy or Marine Corps. The number of women excluded from the study was not recorded.

Participants

For inclusion in this study, potential participants had to be active duty female Marines or Sailors who delivered healthy, full-term infants (gestational age at birth: 37 to 42 weeks). Women who delivered sick or premature infants or who gave birth to multiple infants were excluded from participation, as these conditions may increase the likelihood of postpartum fatigue and stress due to the increased demands associated with these conditions. Women who were planning on changing duty stations or leaving the service during the duration of the study were also excluded, as they would be unable to complete data collection at all five time points. A number of conditions might also have

caused the individual to be excluded from further data collection after the start of the study, including if that participant moved away, if her baby died, or if she declined further participation in the study.

Procedures

The current study uses data collected by US Navy Capt. Jacqueline Rychnovsky, PhD, RN, CPNP (Principal Investigator). Data collection was completed in Fall 2009 and de-identified data was provided to CPT Laurel Cofell (author) upon dissertation committee and institutional review board approval. Data collection was conducted in person and through the use of mail-in packets that were sent to participants a few days before their scheduled Well Child (routine pediatric) appointments. Potential participants were approached by a civilian research assistant (RA) during routine prenatal medical appointments occurring approximately between the 36th and 41st week of gestation, a period during which there are four routine scheduled obstetric appointments. A civilian RA instead of a military researcher was used during all contacts with the participants and potential participants to avoid the possibility that active duty women may feel coerced to participate. Potential participants were given a flyer and a brief summary of the study (see Appendix C) to read, and were allowed to ask the RA any questions they might have. Women who agreed to participate in the study were given an informed consent form, a HIPAA form, and a California Subject's Bill of Rights form approved by the designated institutional review board (see Appendix D) to read and sign. Participants were also informed at the beginning of the study that they were free to withdraw from the study at any time, with no penalty to them if they should decide to do so.

Once the woman agreed to participate in the study and signed the informed consent form, she was given a measure with a number of questions about demographic variables (see Appendix E). Demographic information gathered included age, ethnicity, race, marital status, highest level of education attained, branch of service, and pay grade. The RA did not have further contact with the participant until after she gave birth, which was assessed by accessing the participant's hospital records prior to the first scheduled postpartum data collection point.

All subsequent data collection points involved a number of self-report measures which were sent to the participant several days ahead of her scheduled Well Baby appointment. Women were contacted prior to these appointments in order to ensure contact information was correct and schedule a time and place at which the civilian RA could collect the self-report measures, as well as assess other measures, including BMI and anemia. Table 1 illustrates the approximate time points at which each measure was collected, as well as an estimate of about how long it took for a participant to fill out each measure. Individual measures will be discussed in more detail later. These time points were collected to coincide with Well Child appointments as a means of increasing convenience of assessment for participants.

Table 1

Data Collection Timeline

	Time to Complete Instrument	Gestational Age 36-41 Weeks	Time 1: 2 Months Postpartum	Time 2: 4 Months Postpartum	Time 3: 6 Months Postpartum	Time 4: 9 Months Postpartum	Time 5: 12 Months Postpartum
Consent process	25 minutes	X					
Demo-graphics	5 minutes	X					
# of children cared for	1 minute		X				
Inter-personal Relation-ships	7 minutes		X	X	X	X	X
Anxiety	7 minutes		X	X	X	X	X
Depression	7 minutes		X	X	X	X	X
Fatigue	5 minutes		X	X	X	X	X
Health status	2 minutes		X	X	X	X	X
BMI	5 minutes		X	X	X	X	X
PRT results	n/a				X		
Anemia	5 minutes		X				
Total time		30 minutes	39 minutes	38 minutes	38 minutes	38 minutes	38 minutes

Protection of Participants

A number of measures were put into place to protect the participants of this study. These measures were based first on applicable regulations governing the protection of human research subjects and research participation in military settings, including 32 CFR Part 219 (Protection of Human Subjects), the Belmont Report, "Ethical Principles and Guidelines for the Protection of Human Subjects of Research," and NAVMEDCEN SDIEGOINST 6500.9 (Human Clinical Investigation Program, Institutional Review

Board, and the Protection of Human Subjects). The protection measures utilized were designed to help ensure the participants did not feel coerced into participating, to help identify and treat illness, and to help maintain the participants' confidentiality. There were several mild risks identified, including the risk that participants might become mildly emotionally distressed based on some of the questions in the assessment measures, and the risk that participants may feel coerced into participating in the study, especially if they felt they were being ordered to participate by the principal investigator (PI), Captain Jacqueline Rychnovsky, PhD, RN, CPNP, a high-ranking United States Navy officer. In addition, it was noted that measures employed in this study may identify a participant with anemia, depression, or thoughts of self-harm, and it was determined that it was important to ensure that participant received additional care, although this would not be an additional risk of the study as participants would likely be anemic, depressed, or thinking of harming themselves regardless of study participation.

Participant's confidentiality and anonymity were protected by various methods. First, during original data collection, patient privacy was maintained by assigning a unique indentifying number which was used on all completed instruments and documents. Participants were also instructed to not write identifying information on any of these forms. No names, social security numbers, or other identifying data were on any documents other than the required information on the original consent forms. Original consent forms were secured as required by regulation, in a locked container in a locked room. The master code which lists participants *and* identifying codes were kept in a separate locked container, also in a locked room. In addition, the secondary researcher using this data for her dissertation study, United States Army Captain Laurel Cofell, did

not have access to identifiable data or consent forms. All data utilized for this study were de-identified prior to transfer, which ensured that both anonymity and confidentiality were maintained.

Because participants were all active duty military personnel, it was determined that they may feel coerced into participation if approached by a higher ranking individual. As mentioned previously, participants were informed of their rights immediately upon agreeing to participate in the study. In addition, researchers ensured that active duty women did not feel coerced by using a civilian RA to collect all data. There was relatively little risk that participants felt coerced into participating or did not understand their rights prior to participating.

Although participants were not placed at increased risk for developing depression or anemia, the current study design may have resulted in participants being identified as having one or both of these conditions. In addition, several questions on the Postpartum Depression Screening Scale (PDSS) assessed thoughts related to self-harm and suicide. It was important that women identified with these conditions received necessary treatment. Anemia was assessed at least once over the course of the study, and women identified as having anemia (defined as blood hemoglobin levels less than 11 grams per deciliter of blood) were given a form with their current hemoglobin levels and possible side effects of anemia (see Appendix F for form), as well as retested at the next assessment. They were also asked to visit their primary care providers for follow-up assessment and treatment, although this was not mandated due to confidentiality concerns.

Because postpartum depression is a serious mental illness that can result in functional debilitation, self-harm, or possible death of the mother or infant, it was considered critical that participants identified as having postpartum depression or thoughts of self-harm were referred for treatment. Because of this, participants were informed during the consent process that any data collected will remain confidential with the exception of evidence of postpartum depression or thoughts of self-harm. If a participant displayed significant symptoms of postpartum depression (as evidenced by PDSS scores between 60 and 79), or major postpartum depression (as evidenced by PDSS scores greater than or equal to 80), or evidenced thoughts of self-harm by answering with a three, four, or five to PDSS questions seven (*Have thought that death seemed like the only way out of this living nightmare*), 14 (*Started thinking that I would be better off dead*), 21 (*Wanted to hurt myself*), 28 (*Feel that my baby would be better off without me*), or 35 (*Just wanted to leave the world*), she was immediately referred for follow-up care. In these circumstances, the participant was immediately referred either to her primary obstetric provider or to the pediatric clinical social worker. These referral mechanisms are already in place because all postpartum women are routinely screened for postpartum depression using a different screening instrument. In addition, the PI is a credentialed Pediatric Nurse Practitioner and was stationed at NMCSD between 2004 and 2008, and was familiar with appropriate referral resources as needed.

Ultimately this study was recognized as minimal risk by the institutional review board because women were not exposed to any additional risk beyond what they would be exposed to in real life. Due to this study, participants may have encountered mild distress related to filling out the research instruments, which might be encountered in real

life if participants were asked similar questions by friends, relatives, or providers. Participants might also be diagnosed with anemia or postpartum depression, and because these conditions would be present regardless of participation, study participation may have actually helped participants receive the help they need through the referral channels discussed above. Finally, all standard procedures were taken to ensuring the anonymity, privacy and confidentiality of participant information.

Measures

Self-Report Measures

Demographic information. During the prenatal visit participants were asked to fill out a Demographic Questionnaire (see Appendix E) which was used to assess participant age, ethnicity, race, marital status, highest level of education attained, pay grade, and branch of service. Participants were also asked about their number of previous pregnancies and number of live births. In addition, at the first postpartum data collection point, participants were asked how many children they are responsible for caring for. This question was included to assess demand associated with caring for other children, in addition to the participant's infant.

Assessment of social support and integration. Social support and integration were assessed using the Norbeck Social Support Questionnaire (NSSQ, see Appendix G), developed by Jane Norbeck and colleagues (Baillie, Norbeck, & Barnes, 1988; Norbeck, Lindsey, & Carrieri, 1981, 1983), and revised in 1995. To assess the individual's social network, participants were asked to list "significant people" in the individual's life. Space was provided to list up to 24 people, and the participant's responses to questions about the number of relationships, duration of relationships, frequency of contact, and

social roles these individuals fill was used to assess social integration. The measure consists of eight questions asking about various aspects of the nature of the relationship with each person listed in the network, as well as a question about loss of people in the individual's network. The NSSQ consists of three main variables (Total Functional Support, Total Network Properties, and Total Loss) and two subscales (Emotional Support and Tangible Support [Aid]). The Emotional Support subscale is intended to measure emotional support, whereas the Tangible Support subscale is intended to measure material or service aid. As originally designed, this measure included three subscales, Affect, Affirmation, and Aid, despite the high correlations between items for the Affect and Affirmation subscales (Norbeck et al., 1981). Subsequent factor analysis has further demonstrated that the four items comprising the Affect and Affirmation subscales result in a single factor, and current scoring instructions limit analysis to the two subscales previously mentioned (Norbeck, 1995). Although others have argued that there are, in fact, three subscales (Gigliotti, 2002), permission to use this instrument is only granted to those who follow the 1995 scoring instructions and use the two subscales (Emotional Support and Tangible Support/Aid) previously identified by factor analysis (Norbeck, 1995).

The two subscales, Emotional Support (formerly the Affect and Affirmation subscales) and Tangible Support/Aid, were identified by a factor analysis conducted by Dr. Suzanne Dibble and Dr. Steven Paul. These researchers pooled together data from 1,392 participants that was shared by investigators who used the NSSQ in various studies. Together, the two factors accounted for 74% of the total variance. Normative values of the instrument were also assessed as a result of this factor analysis. For the

purposes of this study, only normative values for women will be discussed. Among the 1,067 women included in the factor analysis, the average number listed in participants' networks was 10.9 (*SD* = 5.9) people. Women scored a mean of 127.2 (*SD* = 72.7) on the Emotional Support subscale and 53.1 (*SD* = 33.4) on the Tangible Support subscale. The average Total Functional Support score was 179.4 (*SD* = 102.1) and the average Total Network/Social Integration score was 98.5 (*SD* = 53.8). Finally, 44.1% of these women reported loss on the NSSQ, and the average Amount of Loss score was 2.4 (*SD* = 1.3). It is unknown how closely the instrument's normative sample resembles the sample used in the current study because this information was not available from the original researchers (J.S. Norbeck, personal communication, July 1, 2010).

The Norbeck Social Support Questionnaire has demonstrated strong psychometric properties. The first version of the NSSQ was administered to 75 Master's nursing students and 60 senior nursing students for the initial validation study (Norbeck et al., 1981). It is important to remember that the initial validation study was conducted using the older method of scoring the NSSQ, which produced three subscales (Aid, Affect, and Affirmation), instead of the two produced using the current scoring guidelines (Tangible Support and Emotional Support). The NSSQ is not a summative-type instrument, therefore it was inappropriate to use the Coefficient Alpha to test internal consistency reliability. Instead, Pearson correlations were calculated among individual items and subscales. This assessment revealed that the two items for each subscale were highly correlated (Affect: .97, Affirmation: .96, and Aid: .89) and the correlations among the three network properties ranged from .88 to .96. The network properties correlated moderately with Aid (.69 to .80) and highly with Affect and Affirmation (.88 to .97). In

addition, the four items that comprise the Affect and Affirmation subscales were highly correlated, with correlations ranging from .95 to .98. As mentioned previously, these findings further support the idea that Affect and Affirmation are better assessed as one subscale. This measure also demonstrated sufficient one-week test-retest reliability. Sixty-seven of the original 75 Master's students completed the NSSQ one week after the original administration. The test-retest correlations for the three network properties were each .92. The subscale test-retest correlations were similarly high. Test-retest correlation for the Aid subscale was .86, test-retest correlation for the Affect subscale was .89, and test-retest correlation for the Affirmation subscale was .88. The NSSQ has demonstrated convergent validity with other measures of social support and integration, and the subscales of the NSSQ have demonstrated convergent validity with similar subscales on other measures of social support (Norbeck et al., 1981). The NSSQ also demonstrates non-significant, low correlations with social desirability scales, demonstrating the general lack of biased answering towards socially desirable responses. Finally, the NSSQ has demonstrated construct validity by being significantly correlated with other measures of social support and integration and by varying in an expected way with reported changes in lifestyle and social networks (Norbeck et al., 1983). Overall, the NSSQ is a reliable and valid measure of the function and structure of an individual's interpersonal relationship resources.

Assessment of psychological functioning. Depression was assessed using the Postpartum Depression Screening Scale (PDSS), developed by Cheryl Tatano Beck and colleagues (Beck & Gable, 2000, 2001a, 2001b). The PDSS is an instrument specially designed to assess pregnancy during the postpartum period. Other common depression

screening instruments, such as Aaron Beck's Beck Depression Inventory (Beck, Steer, & Brown, 1996), do not adequately control for normal postpartum symptoms when assessing symptoms of depression. Because many symptoms of depression, such as changes in sleep patterns and feelings of fatigue, are considered normal for the postpartum period, including these symptoms as evidence of depression may lead at an increase in Type I errors (false positives), unless the instrument specifically addresses the impact the infant has on those symptoms. The PDSS was selected over other general depression screening instruments due to these factors. In addition, the PDSS demonstrated superior accuracy in assessing postpartum depression (as measured by receiver-operator curves) when compared to the Beck Depression Inventory – 2nd Edition (BDI-II) and another inventory of postpartum depression, the Edinburgh Postnatal Depression Scale (Beck & Gable, 2001a).

The Postpartum Depression Screening Scale consists of 35 Likert-scale items that produce seven five-item subscales: Sleeping/eating disturbances, anxiety/insecurity, emotional lability, cognitive impairment, loss of self, guilt/shame, and contemplating harming oneself. Possible answers range from *strongly disagree* (1) to *strongly agree* (5), and the mother is asked to circle the item answer that best describes her feelings over the last two weeks. Scores range from 35 to 175. A score of 60 to 79 signals sub-threshold depression symptoms (i.e. minor depression), whereas a score of 80 or greater indicates major postpartum depression. Using these cut-offs, the PDSS displayed adequate sensitivity and specificity (Beck & Gable, 2001a). The PDSS also displayed strong psychometric characteristics. Internal consistency reliability for the overall scale is .97, and subscale reliabilities range from .83 for anxiety/insecurity to .94 for loss of

self (Baker, Cross, Greaver, Wei, & Lewis, 2005). In a military sample similar to the one in the current study, Rychnovsky (2004) found that overall internal consistency reliability ranged from .93 to .95 from delivery to six weeks after childbirth. Confirmatory factor analysis revealed high construct validity (Beck & Gable, 2000). Furthermore, validation studies using this instrument demonstrated that the PDSS displays adequate content validity and is highly predictive of an interview-assessed postpartum depression diagnosis (Beck & Gable, 2000, 2001a). Finally, the PDSS only requires a seventh grade reading comprehension level, and takes approximately five to ten minutes to complete (Beck & Gable, 2000), making it convenient and appropriate for use in this study. Due to these factors, it was an appropriate measure to use to assess postpartum depression.

Postpartum anxiety was assessed with the State-Trait Anxiety Inventory (STAI), a widely used measure of both an individual's immediate level of anxiety (state anxiety), as well as an individual's long-term anxiety proneness (trait anxiety) (Spielberger, 1983). This instrument was selected due to its wide-ranging research use in numerous populations, including postpartum women (Britton, 2005, 2008; Da Costa et al., 2000). The 40-item STAI consists of two subscales (state anxiety and trait anxiety) each consisting of 20 Likert-scale items. Trait-scale items required the respondent to circle the response to each item that they feel is true "generally." Responses on these items range from *almost never* (1) to *almost always* (4). State-scale items evaluate how respondents feel "right now, at this moment." Participants were asked to circle the answer, which range from *not at all* (1) to *very much so* (4), that most accurately characterized their response to each item. Scores on each scale range from 20 to 80, and overall scores on

the STAI range from 40 to 160. On the state scale, scores between 40 and 59 indicate moderate anxiety, and scores between 60 and 80 indicate severe anxiety (Spielberger, 1983). In a study of 296 mothers, the mean state anxiety score at one month after childbirth was 35.30 (*SD* = 0.68), and 30.7% displayed moderate to severe anxiety (Britton, 2008).

The State-Trait Anxiety Inventory (STAI) has exhibited strong psychometric properties. Internal consistency reliability alpha coefficient values have ranged from .83 to .92 for the state subscale and .96 to .92 for the trait subscale. Test-retest reliability coefficient scores have ranged from .73 to .86 and .86 to .92 for the trait subscale, and .16 to .54 and .83 to .92 for the state subscale. This measure demonstrated construct validity when it was used to compare like subjects in stressful and non-stressful conditions. Finally, this measure was highly correlated with other measures of anxiety, indicating concurrent validity (Soderstrom & Grimm, 2004). In summary, this measure is a widely used and highly valid and reliable measure of state and trait anxiety.

Assessment of self-perceived physical functioning. Two measures were used to measure self-reported physical functioning: The Fatigue Continuum Form (FCF), and the Short-Form 12, Version 2.0 (SF12v2) health survey. The Fatigue Continuum Form (Pugh, Milligan, Parks, Lenz, & Kitzman, 1999) was based on the Theory of Unpleasant Symptoms, which posits that unpleasant physical symptoms, such as fatigue, vary in their timing, quality, intensity, and associated distress. Furthermore, each symptom has physiological, psychological, and situational factors associated with it, and symptoms may synergize to become even more debilitating (Lenz, Pugh, Milligan, Gift, & Suppe, 1997). The FCF was based on this theory, as it assesses these various dimensions of

fatigue. This instrument is a modified version of a Japanese measure (Yoshitake, 1971) used to measure fatigue in industry, and was modified for the purpose of measuring perinatal fatigue (Pugh et al., 1999). Women were asked to rate each item based on how they have felt since childbirth. The FCF consists of 30 Likert-style items, and takes about five minutes to complete. Answers to each item range from *not at all* (1) to *very much so* (4), and possible scores range from 30 to 120. There are no distinct cut-off points for this measure, and instead it is recommended that moderate levels of fatigue are those within one standard deviation above the mean and one standard deviation below the mean (inclusive) for the sample. Low levels of fatigue are considered those below one standard deviation below the mean for the sample. Finally, high levels of fatigue are those greater than one standard deviation above the mean for the sample (Pugh et al., 1999). However, because these levels are not standardized, they were not used in the current study. Instead, fatigue scores were utilized as a continuous variable. The FCF has demonstrated strong psychometric properties. Reported internal consistency reliability for this measure is consistently high, measured at .82 during postpartum hospitalization, at .95 at two weeks postpartum, and at .82 at six weeks postpartum (Lenz et al., 1997). Rychnovsky further demonstrated strong internal consistency reliability in a sample of postpartum military women, and reported reliabilities between .92 and .93 (Rychnovsky, 2004). This measure has also displayed construct validity by being correlated with several factors known to be associated with postpartum fatigue, such as maternal sleep, length of labor, and infant difficulty (Pugh et al., 1999). This instrument was selected because it was developed with postpartum women in mind, and has been used in several studies to assess fatigue in this population.

Although fatigue is a subcomponent of functional health and well-being, it is not the only important indication of this important construct, and thus it is important to measure the individual's perceived functional health and well-being. To measure the construct, the Short-Form 12, Version 2.0 (SF12v2) health survey was employed. The SF12v2 is a shorter version of the widely used SF36v2 (Ware, Kosinski, & Keller, 1996), which has been utilized in numerous studies of health in many populations (Contopoulos-Ioannidis, Karvouni, Kouri, & Ioannidis, 2009). The SF12v2 consists of 12 items that measure vitality, general health perceptions, general mental health, general physical functioning, social functioning, role limitations due to physical health problems, and role limitations due to emotional health problems (Ware et al., 1996). The 12 items take about two minutes to complete and consist of items taken from the SF36v2 and related to each of the dimensions listed above. Upon completion, the SF12v2 was scored to produce two subscales, the Physical Component (PCS-12, hereby referred to as "physical health status," for the sake of simplicity) and a Mental Component (MCS-12, hereby referred to as "mental health status"). The scores on each subscale range from zero to 100, and because this instrument is standardized and norm-based, scores above and below 50 are considered to be above and below the normed national average in the general US population. Ware and colleagues reported that deviations from the normed mean of 50 can be interpreted as very large (10 points or more), moderate to large (five to 10 points), or small to moderate (two to five points; (Ware, Kosinski, Turner-Bowker, & Gandek, 2002). In a study of 817 postpartum women living in Minnesota, means on the physical health component were 52.7 (SD = 9.13) at five weeks and 55.7 (SD = 5.2) at 11 weeks.

Mental health component means were measured as 49.6 (*SD* = 7.9) at five weeks and as 50.4 (*SD* = 7.3) at 11 weeks (McGovern et al., 2007; McGovern et al., 2006).

The SF12v2 is considered a reliable and valid measure of physical and mental health status. Mental health and physical health component scores of the original SF-12 (Version 1.0) are highly correlated with equivalent SF-36 subscales (Ware et al., 1996), which has demonstrated discriminative validity by correctly differentiating individuals suffering from a chronic pain condition (migraine) from those without the condition. In addition, the SF-36 demonstrated construct validity in its measure of physical functioning by correctly predicting missed work days (Essink-Bot, Krabbe, Bonsel, & Aaronson, 1997). The SF-12 subscales have demonstrated construct validity due to statistical correlations with other variables that would impact physical and mental health, such as self-rated prenatal and preconception moods and health, type of delivery, social support, and perceived situational control (McGovern et al., 2006). The measures have also demonstrated test-retest reliability after a two week interval, indicating that the underlying constructs measured by the instrument do not change markedly over a period of two weeks (Ware et al., 1996). Finally, the SF-12 has demonstrated adequate internal consistency reliability, with a reported alpha score of .89 for the PCS-12 and .85 for the MCS-12 (Ware et al., 2002). In summary, the SF12v2 has been shown to be a convenient and adequate measure of mental and physical health status in many populations, including among postpartum women.

Physical and Physiological Measures

Assessment of return to pre-pregnancy physical functioning. Two measures were used to assess return to pre-pregnancy physical function: The military physical readiness

test (PRT) and body mass index (BMI). The PRT was used to measure the woman's return to pre-pregnancy levels of physical fitness. The purpose of this test is to assess health- and performance-related fitness and help ensure that all military personnel maintain a basic minimal standard of physical fitness (*Institute of Medicine* [IOM], 1998). As mentioned previously, military women are not required to maintain physical readiness while pregnant, and are given a reprieve from the fitness test for six months after childbirth. The current study assessed pre-pregnancy and post-pregnancy fitness levels by accessing participants' physical fitness test scores on the Physical Readiness Information Management System (PRIMS, see Appendix H) website during the first postpartum data collection point after the women took a PRT. Some women's PRT scores were not available during the course of the study, and therefore were accessed by providing a contact at the Navy Personnel Command (BUPERS) with the names and social security numbers of participants with missing data, which was then sent by the contact. This change to the original protocol was approved by the NMCSD IRB, and the PI of the original study (Dr. Jacqueline Rychnovksy) handled all interactions with BUPERS. The Navy PRT consists of events designed to test sailors' aerobic capacity, muscle endurance and strength, and flexibility. Aerobic capacity is tested via a 1.5 mile timed run or walk, a 450 meter swim, a 500 yard swim, or a 12-minute timed stationary cycle or elliptical test. Muscular strength and endurance is test via curl-ups (similar to sit-ups) and push-ups. Finally, flexibility is tested via the sit and reach (Department of the Navy, 2005). The Marine Corps fitness test is somewhat different, although it includes components of aerobic capacity and muscular strength and endurance. Female

Marines complete a fitness test which includes a three-mile timed run, a timed bent-arm hang, and abdominal crunches (Department of the Navy, 2002).

The Navy and Marine Corps fitness tests are reliable and valid methods of assessing the aspects of physical fitness they are meant to measure. Research has demonstrated that a 1.5 mile run is a valid predictor of the gold standard of measuring aerobic capacity, the VO_2-Max test, usually conducted in a laboratory (Burger, Bertram, & Stewart, 1990). Furthermore, push-ups tests have reliably been shown to predict other objective measures of upper body strength (Baumgartner, Oh, Chung, & Hales, 2002), and sit-ups as well as curl-ups or "crunches" have been shown by electromyography to effectively test the strength of core abdominal muscles and hip flexors (Szasz, Zimmerman, Frey, Brady, & Spalletta, 2002). In addition, fitness test scores can predict occupational performance, which indicates that the PRT demonstrates construct validity (Sharp, 1994). There were no available studies assessing the inter-rater reliability of Navy and Marine Corp physical readiness testing procedures, which is a potential weakness in this study. However, all military physical readiness tests involve explicit instructions about what constitutes a repetition of each exercise, and how the test should be carried out in general. These measures of fitness were used because they were readily available and as such would not add an additional burden on already busy working mothers. The military already considers these physical fitness assessments to be reliable and valid indicators of the physical fitness of military personnel, thus further indicating their utility in this population.

Body mass index (BMI), based on the participant's weight and height, was used as the other method of assessing her progress returning to her pre-pregnancy state of

fitness. The participant's pre-pregnancy BMI was assessed by accessing "Body Composition Assessment (BCA)" tab on the PRIMS website (see Appendix H), which contains weight and height information from each PRT. The weight and height from the PRT used for assessing pre-pregnancy physical fitness was used. Some participants did not have available height and/or weight measurements. In this situation, the PI of the study, Dr. Jacqueline Rychnovsky, accessed electronic military medical records to find the height and weight values most closely coinciding with the dates which pre- and post-pregnancy height and weight would have been assessed. Height was assessed using the Seca Model 214 portable stadiometer at the first postpartum visit for most participants, and was assumed to not change significantly throughout the first postpartum year. Body mass index was used for this study instead of pounds lost after childbirth because this measure provides a more complete indication of the woman's current weight status, and it is a standardized measure that assesses both height and weight in units of kilograms per meter^2 (kg/m^2). Body mass index is a widely used indication of an individual's risk of health problems based on one's status as overweight or obese (*National Heart, Lung, & Blood Institute* [NHLBI], 1998). For the purposes of this study, participants <u>were not</u> categorized as underweight (BMI below 18.5 kg/m^2), normal weight (BMI between 18.5 and 24.9 kg/m^2), overweight (BMI between 25.0 and 29.9 kg/m^2), or obese (BMI above 30.0 kg/m^2), which are the recommended cut-offs based on the *National Health Lung and Blood Institute*'s (NHLBI, 1998) Clinical Guidelines, except for the purposes of descriptive statistics.

Anemia. Anemia is a condition in which the blood is deficient in hemoglobin, in red blood cells, or in total volume. In pregnant and postpartum women, this condition is

usually diagnosed by researchers and clinicians as hemoglobin less than 11 grams per deciliter (g/dl) of blood. It is a condition that affects approximately 50% of pregnant women (Gabbe, Niebyl, & Simpson, 2002), and although hemoglobin levels usually return to normal within seven days after childbirth (Corwin & Arbour, 2007), approximately 12% of women not taking iron supplementation after childbirth display iron-deficiency anemia (Milman, Bergholt, Byg, Eriksen, & Graudal, 1999), which is associated with fatigue, poor concentration, irritability, and apathy. For the purposes of this study, anemia was to be used as a covariate in the assessment of postpartum fatigue, in the event these conditions were statistically related when assessed during preliminary analyses. It was assessed at the first in-person postpartum visit using a fingerstick hemoglobin assessment administered by the civilian research assistant. The RA was trained for this assessment and used the CLIA-waived HemoCue® blood system. If a participant's blood hemoglobin level was below 11 g/dl a form was given to the participant listing her current hemoglobin levels and requesting that she follow-up with her primary care provider (see Appendix F).

Specific Aims and Statistical Analyses[1]

Overview

The current study will utilize data assessed at five time points over the first year postpartum for most aims and hypotheses. Mixed model regression will be used as the primary form of statistical assessment. This statistical model was selected because it would allow assessment of change over time, and changes in relationships over time,

[1] Statistical consultation was provided by Chiao-Wen Hsiao, M.A., and Cara Olsen, Dr.PH.

both within subjects and between subjects. The purpose of using this analysis is to identify any critical time periods in which interpersonal relationships are especially important for mental and physical health and functioning. Identification of a potential "critical period" that displays especially strong relationships between these variables would allow healthcare providers to better assess and identify weaknesses in a woman's support system and potentially intervene with support resources and recommendations.

Preliminary Analyses

Preliminary analyses included assessing the basic demographic characteristics of the sample using descriptive statistics, assessing basic characteristics of the social support and outcome variables using descriptive statistics, and assessing between demographic group differences in levels and course of social support and mental health and physical health variables. In addition, the variance of social support and outcome variable scores at each time point was assessed at each time point to test the assumption of homogeneity of variance.

Treatment of Missing Data

Data imputation was utilized to account for some missing items, whereas individuals were excluded from analyses in more extensive cases of missing data. Missing items on the PDSS, STAI, or FCF, were accounted for by imputing the mean of the item answers of the subscale which would have included the missing item. For example, if an individual missed an item on the mental confusion subscale of the PDSS, then the completed items in this subscale were averaged, the mean was imputed as the missing item, and the subscale was recalculated to include the missing item(s). Subscale items from the same time point were utilized to better capture the effect of the time

variable on outcome measures, instead of taking the average of the same item over different time points, which may obscure some of the effects of time. This method is similar to the method cited Roth, Switzer, and Switzer (1999). Missing SF12v2 items were not imputed because there are very few (one or two) items per subscale, and the questions are specific and do not lend themselves to imputation. Individuals missing critical demographic information, or any of the social support variables, were excluded from analyses using those variables.

Power Analysis Procedures: Original Study

The PI of the original study (Dr. Jacqueline Rychnovsky) intends to assess the data using latent growth curve modeling (LGC), using a structural equation and multilevel modeling approach to ascertain the fit of more or less restrictive models. Dr. Rychnovsky based her power analysis on these procedures assuming an attrition rate of 50%, given an alpha level of .05 for inferential statistical analyses, and a power level of 80%. Given these parameters, she calculated a required initial sample size of 135, which was expected to dwindle to 90 participants over the course of one-year data collection. Ultimately, 135 participants were assessed at the first time point. At the final data collection point, 82 of these participants remained, leaving the current researcher with a final sample size of 82 participants assessed at all five time points. The statistical procedures for the current study were based on a required power level of 80%, using an alpha level of .05 for all inferential statistics. All power analyses were based on two-tailed tests. Power analyses for the current study will be discussed under each aim.

Statistical Software

Data were analyzed using the *Statistical Package for the Social Sciences* software package, version 16.0 (*SPSS* v. 16.0) and *Predictive Analytics SoftWare*, version 18.0 (*PASW* v. 18.0, previously known as *SPSS*). Power analysis was conducted using nQuery Advisor 6.01. USUHS Biostatistics Consultant Cara Olsen, Dr.PH., assisted with power analyses for mixed model regression analyses.

Specific Aims

Aim one. Assess the course of quantity and qualities of interpersonal relationships reported by active duty Navy and Marine Corps women throughout the first year after childbirth.

Rationale. Few studies have assessed social support and integration over the first year after childbirth, and even fewer have assessed these variables at five time points throughout that time period. The current study assessed overall levels of social support and integration, including functional support provided and number in the social network, as well as subtypes of social support (emotional support and aid) to assess how social support and integration levels and types vary over the first year after childbirth. In addition, this assessment was critical for mixed model analyses of the relationships between interpersonal relationships and mental and physical health variables.

Hypothesis 1a. Participants will report a greater number of individuals in their social networks, greater social integration, and greater total functional support at the first postpartum assessment. This number will decrease over the last four assessments.

Statistical analysis. Mixed model regression was used to assess the course of social support and integration over the first year after childbirth. The independent

variable was time, and the dependent variables were the interpersonal relationship variables (number in the social network, social integration, and total functional support). The social integration variable was a composite variable consisting of number of individuals in the network, duration of these relationships, and frequency of contact with these individuals. Covariates, such as demographic variables, were identified during preliminary data analyses. For example, if ethnic group differences in levels of emotional support were identified during preliminary analyses, ethnicity was entered as a covariate for all analyses concerning emotional support. For the purposes of mixed model regression, time was assessed as a fixed effect. Within-subjects (Level I) variables included the social support variables. There were no primary between-subjects variables. Covariance structure was not chosen a priori. Instead, the structure of covariance was explored using different models of covariance, and a compound symmetry covariance structure was selected because it assumes that the correlation between any pair of observations of the same person is constant, and correlations between participants are zero. We believe that this was the most appropriate structure for this data because it accounted for missing data in a manner that took into consideration previous correlations between observations. Considering that only about two-thirds of participants completed all five assessments (see Results section), missing data had to be taken into account in all analyses, which was another strength of the compound symmetry covariance structure.

Power analysis. Power analyses were based on the power analysis procedure for paired t-tests because measurements of social support were "paired" across time points and the variance was assumed to not change between Time 1 and Time 2, between Time 2 and Time 3, and so on. A sample size of 85 had 80% power to detect a difference in

mean number of people in the network of 1.8 people, assuming a standard deviation of 5.9 (based on findings cited in Norbeck, 1995), using a paired two-tailed *t*-test with an alpha level of .05. A sample size of 85 had 80% power to detect a difference in mean total functional support of 31.4 points, assuming a standard deviation of 102.1 (Norbeck, 1995), using a paired two-tailed *t*-test with an alpha level of .05. Finally, a sample size of 85 had 80% power to detect a difference in mean social integration of 16.5 points, assuming a standard deviation of 53.8 (Norbeck, 1995), using a paired two-tailed *t*-test with an alpha level of .05. The current sample size produced sufficient power to run the previously mentioned analyses.

Hypothesis 1b. Participants will report the highest level of aid at the first postpartum assessment when compared to the latter four postpartum assessments. Emotional support will remain relatively constant throughout all five assessment points.

Statistical analysis. Mixed model regression was used to assess the course of social support over the first year after childbirth. The independent variable was time, and the dependent variables were social support variables (emotional support and aid). Covariates, such as demographic variables, were identified during preliminary data analyses. For the purposes of mixed model regression, time was assessed as a fixed effect. Within-subjects (Level I) variables included the social support variables (emotional support and aid). There were no primary between-subjects variables. Covariance structure was not chosen a priori. Instead, the structure of covariance was explored using different models of covariance, and a compound symmetry covariance structure was selected for reasons discussed above.

Power Analysis. A sample size of 85 had 80% power to detect a difference in mean emotional support of 22.3 points, assuming a standard deviation of 72.7 (Norbeck, 1995), using a paired two-tailed *t*-test with an alpha level of .05. A sample size of 85 had 80% power to detect a difference in mean instrumental support of 10.3 points, assuming a standard deviation of 33.4 (Norbeck, 1995), using a paired two-tailed *t*-test with an alpha level of .05. The current sample size produced sufficient power to run the previously mentioned analyses.

Aim two. Assess the relationship between perceived social support and integration and reported mental health symptoms (depression and anxiety) among active Navy and Marine Corps women during the first year after childbirth.

Rationale. Few studies have assessed mental health symptoms throughout the first year after childbirth. Fewer still have assessed the relationships between mental health and interpersonal relationships in the first postpartum year. The purpose of this aim was to identify any critical time periods in which social support and integration and mental health symptoms are especially strongly associated.

