

The Pennsylvania State University
The Graduate School
College of Health and Human Development

EMOTIONS IN CHRONIC ILLNESS: THE GOOD, THE BAD, AND THE BALANCED

A Dissertation in
Human Development and Family Studies

by
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Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

August 2014

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ABSTRACT

Previous literature has documented the benefits of positive affect and the detriments associated with negative affect but the two literatures have been largely separate from one another. However, to fully understand the affective experience of individuals it is important to consider both positive and negative affect and the connection between the two. Therefore, the three papers of this dissertation sought to examine the affective experience of chronic illness patients and their family members through an investigation of the good (positive affect), the bad (negative affect) and the balanced (relationship between positive and negative affect).

Study 1 assessed emotion transmission in 145 individuals with osteoarthritis and their spouses. Emotion transmission is evident when emotions in an individual's daily experience lead to subsequent and similar emotions in another individual. The current study assessed negative emotion transmission between morning and end of day assessments and positive emotion transmission between morning and afternoon assessments and also between afternoon and end of day assessments. The negative emotion transmission paths (i.e., negative affect predicting negative affect or positive affect) revealed that patient beginning of day affect predicted spouse end of day negative affect but was moderated by both gender and marital satisfaction. Therefore, evidence of transmission is primarily seen in female spouses in marriages with lower satisfaction. Additionally, patient beginning of day negative affect also predicted spouse end of day positive affect but was again moderated by marital satisfaction. In the current investigation, there was no evidence of positive affect transmission.

Study 2 assessed the direct relationship between positive and negative affect in a different configuration by calculating affect balance (relative levels of negative affect and positive affect) in 59 prostate cancer patients and their spouses. The current analyses considered balance in the number of items endorsed but also in intensity of affect experienced. The study also sought to understand the association between perceived stress and daily affect balance, which provides an additional dimension to understanding how individuals navigate the chronic illness experience on a daily basis. Findings demonstrate that affect balance in the number of items endorsed and affect balance in the intensity of affect was associated with perceived stress severity for both patients and spouses. However, the change in balance was not only due to a change in negative affect. Patients' balance was altered both by stress related increases in negative affect and decreases in positive affect. Spouses' balance was altered only through changes in negative affect. Additionally, perception that the stressor was due to prostate cancer was associated with affect balance count and intensity for patients.

Finally, Study 3 investigates affect balance in 173 dementia caregivers and assesses changes in affect balance brought on by stressor context and the impact of an intervention that provides respite care. Findings demonstrate that exposure to care related and non-care related stressors predicted affect balance count and stress reactivity to care related and non-care related stressors predicted affect balance intensity. Additionally, affect balance intensity was directly predicted by ADS use above and beyond the impact of stressors. Findings also reveal that there seems to be an accumulation in the benefits of ADS use because negative affect intensity was lowest when both yesterday and today were ADS days.

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ACKNOWLEDGEMENTS

First, I would like to dedicate this dissertation to my Mom whose journey with ovarian cancer inspired me to take a deeper look at the experiences of chronic illness patients and their family members.

To my dissertation committee: Thank you for being a part of my academic journey. My time at Penn State would not be the same without each of you. All the feedback you provided along the way helped me to grow as a researcher, scientist and writer. Steve, Lynn and Cindy: Thank you for allowing me to use your data to explore research questions that are meaningful to me.

To my cohort: I am fairly confident that we were the loud and annoying cohort when we arrived at Penn State and we probably still are, but I could not have predicted what a wonderful group of friends y'all would be. I am not sure where I would be without your constant encouragement, support and a lot of shared laughter.

To my friends: I am immensely grateful for all of your support whether you are in State College with me or elsewhere. It is a blessing to have so many people to rally behind you in difficult times and celebrate with you in the good times.

Finally, to my Dad and sister: Thank you for always listening to me ramble on about my graduate school issues and successes and encouraging me along the way. And perhaps most important, thank you for believing I could achieve this goal especially in the moments when I did not believe I could.