Hypothesis 2a. The relationship between reported social support and integration and reported mental health symptoms of depression and state anxiety will vary over time. Specifically, these variables will have a significant positive relationship at the first assessment and this relationship will become weaker and eventually non-existent in later assessments.

Statistical analysis. Mixed model regression was used to assess this hypothesis. The independent variables were time and the social support variables (number in social network, total functional support, emotional support, and instrumental support). In

addition, time and the social support variables were multiplied to create interaction variables, which were entered as additional within-subjects independent variables. The dependent variables were the mental health variables (postpartum depression and state anxiety). Time was assessed as a fixed effect. Within-subjects (Level I) variables included time, social support variables, and mental health variables. There were no between-subjects variables. Covariance structure was not chosen a priori. Instead, the structure of covariance was explored using different models of covariance, and a compound symmetry covariance structure was selected for reasons discussed above.

Power analysis. Hypotheses 2a was tested by examining the interaction between two within-subject variables in a mixed model regression. The statistical power for this analysis was simulated by randomly generating 1,000 data sets, each containing multivariate normal observations under the following specifications. This power analysis was conducted under that assumption that most participants would complete three time points. It was hypothesized that there would be a moderate correlation between, for example, social support and mental health symptoms at time 1 and a weaker correlation at time 2. Therefore we generated data with a correlation of .600 at time 1 and .300 at time 2. The power calculation also depended on the intraclass correlation (ICC), or the strength of agreement between repeated measurements on the same subject. This is calculated as the variance between subjects divided by the total variance (between + within subjects). Since there was no available data on intraclass correlation, power analysis was based on estimated power for ICC values of 0.8 (high), 0.5 (medium) and 0.2 (low). When the ICC is 0.8, a sample size of 85 will have 88% power to detect a significant time x social support interaction assuming that the correlation is 0.6 at time 1

and 0.3 at time 2, and that the data are analyzed using mixed model regression with time and social support as fixed effects and a random subject-specific intercept. The power drops to 57% if the ICC is 0.5, and to 47% if the ICC is 0.2. However, even with an ICC of 0.2, the proposed sample size is sufficient to detect a significant interaction term if the correlation is 0.6 at time 1 and 0.16 at time 2.

Aim three. Assess the relationship between perceived social support and integration and perceived physical health and ability to return to pre-pregnancy fitness and weight levels among active duty Navy and Marine Corps women during the first year after childbirth.

Rationale. Few studies have assessed physical health status throughout the first year after childbirth. Fewer still have assessed the relationships between physical health, the ability to return to previous levels of physical functioning, and social support and integration in the first postpartum year. The purpose of this aim was to identify any critical time periods in which interpersonal relationships and physical health status are especially strongly associated. In addition, this aim also assessed the role of social support and integration in participants' ability to return to pre-pregnancy weight and fitness levels.

Hypothesis 3a. The relationship between reported social support and integration and health-related quality-of-life and fatigue (collectively referred to physical health status) will vary over time. Specifically, these variables will have a significant positive relationship at the first assessment and this relationship will become weaker and eventually non-existent in later assessments.

Statistical analysis. Mixed model regression was used to assess this hypothesis. The independent variables were time and the social support variables (number in social network, total network support, emotional support, and aid). In addition, time and the social support variables were multiplied to create interaction variables, which were entered as additional within-subjects independent variables. The dependent variables were the physical health status variables. Time was assessed as a fixed effect. Within-subjects (Level I) variables included time, social support variables, and physical health status variables. There were no between-subjects variables. Covariance structure was not chosen a priori. Instead, the structure of covariance was explored using different models of covariance, and a compound symmetry covariance structure was selected for reasons discussed above.

Power analysis. Hypotheses 3a was tested by examining the interaction between two within-subject variables in a mixed model regression. Power analyses for multiple regression analyses were identical to those described above for Hypothesis 2a.

Hypothesis 3b. Social support and integration will be associated with the ability to return to pre-pregnancy levels of fitness and body weight (as measured by BMI).

Statistical analysis. The independent variables in this hypothesis were time and social support variables. The dependent variables were fitness test scores and BMI measurements (compromised of height and weight measurements). Analyses of fitness outcomes only included Navy participants because none of the Marine Corps participants had available pre- *and* post-pregnancy fitness assessments. Multiple regression analyses were used to assess the influence of interpersonal relationship variables on postpartum fitness (physical readiness test [PRT]) scores. Demographic covariates were entered in

the first block of these analyses, pre-pregnancy fitness scores were entered in the second block, and social support and integration variables were entered into the third block. Mixed model regression was used to assess the relationship between ability to return to pre-pregnancy BMI and various aspects of social support. Time was assessed as a fixed-effect. Within-subjects (Level I) variables included time, social support variables, and the body weight variable. There were no between-subjects variables. Covariance structure was not selected a priori. Instead, the structure of covariance was explored using different models of covariance, and a compound symmetry covariance structure was selected for reasons discussed above.

Power analysis. Hypothesis 3b analyses involving BMI were tested by examining the interaction between two within-subject variables in a mixed model regression. Power analyses for multiple regression analyses were identical to those described above for Hypothesis 2a. Hypothesis 3b analyses involving pre- and post-pregnancy PRT scores were tested using multiple regression analyses. Power for multiple regression analyses was calculated by ensuring there were at least 10 cases per predictor variable in all analyses (Field, 2005).

RESULTS

Demographic and Military Status Variables

One-hundred and thirty-five participants initially agreed to participate in the study when approached during a prenatal visit. Of these, 12 potential participants did not complete the first postpartum assessment at two months postpartum, and therefore no baseline demographic characteristics were collected on these women. Reasons for dropping out prior to the start of the study, or becoming ineligible to participate, varied and included: No longer being interested in participating (three women), having a premature birth (two women), having a multiple birth (one woman), leaving the military (three women), and the baby residing with a grandparent (one woman). Two women could not be contacted.

Of the remaining 123 participants, the average age two months after childbirth was 25.32 (*SD* = 4.65), the modal age was 25, and ages ranged from 19 to 40. A large number of individuals declined to answer ethnicity (10.57%, *n* = 13) and race (10.57%, *n* = 13) demographic items, although there was no overlap between those who declined to answer the ethnicity item and those who declined to answer the race item. In order to minimize unanswered items, and better capture the construct of "culture", the race and ethnicity items were combined. Most participants were White/Not-Hispanic (43.09%, *n* = 53), followed by Black/African-American (20.33%, *n* = 25), Hispanic (17.07%, *n* = 21), Asian (8.94%, *n* = 11), Pacific Islander (4.88%, *n* = 6), "other" (4.07%, *n* = 5), and American Indian/Alaskan Native (0.81%, *n* = 1). One individual reported that she was not Hispanic but declined to specify her race. Future analysis will include the single American Indian/Alaskan Native participant in with the "other" group and combine the

"Asian" and "Pacific Islander" individuals into one group in the interest of conserving power and minimizing Type II errors.

At two months postpartum, most participants were married (64.23%, *n* = 79) or otherwise partnered (7.32%, *n* = 9), although a sizable number of participants reported that they were single (24.39%, *n* = 30). Two participants reported that they were separated (1.63%) and two participants reported that they were divorced (1.63%). One participant (0.81%) declined to report her marital status. Most participants had been pregnant one (49.59%, *n* = 61) or two (29.27%, *n* = 36) times previously. Only 4 participants (3.25%) had never been pregnant before. Twenty-two participants (17.89%) had been pregnant three or more times before. Despite the high number of previous pregnancies, 60.98% (*n* =75) of participants had given birth to no other live children. Thirty-four participants (27.64%) had one other live child, and 13 (10.57%) had two (*n* = 11) or three (*n* =2) more live children. One woman declined to answer the question. Similarly, most women (60.98%, *n* =75) cared for no other children, or one additional child (26.02%, *n* = 32), in the home. Fourteen participants (11.38%) cared for two (*n* = 11) or three (*n* = 3) additional children in the home, and two women declined to answer the question. Although a few women (7.32%, *n* =9) were anemic at some point during the first four months postpartum, most women (83.74%, *n* = 103) manifested normal hemoglobin levels. Several women were never assessed (8.94%, *n* = 11).

The sample was relatively educated, with the vast majority (73.17%, *n* = 90) of participants having attained at least some higher education. Most participants reported that they had some college education without completing an advanced degree (47.15%, *n* = 58). Eighteen participants (14.63%) had an associate's degree, eight (6.50%) had a

bachelor's degree, and six (4.88%) had a graduate degree. Thirty-three (26.83%) had a high school diploma or GED, which is the minimum education required to enlist in the U.S. military.

In terms of military pay grade, most participants (65.04%, *n* =80) came from the non-commissioned officer ranks, with 55.28% (*n* = 68) holding a pay grade of either E-4 or E-5. Individuals from junior enlisted pay grades (E-1 through E-3) comprised 25.20% (*n* =31) of the sample. Officers comprised 9.76% (*n* = 12) of the sample, and were mostly (8.13%, *n* = 10) from junior officer ranks (O-1 through O-3). Future references to the variable "pay grade status" reference whether an individual is considered junior enlisted personnel (E-1 through E-3), senior enlisted personnel (E-4 through E-9), or an officer (O-1 through O-10). This variable was created due to the large number of pay grades represented, and the small numbers of individuals in some pay grade groups. In terms of branch, the vast majority of participants were in the Navy (94.31%, *n* = 116), followed by the Marine Corps (4.88%, *n* = 6). One participant declined to specify her branch of service. Demographic characteristics are represented on Table 2.

Body Mass Index and Physical Readiness Testing Variables

We were able to obtain pre-pregnancy BMI and PRT data for most participants. BMI information was gathered from pre-pregnancy PRT assessments, which also included a body composition assessment. Among the 106 participants who had an available pre-pregnancy BMI, the average BMI was 24.67 (*SD* = 2.98), and ranged from 19.04 to 31.28. Normal weight individuals (those with a BMI between 18.50 and 24.99 kg/m^2) comprised 54.72% of those with a valid pre-pregnancy weight (*n* = 58). Those with a BMI in the overweight range (25.00 to 29.99 kg/m^2) comprised over a third of

those with a valid pre-pregnancy weight (42.45%, *n* = 45). Finally, 2.83% (*n* = 3) of those with a valid pre-pregnancy BMI were obese (BMI greater than or equal to 30.00 kg/m^2). The average time interval at which this pre-pregnancy BMI was measured and when a participant's due date was 55.0 weeks (*SD* = 20.7), and ranged from 32.0 weeks to 157.0 weeks. Weights that were assessed at 2 months or less into the pregnancy were considered an acceptable reflection of normal pre-pregnancy weight, as first trimester weight gain is, on average, less than five pounds (Abrams, Carmichael, & Selvin, 1995). The wide variance of time between when pre-pregnancy weight was assessed and child due date, and the large numbers of individuals without available pre-pregnancy weights, were due to some participants not having regular physical readiness testing assessments.

Body Mass Indices were collected during the study, at each data assessment point. At two months, the average BMI was 27.49 kg/m^2 (*SD* = 4.16) and ranged from 19.53 to 41.73 kg/m^2. At this time, 31.71% of participants were of a normal weight, 43.90% fell into the overweight range, and 24.39% were considered obese. At four months postpartum, 37.40% of participants were overweight and 22.76% were obese. At this time, BMI ranged from 19.26 kg/m^2 to 38.44kg/m^2, and the average BMI was 27.40 kg/m^2 (*SD* = 4.36). At six months postpartum the mean BMI was 26.91 kg/m^2 (*SD* = 4.18) and ranged from 19.12 kg/m^2 to 37.76 kg/m^2. At six months postpartum, when military women are expected to be able to pass weight and fitness standards, 37.40% of participants were overweight and 17.07% of participants were obese. The average BMI at nine months postpartum was 26.23 kg/m^2 (*SD* = 3.71), and ranged from 19.27 kg/m^2 to 34.43 kg/m^2. At this time, 32.52% of participants were overweight and 13.01% of participants were obese. Finally, at 12 months postpartum, the mean BMI was 25.94

kg/m^2 (*SD* = 3.46), and ranged from 19.09 kg/m^2 to 33.25 kg/m^2. Twelve months after childbirth, 30.08% of participants were overweight and 8.94% of participants were obese. See Table 3 for all of the primary psychosocial variable values at each postpartum assessment.

Ninety-one Navy women had valid pre-pregnancy PRT results, and 99 women had valid post-pregnancy PRT results. In total, there were 76 individuals who had both valid pre-pregnancy and post-pregnancy PRT results. Overall PRT results are scored on a categorical basis, based on an average of the three events of the PRT (curl-ups, push-ups, and the cardiovascular event). For the purposes of this study, overall performance categories were considered an ordinal variable and assigned numbers from the lowest category to the highest category. Navy participants obtained scores in one of twelve categories: Fail (0), Medium Satisfactory (1), High Satisfactory (2), Low Good (3), Medium Good (4), High Good (5), Low Excellent (6), Medium Excellent (7), High Excellent (8), Low Outstanding (9), Medium Outstanding (10), and High Outstanding (11). The time interval between when participants took a pre-pregnancy PRT and their infant's due date averaged 29.0 weeks (*SD* = 15.6), and ranged from 29.0 weeks pre-due date to 122.0 weeks pre-due date. The modal pre- and post-pregnancy PRT score was Medium Good (4). Pre-pregnancy overall performance category scores ranged from failing to scoring in the Outstanding Low category. Participants' scores ranged from failing to scoring in the Outstanding Medium category at post-pregnancy assessment. Normality of both pre- and post-pregnancy scoring distributions was confirmed by visual inspection of histogram and normal Q-Q plot distributions.

Analysis of Completers Compared to Non-Completers

The majority of participants (66.67%, $n = 82$) who participated in the study completed all five postpartum assessments. Eleven (8.94%) completed four, 13 (10.57%) completed three, seven (5.69%) completed two, and 10 (8.13%) completed only one assessment. The reported reasons for dropout varied. Of the 41 participants who dropped out prior to the final assessment, 12 reported that they were leaving the military, nine reported that they were pregnant again, five were no longer interested in participating, 13 were unable to be contacted, one had to drop out due to a disciplinary action, and one had to drop out due to geographic relocation.

In order to determine if there were demographic differences between study completers and non-completers, demographic differences were analyzed, and few differences were found. There were no significant differences in age, $t(121) = 0.66$, $p = .513$, or marital status, $\chi^2(4) = 1.60$, $p = .808$, between completers and non-completers. Furthermore, there were no differences in the number of times pregnant, $t(121) = -0.13$, $p = .900$, the number of live children, $t(120) = 0.57$, $p = .572$, and the number of children cared for in the home, $t(119) = 0.30$, $p = .768$, between completers and non-completers. There were no ethnic or racial differences between completers or non-completers, although this may have been due to insufficient numbers of participants in each cell of the chi-square analysis, $\chi^2(6) = 4.56$, $p = .601$. After taking care of this concern by lumping Asian and Pacific Islanders in one group, and including the sole American Indian/Alaskan Native participant in with the “other” group, there were still no statistically significant differences in completion likelihood between individuals of different cultural backgrounds, $\chi^2(4) = 3.20$, $p = .525$. Similarly, there were no

differences between completers and non-completers in the level of education attained, $t(121) = -0.42$, $p = .672$. Finally, there were no differences between completers and non-completers in pay grade, $t(121) = -0.08$, $p = .940$, pay grade status (junior enlisted, senior enlisted, or officer), $\chi^2(2) = 3.00$, $p = .218$, and service branch, $\chi^2(1) = 3.29$, $p = .070$.

Further analysis assessed differences between completers and non-completers in levels of depression, anxiety, and fatigue at two months revealed no significant differences. Completers and non-completers were equally depressed, $t(121) = -0.71$, $p = .482$, fatigued, $t(121) = 0.02$, $p = .982$, and anxious, $t(121) = .34$, $p = .735$. Similarly, they have similar levels of physical, $t(119) = -1.02$, $p = .312$, and mental, $t(119) = -0.11$, $p = .916$, health status (health-related quality of life). There were no significant differences in BMI at two months postpartum between completers and non-completers, $t(121) = -0.67$, $p = .511$. In addition, there were no significant differences between completers and non-completers in post-pregnancy PRT scores, $t(97) = 1.34$, $p = .184$. Finally, differences in social support and integration at two months between completers and non-completers were assessed. There were no significant differences between completers and non-completers in emotional support, $t(121) = -1.55$, $p = .124$, and total social integration (a combined variable including duration or relationships, frequency of interpersonal contact, and number of individuals in the network), $t(120) = -1.48$, $p = .141$. However, completers reported higher levels of tangible support (aid, $M = 50.37$, $SD = 29.07$) at two months than non-completers ($M = 40.05$, $SD = 21.87$), $t(121) = -2.01$, $p = .047$, although the effect size was small to medium, Cohen's $d = 0.40$.

To better elucidate the relationship between the likelihood of a participant returning for the following data collection visit after a given data collection visit, and the

major psychosocial independent and dependent variables (i.e. depression, anxiety, fatigue, health-related quality of life, emotional support, aid, and network integration), generalized estimating equation (GEE) analysis was used, which allows researchers to use nested and/or longitudinal data to create models with binary dependent variables. This analysis was conducted to determine whether a particular independent variable (e.g. depression, emotional support) at a given data collection time (T#) was associated with the participant's return at the following data collection time (T#+1). Each GEE analysis was conducted separately, and because previous analyses revealed that no demographic or military factors were associated with completion or non-completion of the study, none of these factors were controlled for as covariates. For the purpose of these analyses, an exchangeable working correlation matrix structure was selected. This approach assumes that correlations between two observations on the same subject are constant regardless of how far apart in time the two observations were made. A time-series covariance structure such as first-order autoregressive was considered but rejected because the time points are not equally spaced. An unstructured correlation matrix would allow for a less restrictive correlation structure but is not stable in this data set because not all time points were available for each subject.

The results of these analyses are summarized Table 4. Notably, all three social support/integration indices were significantly negatively associated with the odds of not completing the next data collection point. For each one point increase in emotional support, participants were 1% less likely to drop out before the next data collection point. Similarly, for each one point increase in aid (instrumental support), participants were 2% less likely to drop out before the next data collection point. Finally, for each one point

increase in social network properties (a measure of social integration combining the number of contacts and duration and frequency of contact of those relationships), participants were 1% less likely to drop out before the next data collection point. Odds ratios can be found in Table 4. Of note, although odds ratios appear small, this is because they correspond to a one-point change in the independent variable, which for the applicable independent variables are considered very small changes. In comparison, a more substantial change, such as a 10 point change in emotional support (still a relatively small change), would result in an 11% decrease in the odds of dropping out. No other psychosocial variables were significantly associated with the odds of returning for the following data collection visit.

Relationships Between Demographic Variables

In order to determine if there were significant relationships among demographic factors, we conducted a series of analyses, including several *t*-tests, chi-square analyses, Fisher's exact tests, and analyses of variance (ANOVA). Due to insufficient sample size and other statistical constraints, some of these analyses had to be modified, or non-parametric analyses were substituted for parametric analyses, so results in this section should be taken with caution.

Age was significantly associated with education level attained, $H(4) = 47.80$, $p < .001$, with age increasing as education level increased. Age was also significantly associated with ethnicity, $H(4) = 13.81$, $p = .008$, and post hoc analyses indicated that White/Non-Hispanic participants ($M = 26.75$ years, $SD = 5.37$) were significantly older than Black/African American ($M = 23.80$ years, $SD = 4.14$), $U = 428.50$, $p = .012$, and Hispanic ($M = 23.24$ years, $SD = 3.87$), $U = 328.50$, $p = .006$, participants. African-

American/Black participants were also significantly younger than participants in the "other" category (M = 26.83 years, SD = 3.76), U = 36.00, p = .049, as were Hispanic participants, U = 29.00, p = .046. Pay grade status was significantly associated with age, $H(2) = 51.62$, $p < .001$, and post hoc pairwise comparisons indicated that officers (M = 31.25, SD = 5.36) were significantly older than senior enlisted participants (M = 26.02, SD = 3.94), U = 200.50, p = .001, and junior enlisted participants (M = 21.19, SD = 1.89), U = 7.00, $p < .001$. Senior enlisted participants were also significantly older than junior enlisted participants, U = 280.00, $p < .001$. Age was positively correlated with number of times pregnant, r = .484, $p < .001$, and the number of children cared for in the home, r = .507, $p < .001$. Age was not significantly associated with marital status, $F(4, 117) = 1.49$, p = .209, or branch of service, $t(14.72) = 0.53$, p = .603.

Chi-square analyses could not be used for categorical variables due to a large number of cells with less than five cases per cell. Instead, two-tailed Fisher's exact tests were used for categorical variables, and non-parametric analyses such as Kruskal-Wallis and Mann-Whitney analyses were used for continuous variables that violated assumptions for parametric analyses. These analyses indicated that ethnicity was not significantly associated with marital status (p = .536, Fisher's exact test), branch of service (p = .406, Fisher's exact test), previous number of pregnancies, $H(4) = 1.44$, p = .837, or number of children cared for in the house, $H(4) = 7.12$, p = .130. Fisher's exact test statistic could not be used to analyze the association of ethnicity and education, so education was assumed to be an ordinal variable and the Kruskal-Wallis test was used: Ethnicity and education were not significantly associated, $H(4) = 6.52$, p = .164. Ethnicity was significantly associated with pay grade status, (p = .036, Fisher's exact

test). Due to the limited number of individuals in each pay grade by ethnicity condition, post hoc analyses could not be conducted.

Education was not significantly associated with marital status (p = .525, Fisher's exact test), branch of service (p = .672, Fisher's exact test), number of times pregnant, $H(4) = 6.90$, p =.141, or number of children cared for in the house, $H(4) = 6.64$, p = .156. Education was significantly associated with pay grade ($p < .001$, Fisher's exact test). Due to the limited number of individuals in each pay grade by education condition, post hoc chi-square analyses could not be conducted. However, post hoc pairwise Mann-Whitney U analyses were used to compare differing levels of education between different pay grade statuses. Officers had attained significantly higher levels of education than junior enlisted, $U = 0.00$, $p < .001$, and senior enlisted, $U = 13.00$, $p < .001$, participants. In addition, senior enlisted participants had attained significantly more education than junior enlisted participants, $U = 744.00$, $p < .001$.

Marital status was not significantly associated with pay grade status (p = .212, Fisher's exact test), branch of service (p = .347, Fisher's exact test), and number of previous pregnancies, $H(4) = 9.22$, p = .056. Marital status was associated with the number of children cared for in the home, H(4) = 12.68, p = .013. Post hoc pairwise Mann-Whitney analyses indicated that there were no significant differences in number of children between marital status groups except between married and single participants, $U = 734.00$, p = .002.

Pay grade status was not significantly associated with branch of service (p = 1.00, Fisher's exact test) or number of children cared for in the home, $H(2) = 5.96$, p = .051. It was, however, associated with number of previous pregnancies, $H(2) = 8.81$, p = .012.

Both senior enlisted participants, $U = 897.00$, $p = .014$, and officers, $U = 96.00$, $p = .014$, had been pregnant significantly more times than junior enlisted participants.

Branch of service was not significantly associated with number of previous pregnancies, $H(1) = 0.27$, $p = .604$, or number of children cared for in the home, $H(1) = 0.20$, $p = .655$. Number of previous pregnancies and number of children cared for in the home were significantly positively correlated, $r = .756$, $p < .001$.

Determination of Covariates

Simple mixed model regression analyses were used to assess the relationship between demographic factors and the outcome variables for the purpose of determining covariates for later analyses. Tables 5 and 6 highlight the significance levels of the association of various outcome measures and demographic characteristics. Bolded *p* values indicate those demographic variables used as covariates in future analyses. In the interest of thoroughness, any demographic variables in which the association between the demographic variable and any of the primary hypotheses independent or dependent variables reached a significance level of $p \leq .10$ was used as a covariate for models using that dependent or independent variable.

There were no significant differences in levels of depression based on the fixed effects of age, $F(1, 115.43) = 0.47$, $p = .494$, ethnicity/race, $F(4,116.62) = 0.69$, $p = .602$, education level, $F(4, 117.56) = 2.38$, $p = .056$, branch of service, $F(1, 155.58) = 0.37$, $p = .542$, number of previous pregnancies, $F(1, 118.64) = 0.01$, $p = .944$, or the number of children living in the home, $F(1, 116.58) = 0.89$, $p = .348$. Of note, marital status was significantly associated with postpartum depression, $F(4, 129.01) = 3.38$, $p = .011$. Post hoc assessment with Bonferroni adjustment revealed that this associated was driven by

the differences in mean depression scores between separated participants (M = 105.60, SE = 14.14) and married (M = 62.11, SE = 2.07, p = 0.028), partnered (M = 58.88, SE = 6.28, p = .030), and single (M = 55.15, SE = 3.28, p = .007) participants. In addition, military pay grade status was also associated with depression scores, $F(2, 116.89) = 3.66$, p = .029, and post hoc analysis with Bonferroni adjustment revealed significant differences between levels of depression in officers (M = 50.69, SE = 5.26) and junior enlisted (M = 66.92, SE = 3.31) personnel, p = .031.

Age, $F(1, 113.94) = 1.05$, p = .309, ethnicity/race, $F(4, 114.69) = 0.58$, p = .681, marital status, $F(4, 125.47) = 1.45$, p = .222, pay grade status, $F(2, 115.69) = 0.80$, p = .452, and branch of service, $F(1, 148.24) = 1.99$, p = .161, were not significantly associated with state anxiety. Number of previous pregnancies, $F(1, 116.90) = 0.77$, p = .382, and number of children cared for in the home, $F(1, 114.68) = 0.13$, p = .722, were also not associated with state anxiety. Education was significantly associated with state anxiety, $F(4, 113.81) = 3.68$, p = .007, and post hoc analyses with Bonferroni correction indicated that this effect was be driven by significant differences in levels of state anxiety between those with a high school diploma or GED (M= 30.84, SE = 1.74) and those with an associate's degree (M = 40.68, SE = 2.36), p = .011. Trait anxiety was highly correlated with state anxiety, r = .89, $p < .001$. However, this variable was not used as a covariate because the high degree of correlation may indicate a better reflection of the participant's current state rather than a true "trait."

Similarly, fatigue was not significantly associated with age, $F(1, 116.41) = 2.57$, p = .112, ethnicity/race, $F(4, 116.60) = 0.75$, p = .561, marital status, $F(4, 125.43) = 1.24$, p = .299, pay grade status, $F(2, 117.69) = 0.02$, p = .977, branch of service, $F(1, 147.18)$

= 2.39, p = .125, or presence of anemia, $F(1, 57.66) = 1.48$, p = .229. Thus, anemia was not used as a covariate in analyses involving fatigue. Fatigue was not associated with number of previous pregnancies, $F(1, 119.08) = 0.52$, p = .472, and the number of children cared for in the home, $F(1, 116.96) = 0.06$, p = .804. Education was significantly associated with fatigue, $F(4, 115.53) = 4.93$, p = .001. Post hoc analyses with Bonferroni correction reveal that this effect was driven by significant differences in fatigue between individuals with a high school or GED education (M = 39.39, SE = 2.08) and those with some college (M = 47.55, SE = 1.54), p = .020, and differences in fatigue levels between individuals with a high school or GED education and those with an associate's degree (M = 53.22, SE = 2.82), p = .001.

Physical health status (physical health-related quality of life) was not significantly associated with participant age, $F(1, 105.92) = 0.76$, p = .385, number of previous pregnancies, $F(1, 109.45) = 0.13$, p = .716, number of children cared for in the home, $F(1, 110.15) = 0.32$, p = .575, marital status, $F(4, 123.50) = 0.68$, p = .609, or branch of service, $F(1, 155.80) = 0.03$, p = .857. Ethnicity/race was significantly associated with physical health status, $F(4, 111.43) = 2.68$, p = .035. Post hoc analyses with no correction for multiple comparisons revealed that this effect was due to significant differences in physical health status between Hispanic (M = 52.55, SE = 1.00) and Asian/Pacific Islander (M = 49.23, SE = 1.16) participants, p = .033, between Asian/Pacific Islander and White/Non-Hispanic (M = 52.64, SE = 0.64) participants, p = .012, and between White/Non-Hispanic and Black/African-American (M = 49.91, SE = 0.97) participants, p = .021. In addition, education was significantly associated with physical health status, $F(4, 111.46) = 3.70$, p = .007. Post hoc analyses with Bonferroni

correction revealed that this effect was due to significant differences between those with some college (M = 50.63, SE = 0.60) and those with a Bachelor's degree (M = 55.83, SE = 1.57), p = .025, and between those with an associate's degree (M = 50.34, SE = 1.10) and those with a Bachelor's degree, p = .050. Finally, pay grade status was also associated with physical health status, $F(2, 111.16) = 3.99$, p = .021, which post hoc analysis with Bonferroni correction revealed was due to significant differences in physical health status between officers (M = 55.13, SE = 1.33) and junior enlisted personnel (M = 51.33, SE = 0.83), p = .050, and between officers and senior enlisted personnel (M = 51.12, SE = 0.53), p = .018.

Mental health-related quality of life (or "mental health status") was not significantly associated with age, $F(1, 108.56) = 2.33$, p = .130, ethnicity/race, $F(4, 110.84) = 0.32$, p = .865, marital status, $F(4, 125.25) = 1.40$, p = .238, pay grade status, $F(2, 112.18) = 0.290$, p = .749, branch of service, $F(1, 149.29) = 2.47$, p = .118, number of previous pregnancies, $F(1, 112.19) = 0.40$, p = .528, or number of children cared for in the home, $F(1, 111.46) = 0.04$, p = .838. However, mental health status was significantly associated with education, $F(4, 112.11) = 5.69$, $p < .001$, an effect driven largely by significant differences in mental health status between participants with some college education (M = 47.27, SE = 1.13) and those with a high school diploma/GED (M = 53.29, SE = 1.52), p = .019 (according to post hoc analyses with Bonferroni correction).

Body mass index (BMI) was not significantly associated with age, $F(1, 119.56) = 0.66$, p = .420, number of previous pregnancies, $F(1, 120.60) = 0.98$, p = .324, number of children cared for in the home, $F(1, 118.39) = 0.20$, p = .659, ethnicity/race, $F(4, 116.85) = 1.50$, p = .206, marital status, $F(4, 122.05) = 2.24$, p = .069, education, $F(4, 118.64) =$

1.38, $p = .245$, or branch of service, $F(1, 133.01) = 1.49$, $p = .224$. BMI was significantly associated with pay grade status, $F(2, 119.91) = 3.35$, $p = .039$, which post hoc analysis with Bonferroni correction revealed was due to significant differences in BMI between officers ($M = 24.22$, $SE = 1.07$) and senior enlisted personnel ($M = 27.14$, $SE = 0.42$), $p = .036$.

Of the 99 individuals for which post-pregnancy physical readiness test (PRT) scores were available, post-pregnancy PRT was not significantly associated with ethnicity/race, $F(4, 93) = 1.90$, $p = .118$, number of times pregnant, $r = .019$, $p = .848$, the number of children cared for in the home, $r = .148$, $p = .147$, or body mass index, $r = -.173$, $p = .087$. However, post-pregnancy PRT was significantly correlated with age, $r = .230$, $p = .022$, education, $F(4, 94) = 6.10$, $p < .001$, and pay grade status, $F(2, 96) = 9.56$, $p < .001$. Due to violations of the assumption of normality of variance, Kruskal-Wallis' non-parametric test was used to assess PRT score differences by marital status group. No significant differences were found in PRT scores based on marital status, $H(4) = 7.86$, $p = .097$. Post hoc analyses with Bonferroni correction indicated that there were significant differences in PRT scores between individuals with a high school or GED education ($M = 3.33$, $SD = 1.73$), and individuals with an associate's degree ($M = 5.25$, $SD = 1.92$), $p = .017$, or a bachelor's degree ($M = 6.57$, $SD = 1.90$), $p = .001$. There were also significant differences in PRT scores between those with a bachelor's degree and some college ($M = 4.23$, $SD = 1.90$), $p = .029$. Post hoc analyses with Bonferroni correction revealed that there were significant differences in PRT scores between junior-enlisted personnel ($M = 3.23$, $SD = 1.77$) and senior enlisted personnel ($M = 4.60$, $SD = 1.92$), $p = .008$, and officers ($M = 6.09$, $SD = 2.12$), $p < .001$.

Social support variables were generally unassociated with demographic variables. No demographic factors, including a participant's age, $F(1, 118.18) = 0.93$, $p = .337$, ethnicity/race, $F(4, 118.49) = 1.35$, $p = .257$, marital status, $F(4, 127.11) = 0.37$, $p = .830$, education, $F(4, 117.95) = 2.07$, $p = .090$, pay grade status, $F(2, 118.83) = 2.33$, $p = .102$, and branch of service, $F(1, 147.26) = 0.01$, $p = .924$, were associated with the perceived amount of emotional social support provided by her identified network. The number of previous pregnancies, $F(1, 120.33) = 0.14$, $p = .705$, and the number of children cared for in the home, $F(1, 119.68) = 0.01$, $p = .924$, were also unassociated with levels of emotional support. Similarly, age, $F(1, 117.00) = 0.10$, $p = .758$, ethnicity/race, $F(4, 116.94) = 0.54$, $p = .708$, marital status, $F(4, 125.54) = 0.23$, $p = .920$, education, $F(4, 117.14) = 0.72$, $p = .579$, pay grade status, $F(2, 117.84) = 0.66$, $p = .517$, branch of service, $F(1, 145.31) = 0.20$, $p = .658$, number of previous pregnancies, $F(1, 119.21) = 0.003$, $p = .956$, and number of children cared for in the home, $F(1, 119.28) = 0.16$, $p = .692$, were all unassociated with perceived levels of aid provided by participants social support networks. Total functional support, which is a sum of emotional support and aid, was unassociated with all demographic variables.

Age, $F(1, 117.26) = 3.28$, $p = .073$, ethnicity/race, $F(4, 118.16) = 2.35$, $p = .058$, marital status, $F(4, 125.93) = 0.25$, $p = .907$, branch of service, $F(1, 146.11) = 0.06$, $p = .808$, number of previous pregnancies, $F(1, 119.38) = 0.002$, $p = .963$, and number of children cared for in the home, $F(1, 118.34) = 0.15$, $p = .702$, were not associated with the number of people listed in a participant's social network. Education was significantly associated with number of people in the social network, $F(4, 117.02) = 2.72$, $p = .033$, and post hoc analyses with Bonferroni correction revealed that this effect was driven by

significant differences in network size between individuals with a Bachelor's degree (M = 10.24, SE = 1.09) and those with some college (M = 6.74, SE = 0.41), p = .034, and those with a Bachelor's degree and those with a high school/GED-level education (M = 6.60, SE = 0.56), p = .036. Pay grade status was also significantly associated with network size, $F(2, 117.74) = 3.42$, p = .036. Post hoc analyses with Bonferroni correction demonstrated that this difference was driven by significant network size differences between officers (M = 8.64, SE = 0.91) and junior enlisted personnel (M = 5.93, SE = 0.57), p = .039. Age, $F(1,117.22) = 2.88$, p = .092, ethnicity/race, $F(4, 118.21) = 1.80$, p = .134, education, $F(4, 116.75) = 2.40$, p = .054, marital status, $F(4, 125.22) = 0.39$, p = .816, branch of service, $F(1, 143.28) = 0.03$, p = .857, number of previous pregnancies, $F(1, 119.28) = 0.14$, p = .705, and number of children cared for in the home, $F(1, 118.32) = 0.54$, p = .462, were not significantly associated with social integration. However, pay grade status was significantly associated with social integration, $F(2, 117.64) = 3.45$, p = 0.035, and post hoc analyses with Bonferroni correction indicated that officers (M = 80.98, SE = 8.50) reported significantly higher levels of social integration than junior enlisted participants (M = 55.92, SE = 5.34), p = .042. See Tables 5 and 6 for p values and identified covariates.

Primary Independent and Dependent Variables

In general, levels of depression, fatigue, and state anxiety decreased over the course of the first year postpartum, and health-related quality-of-life increased. BMI also decreased. This assertion is tested statistically in the next section. See Table 3 for mean values of these variables over time.

Depression and Anxiety: Clinically Significant Levels and Endorsed Critical Items

At two months postpartum, 31.71% of participants reported clinically significant mild depression symptoms (PDSS scores between 60 and 79), and 24.39% of participants reported PDSS scores of 80 or more, indicating a increased likelihood of these participants meeting Major Depressive Disorder criteria. At this time, 8.94% (n = 11) endorsed any of the critical items on the PDSS (items 7, 14, 21, 28, and 35) with a response of *neither agree nor disagree* (3), *agree* (4), or *strongly agree* (5). At two months, almost one-third (31.71%, n = 39) of participants met the cutoff for moderate state anxiety (a STAI state score of 40 through 59), and five participants (4.07%) met the cutoff for severe anxiety (a STAI state score of 60 or more). At four months postpartum, 35 participants (28.46%) met the PDSS criteria for mild depression, 20 participants (16.26%) met the criteria for Major Depression, and seven participants (5.69%) endorsed at least one PDSS critical item with a score of three or more. Twenty-four participants (19.51%) met criteria for moderate anxiety and 11 participants met criteria for severe anxiety (8.94%). At six months postpartum, nine participants (7.32%) endorsed at least one PDSS critical item, 28 participants (22.76%) reported symptoms indicating mild depression, and 16 participants (13.01%) reported symptoms indicating major depression. Thirty-four participants met cutoff values for moderate (n = 32, 26.02%) to severe (n = 2, 1.63%) state anxiety. At nine months postpartum, 29 participants (23.58%) met criteria for mild depression, 13 participants (10.57%) met criteria for major depression, and five participants (4.07%) endorsed PDSS critical items. Twenty-five participants (20.33%) met criteria for moderate anxiety and seven participants (5.69%) met criteria for severe anxiety. Finally, at twelve months postpartum, five participants (4.07%) endorsed at least

one PDSS critical item, 16 participants (13.01%) met criteria for mild depression, and 11 participants (8.94%) met criteria for major depression. Sixteen participants (13.01%) reported moderate levels of anxiety and two participants (1.63%) reported severe levels of anxiety.

Primary Sources of Social Support

Characteristics of Social Networks

The composition of participants' social networks, in terms of the types of individuals identified as sources of support (e.g. mother, husband/spouse, co-worker), was generally stable over time. Women tended to find their greatest sources of functional support (emotional support plus aid) in the same five people (in order of average amount of functional support provided by this type of person): Husband/partner, mother, friend, sibling, and father. At 12 months postpartum, the participants' mothers overtook participants' husbands/partners as the provider of the highest average quantity of total functional support. However, in terms of membership in participants' social networks, friends made up the bulk of individuals listed. Figure 5 through Figure 7 illustrate the composition of participants' social networks at each assessment. What is notable about these figures is that, as the postpartum year passes, the presence of friends and other, more peripheral, relationships become less prominent and more long-term and permanent relationships (e.g. husband/partner, mother, sibling) become relatively more prominent.

Figure 3. Makeup of Social Networks at Two Months Postpartum (n = 1027)

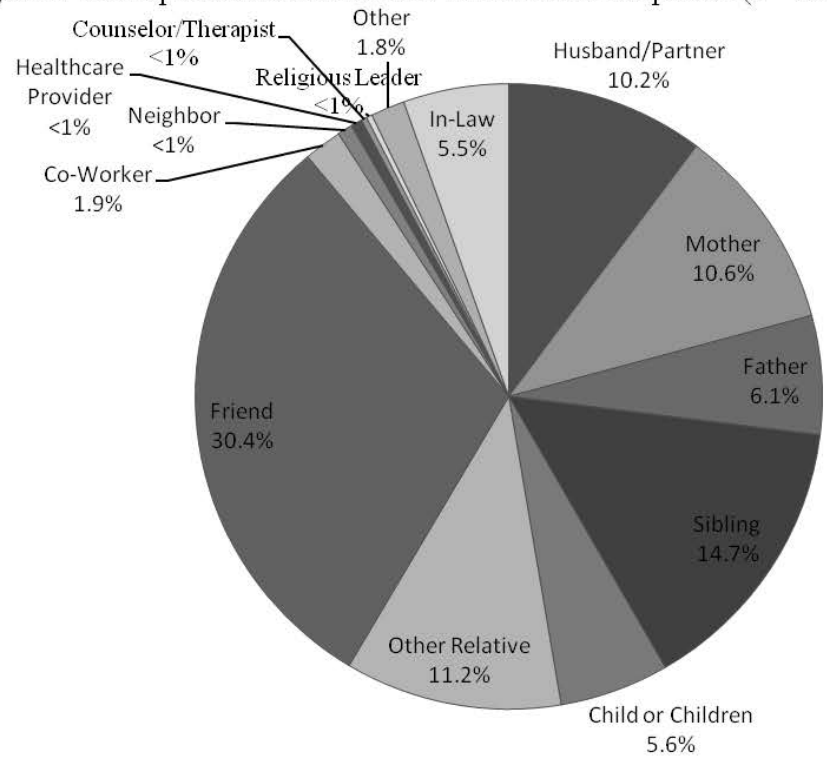


Figure 4. Makeup of Social Networks at Four Months Postpartum (n = 823)

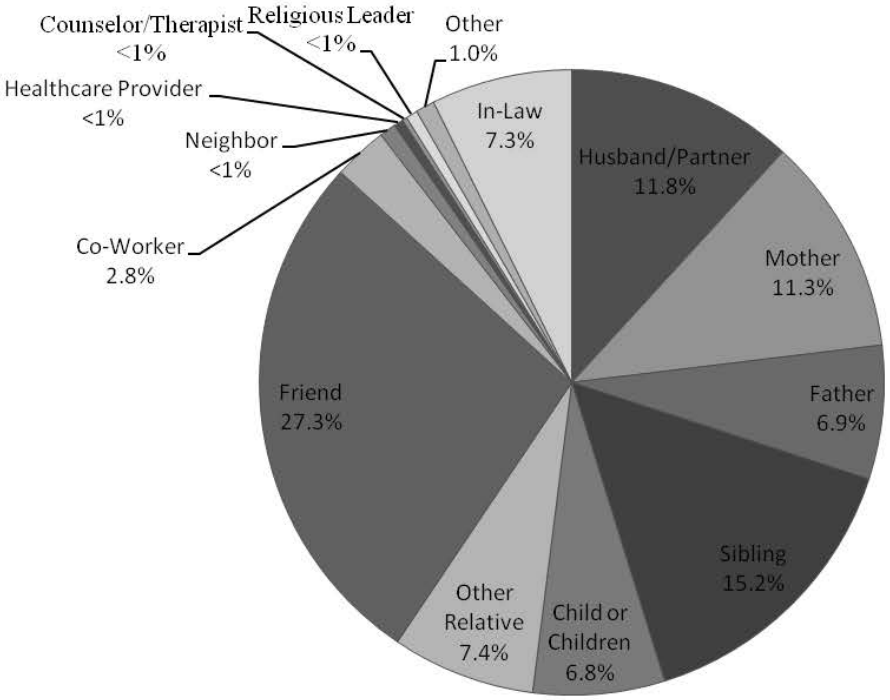


Figure 5. Makeup of Social Networks at Six Months Postpartum (n = 679)

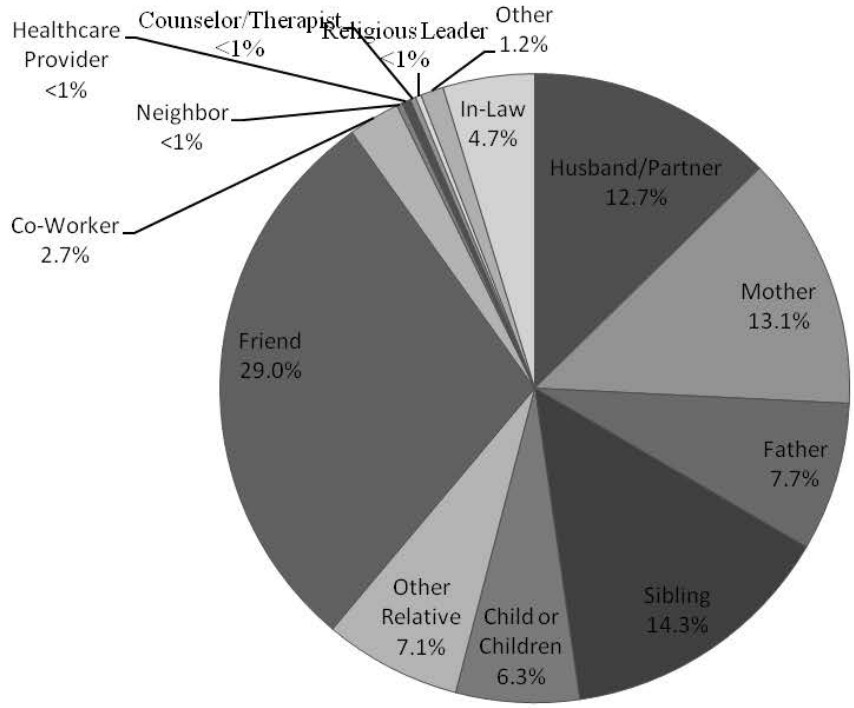
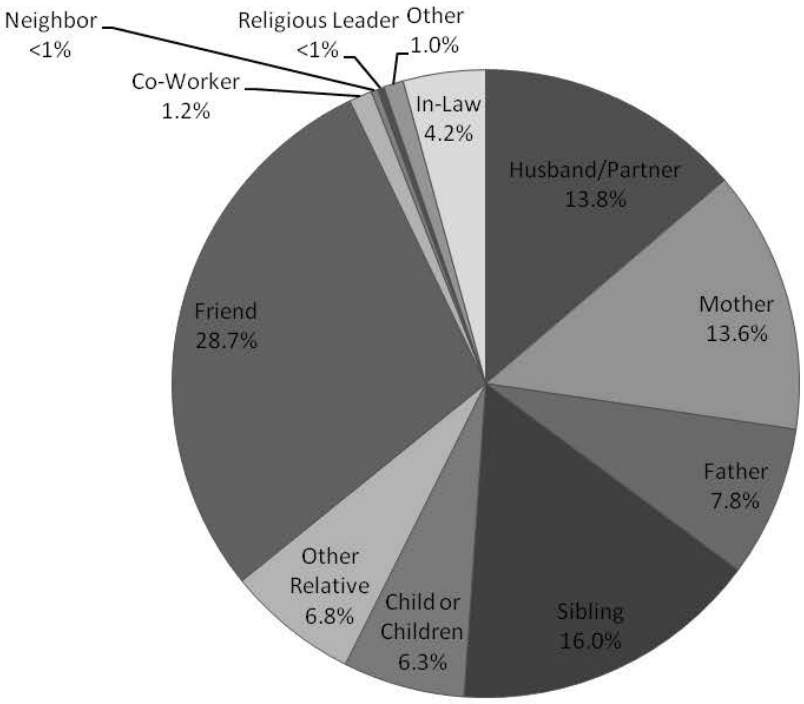
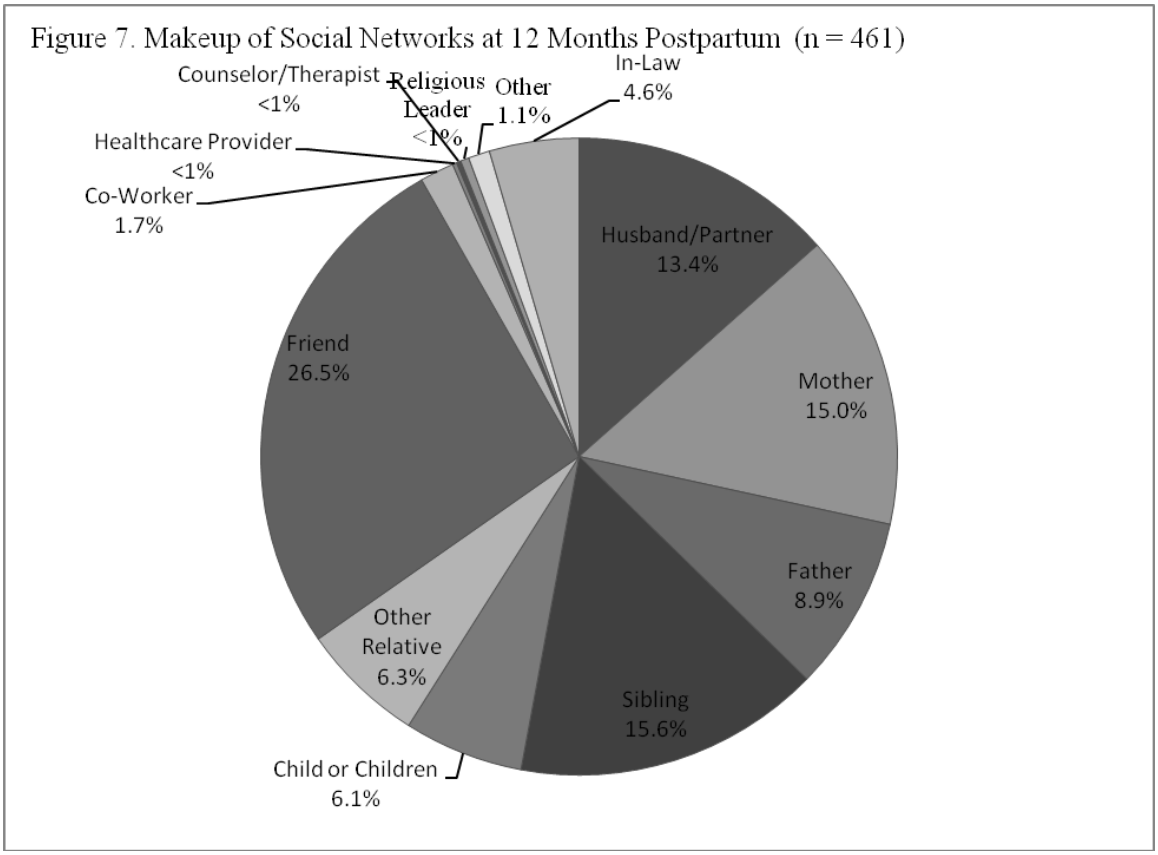


Figure 6. Makeup of Social Networks at Nine Months Postpartum (n = 589)





Preliminary Analyses

Changes in Variables Over Time

Mixed model regression analyses were conducted to determine if the main independent and dependent variables varied over time. In these analyses, the independent or dependent variable of interest (depression, state anxiety, fatigue, physical health status, mental health status, BMI, emotional support, aid, and social integration) was entered as the dependent variable of the model, and the covariates identified in previous analyses were used as fixed factors. Time was also included as a fixed factor to determine if the dependent variable changed over time.

In general, time was significantly associated with the various dependent variables in all analyses. The model predicting depression included marital status, ethnicity/race, education, and time. Of these variables, marital status, education, and time significantly predicted depression after controlling for the other variables entered into the model. Ethnicity/race was not significantly predictive of depression after controlling for the previously mentioned variables. Table 7 highlights the *F* values and unstandardized Beta values associated with each variable. Using the first assessment at two months as the reference category, it appears that depression varies over time after controlling for covariates, and decreases over the first year postpartum. Post hoc pairwise analyses revealed that there were no significant differences between any of the consecutive measurements. The intraclass correlation (ICC) for this model was .489, indicating that 51% of the variance in the model was due to within subject variance.

Time was also significantly associated with postpartum state anxiety (see Table 8 for statistical values). Generally, postpartum state anxiety decreased over time. Post hoc analyses revealed that consecutive measurements of anxiety generally did not differ, except between nine and twelve months, $p = .038$. Education was also significantly associated with state anxiety over the first year postpartum, after controlling for time. The intraclass correlation for this model was .559, indicating that 44% of that variance was due to within subject variance.

Similarly, levels of fatigue significantly decreased over time (see Table 9 for statistical values). Post hoc pairwise contrasts indicated that, among consecutive measurements, there were significant differences in fatigue between four months and six months, $p = .028$, and between nine months and 12 months, $p = .042$. In addition, after

controlling for time, education was still significantly associated with fatigue. This model, including time and education as significant predictors of fatigue, had an ICC value of .615, indicating that 38% of the variance was due to within individual variance.

Mental health status was significantly associated with both education (as a covariate) and time, and consistently increased over the course of the first postpartum year (see Table 10 for statistical values). Post hoc pairwise comparisons revealed that the only consecutive measurements of health status that significantly differed were those measured at nine months and 12 months, $p = .046$.

After accounting for time, education, ethnicity/race, and pay grade status were not significantly associated with physical health status (see Table 11 for statistical values). Time was significantly associated with physical health status, which steadily increased throughout the first year postpartum. Pairwise comparisons of consecutive measurements indicated that there was a significant difference in postpartum physical health status between two months and four months, $p = .002$. The ICC for this model was .310, indicating that 69% of the variance was due to within individual differences.

Similarly, BMI significantly decreased over the course of the first year postpartum, $F(4, 390.65) = 17.25$, $p < .001$. Marital status, $F(4, 119.10) = 2.31$, $p = .062$ was not significantly associated with BMI after accounting for time and pay grade status, but pay grade status, $F(2, 114.66) = 3.54$, $p = .032$, was significantly associated with BMI. Post hoc analyses indicated that there were significant differences in BMI between officers ($M = 25.17$, $SE = 1.34$) and junior ($M = 28.27$, $SE = 0.97$) and senior ($M = 28.10$, $SE = 0.84$) enlisted personnel ($p = .016$ and .011, respectively). Pairwise comparisons of consecutive measurements indicated that there were significant differences in BMI

between four months and six months, $p = .022$, and six months and nine months postpartum, $p = .012$. The ICC for this model was .828, indicating that only 17% of the variance was due to within-individual differences. See Table 12 for the model predicting change in BMI over time.

Hypothesis Testing

Aim One

Hypothesis 1a

Hypothesis 1a stated that participants will report the greatest number of individuals in their social networks, the greatest total functional support, and the greatest levels of social integration at the first postpartum assessment. These numbers were hypothesized to decrease over the first year postpartum. All parts of this hypothesis were supported. After controlling for demographic factors that were independently significantly associated with number listed in the social network (specifically, age, ethnicity/race, education, and pay grade status), time was significantly associated with number in the network, $F(4, 392.57) = 26.40$, $p < .001$. The number of individuals listed in a participant's network decreased throughout the first year postpartum. None of the demographic variables were significantly associated with number in the network. Thus, this analysis supports the first part of Hypothesis 1a. The intraclass correlation value for this model was .658, indicating that 34% of the variance of this model was accounted for by the variability of individuals over time. Post hoc pairwise contrasts with no correction for multiple comparisons indicated that there were significant differences in consecutive measurements of number listed in a participants network between two months and four

months, $p < .001$, and four months and six months postpartum, $p = .002$. See Table 13 for statistical values.

There were no identified covariates to include in the analysis of total functional support (emotional support plus aid) over time. Total functional support was significantly associated with time, $F(4, 395.28) = 22.44$, $p < .001$, and decreased throughout the first year postpartum, indicating support for the second part of Hypothesis 1a. The ICC for this model was .679, which indicates that 32% of the variance was due to differences within individuals. Post hoc pairwise contrasts with no correction for multiple comparisons indicated that there were significant differences in consecutive measurements of total functional support between two months and four months, $p < .001$, and four months and six months postpartum, $p = .006$. See Table 14 for statistical values.

Finally, after controlling for demographic factors that were independently significantly associated with social integration (specifically, age, education, and pay grade status), time was significantly associated with social integration, $F(4, 391.75) = 25.20$, $p < .001$, which decreased over the course of the first postpartum year. Post hoc pairwise contrasts with no correction for multiple comparisons indicated that there were significant differences in consecutive measurements of social integration between two months and four months, $p < .001$, and four months and six months postpartum, $p = .002$. This model produced an ICC value of .698. The statistical values can be found at Table 15.

Hypothesis 1b

Hypothesis 1b posited that postpartum aid (instrumental support) would decrease over the first year postpartum, but that emotional support would remain relatively

constant. This hypothesis was partially supported. Aid decreased throughout the first year postpartum, but so did emotional support, which did not remain constant as hypothesized.

In support of Hypothesis 1b, time was significantly associated with perceived aid, $F(4, 395.02) = 18.18$, $p < .001$, which decreased over the course of the first postpartum year. Post hoc pairwise contrasts indicated that here were significant changes in consecutive measurements of aid between two months and four months, $p = .001$, and four months and six months, $p = .022$, postpartum. The model's intraclass correlation value was .677, indicating that 32% of the variance could be attributed to differences within individuals. Unstandardized Beta values can be seen at Table 17.

However, instead of remaining relatively constant over time, perceived emotional support was also significantly associated with time, $F(4, 396.39) = 21.47$, $p < .001$, and decreased over the first year postpartum. Although both were entered into the model as covariates, neither education, $F(4, 114.01) = 1.64$, $p = .170$, or pay grade status, $F(2, 112.27) = 1.09$, $p = .340$, were significantly associated with emotional support after controlling for time. Post hoc pairwise contrasts indicated that here were significant changes in consecutive measurements of aid between two months and four months, $p < .001$, and four months and six months, $p = .006$, postpartum. The model had an intraclass correlation value of .664, indicating that 36% of the variance could be attributed to differences within individuals. Unstandardized Beta values can be seen at Table 16.

Aim Two

Hypothesis 2a

Hypothesis 2a stated that social support variables will be especially strongly related to mental health outcome variables (depression and state anxiety) early in the postpartum year, and the relationship will weaken over time. Interaction terms were used to test this hypothesis, as well as time, the relevant social support variable (both as independent variables), and any identified covariates. Social support variables tested included the number of people listed in the social network, social integration (a composite of number in the network, the duration of these relationships, and the frequency of contact), emotional support, and aid (instrumental support). Generally, this hypothesis was not supported.

After accounting for time and relevant covariates, the number of people in a participant's social network was not significantly associated with PDSS depression scores, $F(1, 451.47) = 1.90$, $p = .169$, nor was the interaction of time and number in the network, $F(4, 401.18) = 0.69$, $p = .599$. Among the covariates, only pay grade status was significant after controlling for the other terms in the model, $F(2, 105.37) = 3.92$, $p = .023$. Post hoc analyses with no correction indicated that this effect was driven by significant differences in levels of depression between junior enlisted ($M = 69.64$, $SD = 6.55$) and senior enlisted ($M = 56.63$, $SD = 5.74$) participants, $p = .006$. Ethnicity/race, $F(4, 111.32) = 0.49$, $p = .740$, age, $F(1, 105.71) = 0.35$, $p = .556$, and education, $F(4, 109.36) = 2.08$, $p = .088$, were not significantly associated with depression. However, time was significantly associated with depression, $F(4, 398.56) = 3.01$, $p = .018$, which decreased throughout the first year postpartum, and significantly decreased between two

months and four months postpartum, $p = .030$. The ICC for this model was .493, indicating that 51% of the variance could be attributed to within individual differences. See Table 18 for unstandardized Beta values.

Similarly, there was no significant effect of the interaction between social integration and time on depression, $F(4, 405.35) = 0.51$, $p = .727$. In this model, several covariates were significantly associated with depression, including pay grade status, $F(2, 107.22) = 5.10$, $p = .008$, education, $F(4, 110.74) = 3.40$, $p = .011$, and marital status, $F(4, 121.55) = 4.59$, $p = .002$. Post hoc analyses found that junior enlisted participants had significantly higher levels of depression than senior enlisted personnel, $p = .002$. Also according to post hoc analyses, participants with a high school or GED-level education displayed significantly lower levels of depression than participants with some college education, $p = .006$, or an associate's degree, $p = .004$. Post hoc analyses revealed that separated individuals had significantly higher levels of depression than married, $p = .002$, single, $p < .001$, divorced, $p = .019$, and partnered individuals, $p = .001$. Age was not significantly associated with depression, $F(1, 106.78) = 0.33$, $p = .565$. Social integration was not associated with depression after controlling for other variables in the model, $F(1, 412.58) = 1.49$, $p = .223$. However, time was significantly associated with depression, $F(4, 403.28) = 2.65$, $p = .033$, and depression levels significantly decreased between two months and four months, $p = .048$, postpartum. The ICC for this model was .456, indicating that a slight majority (54%) of the variance was due to within individual differences. See Table 19 for unstandardized Beta values.

In the model predicting depression based on emotional support, time, their interaction, and various covariates, all terms were significant except the interaction term,

$F(4, 408.908) = 0.740$, $p = .565$. Pay grade status, $F(2, 108.958) = 4.730$, $p = .011$, education, $F(4, 111.894) = 3.771$, $p = .006$, and marital status, $F(4, 123.627) = 4.251$, $p = .003$ were significantly associated with postpartum depression, as was time, $F(4, 405.564) = 3.183$, $p = .014$, and emotional support, $F(1, 429.722) = 4.440$, $p = .036$. Post hoc analyses indicated that there were significant decreases in consecutive measurements of depression between months two and four, $p = .026$. There were also significantly higher levels of depression in junior enlisted participants (as compared to senior enlisted participants, $p = .003$), participants with some college or an associate's degree (as compared to individuals with a high school or GED-level education, $p = .004$ and $p = .001$, respectively), and participants who were separated (compared to participants who were married, $p = .002$, partnered, $p = .002$, single, $p < .001$, or divorced, $p = .020$). This model's ICC was .453, indicating that slightly over half of the variance (55%) could be attributed to within-individual differences. See Table 20 for unstandardized Beta values.

Finally, the interaction between time and aid (instrumental support) was non-significantly related to depression, $F(4, 409.881) = 1.251$, $p = .289$, although all other terms were significant. Pay grade status, $F(2, 108.760) = 4.994$, $p = .008$, education, $F(4, 111.737) = 3.838$, $p = .006$, and marital status, $F(4, 123.896) = 4.318$, $p = .003$, were all significantly associated with depression. Similar to previous assessments, post hoc analyses revealed that junior enlisted participants were more depressed than senior enlisted participants, $p = .002$, separated participants were more depressed than partnered, $p = .001$, divorced, $p = .022$, single, $p < .001$, and married participants, $p = .002$, and that individuals with no more than a high school diploma or GED were less depressed than participants with some college, $p = .003$, or an associate's-level education, $p = .001$.

Both time, $F(4, 406.976) = 5.004$, $p = .001$, and aid, $F(1, 416.945) = 6.714$, $p = .010$, were also significantly associated with depression. Post hoc analyses revealed that there were significant decreases in consecutive measurements of depression between two months and four months postpartum, $p = .016$. The ICC for this model was .448, indicating that over half of the variance (55%) was due to within individual differences. These analyses do not support the hypothesis that the relationship between social support variables and depression will weaken over time. See Table 21 for unstandardized Beta values.

Like depression, the interactions of time and various social support variables were not significantly associated with state anxiety, not supporting the stated Hypothesis 2a. In addition, there appeared to be less association between time and various social support variables and state anxiety, after controlling for demographic covariates. For example, in the model including number listed in the social network, time, and various demographic covariates, pay grade status, $F(2, 102.735) = 3.86$, $p = .024$, and education, $F(4, 106.298) = 3.489$, $p = .010$, were the only variables significantly associated with state anxiety. Ethnicity/race, $F(4, 107.949) = 0.327$, $p = .860$, age, $F(1, 103.103) = 1.658$, $p = .201$, time, $F(4, 392.481) = 1.227$, $p = .299$, number in the network, $F(1, 473.140) = 1.236$, $p = .267$, and the interaction of time and number in the network, $F(4, 394.743) = 0.068$, $p = .991$, were not significantly associated with state anxiety. Post hoc analyses found that junior enlisted participants were significantly more anxious than senior enlisted participants, $p = .007$, and that individuals with a high school education or GED were significantly less anxious than individuals with some college, $p = .007$, or an associate's degree, $p = .004$. The ICC for this model was .557, indicating that about 44% of the

variance was due to within individual differences. See Table 22 for unstandardized Beta values.

Also defying the hypothesis, social integration, $F(1, 458.687) = 1.775$, $p = .183$, time, $F(4, 395.631) = 1.356$, $p = .249$, and the interaction of these two variables, $F(4, 396.955) = 0.102$, $p = .982$, were not significantly associated with state anxiety, nor was age, $F(1, 107.280) = 1.360$, $p = .246$. Pay grade status, $F(2, 107.400) = 4.022$, $p = .021$, and education, $F(4, 110.236) = 4.189$, $p = .003$, were significantly associated with state anxiety. Post hoc analyses revealed that senior enlisted participants were significantly less anxious than junior enlisted participants, $p = .006$, and that individuals with a high school education or GED were significantly less anxious than those with some college, $p = .004$, or an associate's degree, $p = .001$. The ICC value for this model was .537, indicating that almost half the variance (46%) was due to within individual differences. See Table 23 for unstandardized Beta values.

Emotional support was associated with state anxiety, $F(1, 471.768) = 6.013$, $p = .015$, as was pay grade status, $F(2, 108.877) = 3.147$, $p = .047$, and education, $F(4, 111.442) = 5.391$, $p = .001$. Time, $F(4, 398.091) = 1.415$, $p = .228$, and the interaction of emotional support and time, $F(4, 400.772) = 0.077$, $p = .989$, were not significantly associated with state anxiety, not supporting Hypothesis 2a. Post hoc analyses revealed that senior enlisted participants were significantly less anxious than junior enlisted participants, $p = .015$, and that individuals with no more education than a high school diploma or GED were significantly less anxious than those with some college, $p = .001$, or those with an associate's degree, $p < .001$. The ICC value of this model was .534,

indicating that almost half of the variance (47%) was due to within individual differences. See Table 24 for unstandardized Beta values.

In a model predicting state anxiety, time, $F(4, 398.746) = 3.136$, $p = .015$, education, $F(4, 114.613) = 4.003$, $p = .004$, and aid, $F(1, 470.126) = 7.848$, $p = .005$, were all significantly associated with the outcome variable, although the interaction of time and aid was not significant, $F(4, 400.913) = 0.831$, $p = .506$. Post hoc pairwise comparisons revealed that there were significant differences in consecutive measures of anxious between nine months and 12 months postpartum, $p = .035$. Post hoc analyses also indicated that individuals with some college education or an associate's degree were significantly more anxious than those with only a high school diploma or GED ($p = .009$ and $p = .001$, respectively). In addition, participants with an associate's degree were significantly more anxious than those with a graduate degree, $p = .013$. The ICC value for this model was .542, indicating that 46% of the variance was due to within individual differences. See Table 25 for unstandardized Beta values.

Aim Three

Hypothesis 3a

Hypothesis 3a stated that the relationship between social support variables and somatic postpartum symptoms (fatigue, mental health status, and physical health status) would vary over time. Specifically, physical health status and mental health status were hypothesized to have a significant positive relationship with social support variables at the first assessment and this relationship was hypothesized to become weaker and eventually non-existent in later assessments. Fatigue was hypothesized to have a significant negative relationship with social support variables at the first assessment, and

this relationship was hypothesized to become weaker and eventually become non-significant. These hypotheses were not statistically supported.

Similar to the lack of association between the mental health variables (state anxiety and depression) and the interaction of time and social support variables, there were no associations between interaction variables and fatigue. The interaction of number of individuals in a participant's social network and time was not significantly associated with fatigue, $F(4, 391.185) = 0.497$, $p = .738$, nor was the number of individuals in the network alone, $F(1, 484.931) = 0.483$, $p = .488$. In this model, non-significant covariates included ethnicity/race, $F(4, 109.945) = 0.345$, $p = .847$, age, $F(1, 105.707) = 1.277$, $p = .261$, and pay grade status, $F(2, 105.272) = 2.055$, $p = .133$. Education, $F(4, 108.492) = 4.133$, $p = .004$, and time, $F(4, 389.491) = 4.276$, $p = .002$, were significantly associated with postpartum fatigue. Post hoc analyses indicated that individuals with no more than a high school education or GED had significantly lower levels of fatigue than participants with some college, $p = .003$, or an associate degree, $p = .003$. There were also significant differences in consecutive measures of fatigue between four months and six months postpartum, $p = .049$. The intraclass correlation for this model was .623, indicating that 38% of the variance was due to within individual differences. See Table 26 for unstandardized Beta values.

Also contrary to Hypothesis 3a, the interaction of social integration and time was unassociated with postpartum fatigue, $F(4, 393.215) = 0.508$, $p = .730$. Pay grade status, $F(2, 110.167) = 1.950$, $p = .147$, age, $F(1, 110.182) = 1.185$, $p = .279$, and social integration alone, $F(1, 481.838) = 0.500$, $p = .480$, were unassociated with fatigue. However, education, $F(4, 112.697) = 5.001$, $p = .001$, and time, $F(4, 392.457) = 4.450$, p

= .002, were significantly associated with fatigue. Post hoc analyses reveal, again, that participants with a high school diploma or GED had significantly lower levels of fatigue than those with some college education, $p = .002$, or an associate's degree, $p < .001$. There were significant differences in consecutive measures of fatigue between four months and six months postpartum, $p = .028$. The ICC for this model was .607, indicating that 39% of the variance was due to within individual differences. See Table 27 for unstandardized Beta values.

Similar to the previous two analyses, time, $F(4, 394.702) = 5.353$, $p < .001$, and education, $F(4, 113.728) = 6.007$, $p < .001$, were the only variables significantly associated with fatigue in a model including time, education, pay grade status, $F(2, 111.434) = 1.337$, $p = .267$, emotional support, $F(1, 491.272) = 2.284$, $p = .131$, and the interaction of time and emotional support, $F(4, 396.741) = 0.377$, $p = .825$. Therefore, this analysis does not support Hypothesis 3a. Like previous analyses, post hoc comparisons indicated that individuals with only a high school diploma or GED were significantly less fatigued than those with some college, $p = .001$, or an associate's degree, $p < .001$. There were significant decreases in consecutive measures of fatigue between four months and six months postpartum, $p = .019$. The ICC for this model was .606, indicating that 39% of the variance is due to within individual differences. See Table 28 for unstandardized Beta values.

The model assessing the association of fatigue and the interaction of aid (instrumental support) and time also was not supportive of Hypothesis 3a. In this model, all other variables were significant, including time, $F(4, 395.618) = 7.062$, $p < .001$, aid, $F(1, 488.309) = 5.950$, $p = .015$, and education, $F(4, 116.644) = 5.422$, $p < .001$. Post

hoc analyses found that individuals with an associate's degree had significantly higher levels of fatigue than those with a graduate degree, $p = .012$, or those with a high school or GED-level education, $p < .001$. In addition, those with some college education or a bachelor's degree had significantly higher levels of fatigue than those with only a high school/GED-level education ($p = .001$ and $p = .020$, respectively). There were significant differences in consecutive measurements of fatigue between two months and four months, $p = .036$, between four months and six months, $p = .018$, and between nine and 12 months postpartum, $p = .034$. The interaction of aid and time was not significantly associated with fatigue, $F(4, 397.268) = 0.460$, $p = .765$. The ICC value for this model was .602, indicating that about 40% of the variance was due to within individual differences. See Table 29 for unstandardized Beta values.

Hypothesis 3a was not supported by analyses of associations between the interaction of time and social support variables, and mental health status (SF12v2 Mental Component Scale). Mental health status was not significantly associated with time, $F(4, 379.87) = 2.15$, $p = .074$, number of individuals in the social network, $F(1, 415.33) = 3.50$, $p = .062$, or the interaction of these two variables, $F(4, 381.93) = 0.47$, $p = .760$, nor was it associated with ethnicity/race, $F(4, 104.27) = 0.54$, $p = .709$. In this model mental health status was significantly associated with pay grade status, $F(2, 99.57) = 4.32$, $p = .016$, and education, $F(4, 103.89) = 5.64$, $p < .001$, and approximately 56% of the variance was due to within individual differences (ICC = .438). Post hoc analyses revealed significantly higher mental health status scores in individuals with a high school/GED-level education compared to those with some college, $p = .001$, or an associate's degree, $p < .001$. In addition, those with a bachelor's degree had significantly

poorer mental health status than those with a graduate degree, $p = .036$. Senior enlisted participants also had significantly better mental health status than junior enlisted participants, $p = .004$. See Table 30 for unstandardized Beta values.