CHAPTER 1: INTRODUCTION

1.1 Chronic Illness and Families

A chronic illness diagnosis profoundly impacts an individual physically, psychologically and emotionally. For example, it has been noted that cancer patients may experience fear (Gotay, 1984), hopelessness (Northouse, Laten & Reddy, 1995), anxiety (Segrin, Badger, Dorros, Meek & Lopez, 2007), and depression (Segrin, Badger, Meek, Lopez, Bonham & Sieger, 2005).

However, a chronic illness diagnosis can also greatly impact the family members of the patient. Providing care for a family member has been associated with inadequate rest, inadequate exercise, missing doctor's appointments, forgetting to take medications and the inability to slow down when it is needed (Burton, Newsom, Schulz, Hirsch & German, 1997). Zarit, Stephens, Townsend and Greene (1998) also noted that caregivers may experience a range of emotional distress such as role captivity, overload, worry and strain, anger and anxiety. Additionally, Bigatti and Cronan (2002) note that illness negatively impacts the spouse's physical and mental health even when they are not providing care.

The recognition that chronic illness impacts individuals receiving the diagnosis as well as family members is broadly grounded in family systems theory. Systems theory, originating from Ludwig Von Bertalanffy's (1947) general systems theory, is the proposition that individuals within a system are interrelated and therefore, influence one another. As applied to families, systems theory asserts that families function as an interdependent system and therefore, members are likely to exert mutual influence over one another. Additionally, Larson and Almeida (1999) discuss that on a daily basis family members interact within and outside of the system, and the accumulation of these interactions results in the family members being influenced by and influencing others.

Although family systems theory accounts for influence among family members due to interactions inside and outside of the family, dyadic level theories are also important for further explaining the cyclical processes between a chronic illness patient and another family member, and how these processes might vary within and between families. At the broadest level, Kenny's (1996) models of dyadic interdependence explains how individuals in a dyad are influenced by one another. For example, one form of non-independence that may explain the reciprocal influence seen in dyads is common fate, which is the notion that individuals in a dyad may be similar because they have been exposed to the same factor (Kenny, 1996). The notion of common fate may be especially important in understanding the experience of chronic illness patients and their spouses because they have been exposed to the same broad context of chronic illness.

Additionally, Berg and Upchurch's developmental contextual model assesses coping, appraisal, and adjustment to chronic illness in a way that has not often been done; through a dyadic perspective. The dyadic coping literature has typically considered dyadic coping through a lens of congruence or through the patient's perception of their spouse. Through a congruence framework, the interaction between the dyad members is strictly statistical and assesses whether the individual reports of coping agree (Berg & Upchurch, 2007) which provides information about the dyad but is still largely individualistic. Instead of utilizing one individual's report of themselves and their partner, Berg and Upchurch's model provides a heuristic for considering the reports of both patients and spouses at each point of the chronic illness experience (i.e., appraisal, coping and adjustment).

Another set of dyadic theories that explain potential influence between a chronic illness patient and a family member are the emotion transmission theories. Larson and Almeida (1999)

note that emotion transmission occurs when emotions in one individual's daily experience has a predictive relationship to subsequent emotions in another person. One specific theory that could be categorized under the overarching category of emotion transmission theories is the theory of emotional contagion (Hatfield, Cacioppo and Rapson, 1994). Hatfield and colleagues (1994) define emotional contagion as an individual's tendency to catch the emotional state of another person that they are in contact with.

Finally, Raschick and Ingersoll-Dayton (2004) discuss social exchange theory as the notion that within dyads the behaviors of each individual influences the psychological costs and rewards of the other individual. Social exchange theory is particularly informative in understanding the chronic illness experience when a family member is providing care to the diagnosed individual. Social exchange theory asserts that caregiving involves a mutual exchange between the caregiver and the care recipient, such that the behavior of the care recipient influences whether the caregiver experiences costs or rewards and whether the caregiver experiences costs and rewards influences the care they provide to the care recipient, which suggests that the experiences of each individual impacts the experiences of the other.