The model which tested the associated of time, social integration, and the interaction of these two variables also did not support Hypothesis 3a. Social integration, $F(1, 399.85) = 3.45$, $p = .064$, time, $F(4, 382.51) = 2.30$, $p = .059$, and their interaction term, $F(4, 383.62) = 0.49$, $p = .740$, were not significantly associated with mental health status, nor was age, $F(1, 103.01) = 1.40$, $p = .240$. Education, $F(4, 108.15) = 6.41$, $p < .001$, and pay grade status, $F(2, 104.87) = 3.98$, $p = .022$, were significantly associated with mental health status. Post hoc analyses indicated that participants with an associate's degree had the lowest mental health status levels, and significantly lower mental health status scores than those with some college, $p = .034$, or with only a high school/GED-level education, $p < .001$. Individuals with a graduate degree had significantly higher mental health status scores than individuals with a bachelor's degree, $p = .043$. Finally, those with some college also had significantly lower mental health status scores than those with a high-school education, $p = .001$. Similar to previous analyses, junior enlisted participants had significantly lower mental health status scores than senior enlisted participants, $p = .006$. Approximately 56% of the variance was due to within individual variance (ICC = .435). See Table 31 for unstandardized Beta values.

In the model testing the association of time, emotional support, and their interaction, the interaction term was not significantly associated with mental health status, $F(4, 388.30) = 0.65$, $p = .624$, and therefore Hypothesis 3a was not supported. However, mental health status was significantly associated with education $F(4, 109.87) =$

7.87, $p < .001$, emotional support, $F(1, 413.53) = 7.30$, $p = .007$, and time, $F(4, 385.82) = 2.85$, $p = .024$, and the association with pay grade status closely approached significance, $F(2, 106.87) = 3.08$, $p = .050$. Post hoc analyses indicated that those with a high school/GED-level education had significantly higher mental health status scores than those with some college education, $p < .001$, or an associate's degree, $p < .001$. In addition, individuals with a bachelor's degree had poorer (lower) mental health status scores than those with a graduate degree, $p = .038$. Participants with some college credits but no degree had significantly higher mental health status scores than those with an associate's degree, $p = .014$. Finally, senior enlisted participants had significantly better (higher) mental health status scores than junior enlisted participants, $p = .015$. There were no significant differences in any consecutive measures of mental health status. The ICC for this model was .427, indicating that approximately 57% of the variance was due to within-individual differences. See Table 32 for unstandardized Beta values.

Similarly, education, $F(4, 112.97) = 6.23$, $p < .001$, aid (instrumental support), $F(1, 405.96) = 8.40$, $p = .004$, and time, $F(4, 387.50) = 3.46$, $p = .009$, were significantly associated with mental health status, although the interaction of aid and time was not significantly associated with mental health status, $F(4, 389.79) = 1.09$, $p = .360$, and therefore Hypothesis 3a was not supported. Post hoc analyses indicated that individuals with a high school/GED-level education had significantly better (higher) mental health status scores than those with some college, $p = .002$, those with an associate's degree, $p < .001$, and those with a bachelor's degree, $p = .008$. Individuals with an associate's degree had poorer mental health status scores than those with some college, $p = .029$, or a graduate degree, $p = .006$. There were significant differences in consecutively measured

levels of mental health status between nine months and 12 months, $p = .036$. The ICC for this model was .429, indicating that approximately 57% of the variance was due to within-individual variance. See Table 33 for unstandardized Beta values.

Hypothesis 3a was not supported by the relationship of the interaction of time and social support variables and physical health status (SF12v2 Physical Component Scale). The interaction of time and number of people in an individual's social network was not significantly associated with physical health status, $F(4, 393.90) = 1.10$, $p = .359$, nor was age, $F(1, 99.50) = 0.26$, $p = .609$, education, $F(4, 106.58) = 1.80$, $p = .134$, or pay grade status, $F(2, 101.49) = 0.32$, $p = .725$. Ethnicity/race, $F(4, 106.56) = 2.52$, $p = .046$, number in the network, $F(1, 350.12) = 3.98$, $p = .047$, and time, $F(4, 391.15) = 3.98$, $p = .004$, were significantly associated with physical health status. Post hoc analyses indicated that White/Non-Hispanic participants had higher (better) physical health scores than Black or African-American participants, $p = .031$, and Asian or Pacific Islander participants, $p = .028$. Hispanic participants also had significantly higher physical health status scores than Black or African-American participants, $p = .033$, and Asian or Pacific Islander participants, $p = .030$. There were significant differences in consecutive measurements of physical health between two months and four months postpartum, $p = .007$. The ICC for this model was .311, indicating that almost 69% of the variance was due to within-individual differences. See Table 34 for unstandardized Beta values.

Hypothesis 3a was not supported by the relationship between the interaction of social integration and time and physical health status, which was not significant, $F(4, 390.63) = 1.29$, $p = .274$. Age, $F(1, 99.66) = 0.26$, $p = .615$, ethnicity/race, $F(4, 107.84) = 2.39$, $p = .055$, education, $F(4, 106.79) = 1.82$, $p = .131$, pay grade status, $F(2, 101.79)$

= 0.34, p = .714, and social integration, F(1, 326.75) = 3.42, p = .065, were similarly unassociated with physical health status. Time was the only variable significantly associated with physical health status, F(4, 388.74) = 4.24, p = .002. Post hoc analyses indicated that there were significant differences in measurements of physical health status between two months and four months postpartum, p = .006. The ICC for this model was .310, indicating that 69% of the variance was due to within-individual differences. See Table 35 for unstandardized Beta values.

The interaction of time and emotional support was not significantly associated with physical health status, F(4, 393.84) = 1.18, p = .321, indicating further lack of support for Hypothesis 3a. Ethnicity/race, F(4, 107.17) = 2.32, p = .062, education, F(4, 106.78) = 1.75, p = .144, pay grade status, F(2, 102.40) = 0.23, p = .793, and emotional support, F(1, 339.68) = 2.03, p = .155, were not associated with physical health status. Time was the only variable significantly associated with physical health status, F(4, 390.78) = 4.35, p = .002, and post hoc analyses indicated that there were significant differences in consecutive measures of physical health status between two months and four months postpartum, p = .004. The ICC for this model was .307, indicating that 69% of the variance was due to within-individual variance. See Table 36 for unstandardized Beta values.

The interaction of aid (instrumental support) and time was similarly not significantly associated with physical health status, F(4, 395.46) = 0.61, p = .659, further eroding support of Hypothesis 3a. Again, time was the only variable significantly associated with physical health status in this model, F(4, 392.43) =4.27, p = .002. Aid, F(1, 329.47) = 0.05, p = .824, ethnicity/race, F(4, 107.05) = 2.10, p = .086, education,

$F(4, 106.35) = 1.62$, $p = .176$, and pay grade status, $F(2, 101.96) = 0.27$, $p = .767$, were not significantly associated with physical health status. Post hoc analyses indicated that there were significant differences in consecutive measurements of physical health status between two and four months postpartum, $p = .003$. The ICC for this model was .308, indicating that 69% of the variance was due to within-individual differences. See Table 37 for unstandardized Beta values.

Hypothesis 3b

Hypothesis 3b sought to determine if social support and integration influenced participants' ability to return to previous body weight (as measured by body mass index [BMI]) and physical fitness levels (as measured by US Navy physical readiness testing [PRT] scores). It was hypothesized that social support and integration would be positively associated with PRT scores and would be more strongly related to BMI early in the postpartum year.

None of the interactions between time and various social support and integration variables were significantly associated with BMI, indicating that there is no support in this study for "critical periods" in which social support is especially important to return to pre-pregnancy weight. In the first model, number of individuals listed in the network was significantly positively associated with BMI, $F(1, 446.67) = 4.09$, $p = .044$. Marital status, $F(4, 108.20) = 2.58$, $p = .041$, and time, $F(4, 379.94) = 6.07$, $p < .001$, were also significantly associated with postpartum BMI. Pay grade status, $F(2, 103.32) = 0.84$, $p = .433$, ethnicity/race, $F(4, 105.39) = 1.87$, $p = .122$, education, $F(4, 105.27) = 0.04$, $p = .997$, age, $F(1, 103.61) = 0.06$, $p = .801$, and the interaction of time and number of individuals in the network, $F(4, 381.10) = 0.96$, $p = .430$, were not significantly

associated with BMI. Post hoc comparisons indicated that separated participants had significantly higher body mass indices than partnered, $p = .008$, and single, $p = .023$, participants, and that married participants had a significantly higher BMI than partnered participants, $p = .047$, who had the smallest BMI means. There were significant decreases in consecutive measures of BMI between six and nine months postpartum, $p = .005$. The ICC for this model was .837, indicating that only 16% of the variance was due to within individual differences. See Table 38 for unstandardized Beta values.

Social integration, $F(1, 459.02) = 3.71$, $p = .055$, and the interaction of social integration and time, $F(4, 382.09) = 0.67$, $p = .615$, were not significantly associated with BMI. None of the demographic variables, including age, $F(1, 108.52) = 0.29$, $p = .592$, education, $F(4, 109.99) = 0.08$, $p = .989$, marital status, $F(4, 113.26) = 2.40$, $p = .054$, or pay grade status, $F(2, 108.40) = 0.99$, $p = .377$, were associated with BMI. Time was the only variable in the model significantly associated with BMI, $F(4, 381.43) = 5.16$, $p < .001$, and significantly decreased between six and nine months postpartum, $p = .010$. The ICC for this model was .837, indicating that 16% of the variance was due to within individual variance. See Table 39 for unstandardized Beta values.

Emotional support, $F(1, 456.03) = 3.06$, $p = .081$, and the interaction of time and emotional support, $F(4, 385.51) = 0.84$, $p = .502$, were also not significantly associated with postpartum BMI. The demographic variables entered into the model were not significantly associated with BMI, including marital status, $F(4, 114.44) = 2.33$, $p = .060$, pay grade status, $F(2, 109.54) = 1.00$, $p = .371$, and education, $F(4, 110.90) = 0.13$, $p = .971$. Time was significantly associated with BMI, $F(4, 384.12) = 6.35$, $p < .001$, which significantly decreased between six and nine months after childbirth, $p = .013$. The ICC

for this model was .838, indicating again that 16% of the variance was due to within individual differences. See Table 40 for unstandardized Beta values.

Aid was significantly associated with postpartum BMI, $F(1, 463.19) = 8.04$, $p = .005$, as was time, $F(4, 384.03) = 7.26$, $p < .001$, although the interaction of these two variables was not significantly associated with BMI, $F(4, 384.97) = 1.47$, $p = .209$. Pay grade status was also significantly associated with BMI, $F(2, 114.60) = 3.69$, $p = .028$, although marital status was not associated with BMI, $F(4, 118.76) = 2.43$, $p = .051$. Post hoc analyses indicated that officers had a significantly lower BMI than junior enlisted, $p = .016$, or senior enlisted, $p = .009$, personnel. Like the previous analyses, there were significantly decreases in consecutive BMI measurements between six and nine months postpartum, $p = .013$. The ICC for this model was .834, indicating that about 17% of the model variance was due to within individual differences. See Table 41 for unstandardized Beta values.

Multiple regression was used to test the associated between social support/integration and PRT scores. Hierarchical regression was used, and three blocks were entered into each model in a forced entry manner. The first block consisted of demographic variables associated with PRT scores at a $p < .100$ level (age, education, pay grade status, and marital status), and any additional demographic variables that were associated with the social support variable. The categorical variables were dummy coded. The second block consisted of pre-pregnancy overall PRT performance category score, and the third block included the final value of the social support variable measured (for example, if the participant completed three postpartum assessments, the social support variable from the third assessment was used). The final social

support/integration variable was used because many women did not take a fitness test until well after six months postpartum. The mean time delay between childbirth and the first PRT was 47.485 weeks and ranged from 19 weeks to 108 weeks. This time delay was not found to be associated with PRT scores, $r = .135$, $p = .184$. The regression models were assessed for multicollinearity and influential cases by checking residual plots, Cook's values, and variation inflation factors (VIF). These values were found to be within acceptable limits.

In general, these multiple regression analyses found that final measurements of social support and integration variables were not significantly associated with postpartum PRT scores. The first model assessed the influence of numbers of individuals in the network on post-pregnancy PRT scores. The following dummy variables were entered into the first block: Age, ethnicity, education, marital status, and pay grade status. The first block accounted for 40% of the variance ($r^2 = .401$, adjusted $r^2 = .246$), and was significantly associated with the outcome variable, $p = .005$. The second block, including just pre-pregnancy PRT score, explained an additional 22.4% of the variance ($r^2 = .626$, adjusted $r^2 = .521$, $\Delta r^2 = .224$), and the change in r^2 significantly improved the model, $p < .001$. The third block, which included number listed in the social network, explained an additional 0.5% of the model variance ($r^2 = .631$, adjusted $r^2 = .519$, $\Delta r^2 = .005$), and did not significantly improve the model, $p = .380$, indicating that number listed in the network is not significantly associated with post-pregnancy PRT scores. See Table 42 for statistical values.

The second model assessed the influence of social integration on post-pregnancy PRT scores. The first block included the following dummy variables: Age, education,

marital status, and pay grade status. This block accounted for 31.2% of the variance (r^2 = .312, adjusted r^2 = .192) and was significantly associated with PRT scores, p = .009. The second block explained another 24.8% of the variance (r^2 = .560, adjusted r^2 = .475, Δr^2 = .248), and the change in r^2 significantly improved the model, p < .001. Finally, the third block explained an additional 2.2% of the variance (r^2 = .582, adjusted r^2 = .493, Δr^2 = .022), and did not significantly improve the model, p = .078. See Table 43 for statistical values.

The third model assessed the relationship between emotional support and post-pregnancy PRT scores. The first block consisted of the following dummy variables: Age, education, marital status, and pay grade status. This block was significantly associated with the outcome variable, p = .009, and explained 31.2% of the variance (r^2 = .312, adjusted r^2 = .192). The second block, which added pre-pregnancy PRT scores to the model, explained an additional 24.8% of the variance (r^2 = .560, adjusted r^2 = .475, Δr^2 = .248), and the change in r^2 was statistically significant, p < .001. Finally, the additional of emotional support in the third block of the model did not significantly improve the model, p = .058, and explained an additional 2.5% of the variance (r^2 = .586, adjusted r^2 = .497, Δr^2 = .025). See Table 44 for statistical values.

The final multiple regression model attempted to determine if aid (tangible support) was significantly associated with post-pregnancy PRT scores. The first block included age, marital status, education, and pay grade status, explained 31.2% of the model variance (r^2 = .312, adjusted r^2 = .192), and was significantly associated with post-pregnancy PRT, p = .009. The second block added pre-pregnancy PRT to the model and explained an additional 24.8% of the variance (r^2 = .560, adjusted r^2 = .475, Δr^2 = .248).

This block significantly improved the model, $p < .001$. Finally, the addition of aid in the final block did not significantly improve the model, $p = .344$, and explained an additional 0.6% of the variance ($r^2 = .567$, adjusted $r^2 = .474$, $\Delta r^2 = .006$). See Table 45 for statistical values.

In summary, social support and integration variables did not significantly improve models predicting postpartum PRT scores, and these analyses failed to support Hypothesis 3b. However, demographic blocks were significantly associated with the outcome variable, and the pre-pregnancy PRT scores were also significantly associated with post-pregnancy PRT scores.

DISCUSSION

Social Support During the Postpartum Year

The primary purpose of the current study was to determine if there were "critical periods" in which interpersonal relationships were especially important for mental and physical health outcomes. Previous research has indicated that supportive relationships are critically important for postpartum mental and physical well-being (C. T. Beck, 1996, 2001; Gjerdingen & Center, 2004; Gjerdingen, Froberg, & Fontaine, 1991; Thornton et al., 2006; Walker, 1997), and because military women's social networks may be limited by military lifestyle factors (such as frequent relocations and deployments), it may be particularly challenging for them to receive the right type of support at the right time. The current study sought to document the course of social support and integration during the postpartum year and determine whether there were specific times when social support and integration were especially important for mental and physical health outcomes. It was hypothesized that all forms of functional social support and structural social integration would decrease throughout the course of the first postpartum year, except emotional support, which was expected to remain generally static throughout the first postpartum year. This hypothesis was partially supported, as emotional support also decreased over the course of the year. It was also hypothesized that support would be more important for mental and physical health outcomes at the beginning of the postpartum year, and the strength of the relationship would decrease over time. None of the analyses supported this hypothesis, and therefore there was no support for the concept of "critical periods" in which social support and integration are especially helpful in staving off negative postpartum outcomes.

Despite the lack of support for most hypotheses, the current study produced interesting and significant results which highlight and clarify the role of social support and integration throughout the first postpartum year. In the current study, functional support was divided into emotional support and aid (tangible or instrumental support). Social support and integration variables were generally unassociated with physiological outcome variables (BMI and PRT scores) with one exception: Aid was associated with BMI, which may indicate that women receiving tangible support were more readily able to focus on weight loss efforts such as increasing physical activity and planning healthy meals. This finding is consistent with previous findings indicating that various types of social support are positively associated with weight loss in the postpartum period (Harris et al., 1999; Thornton et al., 2006; Walker, 1997). Aid was also associated with decreased fatigue, perhaps reflecting increased assistance from others in conducting everyday tasks. In contrast, several mental health outcome variables, including depression, state anxiety, and mental health status, were associated with both emotional support and aid. These findings indicate that participants required not just instrumental assistance, but also needed to feel cared for, supported, and accepted for optimal emotional functioning. Although few studies highlighted the role of specific subtypes of support, at least one study has indicated that both aid and emotional support are important in the months following childbirth (Gjerdingen et al., 1991). The current study further highlights the necessity of both types of support during this period.

In contrast to the large impact of functional support on postpartum outcomes, few outcomes were associated with structural support, which is a more quantitative measure of interpersonal relationships. In fact, only physical health status appeared to be

significantly influenced by a structural support variable, and was significantly associated with number of people in the network. These findings appear to highlight the importance of functional support relative to structural support. Specifically, in terms of outcome variables, the quality of social support appeared to be more important than the quantity of relationships.

The findings discussed above may be a reflection of previous findings indicating that women may not benefit from social support in the same way as men. Previous epidemiological research that has examined gender differences in the effects of social support on health has found that the relationship between quantity of support and health measures is stronger among men than among women (House, Landis, & Umberson, 1988). One possible explanation of this discrepancy is that women may incur more costs from social network involvement, and appear to be more affected by social conflict and negative interactions than men (Kawachi & Berkman, 2001; Turner, 1994). Turner (1994) hypothesized that these costs and negative interactions "cancel out" some of the health benefits of social support for women. The instrument used to assess social support in the current study included several items assessing positive aspects of functional social support (such as help with tasks and having someone in which to confide) (Norbeck et al., 1981), and did not assess any negative aspects of support (except loss, which differs from conflict and negative interactions, and was not analyzed in the current study). The variables assessing structural support (number listed and total network properties/social integration) do not reflect the positive or negative qualities of support, and instead simply assess quantity. Thus, it appears that women in the sample may benefit from the positive aspects of social support but not simply the presence of other individuals.

Specific implications of these findings will be discussed in more detail later, but may include the development of tailored interventions to help women elicit enough of the right types of support from significant others, or by creating or enhancing networks for postpartum women with the aim of providing more emotional and tangible support. Ultimately, these interventions may decrease postpartum distress and other negative outcomes, which may improve military readiness and quality-of-life in postpartum military women. It is important to also pay attention to the time periods in which postpartum women are most likely to be distressed, and how these time periods coincide with specific military readiness requirements, which will be discussed next.

Psychosocial Variables and Postpartum Military "Critical Periods"

As we shall see, the current study revealed that postpartum distress decreased over time. As stated above, there was no evidence for the differential impact of social support and integration at different times throughout the postpartum year. However, there were several points throughout the year which coincided with significant decreases in psychosocial outcome measures. These decreases will be discussed in conjunction with the various milestones that postpartum military women experience, such as return to work and taking the first postpartum physical readiness test (PRT).

The women in this study displayed markedly high levels of depression throughout the first postpartum year. At the first assessment, more than 55% of the women reported symptoms consistent with major or minor depression, and almost a quarter of women reported symptoms consistent with Major Depressive Disorder. These numbers steadily decreased throughout the first year postpartum. However, even at 12 months postpartum, over 20% of women reported symptoms consistent with major or minor depression.

In comparison, a review article (Gavin et al., 2005) drawing from previous studies that used structured clinical interviews to diagnose postpartum depression found that, at two months, the estimated point prevalence for major or minor depression was 10.6% (95% *CI*: 8.7 – 13.0), and the estimated point prevalence for major depression was 5.7% (95% *CI*: 3.8 – 8.7). At 12 months, 6.5% (95% *CI*: 2.7 – 12.9) of postpartum women had symptoms consistent with either major or minor depression, and 3.9% (95% *CI*: 2.3 – 6.1) of women had symptoms consistent with major depression. Some of these differences may be due to differences in diagnostic methods, although the instrument used in this study was initially cross-validated with structured clinical interviews (Clemmens et al., 2004). However, another study which used the PDSS to assess depression levels in a sample of 150 postpartum women assessed, on average, five weeks after childbirth, found that 12% of mothers presented with major postpartum depression and 19% had minor postpartum depression (Beck & Gable, 2001b).

In another study assessing a military sample (N = 109) similar to the sample in the current study, 29.4% of participants reported symptoms consistent with minor depression and 11.0% of participants reported symptoms consistent with major depression at six weeks postpartum (Rychnovsky & Beck, 2006). This sample had higher levels of depression, even when compared to other postpartum military women. A possible explanation of this may be that the data in the previously mentioned study (Rychnovsky & Beck, 2006) was collected in 2003, when Operation Iraqi Freedom and Operation Enduring Freedom were still relatively young, and most service members had not yet been hit with the vagaries of multiple deployments. Notably, between FY02 and FY03, the average number of days deployed per service member jumped from 31.7 per year to

49.9 per year (Department of Defense, 2005), although the participants in the previously mentioned study were unlikely to be deployed that year due to their pregnant status. Nonetheless, it should be noted that both the current study and Rychnovsky and Beck (2006) found significantly higher levels of postpartum depression in the military women participants than previous studies with civilian participants.

In addition to the stress related to increased deployments, another possible explanation for increased levels of postpartum depression in the above-mentioned military samples may be due to increased levels of trauma prior to entry into military service, as well as increased chances for exposure to stressors and trauma during service. At least one study has found that military women have higher levels of various childhood traumas as compared to a demographically-similar female civilian sample (Zinzow, Grubaugh, Frueh, & Magruder, 2008). In addition, female military veterans have a higher prevalence of adult sexual assault as compared to civilian women (Zinzow, Grubaugh, Monnier, Suffoletta-Maierle, & Frueh, 2007). Unfortunately, sexual violence is all too present during military service: Various studies indicate that between 9.5% and 33% of women report experiencing a completed or attempted sexual assault during their time in the military (Turchik & Wilson, 2010). Finally, in contrast to civilian women, military women may be exposed to combat-related trauma, further increasing their exposure to potential sources of post-traumatic stress. Research with civilian female samples has indicated that post-traumatic stress and traumatic life events are associated with an increased risk of developing depression and other negative mental health outcomes (McCutcheon et al., 2009; Murthy, 2007). The life experiences discussed above may place military women at greater risk for depression, perhaps partially

explaining the higher rates of postpartum depression in his population. There were no available studies comparing psychopathology prevalence in women who join the military compared to those who do not, but the above research indicates that there may be an increased vulnerability in this population.

As discussed above, postpartum military women sampled displayed higher levels of depression throughout the first year relative to previous civilian and military studies. However, postpartum depression levels significantly decreased between two and four months postpartum in all analyses which included social support variables. There are a number of possible explanations for this change: The participants may have felt physically better (as reflected by physical health status scores, discussed below), they may have adjusted to returning to work, or they may have started to settle into their maternal role. Previous studies on perinatal populations have found a link between physical health status and depression (Brown & Lumley, 2000; McKee, Cunningham, Jankowski, & Zayas, 2001), although these measures were not correlated in the current study. Another possible explanation is adjustment to the role of working mother. Previous research in populations of working mothers have found that adjustment to postpartum employment is significantly associated with decreased depression (Chen, 2001; Gjerdingen & Center, 2003; Gjerdingen & Chaloner, 1994; Killien, 1998; Killien, Habermann, & Jarrett, 2001). However, no available studies investigated the adjustment process after return to work to determine when women were adequately adjusted to the new demands, although at least one study found that longer maternity leave durations were negatively associated with depression (Gjerdingen & Chaloner, 1994).

What is notable about the current study, as well as other studies assessing depression in postpartum working mothers (Gjerdingen & Center, 2004; Gjerdingen & Chaloner, 1994; Killien, 1998; Killien et al., 2001), is the role of social support in improving psychological well-being and minimizing depressive symptoms. In particular, support from co-workers and immediate family members appears to be especially important. In this study, when depression alone was analyzed over time, there were no consecutive measurements with statistically significant decreases in depression. However, when social support variables were entered into the models, depression decreased significantly between two and four months postpartum. Although there were no statistically significant interaction effects between time and social support variables, the above mentioned finding may indicate that, once differing levels social support are accounted for, postpartum women adjust considerably between four and six months postpartum, perhaps indicating a period of time that social support is especially important.

Also notable, a large number of participants reported some degree of suicidal ideation (SI) by failing to disagree with various PDSS items assessing SI. At two months postpartum, 8.9% endorsed at least one PDSS critical item, which decreased to 7.3% at six months and 4.1% at 12 months postpartum. Overall, 7.3% of participants positively endorsed (either *agreed* with or *strongly agreed* with) at least one PDSS item assessing suicidal ideation. In comparison, a review article found that rates of suicidal ideation in non-impoverished populations in Western countries ranged from 0.5% to 4.0% at six to eight weeks postpartum. At four to six months, these numbers ranged from 0.6% to 7.6%, and at one year, one study found that 1.5% endorsed suicidal ideation (Lindahl,

Pearson, & Colpe, 2005). Although these numbers vary widely depending on the specific population studied and the instrument used, it is notable that the military women in the current study tended to display higher levels of SI compared to the women in these studies. There were no available studies that assessed suicidal ideation among military women, so it is unknown whether the levels of SI observed in the current study are significantly higher or lower than the levels in military women as a whole. These high levels are especially notable because participants were informed at the beginning of the study that endorsing suicidal ideation would result in a referral for further assessment of depression and potential for self-harm. Because reporting mental health problems is stigmatized in the military (Greene-Shortridge, Britt, & Castro, 2007; Hoge et al., 2004), these women may have been especially reluctant to report mental health issues in general, but especially issues that might result in referral to mental health services, so thoughts of suicide and self-harm may have actually been underreported in this sample.

In addition to significant depressive symptoms and elevated levels of suicidal ideation, many of the women in this study expressed significant anxiety. At two months, almost one third met the cutoff for moderate anxiety, and 4.1% met the cutoff for severe anxiety. These numbers decreased, with 27.6% of participants at six months and 14.6% of participants at 12 months reporting moderate to severe anxiety. In comparison, 30.7% of a civilian sample of postpartum women displayed moderate to severe anxiety at one month postpartum (Britton, 2008), again indicating that the women in the current study report higher levels of postpartum distress in the form of anxiety. However, there were no significant “critical periods” during which anxiety significantly and reliably decreased.

One notable critical period was the significant decrease in levels of fatigue between four and six months postpartum in all analyses which included this variable. Previous studies have found other "critical periods" in which clinically significant postpartum fatigue appears to significantly decrease, including between one and three months (Gjerdingen et al., 1993). Other studies have found that high levels of clinically significant fatigue persistent one to two years postpartum (Troy, 2003). In short, there is no consensus as to when women are back to "normal" levels of fatigue after giving birth, which may, in part, be due to differing definitions of "clinically significant fatigue," and differing ways of measuring fatigue. The current study provides evidence that, at least among postpartum military women, fatigue starts to significantly lift between four and six months after childbirth.

There are several events which may be influencing fatigue between four and six months, including preparation for the first postpartum PRT and weight assessment and changes in the infant's sleep patterns. Longer periods of infant sleep tend to shift to nighttime by two to three months of age, although nighttime wakening may increase again from six to twelve months postpartum (Kahn, Dan, Groswasser, Franco, & Sottiaux, 1996). Thus, the significant decrease in fatigue found in the current study may reflect the relatively calm sleep patterns of the three to six month old infant. In addition, there are several studies indicating that exercise and physical activity during the postpartum period may actually alleviate fatigue and improve feelings of well-being (Dritsa, Da Costa, Dupuis, Lowensteyn, & Khalife, 2008; Dritsa, Dupuis, Lowensteyn, & Da Costa, 2009; Ko, Yang, & Chiang, 2008; Larson-Meyer, 2002), and therefore the encouragement to exercise that an imminent physical fitness test provides may actually

positively affect levels of postpartum fatigue and contribute to improved feelings of well-being.

Physical health status also improved in the first six months postpartum, and significantly improved between two and four months postpartum. Although postpartum women in the sample had levels of physical health status consistent with population norms (Ware et al., 2002), the mean physical health status variable increased by over two points between two months and four months postpartum which is considered a small to moderate significant improvement, and was the largest improvement in any of the consecutive measurements. As discussed above, this period also coincided with significant decreases in depressive symptoms. These findings may reflect previous research indicating a significant decrease in a number of physical symptoms, including hemorrhoids, breast symptoms, constipation, dizziness, and vaginal discomfort, between one and three months postpartum (Gjerdingen et al., 1993). The improvement in physical health status among postpartum women may reflect normal physiological healing processes, and because these women's physical health status scores reflect population norms, this is one area in which postpartum military women may actually be doing fairly well compared to civilian populations.

In terms of military readiness, there are three "critical periods" in which postpartum mental and physical health may be especially important, and military women may need additional support and assistance. At six weeks postpartum, the military mother returns to work. As mentioned previously, social support is especially important for this adjustment. In addition, workplace characteristics have been shown to decrease postpartum distress, such as flexibility, increased feelings of control at work, and co-

worker and supervisor support (Gjerdingen, McGovern, Chaloner, & Street, 1995; McGovern et al., 2007). At six months postpartum, the postpartum woman is expected to be able to pass a physical fitness test and body weight assessment. Again, social support, in various forms, may improve the woman's ability to eat healthy and exercise (Albright et al., 2005; Thornton et al., 2006). Finally, at six to twelve months postpartum (depending on branch of service), a military woman is expected to be physically and emotionally ready to deploy. Unfortunately, military women may be disproportionately negatively impacted by military-associated factors, discussed below.

First of all, postpartum military women are unable to delay their return to full-time work, which may negatively impact their psychosocial well-being. Although many women return to work soon after childbirth, civilian workplaces may allow options such as flex-time, part-time work, or tele-commuting. Other workplaces may allow extended, if unpaid, maternity leave. In contrast, military women are expected to return to full duty after six weeks of maternity leave, although commanders and supervisors may allow for some flexibility in duty hours. Unfortunately, few studies were available to compare military and civilian working mothers in terms of mental health outcomes, although research suggests that longer maternity leaves are associated with improved mental and physical health outcomes (McGovern et al., 1997). Another way that military women may differ from civilian women is that postpartum military women may be more likely to have deployed spouses, which has been associated with increased risk of depression (Robrecht, Millegan, Leventis, Crescitelli, & McLay, 2008; D. C. Smith, Munroe, Foglia, Nielsen, & Deering, 2010) and postpartum distress (Haas & Pazdernik, 2006, 2007; Weis, Lederman, Lilly, & Schaffer, 2008). Regardless of the cause, these numbers are

alarming and especially significant given the need for military women to be physically and emotionally ready to return to work at six weeks and possibly deploy at six to 12 months postpartum (depending on branch of service). To this end, increased screening and non-stigmatizing treatment options must be available for postpartum military women, and proposed options will be enumerated in more detail later in this discussion. However, there are several ways that military leaders at the lowest levels can better support their postpartum employees.

First, in order to decrease levels of distress and depression, military workplaces should provide reasonable accommodations for postpartum women, such as flexible duty hours. Commanders and other leaders should also foster a supportive atmosphere, particularly in the first four months when depression can be especially influenced by social support and adjustment may be the most challenging. Finally, although many military workplaces provide time for exercise and physical activity, it may be especially important that postpartum women are encouraged and allowed to exercise, as it may attenuate fatigue and improve feelings of well-being. Exercise regimens should be utilized that prepare them for the PRT but also take into consideration the recent physical changes they have experienced. Ultimately, these changes may alleviate some of the high levels of postpartum depression and distress, and improve the readiness of postpartum military women.

The next section will highlight some of the demographic variables associated with postpartum distress, which may help military policy-makers, leaders, and health care providers to ensure that at-risk military mothers are provided with adequate care.

Demographic Variables and Postpartum Health

The current study revealed that there are a number of demographic factors which may be associated with increased risk for postpartum depression and distress in military women. In particular, marital status, education levels, and pay grade status were especially strongly associated with postpartum outcomes throughout multiple analyses. Specifically, separated women, women with some college education or an associate's degree, and junior enlisted women, tended to do more poorly with regard to postpartum outcomes.

One notable and pervasive finding was the poor psychosocial and physical outcomes displayed by separated participants. Only two participants in the sample identified as "separated." Nonetheless, their outcome scores were so poor that they consistently had statistically poorer scores on such diverse measures as depression, anxiety, PRT scores, and body mass index (both separated participants were in the obese BMI range throughout the postpartum year). In light of past research these findings are not surprising. Some of the most consistent predictors of postpartum depression and distress are marital conflict and stressful life events (O'Hara & Swain, 1996). Recent research suggests that single mothers have better outcomes than mothers with unsupportive partners (Bilszta et al., 2008), and other research has indicated that un-partnered couples who broke up before or around the birth of the baby had the poorest mental health outcomes when compared to married/cohabitating or un-partnered couples that had never been in an extended relationship (DeKlyen, Brooks-Gunn, McLanahan, & Knab, 2006). Although the sample of separated participants was small, it appears that the distress associated with marital break-up is strong enough to incur significant mental and

physical health costs, and therefore should be considered a risk factor for negative postpartum outcomes.

Education level was another risk factor associated with postpartum mental and physical health outcomes, in conjunction with pay grade status. In general, participants with a high school education had better postpartum outcomes than those with some college or an associate's degree, and officers and senior enlisted participants had better outcomes than junior enlisted participants. Preliminary analyses indicated that education and pay grade status were significantly associated, and that, among enlisted personnel, junior enlisted participants were more likely than expected to have a high school diploma or GED and senior enlisted participants were more likely to have some college or an associate's degree. These two findings appear to contradict one another, but it is possible that subgroups within these groups explain the relationship. For example, there may be a population of "senior" junior enlisted participants (E-3s, for example) that have started secondary education, but are still on the lower rungs of the military rank structure. Unfortunately, there were not enough participants to conduct subgroup analyses, so we were unable to discern which specific subgroups were at increased risk.

Previous research assessing the association between various demographic factors and postpartum outcomes is mixed. Several review articles have found small to moderate effects of socioeconomic status (SES) variables such as income (pay grade status) and education (Beck, 2001; Robertson, Grace, Wallington, & Stewart, 2004). In these studies, the relationship is generally linear, and individuals in lower socioeconomic status groups tend to do more poorly than those in higher SES groups. In the current sample, junior enlisted participants did indeed do more poorly than senior enlisted participants

and officers, but individuals with the lowest level of education tended to do relatively well when compared to those with some college education or an associate's degree.

These unusual findings may be due, in part, to the roles the military assigns to its members. Junior enlisted participants are generally new to the military and are on the "bottom rung" of the military pay ladder. They often do not have significant power or control over their day-to-day schedule, which may result in stress and poorer postpartum outcomes. In fact, previous research in civilian populations has indicated that women with lower perceptions of workplace control and autonomy tend to have higher postpartum depression scores, although these effects were moderated by perceived co-worker and supervisor support (Dagher et al., 2009). It is more challenging to explain the better outcomes seen in women with high school diplomas relative to those with an associate's degree or some college education. It may be that these participants are higher-level junior enlisted personnel or junior-level non-commissioned officers, in which case their job responsibilities may be increasing relative to previous roles, resulting in increased stress. The effect of education seen in the current study is an area of research that should be further explored to explain the unusual relationship.