1.2 Affect

1.2.1 Negative Affect

The association between negative affect and detriments in health and well-being has been extensively noted through research. Watson (1988) found that between person differences in negative affect was associated with perceived stress and physical complaints and within person differences in negative affect was also associated with perceived stress. Cohen and colleagues (1993) found that independent of health behaviors such as smoking or alcohol consumption, negative affect was positively associated with developing a cold. Furthermore, Brown and

Moskowitz (1997) had participants rate their mood and physical symptoms after social interactions for 20 consecutive days and found that there was an association between level of negative affect and physical symptoms reported. Additionally, Billings, Folkman, Acree and Moskowitz (2000) reported that in HIV caregivers, cognitive avoidance predicted negative affect which was associated with higher levels of physical symptoms reported.

Models of emotion and health assert that emotion is linked to health both directly and indirectly through cognition and behavior. Psychophysiological models state that emotion is linked to health because one function of emotions is to regulate resources in the body (Mayne, 1999). For example, emotions such as fear or anger will activate the sympathetic adrenal medulla because they require effortful control and action whereas other emotions characterized by distress activate the pituitary adrenal cortex to conserve energy (Lundberg & Frankenhaeuser, 1980). In the short term, it is adaptive for emotions to mobilize energy and resources but it is also adaptive for the response to end once the threat has passed (Mayne, 1999). Lazarus (1991) notes that these direct and specific paths can lead to illness when their activation is marked and prolonged.

Additionally, negative emotions may be linked to health through indirect paths. The psychosocial vulnerability model asserts that emotions can produce a stressful environment by perceiving actions of others as emotion congruent, such that the individual views events in a manner that matches their current state which further intensifies the emotional experience (Smith, 1992; Mayne, 1999). Lazarus (1991) also writes that emotions can impact health through faulty appraisals and coping. Depue, Monroe and Schachman (1979) note that appraisals (and coping) impact health because the appraisal of a situation influences the intensity and duration of the psychological threat and activation of physiological systems.

1.2.2 Positive Affect

Another mainly separate literature has discussed the benefits individuals experience when they are able to positively appraise situations and report positive emotions. A review by Pressman and Cohen (2005) found consistent patterns in associations between positive affect and health. Specifically, trait positive affect was associated with increased longevity and lower morbidity and both state and trait positive affect was associated with decreased physical symptoms and pain (Pressman & Cohen, 2005). Additionally, positive affect is associated with lower levels of cortisol independent of the association between negative affect and cortisol (Steptoe, Wardle & Marmot, 2005). In terms of non-health related outcomes, positive affect is also associated with psychological growth following a time of crisis (Fredrickson et al, 2003). Although literature has demonstrated the beneficial effects of positive affect, the mechanisms through which positive affect has an effect are less clear. However, theories have attempted to explain this process.

The broaden and build model (Fredrickson, 1998) proposes that positive emotions broaden an individual's attentional focus by allowing them to not be focused solely on the current stressor which in turn builds personal resources that can be utilized in future stressful situations. For example, Isen and colleagues have found that compared to neutral individuals, individuals experiencing more positive affect were able to develop more creative solutions to a problem solving task (Isen, Daubman and Nowicki, 1987).

Additionally, positive emotions might be beneficial through a process of positive reappraisals and through infusing ordinary events with positive meaning. Folkman and Moskowitz (2000a) define positive reappraisal as a cognitive strategy that allows an individual to view a situation from a more positive perspective which may improve psychological well-being

and similarly, infusing ordinary events with positive meaning as simply taking the time to notice positive aspects of everyday events (Folkman and Moskowitz, 2000a and 2000b). Both of these mechanisms are related to the meaning an individual attaches to a stressor. Folkman and Moskowitz (2000a) note that appraised or situational meaning helps to determine the emotions that an individual will experience after a stressor. Additionally, Almeida (2005) includes subjective appraisal as a component of the daily stress process and notes that how a stressor is appraised may influence how much distress it will cause. Therefore, if an individual is able to reappraise stressors related to chronic illness more positively, then they may experience less distress and more positive emotions.

A third potential mechanism is that positive emotions may have their effect by undoing the effects of negative emotions and experiences. In a laboratory study to test the undoing effect, Fredrickson and Levenson (1998) had all participants watch a short film that would induce negative emotions and then the participants were divided into groups where they would either see another negative film, a neutral film or a positive film. The individuals who saw the positive film returned to their baseline cardiovascular functioning in 20 seconds compared to 40 and 60 seconds in individuals who viewed the neutral or sad films, which suggests that positive emotions helped to reduce the effect of negative emotions. Very closely related to the notion of undoing the effects of negative emotions is the idea of the stress buffering hypothesis. The basic idea of a buffering effect is that personal or social resources will cushion or decrease the impact that a stressor would have on an outcome (Pearlin, Mullan, Semple, Skaff, 1990; Schumacher, Stewart, Archbold, 2007).

Although research and theory suggests that positive emotions are beneficial and negative emotions tend to be negative, we cannot fully understand the benefits and impacts of either affect valence without considering the connection between positive and negative emotions.

1.3 Considering Positive and Negative Affect Together

Much of the literature considers positive and negative affect separately, perhaps because one view often held is that the presence of one indicates the absence of another thereby considering one indirectly tells you about the other. However, much literature suggests that the affect valences are independent and therefore, both can be experienced (Cacioppo & Berntson, 1994; Bradburn and Caplovitz, 1965; Diener, Larson, Levin & Emmons, 1985; Watson & Clark, 1992; Watson, Clark & Tellegen, 1984; Zevon & Tellegen, 1982). Zautra, Potter and Reich (1997) note that even though many individuals assume that positive and negative emotions are opposites and so an unhappy person is also sad, the reality is that most of the time positive and negative affect are independent of one another. Therefore, without considering both positive and negative affect together, we do not truly have a holistic perspective of an individual or their situation. For example, as noted above, research has clearly outlined the benefits of experiencing positive affect and detriments of experiencing negative affect but very little assesses the trajectories of individuals who experience both in high levels or both in low levels or those who experience an apparent balance of the two affect valences. If an individual experiences low levels of negative affect then it would be expected that they were fare well in terms of well-being and health. However, it is not clear if their outcomes would be the same if they were also low on positive affect. In a similar vein, someone experiencing positive affect should also fare well in terms of well-being and health but will those benefits still hold if they also experience high levels

of negative affect. Thus, only considering one affect valence misses the potential effects of the other affect valence.

As mentioned above, although the literature is not extensive, select studies do consider the relationship between positive and negative affect. For example, Cohen and colleagues (2002) found that positive experiences were associated with lower depression scores, lower caregiver burden scores and better self-assessed health. Lopez, Lopez-Arrieta and Crespo (2005) also found that caregivers who reported more satisfaction in their caregiving role also reported lower levels of subjective burden. The balance of positive and negative experiences and their relationship with quality of life outcomes suggests a need to further, and more, consistently, consider positive and negative experiences and emotions jointly. The three papers of this dissertation seek to fill this need by considering a direct connection between positive and negative affect at the daily level in three different chronic illness populations.

1.4 Dissertation Studies

The three papers of this dissertation seek to examine the relationship between positive and negative emotions in individuals impacted by chronic illness. Study 1 examines the affective experience of individuals with osteoarthritis and their spouses. Specifically, the paper will consider emotion transmission, which is when the emotions of one individual show a predictive relationship to subsequent emotions in another individual (Larson & Almeida, 1999) at the within day level. Most research only considers negative transmission but the proposed study will consider transmission of both positive and negative emotions. Research has shown that both positive and negative emotions are reported during stressful times and therefore, it is plausible that both valences of affect would also be transmitted. Additionally, studies often fail to detect

the presence of emotion transmission which may be because the time scale of looking across days is too long for this particular transmission process.

Study 2 assesses the relationship between positive and negative emotions in a different configuration by calculating affect balance in prostate cancer patients and their spouses. Affect balance is the relative levels of positive and negative affect (Hassett et al, 2008) which provides an illustration of the connection between the two valences. The proposed study will also consider the manner in which daily stressors are associated with an individual's affect balance. Specifically, appraisal of stress severity and appraisal of whether the stressor is due to prostate cancer will be assessed. Understanding affect balance in various stress contexts, helps to illuminate nature of daily affective experiences of individuals navigating the chronic illness experience.