As discussed before, the high levels of depression and other negative postpartum outcomes in this sample of military women are alarming. The demographic variables discussed above may allow military leaders and healthcare providers to better target interventions to postpartum women most at risk. For example, postpartum women who recently separated from a spouse should be considered "high risk" for negative postpartum outcomes, including those directly effecting readiness, such as physical fitness, weight, and mental health. As such, military leaders should be educated that

these individuals may be especially prone to problems, and may need extra support. In addition, junior enlisted mothers may have poorer outcomes than other groups, and military leaders could provide them with additional support and perhaps increased autonomy and job flexibility. These interventions would require communication with military leaders and healthcare providers, but could allow increased identification and treatment of women suffering from postpartum distress.

The next section will discuss, in greater detail, how postpartum distress in military women can be better prevented and detected, in part by expanding existing programs as well as implementing new measures.

Implications

Although the findings of this study have implications in a number of different realms, one thing is clear: Women in this sample displayed significant postpartum depression and distress. Depression, in particular, was widespread and long-standing. These alarmingly high levels of negative postpartum outcomes have implications for military readiness and the quality-of-life of female servicemembers, and practically demand increased attention and intervention.

One important component for identifying and treating depressed and distressed postpartum military women is the implementation of regular screening at multiple times throughout the postpartum year. Previous research in both civilian and military populations has pointed to the utility of routine screening for postpartum depression during Well Baby or postpartum examinations (Chaudron, Szilagyi, Kitzman, Wadkins, & Conwell, 2004; Gjerdingen & Yawn, 2007; Rychnovsky & Beck, 2006; Rychnovsky & Brady, 2008). Screening during Well Baby examinations is especially recommended,

as these examinations are repeated several times throughout the postpartum year and are highly attended by postpartum mothers (Gjerdingen & Yawn, 2007). In addition, routine postpartum screening has been shown to be more effective at identifying depressed mothers than spontaneous detection during routine clinical examinations (Evins, Theofrastous, & Galvin, 2000).

Fortunately, the military and veterans healthcare systems are taking these findings under consideration. For example, the 2009 Department of Veterans Affairs/Department of Defense clinical practice guideline for pregnancy management explicitly calls for routine depression screening during postpartum medical appointments (VA/DoD, 2009). The Department of the Navy has already implemented universal screening, at a minimum, at six weeks postpartum and at each of the Well Baby visits for the first six months after childbirth (OPNAVINST 6000.1C, 14 June 2007), for a total of four postpartum screening assessments (in addition to a minimum of two prenatal assessments). These requirements are monitored and enforced by the Navy's Bureau of Medicine Perinatal Advisory Board. However, the other branches do not have branch-wide systems in place for routine and repeated postpartum screening, although some, such as Madigan Army Medical Center's Department of Obstetrics and Gynecology, require screening during the six-week postpartum examination (Smith et al., 2010). The current study has indicated that problems with postpartum depression do not resolve, and do not always begin, by six weeks postpartum. Thus, it is recommended that the other branches of the military develop globally-implemented programs similar to that of the Navy, featuring repeated assessments and higher-level oversight. One possible avenue by which this might occur is the newly created Tricare Perinatal Advisory Board, which

will include providers of perinatal healthcare as well as military leaders, and will advise perinatal policies and best practices for all military services (Peter Nielsen, COL, MD, personal communication, September 27, 2010). However, as of now, there is no systematic structure in place to ensure that all postpartum military women are being screened for depression.

Although postpartum depression is among the most common of postpartum afflictions, a number of women also reported significant anxiety and fatigue, as well as suicidal ideation. Although most existing postpartum depression screening instruments assess suicidality, very few explicitly address fatigue or anxiety. Fatigue is a common, and perhaps sometimes overlooked (Troy, 2003), problem during the postpartum period. Anxiety has also been shown to be a significant problem for postpartum women (Altshuler, Hendrick, & Cohen, 1998; Altshuler et al., 2000; Stuart et al., 1998), and may also be overlooked (Matthey, Barnett, Howie, & Kavanagh, 2003). Although these problems are not as widespread and may not be as disabling as postpartum depression, they also may be associated with significant impairment in some women. It is recommended that postpartum anxiety and fatigue also be periodically assessed. Several self-report and structured interview instruments, such as the Primary Care Evaluation of Mental Disorders (PRIME-MD) or the Patient Health Questionnaire (PHQ; Spitzer, Kroenke, & Williams, 1999), may be used to assess both depression and anxiety, and may be more suitable for detecting anxiety than measures of postpartum depression (Muzik et al., 2000).

Given the findings of the current study and previous research, a comprehensive system of screening and assessment is proposed. First, given the high prevalence of

women experiencing significant symptoms of depression, it is recommended that postpartum women be screened at each Well Baby visit, as well as at their six-week obstetric appointment, using the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987), which is a 10-item scale that is widely used for the purposes of screening for postpartum depression. This measure has several advantages: It is free for public use, it takes a minimal amount of time, and it screens for anxiety and thoughts of self-harm. It is proposed that women also be given the Patient Health Questionnaire-9 (PHQ-9; Spitzer, Kroenke, & Williams, 1999) at the six month Well Baby visit because this measure assesses fatigue and other vegetative symptoms of depression and emotional distress. Because fatigue can be expected to significantly decrease by six months postpartum, continued elevated levels of fatigue may indicate depression, and the PHQ-9's emphasis on vegetative symptoms, such as poor concentration and disturbed appetite, may identify women who do not identify the emotional symptoms of depression measured by the EPDS. Finally, given the importance of social support for postpartum mental and physical health and well-being, it is recommended that women be asked several open-ended questions during Well Baby visits. Questions such as "Do you feel you are getting the support you need from family? From your leadership?" and "Is there someone in your life who could provide support if an emergency were to come up?" can identify women who lack social resources and may be under additional strain. Women who are identified as being depressed or having other potential mental health concerns may be further assessed by providers and referred to behavioral health resources as needed.

Results of the above-mentioned screening procedures may be used to individualize postpartum care and support. For example, women displaying significant depression or distress at their six-week obstetric appointment may be encouraged to utilize additional leave time (or be provided with additional convalescent leave) instead of immediately returning to work at six-weeks postpartum. Providers and leaders of women struggling with postpartum depression or distress could also work together to develop postpartum limited duty profiles to ease the transition back to full-time work, such as allowing for limited hours or part-time duty for a period of several weeks. Women who continue to display significant symptoms of postpartum depression at six months to one year postpartum may require additional care or time to recover before they are eligible deployment, like any individual who is nondeployable for mental health reasons. Although some of these suggestions may be controversial in the current highly demanding military climate, a supportive work environment early in the postpartum period may attenuate more significant impairment later in the postpartum year.

In addition to screening for symptoms of perinatal distress, military women may benefit from education about common postpartum mental and physical health concerns. Unfortunately, antenatal and postnatal education interventions are generally not effective in the primary prevention of postpartum depression (Dennis & Creedy, 2004; Hayes, Muller, & Bradley, 2001). However, providing women and significant others with information about common postpartum problems may result in earlier identification of at-risk individuals (secondary prevention) and treatment of individuals already suffering from depression and other problems (tertiary prevention). Military leaders and health care providers may also benefit from increased education which would enable them to

better support postpartum military women. If health care providers and military leaders are briefed on risk-factors (such as a recent marital separation) and signs of postpartum depression, they may be better able to intervene and refer the active duty mother to appropriate treatment. Educating military commanders and supervisors on the importance of a supportive work environment may ease the transition back to work and improve not only postpartum well-being, but postpartum occupational functionality (which is also in the best interest of commanders and supervisors). Ultimately, although postpartum mothers and fathers may especially benefit from educational interventions, broad-based education campaigns targeting leaders and health care providers may result in a more supportive milieu for the postpartum service woman and her family.

Notably, military women may especially benefit from education of first-line supervisors, including company-grade leaders (officers in the grades of O-1 through O-3 and non-commissioned officers in the grades of E-5 through E-7). These individuals have significant control over the postpartum military woman's working conditions and schedule. A proposed education program for leaders may be modeled after numerous other campaigns targeting sexual harassment, suicide prevention, and equal opportunity concerns, or may be included in existing military regulations regarding military pregnancy and postpartum issues. For example, at this time Army unit commanders are required to counsel pregnant soldiers regarding their rights, options, and responsibilities during and after the pregnancy (per Army Regulation [AR] 635-200 for enlisted personnel and AR 600-8-24 for officers). Educational materials could be included informing unit commanders and other leaders of common concerns and issues faced by pregnant and postpartum soldiers. At a minimum, unit leaders and supervisors should be

educated as to the high levels of distress and depression during the postpartum period, as well as other common reactions, such as high levels of fatigue. Although these high levels of distress should be emphasized in educational materials, materials should also make clear that levels of depression, fatigue, and distress will usually decrease over time. Unit-level leaders should also be educated about the impact of workplace support and flexibility in attenuating distress and depression. Finally, they should be provided guidelines as to best ways to encourage a supportive and non-stigmatizing environment for postpartum service members under their leadership.

Although unit commanders and leadership can significantly impact postpartum military women, these women may also benefit from systemic and macro-level changes. A number of systemic changes have already been identified by organizations such as the Defense Department Advisory Committee on Women in the Services (DACOWITS). DACOWITS, comprised primarily of female high-ranking military retirees, releases an annual report with recommendations based on dozens of focus groups conducted at various military communities. DACOWITS' 2008 annual report noted a distinct lack of available and affordable childcare, especially for women who worked long shifts or non-traditional duty hours. The committee subsequently recommended that the Defense Department strive to ensure high-quality childcare options were available that matched the "operational tempo" of the installation. Specifically, as one senior leader participant stated "Not just to have childcare but to have options that are 7 days a week, 24 hours a day, and are everywhere" (DACOWITS, 2008, p.43).

Postpartum military women may also benefit from leaders at the highest levels promoting options for flexible return-to-work schedules. As mentioned previously, unit

leaders may support their postpartum servicewomen by allowing for flexible return-to-work options by allowing the mother to work limited duty hours or utilize personal leave time in the weeks after returning to work. However, these options are not yet widely promoted by military leaders at the policy-making level. In addition, DACOWITS' recommendations have included that services consider one-time year-long leaves of absence (2003), which would allow both male and female service members the option of taking unpaid time away from active duty in order to pursue child-rearing and family-building and then returning to military service at the same rank and pay level they had prior to the leave of absence. This would benefit the military in that it would allow the military to potentially retain more highly trained personnel who might otherwise turn to employment in the civilian sector.

In addition to perinatal education, screening, and flexible return to work options, postpartum military women may benefit from broader approaches aimed at increasing social support and physical fitness. Previous research has indicated that postpartum fatigue may be somewhat alleviated by increased physical activity (Dritsa et al., 2008; Dritsa et al., 2009; Ko et al., 2008; Larson-Meyer, 2002), and milder cases of postpartum depression may be partially treated by physical activity (Daley, Macarthur, & Winter, 2007). These findings indicate that it is important that postpartum military women (and family members) are not only educated about the importance of fitness, but that systems are in place to support physical activity. Some of these systems are already in place. As an example, several Air Force bases feature fitness centers with child play areas. These areas allow the mother to exercise while simultaneously watching her child, and could be implemented in more military fitness facilities. Programs such as the Army's Pregnant

and Postpartum Physical Training Program encourage soldiers to engage in appropriate types and amounts of physical activity during normal unit physical training time, and should be expanded to other branches. Other potential programs may encourage spousal support and participation in physical activity or provide additional child care options (such as day care services within fitness centers).

In addition to targeting fitness, education and intervention efforts should target social support. As discussed previously, adequate social support has been linked to improved postpartum outcomes, including decreased depression (Beck, 2001) and fatigue (McGovern et al., 2007), improved health-related quality-of-life (Da Costa et al., 2006), and improved activity levels (Albright et al., 2005) and postpartum weight loss (Harris et al., 1999). In particular, support from the spouse or significant other may be especially important (Logsdon, McBride, & Birkimer, 1994; O'Hara, Rehm, & Campbell, 1983), and, as the current study and previous research makes clear, unsupportive spousal relationships can have a significant negative impact on mental and physical well-being (Bilszta et al., 2008; DeKlyen et al., 2006). Military women may be at risk for inadequate social support due to geographic separation from the family-of-origin, spousal deployment, and recent relocations. Fortunately, there are several options which may increase social support, some of which are already being implemented.

One such option that has been utilized at several military clinics is the "CenteringPregnancy®" (Centering Pregnancy website, n.d.) model of prenatal care. This model utilizes group prenatal and postpartum appointments featuring groups of 10 to 12 couples or women with similar due dates. "Centering" allows for increased contact time with providers in a variety of different areas of expertise, as well as the support of

other couples going through similar stages of pregnancy and postpartum adjustment. It has been associated with increased prenatal knowledge relative to standard prenatal care, although more research is needed to determine this model's effect on other outcomes (Baldwin, 2006). A qualitative study of women receiving either group prenatal care (i.e. "Centering") or standard prenatal care in military treatment facilities found that women receiving group prenatal care had an overwhelmingly positive response. They also spent more time during the interview talking about their prenatal care experience than women who received standard prenatal care, who spent more time talking about their birth care experiences (Kennedy et al., 2009). The CenteringPregnancy model of group prenatal care appears to provide opportunities for women to receive prenatal care in a supportive environment.

Another model of care that has been utilized, albeit not in military settings, is the use of a trained supportive peer that will guide the woman through the prenatal and postpartum period. These types of programs typically utilize mothers trained to educate pregnant women about potential prenatal, childbirth, and postpartum concerns. These programs have been shown to be especially helpful for women from a lower socioeconomic status or at higher risk for adverse outcomes (Heins, Nance, & Ferguson, 1987; Shaw, Levitt, Wong, & Kaczorowski, 2006). This type of model would be reasonably easy to implement in a military setting. Military women are already used to having "battle buddies" assigned to provide support during stressful times, such as during basic training. Women who have adjusted well to their own pregnancy and postpartum period could be trained to provide support to women going through the perinatal period.

This type of program may be especially helpful for women identified as “at risk” by the current study, such as junior enlisted women or women with limited education.

A number of significant issues may impact postpartum military women, including significant depression, anxiety, and fatigue, lack of adequate social support, and difficulty returning to a state of physical well-being and military readiness. It is important to first assess the true prevalence of these problems by expanded screening for several postpartum issues, including fatigue, depression, and anxiety. These screenings should be conducted repeatedly over the first six to 12 months postpartum. The next step is educating military women and their partners, providers, and leaders about common postpartum problems and, at a higher level, enacting flexible workplace options, such as gender-neutral optional leaves-of-absence. Finally, women should be enabled to engage in physical activity and provided opportunities to interact with supportive peers. The military healthcare system and leadership have the distinct opportunity to provide the highest level of care and support to active duty postpartum women and dependents. These suggestions are research-based and may improve the comprehensive care provided by the TRICARE healthcare system.

Military Impact

Workplace Productivity, Military Readiness, and Deployability

The high levels of postpartum depression and distress highlighted by this study have a number of negative implications for military leaders. One such implication is the negative impact the postpartum depression and distress has on workplace productivity. Although there are no readily available figures for the negative impact of postpartum depression on military workplaces productivity, research in non-military populations

highlights the large negative impact of depression and postpartum depression on workplace productivity. An oft-cited study found, for instance, that workers with Major Depressive Disorder account for $44 Billion dollars of lost productivity time annually in the United States (Stewart, Ricci, Chee, Hahn, & Morganstein, 2003). Depression is associated with higher levels of absenteeism and "presenteeism" (diminished productivity while at work), even when compared to samples of individuals with rheumatoid arthritis, and these deficits did not remit even with effective treatment for depression, indicating that prevention may be a more effective approach (Adler et al., 2006). Even "minor" depression that does not meet DSM-IV criteria for Major Depressive Disorder can cause significant impairment in meeting occupational responsibilities when individual with minor depression are compared to asymptomatic peers (Wagner et al., 2000).

When compared to women without postpartum depression, women diagnosed with postpartum depression at 24 weeks after childbirth displayed significant functional limitation and deficits not reported in women without postpartum depression, including poorer scores on measures of physical functioning and vitality (Boyce et al., 2000). There was no available research comparing depressed and non-depressed postpartum working women on measures such as time missed from work and decreased work output, but given the documented effects of depression on workplace productivity, and the decreased reported levels of vitality and physical functioning among depressed postpartum women, it is likely that women with postpartum depression are performing at a reduced level compared to their non-depressed peers.

The military's ultimate measure of workplace functioning, military readiness, may be negatively impacted by postpartum depression, distress, and negative physical

outcomes. Women with severe depression, including postpartum depression, may be placed on psychiatric profiles which may limit their workplace utilization as well as their deployability (even after the mandated four to 12 month postpartum deferment). In addition, a sub-analysis of this study found that BMI and postpartum depression were significantly positively associated, indicating that more depressed women had higher Body Mass Indices, and may be therefore at higher risk of failing military weight standards (Cofell & Rychnovsky, 2011), which are considered a component of readiness, much like the PRT.

The proposed supportive interventions may mitigate some of the negative impact of postpartum distress and depression on workplace functionality, readiness, and deployability. As indicated by this study, depression, anxiety, fatigue, mental health status, and BMI were all associated with functional support (emotional support and aid). These results have also been demonstrated in countless studies in civilian populations, discussed earlier in this dissertation. By enacting the proposed revisions, the military may mitigate the negative effects of negative postpartum outcomes on workplace functioning, readiness, and deployability.

Retention

Another importance concern of military leaders is the levels of retention of trained personnel. Although figures vary widely by occupation, it costs approximately $28,500 to recruit and train a single Navy service member, $17,900 to recruit and train a single Air Force service member, and approximately $16,900 to recruit and train a single Army service member (Government Accounting Office [GAO], 2005). Between Fiscal Year (FY) 2004 and FY2009, 14,784 enlisted women left the military before the end of their

service contract due to pregnancy, and 194 officers left the military prematurely during that same period of time (GAO, 2011). Using the most conservative training and recruiting cost numbers, personnel lost to poor perinatal military retention have cost the military over $250 Million since FY04.

Even among those who serve through the end of their military contracts, family concerns drive a number of women to consider leaving the military at the end of their obligated time in service (as opposed to re-enlisting or remaining in the service). DACOWITS' focus group members (both male and female) have consistently cited concerns about inadequate work-life balance, and that this concern was a major point of consideration when contemplating the decision to remain in the military (DACOWITS, 2004, 2006). These concerns were echoed when groups of highly-trained female military physicians, lawyers, and clergy were assessed (DACOWITS, 2007). Notably, a number of women continue to report a perceived stigma attached to being pregnant, and many are reluctant to report a pregnancy to their commanders until after the first trimester (DACOWITS, 2006, 2009). Ultimately, a more reasonable work-life balance, as well as working to combat the perceived stigma associated with pregnancy, may encourage more female service members to continue their military service after the expiration of their service contract.

Family Impact

The current study reveals alarmingly high rates of postnatal distress and depression, indicating a poor overall quality-of-life for many postpartum military women. These concerns do not only impact the postpartum woman, but numerous studies have revealed that infants and children of women with postpartum depression are negatively

impacted in a number of domains. First, depressed postpartum women tend to have shorter durations of breastfeeding when compared to non-depressed peers (Henderson, Evans, Straton, Priest, & Hagan, 2003). Depressed mothers are also less likely to engage in parenting practices associated with infant cognitive and emotional development, including talking to the infant and playing with the infant, showing books to the infant, and following routines (McLearn, Minkovitz, Strobino, Marks, & Hou, 2006). A meta-analysis of studies assessing cognitive outcomes among older children of mothers who had suffered from postpartum depression indicated a small but persistent effect size showing cognitive deficits in this population (Beck, 1998). Furthermore, children whose mothers have suffered from psychiatric illnesses during the child's infancy may be at increased risk for conduct disorders and inappropriate aggression (Zahn-Waxler, Chapman, & Cummings, 1984; Zahn-Waxler, Cummings, McKnew, & Radke-Yarrow, 1984), although women assessed in these studies were not solely diagnosed with postpartum depression. Fortunately, treatment of maternal depression appears to positively influence child-rearing behaviors and older children generally display improved emotional outcomes if maternal depression is effectively treated (Weissman et al., 2006).

Infants and children are not the only ones impacted by maternal depression. Even men in relationships with non-depressed women report significant stress related to the postpartum period (Yu, McElory, Bullock, & Everett, in press). Having a depressed partner puts fathers at higher risk for postnatal depression (Ramchandani, Stein, Evans, & O'Connor, 2005). Given that a large proportion of military women are in relationships with military men, the high levels of postnatal maternal depression may also reflect un-

assessed high levels of paternal depression. The family sequalae and negative outcomes associated with maternal postpartum depression provide additional reasons for utilizing evidence-based approaches to increase postpartum support for mothers as well as the whole family.

Study Limitations

Internal Reliability and Validity

Design

The current study utilized a prospective, longitudinal, mixed model (both between subjects and within subjects) design. Some aims were descriptive in nature (such as the aim to assess and describe the course of social support and integration over the first year after childbirth). There was no experimental manipulation used in this study, and because this study sought to describe a naturally occurring phenomenon (mental and physical health and functioning over the first year after childbirth), there was little experimental control for extraneous variables.

The current study design posed several limitations. First, as with any non-experimental study occurring outside a controlled laboratory environment, it was impossible to determine if changes were truly due to the independent variables measured (i.e. social support and integration) or due to changes in other extraneous and uncontrolled variables. To help remedy this shortcoming, a number of variables were assessed, which allowed the researchers to statistically control for the possible influence of other variables. Variables that were not sources of interest were used as covariates for the purpose of controlling for this variance. As it turns out, the analyses of covariates produced some of the more notable findings of this study.

Another possible limitation of the study was the lack of participant standardization. As it stands, human beings vary, and it is impossible to completely control for that variance. However, some of the major ways that postpartum mothers may vary were eliminated by screening criteria (for example, excluding women with sick infants or women with multiple infants). Other sources of variance (for example, the number of children the woman has had throughout her life) were assessed and controlled for statistically. Other sources of participant variance were less amenable to assessment or control.

A major possible source of participant variance which posed a limitation in the interpretation of this study was the participant's branch of service (U.S. Navy versus U.S. Marine Corps). As discussed previously, the US Navy and Marine Corps have different fitness testing standards and procedures, different timelines for postpartum deployability, and, in a broader sense, different cultures. The Marine Corps could be considered the most "masculine" and is the most male-dominated of all the branches of service (Segal & Segal, 2004). The Navy is less stereotypically masculine and has a larger proportion of female service members. These different standards and different cultures might have resulted in different stressors and perceptions of postpartum women. Unfortunately, there were not enough Marine Corps participants to parse out the differences between these groups of women, and there were no other branches represented in the study. As such, the differences in the status of women in these two services, and the policies affecting postpartum women, are worthy of additional study.

Measures

Another limitation of this study was the use of numerous self-report measures. In the broad sense, self-report measures are problematic because there is no way to verify if participants are being careful and honest when filling out these measures. There are a number of reasons to under-report or over-report symptoms or lifestyle factors, and researchers can only speculate as to whether these reasons were motivating participants to answer questions a certain way. Social support and integration, anxiety, depression, fatigue, and health-related quality-of-life were all assessed via questionnaires instead of clinical interviews. Structured clinical interviews, such as the *Structured Clinical Interview for DSM-IV* (Spitzer, Williams, Gibbon, & First, 1992), are considered the "gold standard" for diagnosing psychopathology for the purposes of research. To address this weakness, validated self-report measures were used in the assessment of these variables. However, these measures may still be considered inferior to a clinical interview conducted by a mental health profession trained in interviewing for the purposes of research. Social support and integration is another variable that may be especially vulnerable to self-report bias. Participants may have over-reported the number and quality of their relationships in order to look better or make themselves feel better. Women who have a more negative view of themselves or who are depressed may have perceived fewer social contacts and lower relationship quality. Unfortunately, it would be almost impossible to objectively assess participants' relationships and interpersonal interactions, as this would likely require significant time and effort observing the participant's daily interactions with others, and developing a method for objectively assessing these interactions. Fortunately, the Norbeck Social Support Questionnaire is a

reliable and valid instrument that has been used to assess various dimensions of social support and integration in populations of postpartum women.

A strength of this study was the use of physiological measurements to assess fitness, body weight and composition, and anemia. The measure used for anemia is objective and leaves little room for alternate interpretations. However, the measures for fitness and body weight are possibly problematic as they introduce additional variance due to differences in measurements and assessment means. First, because the Marine Corps and Navy use different methods of assessing physical fitness, drawing comparisons between these groups is challenging. In the current study, none of the Marine Corps participants provided both pre- and post-pregnancy PRT scores, and thus were not included in any analyses concerning these variables, but any future research comparing PRT scores between branches would require a method of standardizing these scores. Body Mass Index is also a problematic variable because there are distinct weaknesses in its ability to reflect body composition. In this population, women may be more fit and muscular, which may be reflected by higher BMI scores. Thus, the use of BMI instead of the use of a body composition assessment could be criticized. There are a number of ways to assess body composition, ranging from crude (for example, using calipers or body circumference measurements) to advanced (for example, body impedance analysis). Each method of body composition assessment has its strengths and weaknesses. Ultimately, body composition assessment was not used for this study because many of the methods are imprecise and introduce other forms of error variance. For the purposes of this study, it was assumed that all fitness-testing and pre-pregnancy weight and height assessments were conducted in good faith using relatively accurate assessment means.

However, it should be noted that some participants were not able to be seen in person by the research assistant at all postpartum visits, and thus had to weigh themselves and mail in this information with the other self-report measures, possibly introducing another source of variance.

External Validity

Generalizability

The postpartum women used as research participants in this study were comprised of a subsample of women in the Navy and Marine Corps, which is a subsample of women in the active duty military, which is a subsample of postpartum American women. The sample was one of convenience, based on admissions to a single military treatment facility located on the West Coast of the United States. As such, this sample may not be representative of all Navy or Marine Corps women, all military women, or all postpartum American women. Demographic characteristics such as ethnicity, age, and socioeconomic status may have differed from these wider populations, and thus was assessed and controlled for. However, other variables present in this population may have caused the sample differ in ways that were not as easily identified or controlled. For example, military women in the Navy and Marine Corps may differ appreciably from other military women due to branch culture, policies governing the status of women, or even the type of women that join these services. The geographic characteristics may also limit generalizability, as the urban location in which the participants were stationed is known to have a high quality-of-life, a high average socioeconomic status, and comfortable climate. These factors may have influenced the level of stress participants experienced due to environmental factors, also limiting generalizability to populations in

other locations, such as more rural or economically depressed regions, or regions with harsher climates. Finally, postpartum active duty military women are a subset of working postpartum women, who are a subset of postpartum women. The nature of the military career and workplace may limit generalizability of this study to postpartum women working in other career fields and occupational environments. For example, the male-dominated nature of military workplaces may add an additional stressor for military women not present for all non-military working women. Furthermore, non-working mothers may experience different stressors and protective factors, which may change the nature of the postpartum period considerably. To ameliorate these generalizability concerns, caution should be used when interpreting results and applying findings to populations other than postpartum Navy and Marine Corps women.

Summary

Although these limitations are important to assess, discuss, and control for when possible, the research design was still very strong and appropriate for addressing the aims of this study. The unique longitudinal design of this study and the wide variety of measures utilized allowed analysis and assessment of numerous factors related to postpartum health in military women. The research questions were important and appropriate for gaining a better understanding of the role social support and integration play in postpartum mental and physical health. Thus, this study makes several important contributions to the fund of knowledge, which may also be expanded by studying questions raised by the current study.

Future Directions

The current study produced a number of important findings. First, many of the women in the sample were experiencing significant emotional distress throughout the postpartum year. Second, the quality of the support provided by the woman's support network appeared to be more important for well-being than the quantitative properties of the social network. Finally, women meeting specific demographic characteristics appeared to be at higher risk for adverse postpartum outcomes. These findings beg several questions, best addressed by future research.

First, one of the more enigmatic findings was the association between demographic and military factors and postpartum health. Notably, pay grade status and education appeared to be especially strongly linked to postpartum well-being, even compared to widely researched factors such as marital status. There has been very little research into the effects of military status and rank on health, much less postpartum mental and physical health. In addition, very little research has been conducted assessing the relationship between education and postpartum functioning. Future studies should attempt to parse out the roles of workplace conditions, job roles and autonomy, supervisor and co-worker support, intelligence, and household income, in order to determine the role each of these factors may play in postpartum well-being.

Future research should also delve further into the impact of various social relationships and aspects of the social network on postpartum health. The current study seems to suggest that the quantitative properties of the social network are less important than the quality of the support provided. A logical next step would be to assess whether or not military women feel they are receiving adequate support, and how they feel they

could be better supported. In addition, there are several logical reasons to assume that active duty military women have different (and potentially poorer) social support networks than non-military women, such as geographic separation from the woman's family of origin, which comprises an important fount of support throughout the postpartum year. Exploring these issues further may help better elucidate the unique experiences of military women, and develop programs and policies that allow for increased support.

Finally, the high levels of depression and other mental and (to a lesser degree) physical health concerns demand further research into the predisposing and precipitating factors in this population. Several risk factors have been identified, such as marital separation. However, there are still numerous questions about the impact of various military factors on postpartum mental health. One thing that is currently unknown is the relationship between various military policies, such as the six-week maternity leave, and well-being after childbirth. The impact of these policies and other military specific events, such as deployment, should be further explored in order to develop policies that meet both the needs of the military, as well as the needs of the individual service member and her family.

These research questions could be explored a number of different ways. First, it is recommended that more qualitative research be conducted with this population. Questions of whether or not postpartum military women feel supported, and how they could be better supported, may be best answered by a focus group or individual interview approach. In addition, focus groups or interviews may allow service women to discuss their perceptions of military policies and workplace conditions for postpartum mothers.

Similar groups should be run with postpartum military dependents and civilian working mothers. These groups can then be compared using content analyses to identify and explore the issues unique to postpartum service women and others served by the military health care system.

Finally, a notable weakness in the current study was the lack of representation of other military branches. Thus, quantitative and qualitative means could be used to compare women from the Army, Navy, Marine Corps, Air Force, and Coast Guard. This approach may effectively highlight the impact of various postpartum policies. For example, Army service women may be deployed at six months postpartum, whereas Navy service women must wait 12 months postpartum. A qualitative approach may highlight some of the positive and negative aspects of each branch's approach, and a quantitative approach, similar to the one used in this study, may identify differing levels of postpartum distress. Furthermore, assessing workplace conditions and comparing between branches may identify positive workplaces attributes and approaches which could then be applied to all the services.

Regardless of the approach used, this study raises a number of issues that can be further explored by future research. The current study and proposed research could further assist leaders in creating policies that will improve the quality-of-life of postpartum women, as well as military readiness.

Summary

The current study used a longitudinal design to assess the mental and physical health and social support of postpartum military women at five time points throughout the postpartum year. A number of variables were assessed, including social support,

depression, anxiety, fatigue, health-related quality-of-life, fitness, and body mass index. Mixed model regression was used to assess these variables over time and also determine if social support was especially important for mental and physical well-being at any particular point during the postpartum year. It was hypothesized that social support would be especially important early in the postpartum year when the mother was adjusting to the new infant. In terms of the hypotheses, we found that social support and postpartum distress decreased over time, but that there was no interaction between time and any of the outcome variables, indicating that social support was not especially important at any particular time period during that first year. However, we did find a number of other interesting and important results. First of all, the military women in the sample displayed very high levels of depression throughout the year, and never really returned to a state of postpartum mood comparable to those found in other studies of postpartum women. Second, demographic and socioeconomic factors, particularly education and pay grade status, were associated with postpartum outcomes. Finally, the women tended to benefit more from higher levels of emotional and tangible support (aid), rather than the sheer number of individuals in their networks.

Some of the results of this study, such as the high levels of depression, are troubling, as they indicate poorer quality-of-life for these women and their families, as well as degraded military readiness. However, other findings provide hope for improved outcomes for this population. We have identified a number of factors associated with improved postpartum health, and some of these factors can be modified through better screening, education, programs, and policies. Other factors, such as demographic factors, may not be modifiable, but programs may be developed to better support at-risk

populations. The knowledge gained through this study will hopefully allow leaders and policymakers to better support postpartum military women. However, now that the knowledge is available, the effort must be made. Increased focus on postpartum health has been advocated by both the United States and Canadian governments (in the form of the Melanie Blocker Stokes MOTHERS Act and the Saskatchewan Province MotherFirst report endorsement, respectively), so now is an especially fortuitous time for military leadership to allocate attention and resources to programs benefiting postpartum women. In fact, the military health care community has developed several programs aimed at decreasing negative postpartum outcomes. Under the umbrella of the new Tricare Perinatal Advisory Board, these programs may be evaluated and expanded to ensure that these women are receiving the best care available.

Improved postpartum health is critically important for military women and their families. Of primary importance is the woman's quality-of-life, as well as her ability to function in her role as a mother. However, military women play an important part in the defense of the nation, and their well-being directly influences military readiness. Women with postpartum mental or physical health concerns may not be able to fulfill their garrison roles, and may not be ready to deploy when needed. Furthermore, if they feel they are not getting the care they need, and it is negatively impacting their quality-of-life and ability to fulfill their roles at home, they may decide to leave the military. For example, a qualitative research thesis written by USMC Major Adrienne Evertson and Air Force Captain Amy Nesbitt highlighted the struggles many military women experience as they attempt to balance family life and military duties, including significant pressure to return to full duty as soon as possible after childbirth (2004). A significant

number of enlisted women also leave the military annually due to becoming pregnant and choosing not to remain in service. By improving postpartum care and support, the military may be better able to retain these highly trained valuable service members.

As the number of women in the military increases, the importance of adequate postpartum care and support will also increase. Military women represent a unique population of working women whose mental and physical well-being directly influence the defense of the nation. As it stands, the postpartum period is fraught with stressors and physical changes that place mothers at high risk for negative mental and physical health outcomes, and military service may increase exposure to various risk factors, such as family separations. These negative outcomes may negatively influence a postpartum service woman's ability to fulfill her role in the defense of the nation. More importantly, however, these women may not be able to fulfill their roles within their families, and are likely experiencing degraded quality-of-life. In short, they are suffering. Because these women have sworn to uphold the defense of the United States, and in many cases have made significant sacrifices in the name of national defense, they deserve superior postpartum care and support. The findings of this study add to the fund of knowledge concerning psychosocial factors that influence postpartum well-being. The next step is to ensure that these findings are disseminated to healthcare providers, military leaders, and postpartum military women and their families. Beyond that, these findings may also be used to craft interventions to ensure these women are receiving optimal care and support. Ultimately, we ask that those influencing military and healthcare policy decisions concerning postpartum military women take the time to read and consider these findings so that these women may receive the support they deserve.

Table 2

Demographic Characteristics of Study Participants at Two Months Postpartum (*N* = 123)

	M (SD)
Age (years)	25.32 (4.65)
	N (%)
Ethnicity/Race	
White/Non-Hispanic	53 (43.09)
Black/African-American	25 (20.33)
Hispanic	21 (17.07)
Asian	11 (8.94)
Pacific Islander	6 (4.88)
"Other"	5 (4.07)
American Indian/ Alaskan Native	1 (0.81)
Unknown	1 (0.81)
Marital Status	
Married	79 (64.23)
Single	30 (24.39)
Partnered	9 (7.32)
Separated	2 (1.63)
Divorced	2 (1.63)
Unknown	1 (0.81)
Number of Previous Pregnancies	
Zero	4 (3.25)
One	61 (49.59)
Two	36 (29.27)
Three or more	22 (17.89)
Number of Live Children (in addition to infant)	
Zero	75 (60.98)
One	34 (27.64)

(Table 2 continues)

(Table 2 continued)

	N (%)
Number of Live Children (in addition to infant, continued)	
Two	11 (8.94)
Three	2 (1.63)
Unknown	1 (0.81)
Number of Children Cared for in Home (in addition to infant)	
Zero	75 (60.98)
One	32 (26.02)
Two	11 (8.94)
Three	3 (2.44)
Unknown	2 (1.63)
Highest Education Attained	
High School Diploma/GED	33 (26.83)
Some College	58 (47.15)
Associate's Degree	18 (14.63)
Bachelor's Degree	8 (6.50)
Graduate Degree	6 (4.88)
Pay Grade	
Junior Enlisted (E-1 through E-3)	31 (25.20)
Senior Enlisted (E-4 through E-9)	80 (65.04)
Officer	12 (9.76)
Branch of Service	
U.S. Navy	116 (94.31)
U.S. Marine Corps	6 (4.88)
Unknown	1 (0.81)

Table 3

Primary Psychosocial Variables at each Postpartum Assessment

Variable	Two Months M (SD) (*N = 123*)	Four Months M (SD) (*N = 122*)	Six Months M (SD) (*N* = 113)	Nine Months M (SD) (*N* = 94)	Twelve Months M (SD) (*N* = 82)
Depression (PDSS)	66.25 (23.92)	62.14 (24.29)	58.60 (23.08)	58.02 (24.75)	55.07 (21.41)
State Anxiety (STAI)	36.34 (11.72)	36.32 (13.31)	34.91 (11.41)	34.74 (13.36)	32.43 (11.54)
Fatigue (FCF)	49.41 (14.48)	47.73 (16.40)	45.00 (14.31)	43.21 (14.94)	40.86 (11.30)
Mental Health Status (SF12v2)	46.89 (11.74)	47.87 (11.54)	48.12 (12.05)	48.76 (12.09)	51.09 (9.87)
Physical Health Status (SF12v2)	49.09 (7.06)	51.24 (6.78)	52.72 (6.77)	53.03 (5.84)	54.10 (5.40)
Body Mass Index (BMI)	27.49 (4.16)	27.40 (4.36)	26.91 (4.18)	26.23 (3.71)	25.94 (3.46)
Emotional Support (NSSQ)	111.80 (62.56)	98.77 (57.92)	88.88 (46.04)	87.06 (43.58)	81.91 (41.78)
Aid (NSSQ)	46.93 (27.24)	41.31 (28.15)	37.76 (20.33)	36.98 (19.70)	34.28 (19.69)
Number in Network (NSSQ)	8.35 (4.53)	7.34 (4.05)	6.47 (3.28)	6.27 (3.10)	5.89 (3.08)
Total Network Properties (NSSQ)	77.94 (40.53)	68.58 (37.40)	61.18 (31.35)	60.89 (29.29)	57.63 (29.24)

Table 4

Summary of a Series of Generalized Estimating Equation Analyses for Psychosocial Variables Associated with Participants' Odds of Returning for Follow-Up Data Collection

Variable	B	SEB	Odds Ratio	95% Wald Confidence Interval
Depression (PDSS)	-0.006	0.007	0.995	0.982-1.008
State Anxiety (STAI State Scale)	0.001	0.014	1.001	0.974-1.028
Trait Anxiety (STAI Trait Scale)	-0.003	0.015	0.997	0.968-1.026
Fatigue (FCF)	-0.004	0.011	0.996	0.975-1.017
Physical Health-Related Quality of Life (SF12v2)	-0.012	0.022	0.988	0.946-1.031
Mental Health-Related Quality of Life (SF12v2)	-0.003	0.014	0.997	0.969-1.025
Body Mass Index	0.009	0.040	1.009	0.934-1.091
Emotional Support (NSSQ)	-0.012[a]	0.004	0.989	0.980-0.997
Aid (NSSQ)	-0.021[b]	0.010	0.979	0.960-0.997
Social Integration (NSSQ)	-0.014[c]	0.006	0.986	0.975-0.997

Note. [a] $p = .007$, [b] $p = .025$, [c] $p = .012$

Table 5
Relationships Between Demographic Factors and Primary Independent Variables

	Emotional Support	Aid	Total Functional Support	Number in Network	Social Integration
Age	.337	.758	.431	**.073**	**.092**
Ethnicity/Race	.257	.708	.353	**.058**	.134
Education	**.090**	.579	.158	**.033***	**.054**
Marital Status	.830	.920	.852	.907	.816
Pay Grade Status	**.102**	.517	.172	**.036***	**.035***
Branch of Service	.924	.658	.831	.808	.857
Number of Previous Pregnancies	.705	.956	.773	.963	.705
Number of Children in Home	.924	.692	.953	.702	.462

Note. *$p <$ .05, **$p <$ .01, ***$p <$ .001,values in boldface indicate use of variable in appropriate analyses

Table 6
Relationships Between Demographic Factors and Primary Dependent Variables

	Depression	State Anxiety	Fatigue	Mental Health Status	Physical Health Status	Body Mass Index	Physical Readiness Testing
Age	.494	.309	.112	.130	.385	.420	**.022***
Ethnicity/Race	.602	.681	.561	.865	**.035***	.206	.118
Education	**.056**	**.007****	**.001****	**<.001*****	**.007****	.245	**< .001*****
Marital Status	**.011***	.222	.299	.238	.609	**.069**	**.097**
Pay Grade Status	**.029***	.452	.977	.749	**.021***	**.039***	**< .001*****
Branch of Service	.542	.161	.125	.118	.857	.224	N/A
Number of Previous Pregnancies	.944	.382	.472	.528	.716	.324	.848
Number of Children in Home	.348	.722	.804	.838	.575	.657	.147

Note. *$p <$ .05, **$p <$ .01, ***$p <$ .001,values in boldface indicate use of variable in appropriate analyses

Table 7
Preliminary Analyses: Model Predicting Change in Depression Scores Over Time

	B	SE	df	*p*
Intercept, $F(1, 120.55) = 183.16$, $p < .001$***				
	60.46	4.39	127.76	< .001***
Marital Status, $F(4, 120.56) = 3.93$, $p = .005$**				
Married	Ref.			
Partnered	-5.05	6.80	117.06	.459
Separated	47.36	14.43	138.69	.001**
Divorced	-3.63	13.42	121.18	.787
Single	-7.27	3.99	108.02	.071
Ethnicity/Race, $F(4, 110.87) = 0.41$, $p = .803$				
White/Non-Hispanic	Ref.			
Black or African-American	4.74	4.59	113.35	.304
Asian or Pacific Islander	-0.26	5.25	112.92	.960
Hispanic	2.80	4.79	108.24	.560
Other	5.95	7.99	108.49	.458
Education, $F(4, 109.98) = 2.57$, $p = .042$*				
High School Diploma/GED	Ref.			
Some College	8.60	4.08	110.67	.037*
Associate's Degree	12.30	5.76	114.15	.035*
Bachelor's Degree	-0.012	7.27	104.16	.986
Graduate Degree	-7.38	8.24	110.33	.372
Time, $F(4, 400.33) = 7.69$, $p < .001$***				
Two Months	Ref.			
Four Months	-3.82	2.15	400.98	.076
Six Months	-6.95	2.20	403.80	.002**
Nine Months	-8.64	2.29	406.30	< .001***
Twelve Months	-12.15	2.39	408.23	< .001***

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .489

Table 8
Preliminary Analyses: Model Predicting Change in State Anxiety Scores Over Time

	B	SE	df	*p*
Intercept, $F(1, 113.63) = 781.83$, $p < .001$***				
	31.90	1.83	147.28	< .001***
Education, $F(4, 114.09) = 3.69$, $p = .007$**				
High School Diploma/GED	Ref.			
Some College	5.65	2.17	116.40	.010*
Associate's Degree	9.80	2.93	118.39	.001**
Bachelor's Degree	6.08	3.83	109.17	.116
Graduate Degree	-1.23	4.38	115.20	.780
Time, $F(4, 398.57) = 3.68$, $p = .006$**				
Two Months	Ref.			
Four Months	-0.041	1.05	400.30	.969
Six Months	-1.27	1.07	403.07	.238
Nine Months	-1.50	1.12	405.18	.180
Twelve Months	-4.02	1.17	406.30	.001**

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .559

Table 9
Preliminary Analyses: Model Predicting Change in Fatigue Scores Over Time

	B	SE	df	*p*
Intercept, $F(1, 115.46) = 932.28$, $p < .001$***				
	42.83	2.16	143.64	< .001***
Education, $F(4, 115.96) = 5.03$, $p = .001$**				
High School Diploma/GED	Ref.			
Some College	8.30	2.58	118.25	.002**
Associate's Degree	13.73	3.48	120.04	< .001***
Bachelor's Degree	9.74	4.58	111.55	.035*
Graduate Degree	0.449	5.22	116.74	.931
Time, $F(4, 396.82) = 15.35$, $p < .001$***				
Two Months	Ref.			
Four Months	-1.87	1.13	398.60	.099
Six Months	-4.45	1.16	401.02	< .001***
Nine Months	-6.21	1.21	402.64	< .001***
Twelve Months	-8.88	1.26	403.43	< .001***

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .615

Table 10
Preliminary Analyses: Model Predicting Change in Mental Health Status Scores Over Time

	B	SE	df	*p*
Intercept, $F(1, 112.36) = 1994.70$, $p < .001$***				
	51.86	1.65	158.86	< .001***
Education, $F(4, 112.26) = 5.65$, $p < .001$***				
High School Diploma/GED	Ref.			
Some College	-6.03	1.90	113.60	.002**
Associate's Degree	-11.08	2.58	116.70	< .001***
Bachelor's Degree	-7.88	3.36	107.40	.021*
Graduate Degree	-0.66	3.84	113.362	.864
Time, $F(4, 383.75) = 3.50$, $p = .008$**				
Two Months	Ref.			
Four Months	1.11	1.10	384.82	.310
Six Months	1.21	1.13	388.96	.285
Nine Months	1.94	1.18	391.36	.102
Twelve Months	4.55	1.25	392.93	< .001***

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .451

Table 11
Preliminary Analyses: Model Predicting Change in Physical Health Status Scores Over Time

	B	SE	df	*p*
Intercept, $F(1, 103.49) = 5780.60$, $p < .001$***				
	50.42	1.17	137.77	< .001***
Ethnicity/Race, $F(4, 106.92) = 2.10$, $p = .086$				
White/Non-Hispanic	Ref.			
Black or African-American	-2.19	1.17	112.43	.064
Asian or Pacific Islander	-2.65	1.29	109.30	.043*
Hispanic	0.51	1.17	101.70	.667
Other	-0.35	1.96	103.34	.860
Pay Grade Status, $F(2, 102.79) = 0.28$, $p = .754$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	0.06	1.05	105.36	.957
Officer	-2.46	3.56	101.08	.492
Education, $F(4, 106.58) = 1.64$, $p = .171$				
High School Diploma/GED	Ref.			
Some College	-1.59	1.04	108.37	.129
Associate's Degree	-1.63	1.47	112.09	.270
Bachelor's Degree	5.33	3.48	99.93	.129
Graduate Degree	4.45	3.46	102.91	.202
Time, $F(4, 386.82) = 11.65$, $p < .001$***				
Two Months	Ref.			
Four Months	2.14	0.70	385.97	.002**
Six Months	3.45	0.72	391.00	< .001***
Nine Months	3.78	0.75	394.82	< .001***
Twelve Months	4.73	0.80	397.58	< .001***

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .310

Table 12
Preliminary Analyses: Model Predicting Change in BMI Over Time

	B	SE	df	*p*
Intercept, $F(1, 120.85) = 985.97$, $p < .001$***				
	28.11	0.78	120.14	< .001***
Marital Status, $F(4, 119.10) = 2.31$, $p = .062$				
Married	Ref.			
Partnered	-2.31	1.31	118.14	.081
Separated	5.71	2.70	127.30	.036*
Divorced	2.04	2.63	117.95	.440
Single	-0.60	0.80	113.46	.457
Pay Grade Status, $F(2, 114.66) = 3.54$, $p = .032$*				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-0.17	0.80	114.52	.834
Officer	-3.09	1.27	114.42	.016*
Time, $F(4, 390.65) = 17.25$, $p < .001$***				
Two Months	Ref.			
Four Months	-0.26	0.21	392.10	.227
Six Months	-0.77	0.22	392.94	.001**
Nine Months	-1.36	0.23	393.35	< .001***
Twelve Months	-1.65	0.24	393.58	< .001***

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .828

Table 13
Hypothesis 1a: Changes in Number of Individuals in Social Network Over Time

	B	SE	df	*p*
Intercept, $F(1, 106.95) = 7.85$, $p = .006$**				
	7.80	2.00	108.04	< .001***
Age, $F(1, 107.26) = 0.02$, $p = .878$				
	0.01	0.09	107.26	.878
Ethnicity/Race, $F(4, 110.25) = 2.36$, $p = .058$				
White/Non-Hispanic	Ref.			
Black or African-American	-1.85	0.82	113.54	.025*
Asian or Pacific Islander	-0.70	0.90	110.91	.438
Hispanic	-0.21	0.84	107.10	.800
Other	2.14	1.38	108.78	.126
Education, $F(4, 108.82) = 2.31$, $p = .063$				
High School Diploma/GED	Ref.			
Some College	0.03	0.75	112.48	.969
Associate's Degree	-0.12	1.08	112.70	.914
Bachelor's Degree	2.68	2.61	105.31	.307
Graduate Degree	-2.46	2.63	105.29	.353
Pay Grade Status, $F(2, 106.71) = 0.36$, $p = .697$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	0.60	0.80	109.56	.457
Officer	1.54	2.51	104.60	.540
Time, $F(4, 392.57) = 26.40$, $p < .001$***				
Two Months	Ref.			
Four Months	-1.12	0.28	394.45	< .001***
Six Months	-2.03	0.29	396.47	< .001***
Nine Months	-2.35	0.30	397.50	< .001***
Twelve Months	-2.73	0.31	398.13	< .001***

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .658

Table 14
Hypothesis 1a: Changes in Total Functional Support Over Time

	B	SE	df	*p*
Intercept, $F(1, 123.23) = 507.43$, $p < .001$***				
	158.72	6.52	201.42	< .001***
Time, $F(4, 395.28) = 22.44$, $p < .001$***				
Two Months	Ref.			
Four Months	-20.15	5.41	397.18	< .001***
Six Months	-35.50	5.56	399.24	< .001***
Nine Months	-40.61	5.79	400.48	< .001***
Twelve Months	-50.30	6.07	400.98	< .001***

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .679

Table 15
Hypothesis 1a: Changes in Social Integration Scores Over Time

	B	SE	df	*p*
Intercept, $F(1, 110.97) = 6.50$, $p = .012$*				
	63.63	17.76	111.97	< .001***
Age, $F(1, 111.20) = 0.11$, $p = .746$				
	0.27	0.83	111.20	.746
Education, $F(4, 112.40) = 1.67$, $p = .162$				
High School Diploma/GED	Ref.			
Some College	-1.75	7.15	116.11	.807
Associate's Degree	-1.01	9.92	116.07	.919
Bachelor's Degree	18.22	24.71	108.97	.462
Graduate Degree	-23.35	25.17	109.18	.356
Pay Grade Status, $F(2, 110.72) = 1.13$, $p = .328$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	10.41	7.41	113.65	.163
Officer	20.95	23.60	108.38	.377
Time, $F(4, 391.75) = 25.20$, $p < .001$***				
Two Months	Ref.			
Four Months	-10.76	2.47	363.62	< .001***
Six Months	-18.58	2.53	395.65	< .001***
Nine Months	-19.33	2.64	396.70	< .001***
Twelve Months	-24.17	2.78	397.16	< .001***

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .698

Table 16
Hypothesis 1b: Model Predicting Change in Emotional Support Over Time

	B	SE	df	*p*
Intercept, $F(1, 113.81) = 254.92$, $p < .001$***				
	104.48	9.42	130.99	< .001***
Education, $F(4, 114.01) = 1.64$, $p = .170$				
High School Diploma/GED	Ref.			
Some College	-5.38	10.21	117.65	.599
Associate's Degree	-10.01	13.70	118.11	.467
Bachelor's Degree	18.42	34.30	109.85	.592
Graduate Degree	-39.59	34.29	109.81	.251
Pay Grade Status, $F(2, 112.27) = 1.09$, $p = .340$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	13.31	10.03	115.46	.187
Officer	34.82	34.82	109.75	.320
Time, $F(4, 396.39) = 21.47$, $p < .001$				
Two Months	Ref.			
Four Months	-14.22	3.90	398.22	< .001***
Six Months	-25.38	4.00	400.48	< .001***
Nine Months	-28.83	4.16	401.67	< .001***
Twelve Months	-35.09	4.37	402.21	< .001***

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .664

Table 17
Hypothesis 1b: Model Predicting Change in Aid Over Time

	B	SE	df	*p*
Intercept, $F(1, 122.91) = 412.69$, $p < .001$***				
	49.93	2.14	201.77	< .001***
Time, $F(4, 395.02) = 18.18$, $p < .001$***				
Two Months	Ref.			
Four Months	-5.94	1.78	396.93	.001**
Six Months	-10.17	1.83	399.01	< .001***
Nine Months	-11.80	1.91	400.26	< .001***
Twelve Months	-15.24	2.00	400.77	< .001***

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .677

Table 18
Hypothesis 2a: The Relationship Between Number in the Social Network, Time, and Depression

	B	SE	df	*p*
Intercept, $F(1, 108.88) = 15.28$, $p < .001$***				
	65.84	12.15	122.95	< .001***
Age, $F(1, 105.71) = 0.35$, $p = .556$				
	0.30	0.51	105.71	.556
Ethnicity/Race, $F(4, 111.32) = 0.49$, $p = .740$				
White/Non-Hispanic	Ref.			
Black or African-American	-0.71	4.83	116.97	.884
Asian or Pacific Islander	2.07	5.29	112.11	.696
Hispanic	5.02	4.88	105.44	.305
Other	7.24	8.11	109.47	.374
Education, $F(4, 109.36) = 2.08$, $p = .088$				
High School Diploma/GED	Ref.			
Some College	10.11	4.39	112.85	.023*
Associate's Degree	12.89	6.34	113.94	.044*
Bachelor's Degree	9.40	15.17	103.40	.537
Graduate Degree	-3.12	15.30	103.74	.839
Pay Grade Status, $F(2, 105.37) = 3.92$, $p = .023$*				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-13.01	4.67	109.52	.006**
Officer	-16.45	14.55	102.57	.261
Number in Network at 2 months, $F(1, 451.47) = 1.90$, $p = .169$				
	-0.70	0.40	482.63	.078
Time, $F(4, 398.56) = 3.01$, $p = .018$*				
Two Months	Ref.			
Four Months	-5.90	4.59	400.54	.199
Six Months	-10.17	4.90	404.28	.038*
Nine Months	-16.50	5.17	407.17	.002**
Twelve Months	-12.45	5.31	408.51	.019*
Time x Number in Network, $F(4, 401.18) = 0.69$, $p = .599$				
Two Months	Ref.			
Four Months	0.15	0.52	400.30	.778
Six Months	0.25	0.62	408.67	.689
Nine Months	0.94	0.68	414.23	.166
Twelve Months	-0.31	0.72	410.65	.667

Note. *$p < .05$, **$p < .01$, ***$p < .001$. ICC = .493

Table 19
Hypothesis 2a: The Relationship Between Social Integration, Time, and Depression

	B	SE	df	*p*
Intercept, $F(1, 111.83) = 21.06$, $p < .001$***				
	68.97	10.88	126.50	< .001***
Age, $F(1, 106.78) = .33$, $p = .565$				
	0.27	0.48	106.78	.565
Marital Status, $F(4, 121.55) = 4.59$, $p = .002$**				
Married	Ref.			
Partnered	-5.19	6.32	116.94	.413
Separated	43.78	13.72	140.15	.002**
Divorced	-0.40	12.69	123.66	.975
Single	-9.24	3.78	108.77	.016*
Education, $F(4, 110.74) = 3.40$, $p = .011$*				
High School Diploma/GED	Ref.			
Some College	11.72	4.18	113.94	.006**
Associate's Degree	17.38	5.84	115.77	.004**
Bachelor's Degree	6.68	14.00	104.15	.634
Graduate Degree	-4.09	14.29	104.96	.775
Pay Grade Status, $F(2, 107.22) = 5.10$, $p = .008$**				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-13.75	4.33	111.99	.002**
Officer	-15.51	13.29	103.87	.246
Social Integration at 2 months, $F(1, 412.58) = 1.49$, $p = .223$				
	-0.08	0.04	489.46	.089
Time, $F(4, 403.28) = 2.65$, $p = .033$*				
Two Months	Ref.			
Four Months	-5.97	4.67	405.21	.202
Six Months	-11.27	4.93	409.81	.023*
Nine Months	-15.07	5.29	412.61	.005**
Twelve Months	-12.47	5.44	414.86	.022*
Time x Social Integration, $F(4, 405.35) = 0.51$, $p = .727$				
Two Months	Ref.			
Four Months	0.02	0.06	404.46	.675
Six Months	0.05	0.07	412.18	.438
Nine Months	0.09	0.07	418.04	.237
Twelve Months	-0.02	0.08	415.87	.849

Note. *$p < .05$, **$p < .01$, ***$p < .001$. ICC = .456

Table 20
Hypothesis 2a: The Relationship Between Emotional Support, Time, and Depression

	B	SE	df	*p*
Intercept, $F(1, 162.74) = 215.44$, $p < .001$***				
	76.48	5.21	236.27	< .001***
Marital Status, $F(4, 123.63) = 4.25$, $p = .003$**				
Married	Ref.			
Partnered	-4.48	6.26	199.10	.476
Separated	42.88	13.67	142.30	.002**
Divorced	-0.72	12.64	125.64	.955
Single	-8.67	3.77	110.61	.023*
Education, $F(4, 111.89) = 3.77$, $p = .006$**				
High School Diploma/GED	Ref.			
Some College	11.75	4.02	114.44	.004**
Associate's Degree	18.03	5.42	117.43	.001**
Bachelor's Degree	9.16	13.11	104.81	.486
Graduate Degree	-2.36	13.13	105.43	.857
Pay Grade Status, $F(2, 108.96) = 4.73$, $p = .011$*				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-12.15	3.96	113.92	.003**
Officer	-14.11	13.27	105.57	.290
Emotional Support at 2 months, $F(1, 429.72) = 4.44$, $p = .036$*				
	-0.07	0.03	489.96	.013*
Time, $F(4, 405.56) = 3.18$, $p = .014$*				
Two Months	Ref.			
Four Months	-6.66	4.43	407.61	.134
Six Months	-9.63	4.78	410.81	.044*
Nine Months	-16.64	5.06	414.70	.001**
Twelve Months	-13.23	5.29	415.90	.013*
Time x Emotional Support, $F(4, 408.91) = 0.74$, $p = .565$				
Two Months	Ref.			
Four Months	0.02	0.04	408.25	.620
Six Months	0.01	0.04	416.43	.846
Nine Months	0.07	0.05	422.93	.128
Twelve Months	-0.01	0.05	420.79	.798

Note. *$p < .05$, **$p < .01$, ***$p < .001$. ICC = .453

Table 21
Hypothesis 2a: The Relationship Between Aid, Time, and Depression

	B	SE	df	*p*
Intercept, $F(1, 156.66) = 231.27$, $p < .001$***				
	79.19	5.11	225.59	< .001***
Marital Status, $F(4, 123.90) = 4.32$, $p = .003$**				
Married	Ref.			
Partnered	-4.57	6.18	119.35	.461
Separated	42.47	13.52	142.78	.002**
Divorced	-0.03	12.49	126.10	.998
Single	-8.70	3.72	110.59	.022*
Education, $F(4, 111.74) = 3.84$, $p = .006$**				
High School Diploma/GED	Ref.			
Some College	11.92	3.97	114.50	.003**
Associate's Degree	18.07	5.36	117.88	.001**
Bachelor's Degree	9.86	12.95	105.09	.448
Graduate Degree	-1.07	12.92	104.84	.934
Pay Grade Status, $F(2, 108.76) = 4.99$, $p = .008$**				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-12.27	3.90	113.77	.002**
Officer	-15.70	13.06	104.90	.232
Aid (Instrumental Support) at 2 months, $F(1, 416.95) = 6.71$, $p = .010$*				
	-0.22	0.06	491.44	.001**
Time, $F(4, 406.98) = 5.00$, $p = .001$**				
Two Months	Ref.			
Four Months	-8.94	4.13	408.14	.031*
Six Months	-11.67	4.60	408.55	.012*
Nine Months	-19.28	4.83	411.96	< .001***
Twelve Months	-16.87	4.92	417.13	.001**
Time x Aid, $F(4, 409.88) = 1.25$, $p = .289$				
Two Months	Ref.			
Four Months	0.09	0.08	407.93	.252
Six Months	0.06	0.10	414.67	.532
Nine Months	0.23	0.11	418.62	.030*
Twelve Months	0.05	0.11	415.98	.662

Note. *$p < .05$, **$p < .01$, ***$p < .001$. ICC = .448

Table 22
Hypothesis 2a: The Relationship Between Number in the Social Network, Time, and State Anxiety

	B	SE	df	*p*
Intercept, $F(1, 105.99) = 13.72$, $p < .001$***				
	28.60	6.49	117.19	< .001***
Age, $F(1, 103.10) = 1.66$, $p = .201$				
	0.36	0.28	103.10	.201
Ethnicity/Race, $F(4, 107.95) = 0.33$, $p = .860$				
White/Non-Hispanic	Ref.			
Black or African-American	1.06	2.58	112.96	.682
Asian or Pacific Islander	2.31	2.84	108.68	.416
Hispanic	1.87	2.62	102.83	.476
Other	3.56	4.35	106.13	.415
Education, $F(4, 106.30) = 3.49$, $p = .010$*				
High School Diploma/GED	Ref.			
Some College	6.51	2.35	109.37	.007**
Associate's Degree	10.00	3.40	110.45	.004**
Bachelor's Degree	10.04	8.17	101.04	.222
Graduate Degree	0.86	8.23	101.32	.917
Pay Grade Status, $F(2, 102.74) = 3.86$, $p = .024$*				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-6.90	2.50	106.37	.007**
Officer	-9.41	7.83	100.25	.232
Number in Network at 2 months, $F(1, 473.14) = 1.24$, $p = .267$				
	-0.27	0.20	476.86	.175
Time, $F(4, 392.48) = 1.23$, $p = .299$				
Two Months	Ref.			
Four Months	-0.65	2.27	394.83	.771
Six Months	-1.61	2.38	397.97	.498
Nine Months	-3.28	2.51	400.31	.193
Twelve Months	-5.09	2.58	401.44	.049*
Time x Number in Network, $F(4, 394.74) = 0.07$, $p = .991$				
Two Months	Ref.			
Four Months	0.05	0.25	394.30	.846
Six Months	0.02	0.30	401.66	.953
Nine Months	0.16	0.33	406.66	.636
Twelve Months	0.11	0.35	402.94	.764

Note. *$p < .05$, **$p < .01$, ***$p < .001$. ICC = .557

Table 23
Hypothesis 2a: The Relationship Between Social Integration, Time, and State Anxiety

	B	SE	df	*p*
Intercept, $F(1, 110.35) = 15.75$, $p < .001$***				
	30.91	5.87	123.99	< .001***
Age, $F(1, 107.28) = 1.36$, $p = .246$				
	0.31	0.26	107.28	.246
Education, $F(4, 110.24) = 4.19$, $p = .003$**				
High School Diploma or GED	Ref.			
Some College	6.69	2.29	114.37	.004**
Associate's Degree	10.89	3.19	115.18	.001**
Bachelor's Degree	10.17	7.83	104.27	.197
Graduate Degree	1.11	8.00	105.08	.890
Pay Grade Status, $F(2, 107.40) = 4.02$, $p = .021$*				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-6.62	2.38	112.21	.006**
Officer	-9.62	7.48	103.95	.202
Social Integration at 2 months, $F(1, 458.69) = 1.78$, $p = .183$				
	-0.03	0.02	490.67	.121
Time, $F(4, 395.63) = 1.36$, $p = .249$				
Two Months	Ref.			
Four Months	-0.76	2.30	399.18	.740
Six Months	-1.71	2.43	403.42	.483
Nine Months	-3.01	2.61	404.87	.251
Twelve Months	-5.78	2.69	406.64	.032*
Time x Social Integration, $F(4, 396.96) = 0.10$, $p = .982$				
Two Months	Ref.			
Four Months	0.01	0.03	397.10	.790
Six Months	0.00	0.03	403.86	.979
Nine Months	0.01	0.04	408.78	.693
Twelve Months	0.02	0.04	406.11	.590

Note. *$p < .05$, **$p < .01$, ***$p < .001$. ICC = .537

Table 24
Hypothesis 2a: The Relationship Between Emotional Support, Time, and State Anxiety

	B	SE	df	*p*
Intercept, $F(1, 222.59) = 519.94$, $p < .001$***				
	38.59	2.55	253.92	< .001***
Education, $F(4, 111.44) = 5.39$, $p = .001$**				
High School Diploma/GED	Ref.			
Some College	7.13	2.19	115.18	.001**
Associate's Degree	11.92	2.95	116.72	< .001***
Bachelor's Degree	13.16	7.29	104.98	0.074
Graduate Degree	3.87	7.31	105.74	0.598
Pay Grade Status, $F(2, 108.88) = 3.15$, $p = .047$*				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-5.30	2.15	113.54	.015*
Officer	-8.81	7.42	105.65	.237
Emotional Support at 2 months, $F(1, 471.77) = 6.01$, $p = .015$**				
	-0.04	.014	488.19	.009**
Time, $F(4, 398.09) = 1.42$, $p = .228$				
Two Months	Ref.			
Four Months	-1.27	2.17	401.57	.558
Six Months	-2.24	2.34	404.32	.339
Nine Months	-3.42	2.48	407.24	.169
Twelve Months	-5.82	2.60	407.47	.026*
Time x Emotional Support, $F(4, 400.77) = 0.08$, $p = .989$				
Two Months	Ref.			
Four Months	0.01	0.02	400.76	.673
Six Months	0.00	0.02	408.23	.930
Nine Months	0.01	0.02	414.07	.665
Twelve Months	0.01	0.03	411.07	.767

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .534

Table 25
Hypothesis 2a: The Relationship Between Aid, Time, and State Anxiety

	B	SE	df	*p*
Intercept, $F(1, 212.52) = 569.43$, $p < .001$***				
	37.79	2.33	291.82	< .001***
Education, $F(4, 114.61) = 4.00$, $p = .004$**				
High School Diploma/GED	Ref.			
Some College	5.56	2.10	116.77	.009**
Associate's Degree	9.65	2.85	119.57	.001**
Bachelor's Degree	6.92	3.72	109.70	.066
Graduate Degree	-1.79	4.24	115.32	.675
Aid (Instrumental Support) at 2 months, $F(1, 470.13) = 7.85$, $p = .005$**				
	-0.13	0.03	491.73	< .001***
Time, $F(4, 398.75) = 3.14$, $p = .015$*				
Two Months	Ref.			
Four Months	-2.88	2.02	401.67	.156
Six Months	-4.15	2.25	401.84	.066
Nine Months	-5.87	2.37	404.17	.013*
Twelve Months	-7.87	2.41	408.69	.001**
Time x Aid, $F(4, 400.91) = 0.83$, $p = .506$				
Two Months	Ref.			
Four Months	0.05	0.03	399.91	.178
Six Months	0.05	0.05	406.24	.330
Nine Months	0.08	0.05	409.50	.126
Twelve Months	0.06	0.06	406.03	.248

Note. *$p < .05$, **$p < .01$, ***$p < .001$. ICC = .542

Table 26
Hypothesis 3a: The Relationship Between Number in the Social Network, Time, and Fatigue

	B	SE	df	*p*
Intercept, $F(1, 108.32) = 16.06$, $p < .001$***				
	37.79	7.79	117.23	< .001***
Age, $F(1, 105.71) = 1.28$, $p = .261$				
	0.38	0.33	105.71	.261
Ethnicity/Race, $F(4, 109.95) = 0.35$, $p = .847$				
White/Non-Hispanic	Ref.			
Black or African-American	0.33	3.11	114.51	.917
Asian or Pacific Islander	3.24	3.42	110.51	.346
Hispanic	-1.03	3.17	105.51	.747
Other	2.07	5.25	108.07	.694
Education, $F(4, 108.49) = 4.13$, $p = .004$**				
High School Diploma/GED	Ref.			
Some College	8.75	2.84	111.38	.003**
Associate's Degree	12.57	4.09	112.31	.003**
Bachelor's Degree	7.80	9.88	103.81	.431
Graduate Degree	-3.30	9.96	104.04	.741
Pay Grade Status, $F(2, 105.27) = 2.06$, $p = .133$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-6.07	3.02	108.51	.047*
Officer	-3.52	9.48	103.02	.711
Number in Network at 2 months, $F(1, 484.93) = 0.48$, $p = .488$				
	-0.06	0.21	467.16	.772
Time, $F(4, 389.49) = 4.28$, $p = .002$**				
Two Months	Ref.			
Four Months	0.41	2.40	391.79	.865
Six Months	-3.56	2.56	394.32	.165
Nine Months	-6.72	2.73	396.31	.014*
Twelve Months	-8.96	2.78	397.12	.001**
Time x Number in Network, $F(4, 391.19) = 0.50$, $p = .738$				
Two Months	Ref.			
Four Months	-0.33	0.27	391.05	.218
Six Months	-0.10	0.32	397.02	.753
Nine Months	0.03	0.36	401.32	.940
Twelve Months	0.03	0.38	397.86	.945

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .623

Table 27
Hypothesis 3a: The Relationship Between Social Integration, Time, and Fatigue

	B	SE	df	*p*
Intercept, $F(1, 112.98) = 17.60$, $p < .001$***				
	38.59	7.11	123.77	< .001***
Age, $F(1, 110.18) = 1.19$, $p = .279$				
	0.35	0.32	110.18	.279
Education, $F(4, 112.70) = 5.00$, $p = .001$**				
High School Diploma/GED	Ref.			
Some College	8.93	2.79	116.48	.002**
Associate's Degree	14.40	3.88	117.20	< .001***
Bachelor's Degree	7.80	9.57	107.38	.417
Graduate Degree	-2.77	9.77	108.09	.777
Pay Grade Status, $F(2, 110.17) = 1.95$, $p = .147$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-5.68	2.89	114.47	.052
Officer	-3.15	9.15	107.03	.731
Social Integration at 2 months, $F(1, 481.84) = 0.50$, $p = .480$				
	-0.01	0.02	483.17	.658
Time, $F(4, 392.46) = 4.45$, $p = .002$**				
Two Months	Ref.			
Four Months	0.49	2.50	396.01	.844
Six Months	-3.97	2.64	399.52	.133
Nine Months	-6.50	2.87	400.71	.024*
Twelve Months	-9.80	2.91	402.02	.001**
Time x Social Integration, $F(4, 393.22) = 0.51$, $p = .730$				
Two Months	Ref.			
Four Months	-0.03	0.03	393.73	.263
Six Months	-0.01	0.04	399.07	.850
Nine Months	0.00	0.04	403.32	.932
Twelve Months	0.01	0.04	400.73	.724

Note. *$p < .05$, **$p < .01$, ***$p < .001$. ICC = .607

Table 28
Hypothesis 3a: The Relationship Between Emotional Support, Time, and Fatigue

	B	SE	df	*p*
Intercept, $F(1, 222.44) = 576.50$, $p < .001$***				
	47.56	3.00	233.89	< .001***
Education, $F(4, 113.73) = 6.01$, $p < .001$***				
High School Diploma/GED	Ref.			
Some College	9.49	2.68	117.12	.001**
Associate's Degree	15.58	3.60	118.49	< .001***
Bachelor's Degree	11.32	8.95	107.98	.209
Graduate Degree	0.70	8.97	108.65	.938
Pay Grade Status, $F(2, 111.43) = 1.34$, $p = .267$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-4.27	2.63	115.56	.107
Officer	-2.54	9.11	108.53	.781
Emotional Support at 2 months, $F(1, 491.27) = 2.28$, $p = .131$				
	-0.02	0.02	478.51	.123
Time, $F(4, 394.70) = 5.35$, $p < .001$***				
Two Months	Ref.			
Four Months	-0.95	2.35	398.07	.687
Six Months	-4.54	2.54	400.22	.075
Nine Months	-7.58	2.72	402.80	.006**
Twelve Months	-11.19	2.82	402.61	< .001***
Time x Emotional Support, $F(4, 396.74) = 0.38$, $p = .825$				
Two Months	Ref.			
Four Months	-0.01	0.02	396.97	.525
Six Months	0.00	0.02	403.10	.855
Nine Months	0.01	0.03	408.05	.749
Twelve Months	0.02	0.03	405.18	.498