Finally, Study 3 investigates affect balance and changes in affect balance following an intervention that provides respite for individuals providing informal care to a relative with dementia. Dementia caregiving has been called the prototypic stressor (Vitaliano, Young & Zhang, 2004) and respite from care related tasks has been shown to be beneficial for caregivers in multiple domains (Zarit, Stephens, Townsend and Greene, 1998; Wimo et al, 1990; Gaugler et al, 2003). Therefore, we would also expect that this respite intervention would impact the relative levels of positive and negative affect experienced by the caregivers, above and beyond the impact that stressors would have on affect balance.

1.5 Dissertation Themes

The main theme connecting the three dissertation papers is a consideration of both positive and negative affect and the relationship between the two affect valences. As noted

above, to further advance our understanding of individuals' affective experiences we need to consider the association between positive and negative affect instead of continuing to assess them separately. Paper 1 considers the association of positive and negative affect indirectly by considering transmission of both affect valences within the same day but also directly by considering cross-domain emotion transmission. Papers 2 and 3 also take a direct approach to considering positive and negative affect by assessing affect balance and by considering what aspects of the stressor context are associated with affect balance on a daily level.

Additionally, the three papers take a contextual approach to understanding the affective experience of individuals who have been impacted by a chronic illness. Chronic illness is one broad context that clearly impacts families once a diagnosis has been received but there are additional micro level contextual factors that should also be considered. Papers 1 considers the social context, specifically the marital context, by taking a direct dyadic approach to considering how the affective experience of one individual is influenced by their partner's affective experience. Papers 2 and 3 consider the environmental context of stressors by directly considering how stressors or stressor reduction is associated with affect balance.

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CHAPTER 2. STUDY 1

Emotion Transmission in Osteoarthritis Patients and their Spouses

2.1 Introduction

2.1.1 Emotion Transmission

According to Larson and Almeida (1999), emotion transmission occurs when emotions experienced in an individual's immediate daily experience lead to subsequent and similar, although not necessarily the same, emotions in another person. Emotion transmission is especially likely among spouses because of the interdependence of the marital relationship and the shared experience of stressors and rewards. Berg and Upchurch (2007) suggest that following a chronic illness diagnosis, the patient and the spouse jointly utilize their coping resources to re-establish homeostasis and often appraise stressors as shared. It is in part through these shared experiences that emotion transmission occurs.

2.1.2 Models of Emotion Transmission

Numerous models have been proposed to test for the existence of emotion transmission. One model that is often utilized to explain emotion transmission is the concurrent model which proposes that an emotion is being transmitted in an established path from sender to receiver (Larson & Almeida, 1999). Although an association between individuals' emotions in the concurrent model would suggest an interplay of emotions between family members, one cannot definitively conclude the presence of transmission because transmission might be confounded with other processes when both individuals' reports occur at the same time point. The prospective change model is the strongest test of emotion transmission because it includes a time lag function which increases predictive power. The prospective change model considers whether the sender's emotion at one time point predicts the receiver's emotion at a second time point, when the receiver's previous emotion is controlled (Larson & Almeida, 1999).

2.1.3 Theoretical Frameworks for Emotion Transmission

Three theories have been described as underlying frameworks for the phenomenon of emotion transmission: systems theory, emotional contagion theory, and the interactional theory of depression.

Systems theory, originating from Ludwig Von Bertalanffy's (1947) general systems theory, is the general proposition that individuals within a system are interrelated and therefore, influence one another. As applied to families, systems theory asserts that families function as a unit and the interdependence of the family members result in individuals mutually influencing one another. Influence is likely between members of the system and Cox and Paley (1997) note that this influence is continuous and reciprocal because of the interdependence of the individuals. Additionally, Larson and Almeida (1999) discuss that on a daily basis family members interact within and outside of the system, and the accumulation of these interactions results in each family member influencing and being influenced by other family members. The hierarchy inherent in family systems would also suggest that not all families or family members influence each other similarly. Emotion transmission paths are thought to be moderated by stable characteristics of the individual, dyad or family (i.e., marital quality) or dynamic characteristics that are only present on certain days (i.e., a particular stressor; Larson & Almeida, 1999).