Note. *$p < .05$, **$p < .01$, ***$p < .001$. ICC = .606

Table 29
Hypothesis 3a: The Relationship Between Aid, Time, and Fatigue

	B	SE	df	*p*
Intercept, $F(1, 212.81) = 677.76$, $p < .001$***				
	47.72	2.69	274.26	< .001***
Education, $F(4, 116.64) = 5.42$, $p < .001$***				
High School Diploma/GED	Ref.			
Some College	8.24	2.52	118.89	.001**
Associate's Degree	13.74	3.41	121.31	< .001***
Bachelor's Degree	10.60	4.47	112.29	.020*
Graduate Degree	-0.15	5.09	117.04	.977
Aid (Instrumental Support) at 2 months, $F(1, 488.31) = 5.95$, $p = .015$*				
	-0.10	0.04	484.09	.003**
Time, $F(4, 395.62) = 7.06$, $p < .001$***				
Two Months	Ref.			
Four Months	-2.73	2.20	398.73	.214
Six Months	-6.67	2.45	398.48	.007**
Nine Months	-9.95	2.60	400.74	< .001***
Twelve Months	-11.67	2.62	404.47	< .001***
Time x Aid, $F(4, 397.27) = 0.46$, $p = .765$				
Two Months	Ref.			
Four Months	0.01	0.04	396.74	.865
Six Months	0.03	0.05	402.02	.509
Nine Months	0.07	0.06	404.81	.227
Twelve Months	0.04	0.06	401.35	.505

Note. *$p < .05$, **$p < .01$, ***$p < .001$. ICC = .602

Table 30
Hypothesis 3a: The Relationship Between Number in the Social Network, Time, and Mental Health Status

	B	SE	df	*p*
Intercept, $F(1, 102.70) = 62.97$, $p < .001$***				
	51.94	5.64	117.50	< .001***
Age, $F(1, 98.37) = 1.43$, $p = .234$				
	-0.28	0.24	98.37	.234
Ethnicity/Race, $F(4, 104.27) = 0.54$, $p = .709$				
White/Non-Hispanic	Ref.			
Black or African-American	1.11	2.24	110.83	.620
Asian or Pacific Islander	-0.75	2.45	105.56	.759
Hispanic	-1.67	2.25	98.28	.460
Other	-3.71	3.73	101.41	.322
Education, $F(4, 103.89) = 5.64$, $p < .001$***				
High School Diploma/GED	Ref.			
Some College	-6.99	2.03	105.35	.001**
Associate's Degree	-11.20	2.94	107.97	< .001***
Bachelor's Degree	-10.27	7.02	98.27	.147
Graduate Degree	-0.39	7.11	100.55	.956
Pay Grade Status, $F(2, 99.57) = 4.32$, $p = .016$*				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	6.33	2.15	102.27	.004**
Officer	6.16	6.74	97.78	.363
Number in Network at 2 months, $F(1, 415.33) = 3.50$, $p = .062$				
	0.42	0.20	467.12	.034*
Time, $F(4, 379.87) = 2.15$, $p = .074$				
Two Months	Ref.			
Four Months	0.97	2.30	380.65	.675
Six Months	1.51	2.51	386.75	.548
Nine Months	5.19	2.63	388.12	.050
Twelve Months	6.71	2.74	390.29	.015*
Time x Number in Network, $F(4, 381.93) = 0.47$, $p = .760$				
Two Months	Ref.			
Four Months	0.09	0.26	380.19	.736
Six Months	0.03	0.32	390.38	.914
Nine Months	-0.34	0.35	395.31	.327
Twelve Months	-0.22	0.37	391.80	.551

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .438

Table 31
Hypothesis 3a: The Relationship Between Social Integration, Time, and Mental Health Status

	B	SE	df	*p*
Intercept, $F(1, 107.54) = 68.30$, $p < .001$***				
	51.55	5.14	124.58	< .001***
Age, $F(1, 103.01) = 1.40$, $p = .240$				
	-0.27	0.23	103.01	.240
Education, $F(4, 108.15) = 6.41$, $p < .001$***				
High School Diploma/GED	Ref.			
Some College	-6.97	1.99	110.75	.001**
Associate's Degree	-11.99	2.79	113.00	< .001***
Bachelor's Degree	-9.24	6.80	101.81	.177
Graduate Degree	0.03	6.98	104.90	.997
Pay Grade Status, $F(2, 104.87) = 3.98$, $p = .022$*				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	5.83	2.07	108.84	.006**
Officer	5.35	6.50	102.04	.412
Social Integration at 2 months, $F(1, 399.85) = 3.45$, $p = .064$				
	0.05	0.02	476.41	.032*
Time, $F(4, 382.51) = 2.30$, $p = .059$				
Two Months	Ref.			
Four Months	0.96	2.34	384.43	.682
Six Months	1.54	2.54	390.08	.545
Nine Months	4.61	2.70	391.78	.088
Twelve Months	7.53	2.80	394.85	.007**
Time x Social Integration, $F(4, 383.62) = 0.49$, $p = .740$				
Two Months	Ref.			
Four Months	0.01	0.03	382.36	.825
Six Months	0.00	0.03	391.11	.949
Nine Months	-0.03	0.04	396.64	.450
Twelve Months	-0.04	0.04	394.11	.308

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .435

Table 32
Hypothesis 3a: The Relationship Between Emotional Support, Time, and Mental Health Status

	B	SE	df	*p*
Intercept, $F(1, 222.25) = 802.29$, $p < .001$***				
	44.60	2.37	281.85	< .001***
Education, $F(4, 109.87) = 7.87$, $p < .001$***				
High School Diploma/GED	Ref.			
Some College	-7.24	1.91	112.18	< .001***
Associate's Degree	-12.91	2.58	115.02	< .001***
Bachelor's Degree	-11.68	6.33	102.49	.068
Graduate Degree	-2.31	6.39	106.22	.719
Pay Grade Status, $F(2, 106.87) = 3.08$, $p = .050$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	4.65	1.88	110.60	.015*
Officer	4.65	6.46	104.41	.473
Emotional Support at 2 months, $F(1, 413.53) = 7.30$, $p = .007$**				
	0.04	0.01	476.95	.002**
Time, $F(4, 385.82) = 2.85$, $p = .024$*				
Two Months	Ref.			
Four Months	1.48	2.23	388.42	.507
Six Months	2.12	2.45	393.45	.386
Nine Months	5.65	2.59	395.63	.029*
Twelve Months	8.15	2.74	396.10	.003**
Time x Emotional Support, $F(4, 388.30) = 0.65$, $p = .624$				
Two Months	Ref.			
Four Months	0.00	0.02	387.46	.907
Six Months	0.00	0.02	397.17	.991
Nine Months	-0.03	0.02	403.24	.245
Twelve Months	-0.03	0.03	400.07	.306

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .427

Table 33
Hypothesis 3a: The Relationship Between Aid, Time, and Mental Health Status

	B	SE	df	*p*
Intercept, $F(1, 211.56) = 970.60$, $p < .001$***				
	46.08	2.19	319.73	< .001***
Education, $F(4, 112.97) = 6.23$, $p < .001$***				
High School Diploma/GED	Ref.			
Some College	-5.89	1.83	113.78	.002**
Associate's Degree	-10.94	2.48	118.28	< .001***
Bachelor's Degree	-8.71	3.23	108.22	.008**
Graduate Degree	-0.00	3.68	113.46	.999
Aid (Instrumental Support) at 2 months, $F(1, 405.96) = 8.40$, $p = .004$**				
	0.12	0.03	479.75	< .001***
Time, $F(4, 387.50) = 3.46$, $p = .009$**				
Two Months	Ref.			
Four Months	2.76	2.09	388.45	.187
Six Months	3.56	2.38	392.94	.136
Nine Months	7.46	2.49	395.30	.003**
Twelve Months	7.87	2.55	398.21	.002**
Time x Aid, $F(4, 389.79) = 1.09$, $p = .360$				
Two Months	Ref.			
Four Months	-0.02	0.04	387.51	.550
Six Months	-0.03	0.05	396.61	.493
Nine Months	-0.11	0.06	400.87	.042*
Twelve Months	-0.05	0.06	396.64	.351

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .429

Table 34
Hypothesis 3a: The Relationship Between Number in the Social Network, Time, and Physical Health Status

	B	SE	df	*p*
Intercept, $F(1, 104.63) = 257.88$, $p < .001$***				
	52.62	3.03	126.75	< .001***
Age, $F(1, 99.50) = 0.26$, $p = .609$				
	-0.06	0.12	99.50	.609
Ethnicity/Race, $F(4, 106.56) = 2.52$, $p = .046$*				
White/Non-Hispanic	Ref.			
Black or African-American	-2.61	1.20	113.93	.031*
Asian or Pacific Islander	-2.89	1.30	107.91	.028*
Hispanic	0.36	1.18	99.62	.760
Other	-0.20	1.97	103.90	.921
Education, $F(4, 106.58) = 1.80$, $p = .134$				
High School Diploma/GED	Ref.			
Some College	-1.47	1.08	107.554	.176
Associate's Degree	-1.40	1.56	110.75	.373
Bachelor's Degree	6.41	3.70	100.19	.087
Graduate Degree	4.53	3.76	103.58	.231
Pay Grade Status, $F(2, 101.49) = 0.32$, $p = .725$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	0.45	1.14	104.12	.691
Officer	-1.92	3.55	99.79	.591
Number in Network at 2 months, $F(1, 350.12) = 3.98$, $p = .047$*				
	-0.11	0.12	470.76	.366
Time, $F(4, 391.15) = 3.98$, $p = .004$**				
Two Months	Ref.			
Four Months	1.82	1.47	389.67	.216
Six Months	5.24	1.60	398.16	.001**
Nine Months	5.13	1.68	400.43	.002**
Twelve Months	4.19	1.74	403.98	.017*
Time x Number in Network, $F(4, 393.90) = 1.10$, $p = .359$				
Two Months	Ref.			
Four Months	0.02	0.17	390.19	.919
Six Months	-0.31	0.20	403.33	.121
Nine Months	-0.26	0.22	408.96	.238
Twelve Months	0.06	0.23	407.03	.793

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .311

Table 35
Hypothesis 3a: The Relationship Between Social Integration, Time, and Physical Health Status

	B	SE	df	*p*
Intercept, $F(1, 105.44) = 254.29$, $p < .001$***				
	52.29	3.05	128.09	< .001***
Age, $F(1, 99.66) = 0.26$, $p = .615$				
	-0.06	0.12	99.67	.615
Ethnicity/Race, $F(4, 107.84) = 2.39$, $p = .055$				
White/Non-Hispanic	Ref.			
Black or African-American	-2.52	1.19	113.17	.037*
Asian or Pacific Islander	-2.81	1.30	107.89	.033*
Hispanic	0.41	1.19	99.73	.727
Other	-0.37	2.00	109.14	.852
Education, $F(4, 106.79) = 1.82$, $p = .131$				
High School Diploma/GED	Ref.			
Some College	-1.47	1.08	108.33	.177
Associate's Degree	-1.49	1.57	111.92	.343
Bachelor's Degree	6.42	3.71	100.46	.087
Graduate Degree	4.68	3.76	103.45	.216
Pay Grade Status, $F(2, 101.79) = 0.34$, $p = .714$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	0.44	1.14	104.84	.702
Officer	-2.03	3.55	99.73	.569
Social Integration at 2 months, $F(1, 326.75) = 3.42$, $p = .065$				
	-0.01	0.01	467.77	.544
Time, $F(4, 388.74) = 4.24$, $p = .002$**				
Two Months	Ref.			
Four Months	-1.47	1.08	108.33	.177
Six Months	-1.49	1.57	111.92	.343
Nine Months	6.42	3.71	100.46	.087
Twelve Months	4.68	3.76	103.45	.216
Time x Social Integration, $F(4, 390.63) = 1.29$, $p = .274$				
Two Months	Ref.			
Four Months	-0.00	0.02	387.81	.994
Six Months	-0.04	0.02	398.77	.083
Nine Months	-0.03	0.02	404.12	.199
Twelve Months	0.01	0.03	404.12	.817

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .310

Table 36
Hypothesis 3a: The Relationship Between Emotional Support, Time, and Physical Health Status

	B	SE	df	*p*
Intercept, $F(1, 182.64) = 3054.76$, $p < .001$***				
	50.67	1.53	267.06	< .001***
Ethnicity/Race, $F(4, 107.17) = 2.32$, $p = .062$				
White/Non-Hispanic	Ref.			
Black or African-American	-2.36	1.18	113.59	.047*
Asian or Pacific Islander	-2.77	1.28	108.68	.033*
Hispanic	0.49	1.16	100.60	.677
Other	-0.34	1.96	104.67	.863
Education, $F(4, 106.78) = 1.75$, $p = .144$				
High School Diploma/GED	Ref.			
Some College	-1.66	1.03	107.81	.110
Associate's Degree	-1.75	1.46	112.01	.234
Bachelor's Degree	5.44	3.45	99.11	.118
Graduate Degree	3.88	3.44	102.89	.262
Pay Grade Status, $F(2, 102.40) = 0.23$, $p = .793$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	0.18	1.05	105.34	.866
Officer	-1.99	3.54	100.78	.574
Emotional Support at 2 months, $F(1, 339.68) = 2.03$, $p = .155$				
	0.00	0.01	471.55	.797
Time, $F(4, 390.78) = 4.35$, $p = .002$**				
Two Months	Ref.			
Four Months	2.46	1.42	391.46	.085
Six Months	5.74	1.56	398.39	< .001***
Nine Months	5.10	1.65	401.29	.002**
Twelve Months	4.33	1.75	403.34	.014*
Time x Emotional Support, $F(4, 393.84) = 1.18$, $p = .321$				
Two Months	Ref.			
Four Months	-0.00	0.01	391.87	.717
Six Months	-0.03	0.01	403.79	.066
Nine Months	-0.02	0.02	410.24	.299
Twelve Months	0.01	0.02	408.63	.761

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .307

Table 37
Hypothesis 3a: The Relationship Between Aid, Time, and Physical Health Status

	B	SE	df	*p*
Intercept, $F(1, 167.58) = 3265.46$, $p < .001$***				
	49.95	1.50	250.28	< .001***
Ethnicity/Race, $F(4, 107.05) = 2.10$, $p = .086$				
White/Non-Hispanic	Ref.			
Black or African-American	-2.18	1.18	113.20	.066
Asian or Pacific Islander	-2.68	1.29	108.25	.039*
Hispanic	0.49	1.17	100.43	.674
Other	-0.42	1.97	104.88	.830
Education, $F(4, 106.35) = 1.62$, $p = .176$				
High School Diploma/GED	Ref.			
Some College	-1.59	1.04	107.43	.129
Associate's Degree	-1.57	1.48	112.99	.291
Bachelor's Degree	5.29	3.47	99.03	.131
Graduate Degree	4.39	3.45	101.79	.206
Pay Grade Status, $F(2, 101.96) = 0.27$, $p = .767$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	0.03	1.05	104.98	.977
Officer	-2.40	3.55	99.77	.500
Aid at 2 months, $F(1, 329.47) = 0.05$, $p = .824$				
	0.01	0.02	471.00	.605
Time, $F(4, 392.43) = 4.27$, $p = .002$**				
Two Months	Ref.			
Four Months	2.35	1.34	391.30	.081
Six Months	5.24	1.53	398.19	.001**
Nine Months	4.82	1.60	401.02	.003**
Twelve Months	4.84	1.64	404.66	.003**
Time x Aid, $F(4, 395.46) = 0.61$, $p = .659$				
Two Months	Ref.			
Four Months	-0.01	0.03	391.88	.841
Six Months	-0.04	0.03	402.79	.176
Nine Months	-0.03	0.04	408.03	.483
Twelve Months	0.01	0.04	404.54	.892

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .308

Table 38
Hypothesis 3b: The Relationship Between Number in the Social Network, Time, and Body Mass Index

	B	SE	df	*p*
Intercept, $F(1, 105.42) = 75.93$, $p < .001$				
	27.84	2.45	107.28	< .001***
Age, $F(1, 103.61) = 0.06$, $p = .801$				
	0.03	0.10	103.61	.801
Ethnicity/Race, $F(4, 105.39) = 1.87$, $p = .122$				
White/Non-Hispanic	Ref.			
Black or African-American	-0.15	0.97	106.82	.874
Asian or Pacific Islander	-2.75	1.06	105.71	.011*
Hispanic	-0.14	0.98	103.96	.890
Other	0.08	1.61	104.61	.963
Marital Status, $F(4, 108.20) = 2.58$, $p = .041$*				
Married	Ref.			
Partnered	-2.72	1.35	107.26	.047*
Separated	5.35	2.74	114.82	.053
Divorced	1.73	2.66	106.74	.517
Single	-1.02	0.82	104.03	.215
Education, $F(4, 105.27) = 0.04$, $p = .997$				
High School Diploma/GED	Ref.			
Some College	-0.25	0.88	105.60	.777
Associate's Degree	0.09	1.28	106.64	.944
Bachelor's Degree	0.05	3.07	102.94	.987
Graduate Degree	0.01	3.09	102.96	.996
Pay Grade Status, $F(2, 103.32) = 0.84$, $p = .433$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-0.09	0.94	104.35	.920
Officer	-3.70	2.93	102.60	.209
Number in Network at 2 months, $F(1, 446.67) = 4.09$, $p = .044$*				
	0.03	0.04	420.54	.527
Time, $F(4, 379.94) = 6.07$, $p < .001$				
Two Months	Ref.			
Four Months	-0.47	0.44	380.85	.284
Six Months	-1.39	0.51	381.89	.007**
Nine Months	-1.93	0.50	382.33	< .001***
Twelve Months	-1.95	0.51	382.75	< .001***

(Table 38 continues)

(Table 38 continued)

	B	SE	df	*p*
Time x Number in Network, $F(4, 381.10) = 0.96$, $p = .430$				
Two Months	Ref.			
Four Months	0.02	0.05	380.54	.659
Six Months	0.11	0.07	384.32	.107
Nine Months	0.10	0.07	385.30	.143
Twelve Months	0.05	0.07	383.48	.446

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .837

Table 39
Hypothesis 3b: The Relationship Between Social Integration, Time, and Body Mass Index

	B	SE	df	*p*
Intercept, $F(1, 110.35) = 73.93$, $p < .001$***				
	26.72	2.29	113.09	< .001***
Age, $F(1, 108.52) = 0.29$, $p = .592$				
	0.06	0.10	108.52	.592
Marital Status, $F(4, 113.26) = 2.40$, $p = .054$				
Married	Ref.			
Partnered	-2.29	1.35	112.10	.092
Separated	5.93	2.78	120.25	.035*
Divorced	2.30	2.69	111.98	.395
Single	-0.76	0.82	108.88	.361
Education, $F(4, 109.99) = 0.08$, $p = .989$				
High School Diploma or GED	Ref.			
Some College	-0.24	0.90	110.60	.787
Associate's Degree	0.19	1.25	111.51	.877
Bachelor's Degree	0.53	3.08	107.52	.865
Graduate Degree	-0.03	3.14	107.79	.994
Pay Grade Status, $F(2, 108.40) = 0.99$, $p = .377$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-0.38	0.93	109.75	.683
Officer	-4.11	2.93	107.40	.163
Social Integration at 2 months, $F(1, 459.02) = 3.71$, $p = .055$				
	-0.00	0.00	432.95	.446
Time, $F(4, 381.43) = 5.16$, $p < .001$***				
Two Months	Ref.			
Four Months	-0.45	0.46	383.10	.331
Six Months	-1.31	0.52	383.89	.013*
Nine Months	-1.90	0.53	384.46	< .001***
Twelve Months	-1.88	0.54	385.29	.001**

(Table 39 continues)

(Table 39 continued)

	B	SE	df	*p*
Time x Social Integration, $F(4, 382.09) = 0.67$, $p = .615$				
Two Months	Ref.			
Four Months	0.00	0.01	381.97	.694
Six Months	0.01	0.01	385.09	.195
Nine Months	0.01	0.01	386.09	.194
Twelve Months	0.00	0.01	384.76	.577

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .837

Table 40
Hypothesis 3b: The Relationship Between Emotional Support, Time, and Body Mass Index

	B	SE	df	*p*
Intercept, $F(1, 131.48) = 787.03$, $p < .001$***				
	27.97	0.95	142.26	< .001***
Marital Status, $F(4, 114.44) = 2.33$, $p = .060$				
Married	Ref.			
Partnered	-2.20	1.34	113.30	.102
Separated	5.78	2.78	121.31	.040*
Divorced	2.20	2.68	113.10	.414
Single	-0.81	0.82	110.10	.328
Education, $F(4, 110.90) = 0.13$, $p = .971$				
High School Diploma/GED	Ref.			
Some College	-0.12	0.87	111.34	.888
Associate's Degree	0.47	1.16	112.52	.684
Bachelor's Degree	1.16	2.89	108.31	.688
Graduate Degree	0.63	2.89	108.47	.828
Pay Grade Status, $F(2, 109.54) = 1.00$, $p = .371$				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-0.16	0.85	110.93	.855
Officer	-4.08	2.92	108.56	.165
Emotional Support at 2 months, $F(1, 456.03) = 3.06$, $p = .081$				
	0.00	0.00	427.29	.662
Time, $F(4, 384. 12) = 6.35$, $p < .001$***				
Two Months	Ref.			
Four Months	-0.47	0.44	385.56	.281
Six Months	1.37	0.51	386.19	.008**
Nine Months	-1.98	0.50	386.94	< .001***
Twelve Months	-2.03	0.52	387.08	< .001***
Time x Emotional Support, $F(4, 385. 51) = 0.84$, $p = .502$				
Two Months	Ref.			
Four Months	0.00	0.00	385.00	.691
Six Months	0.01	0.01	388.97	.179
Nine Months	0.01	0.00	390.01	.134
Twelve Months	0.00	0.01	388.66	.419

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .838

Table 41
Hypothesis 3b: The Relationship Between Aid, Time, and Body Mass Index

	B	SE	df	*p*
Intercept, $F(1, 136.64) = 886.14$, $p < .001$***				
	27.69	0.83	156.53	< .001***
Marital Status, $F(4, 118.76) = 2.43$, $p = .051$				
Married	Ref.			
Partnered	-2.27	1.30	117.63	.083
Separated	5.78	2.67	126.77	.032*
Divorced	1.95	2.61	117.43	.455
Single	-0.77	0.79	113.51	.332
Pay Grade Status, $F(2, 114.60) = 3.69$, $p = .028$*				
Junior Enlisted (E1 - E3)	Ref.			
Senior Enlisted (E4 - E9)	-0.08	0.79	114.68	.920
Officer	-3.06	1.26	114.42	.016*
Aid (Instrumental Support) at 2 months, $F(1, 463.19) = 8.04$, $p = .005$**				
	0.01	0.01	434.35	.229
Time, $F(4, 384.03) = 7.26$, $p < .001$***				
Two Months	Ref.			
Four Months	-0.40	0.41	386.11	.332
Six Months	-1.42	0.47	385.19	.003**
Nine Months	-2.05	0.47	385.63	< .001***
Twelve Months	-1.81	0.49	387.37	< .001***
Time x Aid, $F(4, 384.97) = 1.47$, $p = .209$				
Two Months	Ref.			
Four Months	0.00	0.01	384.60	.767
Six Months	0.02	0.01	388.02	.076
Nine Months	0.02	0.01	387.90	.055
Twelve Months	0.01	0.01	385.56	.564

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ICC = .834

Table 42

Hypothesis 3b: The Relationship Between Number of Individuals in the Social Network and Post-Pregnancy PRT Scores

Step and predictor variable	B	SEB	β	ΔR^2	*p*
Step 1				.401	.005**
Constant	5.08	1.47			.001**
Age	-0.09	0.06	-0.21		.165
Ethnicity					
White/Non-Hispanic	0.00				
Black/African-American	-1.12	0.69	-0.19		.112
Hispanic	0.44	0.68	0.08		.523
Asian/Pacific Islander	0.76	0.64	0.15		.238
Other	1.75	0.93	0.22		.065
Education					
High School/GED	0.00				
Some College	0.81	0.59	0.20		.178
Associate's Degree	1.83	0.79	0.36		.023*
Bachelor's Degree	4.97	1.68	0.68		.005**
Graduate Degree	4.04	1.63	0.46		.016*
Marital Status					
Married	0.00				
Partnered	-1.26	1.37	-0.10		.359
Separated	-3.87	1.91	-0.22		.048*
Divorced	-0.28	1.82	-0.02		.881
Single	-0.12	0.51	-0.03		.813
Pay Grade Status					
Junior Enlisted	0.00				
Senior Enlisted	0.47	0.62	0.11		.458
Officers	-0.53	1.55	-0.08		.734
Step 2				.224	< .001***
Constant	3.21	1.22			.011*
Age	-0.10	0.05	-0.25		.046*

(Table 42 continues)

(Table 42 Continued)

Step and predictor variable	B	SEB	β	ΔR^2	*p*
Ethnicity					
White/Non-Hispanic	0.00				
Black/African-American	-0.44	0.56	-0.08		.438
Hispanic	0.00	0.55	0.00		1.000
Asian/Pacific Islander	0.41	0.51	0.08		.428
Other	2.08	0.74	0.26		.007**
Education					
HS/GED	0.00				
Some College	0.47	0.48	0.12		.330
Associate's Degree	0.92	0.65	0.18		.161
Bachelor's Degree	2.19	1.42	0.30		.130
Graduate Degree	1.95	1.35	0.22		.154
Marital Status					
Married	0.00				
Partnered	-1.10	1.09	-0.09		.319
Separated	-3.47	1.53	-0.20		.027*
Divorced	-0.28	1.46	-0.02		.850
Single	0.06	0.41	0.01		.883
Pay Grade Status					
Junior Enlisted	0.00				
Senior Enlisted	0.83	0.50	0.20		.102
Officers	0.52	1.25	0.08		.677
Pre-Pregnancy PRT Score	0.54	0.09	0.57		< .001***
Step 3				.005	.380
Constant	3.03	1.24			.017*
Age	-0.10	0.05	-0.25		.043*
Ethnicity					
White/Non-Hispanic	0.00				
Black/African-American	-0.36	0.57	-0.06		.532
Hispanic	0.00	0.55	0.00		.996
Asian/Pacific Islander	0.37	0.51	0.07		.474
Other	1.92	0.77	0.24		.015*

(Table 42 continues)

(Table 42 continued)

Step and predictor variable	B	SEB	β	ΔR^2	*p*
Education					
HS/GED	0.00				
Some College	0.49	0.48	0.12		.307
Associate's Degree	0.96	0.65	0.19		.146
Bachelor's Degree	2.12	1.43	0.29		.143
Graduate Degree	2.09	1.36	0.24		.130
Marital Status					
Married	0.00				
Partnered	-1.00	1.10	-0.08		.363
Separated	-3.54	1.53	-0.21		.025*
Divorced	-0.34	1.46	-0.02		.816
Single	0.04	0.41	0.01		.918
Pay Grade Status					
Junior Enlisted	0.00				
Senior Enlisted	0.78	0.51	0.18		.131
Officers	0.37	1.26	0.06		.770
Pre-Pregnancy PRT Score	0.54	0.09	0.57		< .001***
Number in Network	0.05	0.05	0.08		.380

Note. R^2 = .631, *p < .05, **p < .01, ***p < .001

Table 43

Hypothesis 3b: The Relationship Between Social Integration and Post-Pregnancy PRT Scores

Step and predictor variable	B	SEB	β	ΔR^2	*p*
Step 1				.312	.009**
Constant	4.94	1.40			.001**
Age	-0.08	0.06	-0.19		.225
Education					
High School/GED	0.00				
Some College	0.71	0.60	0.18		.242
Associate's Degree	1.85	0.74	0.37		.015*
Bachelor's Degree	3.66	1.63	0.50		.028*
Graduate Degree	3.08	1.64	0.35		.064
Marital Status					
Married	0.00				
Partnered	-0.80	1.33	-0.06		.552
Separated	-3.51	1.90	-0.20		.069
Divorced	-0.64	1.84	-0.04		.732
Single	-0.49	0.49	-0.11		.321
Pay Grade Status					
Junior Enlisted	0.00				
Senior Enlisted	0.79	0.63	0.19		.214
Officers	0.33	1.54	0.05		.830
Step 2				.248	< .001***
Constant	3.05	1.17			.011*
Age	-0.09	0.05	-0.22		.073
Education					
High School/GED	0.00				
Some College	0.43	0.49	0.11		.355
Associate's Degree	1.15	0.61	0.23		.064
Bachelor's Degree	1.63	1.35	0.22		.234
Graduate Degree	1.51	1.34	0.17		.264

(Table 43 continues below)

(Table 43 continued)

Step and predictor variable	B	SEB	β	ΔR^2	*p*
Marital Status					
Married	0.00				
Partnered	-0.28	1.08	-0.02		.796
Separated	-3.47	1.53	-0.20		.027*
Divorced	-0.46	1.49	-0.03		.761
Single	-0.11	0.40	-0.03		.785
Pay Grade Status					
Junior Enlisted	0.00				
Senior Enlisted	0.98	0.51	0.23		.058
Officers	0.90	1.25	0.14		.476
Pre-Pregnancy PRT Score	0.54	0.09	0.57		< .001***
Step 3				.022	.078
Constant	2.63	1.17			.029*
Age	-0.09	0.05	-0.23		.064
Education					
HS/GED	0.00				
Some College	0.52	0.48	0.13		.284
Associate's Degree	1.24	0.60	0.25		.044*
Bachelor's Degree	1.60	1.33	0.22		.234
Graduate Degree	1.84	1.33	0.21		.173
Marital Status					
Married	0.00				
Partnered	-0.24	1.06	-0.02		.821
Separated	-3.58	1.51	-0.21		.021*
Divorced	-0.51	1.46	-0.03		.727
Single	-0.10	0.39	-0.02		.798
Pay Grade Status					
Junior Enlisted	0.00				
Senior Enlisted	0.81	0.51	0.19		.117
Officers	0.51	1.24	0.08		.682
Pre-Pregnancy PRT Score	0.53	0.09	0.57		< .001***
Social Integration	0.01	0.01	0.16		.078

Note. R^2 = .582, *p < .05, **p < .01, ***p < .001

Table 44
Hypothesis 3b: The Relationship Between Emotional Support and Post-Pregnancy PRT Scores

Step and predictor variable	B	SEB	β	ΔR^2	*p*
Step 1				.312	.009**
Constant	4.94	1.40			
Age	-0.08	0.06	-0.19		.225
Education					
High School/GED	0.00				
Some College	0.71	0.60	0.18		.242
Associate's Degree	1.85	0.74	0.37		.015*
Bachelor's Degree	3.66	1.63	0.50		.028*
Graduate Degree	3.08	1.64	0.35		.064
Marital Status					
Married	0.00				
Partnered	-0.80	1.33	-0.06		.552
Separated	-3.51	1.90	-0.20		.069
Divorced	-0.64	1.84	-0.04		.732
Single	-0.49	0.49	-0.11		.321
Pay Grade Status					
Junior Enlisted	0.00				
Senior Enlisted	0.79	0.63	0.19		.214
Officers	0.33	1.54	0.05		.830
Step 2				.248	< .001***
Constant	3.05	1.17			.011*
Age	-0.09	0.05	-0.22		.073
Education					
High School/GED	0.00				
Some College	0.45	0.49	0.11		.355
Associate's Degree	1.15	0.61	0.23		.064
Bachelor's Degree	1.63	1.35	0.22		.234
Graduate Degree	1.51	1.34	0.17		.264

(Table 44 continues below)

(Table 44 continued)

Step and predictor variable	B	SEB	β	ΔR^2	*p*
Marital Status					
Married	0.00				
Partnered	-0.28	1.08	-0.02		.796
Separated	-3.47	1.53	-0.20		.027*
Divorced	-0.46	1.49	-0.03		.761
Single	-0.11	0.40	-0.03		.785
Pay Grade Status					
Junior Enlisted	0.00				
Senior Enlisted	0.98	0.51	0.23		.058
Officers	0.90	1.25	0.14		.476
Pre-Pregnancy PRT Score	0.54	0.09	0.57		< .001***
Step 3				.025	.058
Constant	2.57	1.17			.032*
Age	-0.09	0.05	-0.23		.061
Education					
HS/GED	0.00				
Some College	0.59	0.48	0.15		.224
Associate's Degree	1.35	0.60	0.27		.029*
Bachelor's Degree	1.69	1.33	0.23		.208
Graduate Degree	2.00	1.34	0.23		.140
Marital Status					
Married	0.00				
Partnered	-0.27	1.05	-0.02		.802
Separated	-3.48	1.50	-0.20		.024*
Divorced	-0.49	1.46	-0.03		.739
Single	-0.17	0.39	-0.04		.666
Pay Grade Status					
Junior Enlisted	0.00				
Senior Enlisted	0.76	0.51	0.18		.144
Officers	0.35	1.25	0.06		.778
Pre-Pregnancy PRT Score	0.53	0.09	0.57		< .001***
Emotional Support	0.01	0.00	0.18		.058

Note. R^2 = .586, *p < .05, **p < .01, ***p < .001

Table 45

Hypothesis 3b: The Relationship Between Aid (Tangible Support) and Post-Pregnancy PRT Scores

Step and predictor variable	B	SEB	β	ΔR^2	*p*
Step 1				.312	.009
Constant	4.94	1.40			.001**
Age	-0.08	0.06	-0.19		.225
Education					
High School/GED	0.00				
Some College	0.71	0.60	0.18		.242
Associate's Degree	1.85	0.74	0.37		.015*
Bachelor's Degree	3.66	1.63	0.50		.028*
Graduate Degree	3.08	1.64	0.35		.064
Marital Status					
Married	0.00				
Partnered	-0.80	1.33	-0.06		.552
Separated	-3.51	1.90	-0.20		.069
Divorced	-0.64	1.84	-0.04		.732
Single	-0.49	0.49	-0.11		.321
Pay Grade Status					
Junior Enlisted	0.00				
Senior Enlisted	0.79	0.63	0.19		.214
Officers	0.33	1.54	0.05		.830
Step 2				.248	< .001***
Constant	3.05	1.17			.011*
Age	-0.09	0.05	-0.22		.073
Education					
High School/GED	0.00				
Some College	0.45	0.49	0.11		.355
Associate's Degree	1.15	0.61	0.23		.064
Bachelor's Degree	1.63	1.35	0.22		.234
Graduate Degree	1.51	1.34	0.17		.264

(Table 45 continues below)

(Table 45 continued)

Step and predictor variable	B	SEB	β	ΔR^2	*p*
Marital Status					
Married	0.00				
Partnered	-0.28	1.08	-0.02		.796
Separated	-3.47	1.53	-0.20		.027*
Divorced	-0.46	1.49	-0.03		.761
Single	-0.11	0.40	-0.03		.785
Pay Grade Status					
Junior Enlisted	0.00				
Senior Enlisted	0.98	0.51	0.23		.058
Officers	0.90	1.25	0.14		.476
Pre-Pregnancy PRT Score	0.54	0.09	0.57		< .001***
Step 3				.006	.344
Constant	2.68	1.23			.033*
Age	-0.09	0.05	-0.21		.087
Education					
High School/GED	0.00				
Some College	0.46	0.49	0.12		.344
Associate's Degree	1.18	0.61	0.24		.057
Bachelor's Degree	1.52	1.36	0.21		.270
Graduate Degree	1.52	1.35	0.17		.262
Marital Status					
Married	0.00				
Partnered	-0.23	1.08	-0.02		.835
Separated	-3.57	1.54	-0.21		.023*
Divorced	-0.42	1.49	-0.02		.779
Single	-0.10	0.40	-0.02		.809
Pay Grade Status					
Junior Enlisted	0.00				
Senior Enlisted	0.86	0.53	0.20		.107
Officers	0.79	1.25	0.12		.530
Pre-Pregnancy PRT Score	0.55	0.09	0.59		< .001***
Aid (Tangible Support)	0.01	0.01	0.09		.344