Dyad level theories such as emotional contagion theory are important for understanding the underlying cyclical processes between a chronic illness patient and one other family member that may result in emotion transmission. Hatfield and colleagues (Hatfield, Cacioppo and Rapson, 1994) define emotional contagion as an individual's tendency to "catch" the emotional state of another person with whom they are in contact. A number of potential mechanisms have been proposed to explain the processes through which emotional contagion occurs. One

proposed mechanism is cognitive reasoning through which individuals are able to know and feel what others around them are feeling (Hatfield et al, 1994). Similar to these cognitive processes, emotional contagion may occur when individuals draw inferences about their emotional state based on their awareness of another person's emotional state (Hatfield et al, 1994).

An additional dyadic level theory that provides an explanation for emotion transmission is the interactional theory of depression (Coyne, 1976). The interactional theory of depression posits that when individuals are depressed, their mood is aversive to others and may lead to some degree of social rejection. This social rejection further induces negative affect in both individuals. In some instances of emotion transmission, the transmitted emotion may “transform” into another received emotion, indicating that there is not always a simple correspondence between the transmitted and received emotions (Larson & Almeida, 1999). Coyne's interactional theory of depression is an example of an emotion transforming between transmission and reception, specifically, depression is being transmitted and results in other types of negative affect (e.g., annoyance).

2.1.4 Negative Emotion Transmission

Negative emotion transmission exists when a negative emotion in one individual is associated with greater negative emotion, or with decreased positive emotion, in their partner. For example, Thompson and Bolger (1999) found that for individuals preparing for the bar exam, the examinee's depressed mood predicted the partner's feelings about the relationship, which further predicted the partner's depression and anxiety. Larson and Almeida (1999) noted that chronic distress increases the probability that negative emotions will be transmitted and therefore, in a chronic stress situation such as chronic illness, it is expected that negative emotions will be transmitted often.

Many studies have demonstrated instances where emotions of two individuals are linked and suggest emotion transmission but the direction of influence is not clear because the reports were collected concomitantly. In a study with cancer patients and their spouses, Fang, Manne and Pape (2001) found that at each of 3 time points, there was a direct path between concurrent reports of cancer patient psychological distress and spouse psychological distress, suggesting that patients are transmitting distress to their spouse. Segrin and colleagues (2005) found that patients' negative affect was associated with partners' depression at the same time point. Additionally, Berg, Wiebe and Butner (2011) found evidence of negative affect co-variation in prostate cancer patients and their wives, on days when they reported similar daily stressors. Although there is co-variation between emotions, a specific path could not be determined because the data were not analyzed in a lagged fashion. Similarly, Segrin et al (2007) found an association between patient anxiety and spouse anxiety and Yorgason and colleagues (2006) also reported an association between husband and wife negative mood, but in both studies the direction of influence was not clear.

Transmission can also exist across domains or affect valences and occasionally evidence has been found for negative emotions leading to reduced positive emotions in the partner. Thompson and Bolger (1999) found that for individuals preparing for the bar exam, the examinee's depressed mood predicted the partner's feelings about the relationship, which also predicted levels of contentment and exhilaration. Although not a strong example of emotion transmission, Thompson and Bolger's findings suggest that one individual's negative emotions can impact another individual's positive emotions.

While numerous studies have suggested the occurrence of emotion transmission, transmission can only be accurately explored in longitudinal studies. In a longitudinal study of

female osteoarthritis patients and their caregiving husbands, Druley and colleagues (2003) found that patients' levels of depressive symptoms predicted increases in husbands' anger six months later. Additionally, patients' anger predicted husbands' increased anger six months later.

Although longitudinal studies are necessary to adequately assess emotion transmission, a six month period may suggest a process more complex than transmission, where a series of events are occurring between the data collection points which eventually leads to the subsequent emotion. Findings such as these underscore the need for a shorter time frame to adequately and accurately assess emotion transmission.