Note. R^2 = .567, *p < .05, **p < .01, ***p < .001

Appendix A

Table 46

Critical Times During the First Year After Childbirth

Time	1 Month Postpartum (Weeks 1-4)	2 Months Postpartum (Weeks 5-8)	3 Months Postpartum (Weeks 9-12)	4 Months Postpartum (Weeks 13-16)	5 Months Postpartum (Weeks 17-20)	6 Months Postpartum (Weeks 21-24)
Issues & Milestones	*Mother:* • Mother may be experiencing significant pain & fatigue related to childbirth • C-section incisions & episiotomy sites are healing: Sex is often avoided during this time • Up to 55% of mothers may experience "maternity blues" during the first 2 weeks after childbirth *Baby:* • Spends most time sleeping • 2-4 weeks: First routine medical appointment • 3 weeks: Colic may manifest	*Mother:* • 4 to 6 weeks: Uterus has returned to normal size & body should be generally physically recovered from childbirth • 6 weeks: Military mother returns to work *Baby:* • Becomes more responsive to stimuli; May make word-like sounds; Learning to interact with the environment (rolling over, making noise, etc.) • 8 weeks: Second routine medical appointment	*Mother:* • By 3 months: Menstruation resumes among women not breast-feeding • Peak in prevalence of postpartum depression (PPD): 1 in 5 mothers may have experienced PPD by this time *Baby:* • Baby is able to laugh, acknowledge and respond to familiar people, and grasp small objects • Baby should be able to sleep through night	*Baby:* • Baby may be able to pull self along ground & may start sucking thumb • Third routine medical appointment	*Baby:* • Often demonstrates keen interest in the outside world • Starts eating solid food • May sit without support & be able to pull self to standing position • Teething may start	*Mother:* • 6 months: Required to meet weight & fitness standards • 6 months: Marine Corps, Air Force, and Army mother may be deployed *Baby:* • Breastfeeding recommended for first 6 months • May begin making meaningful verbal communications • Personality becomes more apparent • May start crawling • Fourth routine medical appointment • Teeth may appear

Time	7 Months Postpartum (Weeks 25-28)	8 Months Postpartum (Weeks 29-32)	9 Months Postpartum (Weeks 33-36)	10 Months Postpartum (Weeks 37-40)	11Months Postpartum (Weeks 41-44)	12 Months Postpartum (Weeks 45-48)	13 Months Postpartum (Weeks 49-52)
Issues & Milestones	*Mother:* • Another peak in prevalence of postpartum depression *Baby:* • Can use pincer grasp • Can meaningfully request "mama" or "dada" • May be "cruising": Moving around living area while grasping furniture	*Mother:* • Menstruation will have returned among women who are exclusively breast-feeding *Baby:* • May play "peek-a-boo" • May be standing without assistance	*Baby:* • Average age for baby to be crawling • Fifth Routine Medical Appointment	*Baby:* • Has mastered pincer grasp • May be able to stand without shaking • Can understand verbal commands • Vocabulary expands to several words	*Baby:* • May communicate with nonsense language as well as pointing or gesturing & making noises • May begin walking	*Baby:* • May know 5 words • Body weight will have tripled over 12 months • Sixth routine medical appointment	*Mother:* • May still be experiencing postpartum fatigue *Baby:* • May know 10 words • "No!" may be frequently used word

Appendix B

Table 47

United States Active Duty Military Service Policies Related to Pregnancy and the Postpartum Period

	Applicable Regulations	Physical Training During Pregnancy	Fitness Testing and Weight Standards During Pregnancy	Fitness Testing After Pregnancy	Weight After Pregnancy	Maternity Leave	Paternity Leave	Deployment	Separation from Service
U.S. Army	Army Regulation (AR) 40-501 (September 10, 2008); Field Manual (FM) 21-20 (October 1, 1998); AR 635-200 (June 6, 2005); AR 600-8-24 (November 19, 2008); AR 600-9 (November 27, 2006); AR 614-30 (November 19, 2008)	Pregnant soldiers may not be required to exercise without obstetrician's approval; Soldiers may exercise at their own pace	Soldiers not required to take physical readiness test (PRT) or pass weight standards throughout pregnancy	Fitness testing resumes at six months postpartum	Soldiers required to meet weight standard six months postpartum	Soldier returns to work six weeks after childbirth; Convalescent leave can be extended in special medical situations	No, although emergency leave may be approved by commander	Soldiers may be deployed six months postpartum; Soldiers assigned to overseas combat zones will be returned to the Continental U.S. (CONUS) once pregnancy is confirmed	Pregnant enlisted personnel may request separation; Pregnant officers may request separation if they have completed their Active Duty Service Obligation (ADSO)

	Applicable Regulations	Physical Training During Pregnancy	Fitness Testing and Weight Standards During Pregnancy	Fitness Testing After Pregnancy	Weight After Pregnancy	Maternity Leave	Paternity Leave	Deployment	Separation from Service
U.S. Air Force	Air Force Instruction (AFI) 44-102 (May 23, 2007); AFI 10-248 (August 22. 2007); AFI 36-3208 (July 9, 2004)	Restrictions based on medical assessment by obstetrician; Pregnant airmen encouraged to participate in an individualized exercise program	Pregnant airmen are not required to undergo Fitness Assessment, including weight assessment	Fitness testing resumes at six months postpartum	Airmen must comply with Air Force Fitness Program at six months postpartum; Air Force Fitness Program includes weight assessment and waist measurement	Airman returns to work six weeks after childbirth; Convalescent leave can be extended in special medical situations	No, although emergency leave may be approved by commander	Airmen assigned to areas without routine obstetric care will have assignment curtailed by 24th week of pregnancy; Personnel may be deployed six months after childbirth	Pregnant enlisted personnel may request separation; Officers may request separation in extenuating situations

	Applicable Regulations	Physical Training During Pregnancy	Fitness Testing and Weight Standards During Pregnancy	Fitness Testing After Pregnancy	Weight After Pregnancy	Maternity Leave	Paternity Leave	Deployment	Separation from Service
U.S. Navy	OPNAVINST 6000.1C (June 14, 2007)	Restrictions based on medical assessment by obstetrician; Pregnant sailors encouraged to participate in an individualized exercise program	Pregnant sailors are not required to undergo fitness testing or weight assessment	Fitness testing resumes at six months postpartum	Sailors must comply with weight standards at six months postpartum	Sailor returns to work six weeks after childbirth; Convalescent leave can be extended in special medical situations	No, although commanders are encouraged to provide expectant fathers with leave whenever possible	Sailors may not be deployed while pregnant, and may not remain onboard a ship after the 20th week of pregnancy; Sailors may be deployed 12 months after childbirth	Pregnant enlisted personnel may request separation; Pregnant officers may request separation but separation is unlikely to be granted unless the officer has completed her ADSO
U.S. Marine Corps	Marine Corps Order (MCO) 5000.12E (December 8, 2004)	Restrictions based on medical assessment by obstetrician; Pregnant sailors encouraged to participate in an individualized exercise program	Pregnant Marines are not required to undergo fitness testing or weight assessment	Fitness testing resumes at six months postpartum	Marines must comply with weight standards at six months postpartum	Marine returns to work six weeks after childbirth; Convalescent leave can be extended in special medical situations	No, although commanders are encouraged to provide expectant fathers with leave whenever possible	Pregnant Marines are not deployable; Marines may be deployed 6 months after childbirth	Pregnant Marines may request separation, however, requests are normally denied unless there are extenuating circumstances

Appendix C

24 SEP 07

From: Head, Nursing Research & Analysis
To: Chair, Institutional Review Board

Subj: REQUEST TO ADD/MODIFY RECRUITMENT BROCHURES #NMCSD.2007.0102

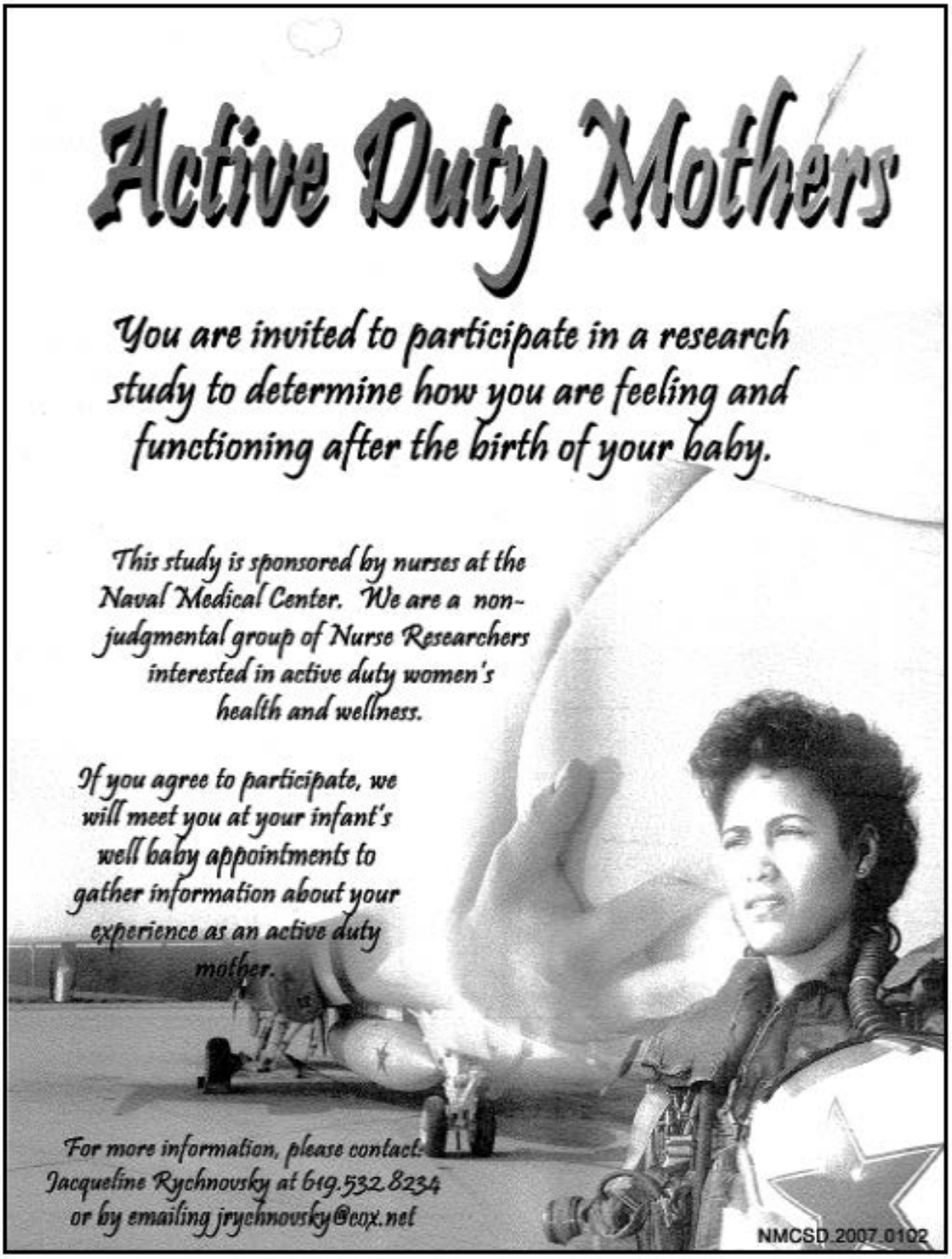
Encl: (1) Recruitment Poster

1. Respectfully request approval for the study poster in Enclosure (1) for the above referenced study.

2. Please feel free to contact me if additional information is required. I can be reached at j.rychnovsky@med.navy.mil

J RYCHNOVSKY
CDR NC USN

IRB
APPROVED
DATE 12 13 07
INT DAT
NAVAL MEDICAL CENTER SAN DIEGO


Active Duty Mothers
You are invited to participate in a research study to determine how you are feeling and functioning after the birth of your baby.
This study is sponsored by nurses at the Naval Medical Center. We are a non-judgmental group of Nurse Researchers interested in active duty women's health and wellness.
If you agree to participate, we will meet you at your infant's well baby appointments to gather information about your experience as an active duty mother.
For more information, please contact-
Jacqueline Rychnovsky at 619.532.8234
or by emailing jrychnovsky@cox.net
NMCSD.2007.0102

Appendix D

IV. CONSENT FORM, INFORMATION SHEET, OR WAIVER

Insert hard copy of appropriate documents. In separate template files, you'll find:

1. 1st party consent
2. PHI checklist
3. HIPAA Patient Authorization

Research Project Information Sheet

Naval Medical Center San Diego

Dear Subjects:

The Naval Medical Center in cooperation with the (State Department) and the (Name of Collaborator), is conducting a research project titled **"Are US Navy and Marine Women Operationally Ready During the First Year Postpartum"** to study how active duty women are feeling during the first year after childbirth:

Your Cooperation is greatly appreciated.

Study Procedures – If you agree to participate, the following procedures will be performed: If you agree to participate, the following procedures will be performed: Several days before each of your baby's Well Child Visits (at 2, 4 6, 9, and 12 months postpartum) several questionnaires will be mailed to you. A Research Assistant will meet you at the Well Child Visit (or another convenient location of your choice) to pick up the questionnaires. At this time we will also take height and weight measurements in a private location and take a drop of blood from your finger to test for anemia (low iron). You will be asked to record how many days work you have missed because you or your baby was sick. Lastly, near the end of the study, you will be asked to provide a copy of your Physical Readiness Testing Report using the computer program PRIMS, and you will talk briefly with a member of the research staff to discuss the job duties you performed after you had your baby. No personal identifiers will be recorded to protect your privacy.

Risks – You might feel uncomfortable wile completing the research questionnaires, as they will be asking questions about how you are feeling mentally and physically sine childbirth. There will be minimal pain when the drop of blood is taken from your finger. Very rarely a bruise or infection can occur on your fingertip where the blood is being drawn

Benefits – There are no direct benefits to you for participating in this study other than knowing you may be helping nurses understand how pregnant military women are feeling after the birth of their baby.

Your participation in this study is entirely voluntary and the alternative, if you elect not to participate, there will be no penalty and you will receive standard of care medical treatment.

IRB APPROVED DATE 12/2/08 INT EXP OCT 08 2009 NAVAL MEDICAL CENTER SAN DIEGO

IRB APPROVED DATE 12/13/07 INT EXP DEC 13 2008 NAVAL MEDICAL CENTER SAN DIEGO

Subject's Initials: _____

IRB Approval Stamp/Seal Required
(Do not make any alterations to this documents w/out prior approval)

Confidentiality - In all publications and presentations resulting from this research study, information about you or your participation in this project will be kept in the strictest confidence and will not be released in any form identifiable to you personally.

If you have any questions regarding this research study, **you may contact CDR Jacqueline Rychnovsky, NC, USN at (619) 532-8234.** If you have any questions about your rights as an individual while participating in a research study at the Naval Medical Center, San Diego, you may contact **CDR D. A. Tanen, MC, USN, Chairman, Institutional Review Board at (619) 532-8125, or Dr. Warren Lockette, Head, Clinical Investigation Department at (619) 532-8127**. If you believe that you have been injured as a result of your participation in this research study, you may contact **CDR William Boland, JAGC, USN, Naval Medical Center, San Diego, Legal Department, at (619) 532-6475**.

This form is yours to keep for your information. Thank you.

If you have any further Questions or Concerns, Please speak to one of the Physicians.

SIGNATURE

You are making a decision whether or not to participate in the research project above. Your signature indicates that you have had this information presented to you, have had the opportunity to ask questions about the research and your participation, and agree to participate in the study. Further, your signature indicates that you have been provided with a copy of this consent document, a Health Information Portability and Accountability Act (HIPAA) Patient Authorization form and a document entitled, "California Experimental Subject's Bill of Rights."

SIGNATURES AND **DATE** SIGNED: **PRINTED** OR **TYPED IDENTIFICATION**:

Patient / Subject (Date)	Name / Status / Sponsor's SSN
Investigator/ Researcher (Date) (Person obtaining consent)	Name / Grade or Rank

IRB APPROVED DATE 12/2/08 INT EXPIRES OCT 08 2009 NAVAL MEDICAL CENTER SAN DIEGO

IRB APPROVED DATE 12/13/07 INT EXP DEC 13 2008 NAVAL MEDICAL CENTER SAN DIEGO

Subject's Initials: _____

IRB Approval Stamp/Seal Required
(Do not make any alterations to this documents w/out prior approval)

PATIENT AUTHORIZATION TO USE AND/OR DISCLOSE PROTECTED HEALTH INFORMATION FOR RESEARCH (HIPAA)

(In Keeping with the Health Insurance Portability and Accountability Protection Act)

What is Confidentiality of records all about?

The Naval Medical Center San Diego makes every effort to maintain the confidentiality of protected health information we obtain about you. However, we cannot absolutely guarantee confidentiality because other people may need to see your information in the course of this research study. Most people and organizations will protect the privacy of your information, but may not be required to do so by the law. Also, if the results of this research study are presented at meetings or are published, your name will not be used.

What is HIPAA all about?

The Health Insurance Portability and Accountability Act (HIPAA) requires that we get your permission to use protected health information about you that is either created by or used in connection with this research study. This permission is called an Authorization. The information we use includes your entire research record and supporting information from your medical records, results of laboratory test, X-rays, MRIs, CT scans and observations made by a physician or nurse which are both clinical and research in nature.

What will we do with this information?

Your protected health information will be collected and used during the course of the research study, to monitor your health status, to measure the effects of drugs or devices or procedures, to determine research results, and to possibly develop new tests, procedures, and commercial products.

Your research doctor will use this information to report the results of research to sponsors and federal agencies, like the Food and Drug Administration (FDA). The information may also be reviewed when the research study is audited for compliance. When the study is over, you have the right to see the information and copy it for your records.

Who will we share your information with?

Your information may be shared with any of the following:

- The sponsor of the study, or its agents, such as data repositories
- Other medical centers, institutions, or research investigators outside of the Naval Medical Center San Diego, participating in this research study
- State and Federal agencies which have authority over the research, the Naval Medical Center San Diego or patients. Good examples are: the Department of Health and Human Services (DHHS), the Food and Drug Administration (FDA), the National Institute of Health (NIH), the Office of Human Research Protections (OHRP), and the Department of Social Services (DSS) or other.
- This hospital or clinic.
- Accrediting agencies, such as JCAHO.
- A data safety monitoring board, if applicable
- Clinical staff who may not be involved directly in the research study, but who may become involved in your care, if it is possibly related to treatment

For this research study, the study investigator may share this authorization form and records which identify you to comply with regulatory requirements or for purposes related to this research to:

All documented Principal, Associate, and Sub-investigators, and the Medical Monitor (if one is assigned). In addition,

What if you want to revoke or cancel away your Authorization?

If you decide to participate in this research study, your Authorization for this study will not expire unless you revoke or cancel it in writing to the research doctor. If you revoke your Authorization, you will also be removed from the study, but standard medical care and any other benefit to which you are entitled will not be affected in any way.

Revoking your Authorization only affects the use and disclosure (sharing) of information after your written request has been received. Federal law requires sending study information to the FDA for studies it regulates, like studies of drugs and devices. In a case like this, your information may need to be reported to them and cannot be removed from the research records once it is collected.

Do you have to sign this form?

You have the right to refuse to sign this Authorization form and not be a part of this study. You can also tell your study doctor you want to withdraw from the study at any time without revoking the Authorization to use your health information. By signing this research Authorization form, you authorize the use and/or disclosure of your protected health information described above.

This authorization expires 25 years from the date of signature.

SIGNATURE AND **DATE** SIGNED:		**PRINTED** OR **TYPED IDENTIFICATION:**
Patient/Subject	(Date)	Name/Status/Sponsor's SSN
Researcher/investigator	(Date)	Name/Grade or Rank

template updated 5/8/07 per - California CIVILCODE - See the CMIA section §56.104(a)(2) (expiration date) and uses and Disclosures - (14 point font)

California Experimental Subject's Bill of Rights

(a) Be informed of the nature and purpose of the experiment.

(b) Be given an explanation of the procedures to be followed in the medical experiment, and any drug or device to be utilized.

(c) Be given a description of any attendant discomforts and risks reasonably to be expected from the experiment.

(d) Be given an explanation of any benefits to the subject reasonably to be expected from the experiment, if applicable.

(e) Be given a disclosure of any appropriate alternative procedures, drugs or devices that might be advantageous to the subject, and their relative risks and benefits.

(f) Be informed of the avenues of medical treatment, if any, available to the subject after the experiment if complications should arise.

(g) Be given an opportunity to ask any questions concerning the experiment or the procedures involved.

(h) Be instructed that consent to participate in the medical experiment may be withdrawn at any time and the subject may discontinue participation in the medical experiment without prejudice.

(i) Be given a copy of the signed and dated written consent form as provided for by Section 24173 or 24178.

(j) Be given the opportunity to decide to consent or not to consent to a medical experiment without the intervention of any element of force, fraud, deceit, duress, coercion, or undue influence on the subject's decision.

SIGNATURES AND DATE SIGNED:

_____
Patient / Subject (Date)
(if Applicable)

_____
Witness (Date)

PRINTED OR TYPED IDENTIFICATION:

_____
Name / Status / Sponsor's SSN

_____
Name / Grade or Rank

Version date: 1 Nov 04

Appendix E

NMCSD 2007.0102 Demographic Form

Subject ID #_____

Age_____

Number of pregnancies_____

Number of living children_____

Number of children presently cared for in the home_____

Approximate due date_____/_____/_____

Military Pay Grade _____

Branch of Service
- ☐ US Navy
- ☐ Marine Corps

Marital Status
- ☐ Married
- ☐ Partnered
- ☐ Separated
- ☐ Divorced
- ☐ Single

Ethnicity
- ☐ Hispanic
- ☐ Non-Hispanic

Race (mark one or more)
- ☐ White/Caucasian
- ☐ Black/African American
- ☐ Pacific Islander
- ☐ Asian
- ☐ American Indian and Alaska Native
- ☐ Other _____

Education
- ☐ High school diploma or GED
- ☐ Some college
- ☐ Associate's Degree
- ☐ Bachelor's Degree
- ☐ Graduate Degree

Appendix F

Date: _____

As part of being in this research study a droplet of blood was taken from your finger to test your hemoglobin. Today your reading is _____ , indicating that you might be anemic (a low count of red blood cells, or "low iron") which might be making you feel tired or weak. Please take this form to your Primary Care Provider for further evaluation.

Sincerely,

CDR J. Rychnovsky, NC, USN

Principal Investigator

619-532-8234

Date: _____

As part of being in this research study a droplet of blood was taken from your finger to test your hemoglobin. Today your reading is _____ , indicating that you might be anemic (a low count of red blood cells, or "low iron") which might be making you feel tired or weak. Please take this form to your Primary Care Provider for further evaluation.

Sincerely,

CDR J. Rychnovsky, NC, USN

Principal Investigator

619-532-8234

Appendix G

SOCIAL SUPPORT QUESTIONNAIRE

PLEASE READ ALL DIRECTIONS
ON THIS PAGE BEFORE STARTING

Please list each significant person in your life on the right. Consider all the persons who provide personal support for you or who are important to you.

Use only first names or initials, and then indicate the relationship, as in the following example:

Example:

	First Name or Initials	Relationship
1.	Mary T	friend
2.	Bob	brother
3.	M.T.	mother
4.	Sam	friend
5.	Mrs. R.	neighbor

etc.

Use the following list to help you think of the people important to you, and list as many people as apply in your case.

- spouse or partner
- family members or relatives
- friends
- work or school associates
- neighbors
- health care providers
- counselor or therapist
- minister/priest/rabbi
- other

You do not have to use all 24 spaces. Use as many spaces as you have important persons in your life.

WHEN YOU HAVE FINISHED YOUR LIST, PLEASE TURN TO PAGE 2.

Note: Before use, pages 1-4 should be cut along the dashed center line to allow the response lines for Questions 1-6 to align with the Personal Network list on page 5.

For each person you listed, please answer the following questions by writing in the number that applies.

0 = not at all
1 = a little
2 = moderately
3 = quite a bit
4 = a great deal

Question 1:

How much does this person make you feel liked or loved?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

[EMO1]

Question 2:

How much does this person make you feel respected or admired?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

[EMO2]

GO ON TO NEXT PAGE

Note: Before use, pages **1**-4 should be cut along the dashed center line to allow the response lines for Questions 1-6 to align with the Personal Network list on page 5.

0 = not at all
1 = a little
2 = moderately
3 = quite a bit
4 = a great deal

Question 3:

How much can you confide in this person?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

[EMO3]

Question 4:

How much does this person agree with or support your actions or thoughts?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

[EMO4]

GO ON TO NEXT PAGE

Note: Before use, pages 1-4 should be cut along the dashed center line to allow the response lines for Questions 1-6 to align with the Personal Network list on page 5.

0 = not at all
1 = a little
2 = moderately
3 = quite a bit
4 = a great deal

Question 5:

If you needed to borrow $10, a ride to the doctor, or some other immediate help, how much could this person usually help?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

[AID5]

Question 6:

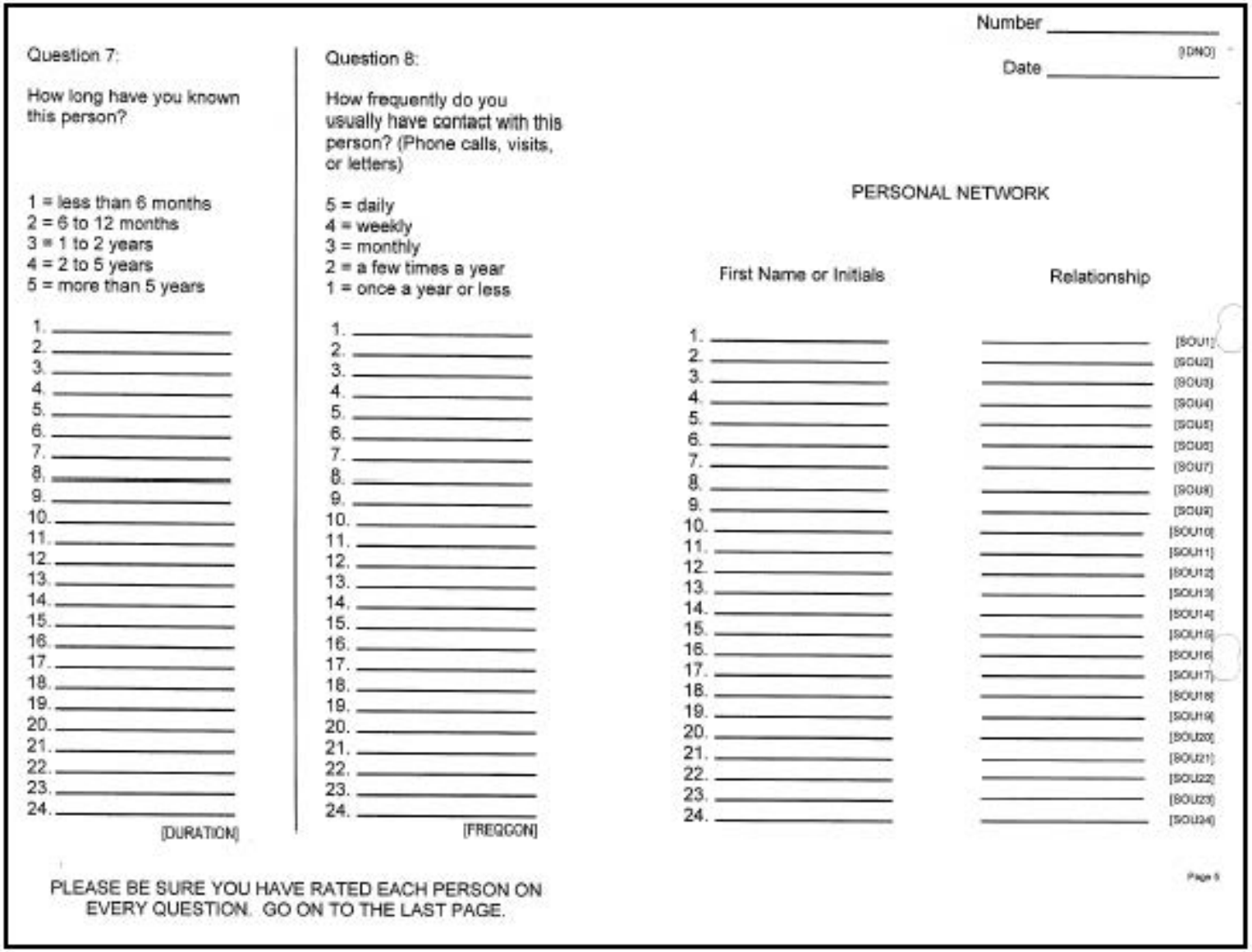
If you were confined to bed for several weeks, how much could this person help you?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

[AID6]

GO ON TO NEXT PAGE

Note: Before use, pages 1-4 should be cut along the dashed center line to allow the response lines for Questions 1-6 to align with the Personal Network list on page 5.



Number _____ [IDNO]

Date _____

PERSONAL NETWORK

Question 7:

How long have you known this person?

1 = less than 6 months
2 = 6 to 12 months
3 = 1 to 2 years
4 = 2 to 5 years
5 = more than 5 years

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

[DURATION]

Question 8:

How frequently do you usually have contact with this person? (Phone calls, visits, or letters)

5 = daily
4 = weekly
3 = monthly
2 = a few times a year
1 = once a year or less

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

[FREQCON]

First Name or Initials	Relationship	
1. _____	_____	[SOU1]
2. _____	_____	[SOU2]
3. _____	_____	[SOU3]
4. _____	_____	[SOU4]
5. _____	_____	[SOU5]
6. _____	_____	[SOU6]
7. _____	_____	[SOU7]
8. _____	_____	[SOU8]
9. _____	_____	[SOU9]
10. _____	_____	[SOU10]
11. _____	_____	[SOU11]
12. _____	_____	[SOU12]
13. _____	_____	[SOU13]
14. _____	_____	[SOU14]
15. _____	_____	[SOU15]
16. _____	_____	[SOU16]
17. _____	_____	[SOU17]
18. _____	_____	[SOU18]
19. _____	_____	[SOU19]
20. _____	_____	[SOU20]
21. _____	_____	[SOU21]
22. _____	_____	[SOU22]
23. _____	_____	[SOU23]
24. _____	_____	[SOU24]

Page 5

PLEASE BE SURE YOU HAVE RATED EACH PERSON ON EVERY QUESTION. GO ON TO THE LAST PAGE.

9. During the past year, have you lost any important relationships due to moving, a job change, divorce or separation, death, or some other reason?

_____ 0. No
_____ 1. Yes

[LO69]

IF YOU LOST IMPORTANT RELATIONSHIPS DURING THIS PAST YEAR:

9a. Please indicate the number of persons from each category who are *no longer available* to you.

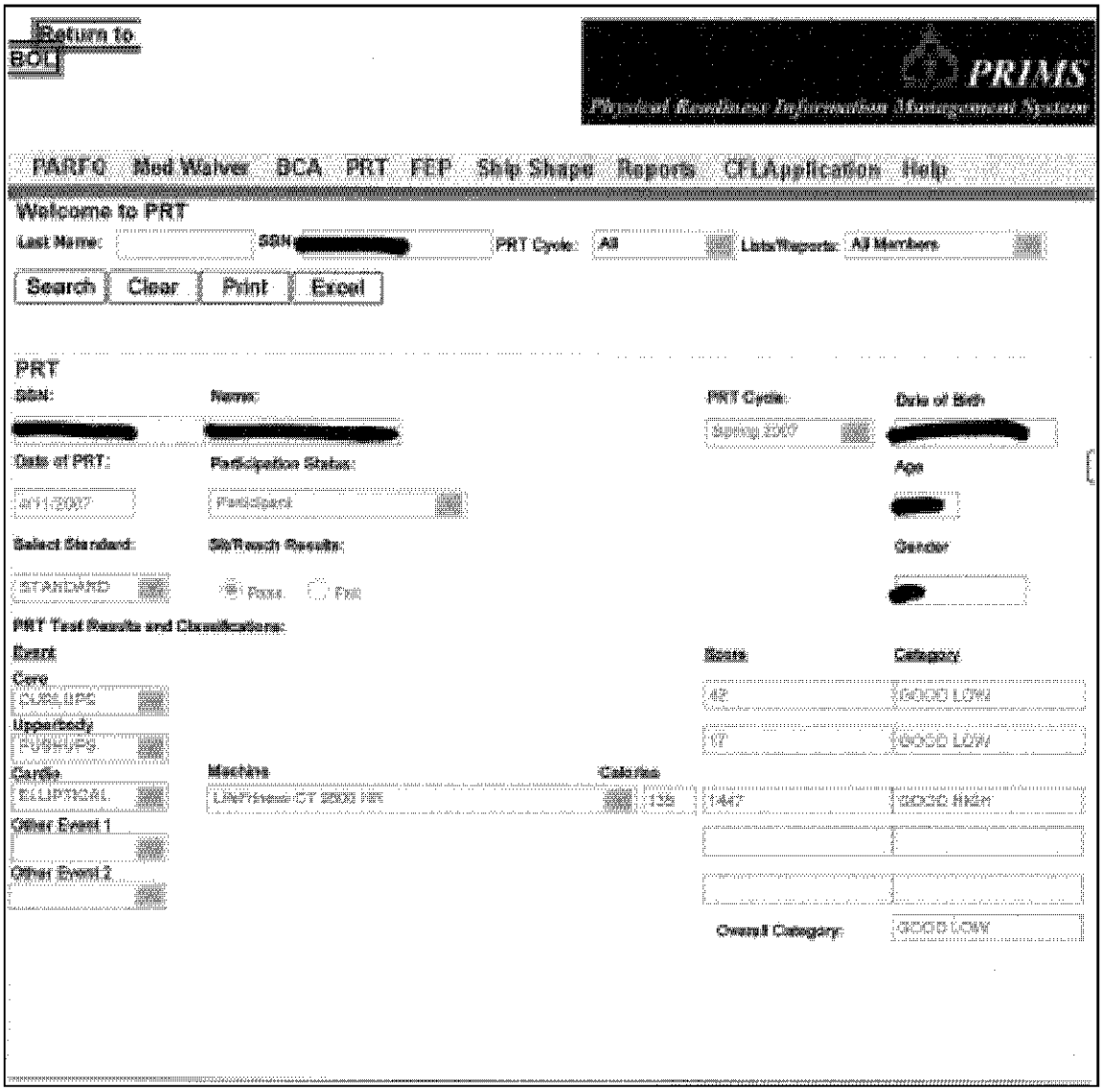
_____spouse or partner [LO69A]
_____family members or relatives [LO69B]
_____friends [LO69C]
_____work or school associates [LO69D]
_____neighbors [LO69E]
_____health care providers [LO69F]
_____counselor or therapist [LO69G]
_____minister/priest/rabbi [LO69H]
_____other (specify) _____ [LO69I]

[LO69NO]

9b. Overall, how much of your support was provided by these people who are no longer available to you? [LO69AVT]

_____ 0. none at all
_____ 1. a little
_____ 2. a moderate amount
_____ 3. quite a bit
_____ 4. a great deal

Appendix H


Return to BOL
PRIMS
Physical Readiness Information Management System
PARFQ Med Waiver BCA PRT FEP Ship Shape Reports CFLApplication Help
Welcome to PRT
Last Name:
SSN:
PRT Cycle:
All
Lists/Reports:
All Members
Search
Clear
Print
Excel
PRT
SSN:
Name:
PRT Cycle:
Spring 2007
Date of Birth:
Date of PRT:
4/11/2007
Participation Status:
Participant
Age:
Select Standard:
STANDARD
Skillreach Results:
Pass
Fail
Gender:
PRT Test Results and Classifications:
Event
Score
Category
Core
CURLUPS
42
GOOD LOW
Upperbody
PUSHUPS
17
GOOD LOW
Cardio
RUN2MILE
Machine
Calories
1447
GOOD HIGH
Other Event 1
Other Event 2
Overall Category:
GOOD LOW

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