2.1.5 Positive Emotion Transmission

Although chronic illness is most often associated with negative emotions, positive emotions also are present (e.g., Folkman, Moskowitz, Ozer & Park, 1997). Transmission of positive emotions, however, is less often examined and seldom found. For example, Segrin et al (2005) indicated that the partner's positive affect was associated with fewer depressive symptoms in breast cancer patients and Butner, Diamond and Hicks (2007) found significant covariation between partners' positive affect. Conversely, Berg, Weibe and Butner (2011) and Saxbe and Repetti (2010) did not find evidence of an association between partners' positive moods. The mixed results related to positive affect covariation or transmission may be the result of using a time scale that is too long for positive affect because the experience of positive affect may not long lasting during times of prolonged stress. Therefore, the potential transmission of positive affect may not last across days, which has been the time scale most often used. In order to detect transmission of positive emotions, studies may need to consider a shorter time scale than what has previously been assessed. A more fitting approach to assess positive emotion

transmission would be to consider paths from positive affect to increased positive affect and decreased negative affect through shorter time scales within a day.

2.1.6 Moderators of Negative Emotion Transmission

Although the presence of negative transmission has been documented in the literature it is not expected that all couples would experience transmission similarly. It was expected that both gender and marital satisfaction would moderate transmission paths. Previous findings suggest that the flow of emotions more often runs from husbands to wives (Notarius & Johnson, 1982; Roberts & Krokoff, 1990). The direction of influence from husbands to wives would be expected because wives make a deliberate effort to be empathic toward their husbands (Almeida & Kessler, 1998; Doherty, Orimoto, Singelis, Hatfield & Hebb, 1995). Additionally, women tend to be more focused on their relationship and tend to demonstrate more interdependence in their self construal (Kiecolt-Glaser & Newton, 2001; Cross & Madson, 1997). Therefore, the research suggests that emotion transmission paths from patients to spouses will be stronger for female spouses.

Larson and Almeida (1999) also note that stable characteristics of the family, such as marital quality, can moderate transmission. Rook, Dooley and Catalano (1991) also noted that it is unlikely that all families are equally vulnerable to transmission. Berscheid (1983) hypothesized that spouses in close marriages were more likely to be impacted by the “emotional reverberations” from events experienced by their partner. It is expected that transmission would be stronger in marriages with higher satisfaction for multiple reasons. First, one necessary component of being impacted by another person’s emotions is to be aware of that person’s emotions and individuals in higher satisfaction marriages may be more in tune with and aware of their partner’s emotions. Additionally, individuals in high satisfaction marriages may also

experience similar emotions to their partner through being sympathetic to their partner's experiences. For example, if the patient is frustrated by what happened at a recent doctor's appointment, the spouse may become frustrated on their behalf. Therefore, it is expected that emotion transmission will be stronger in marriages where the spouse has reported higher satisfaction.

The two moderation hypotheses suggest that combining the moderators in a three way interaction between patient affect, spouse gender and marital satisfaction might provide a more complete picture of the transmission process. Specifically, transmission may be stronger for female spouses in high satisfaction marriages. In contrast, additional work should be done in the area of positive emotion transmission before considering moderators of that process.

2.1.7 Osteoarthritis and Emotion Transmission

Approximately 27 million individuals have been diagnosed with osteoarthritis (OA; American College of Rheumatology, 2012), which is characterized by the degeneration of joint cartilage and results in pain and stiffness of the joints (Centers for Disease Control and Prevention, 2011). Additionally, OA causes physical and social limitations and is the leading cause of disability in older adults (American College of Rheumatology, 2012). The patient's daily experience of pain and/or disability might impact transmission processes by providing an external explanation for their emotions. Downey, Purdie and Schaffer-Neitz (1999) considered if the anger transmission process between mothers and children was different for "typical" mothers and mothers with Reflex Sympathetic Dystrophy Syndrome (RSDS) in which mothers' pain may provide a clear and non-interpersonal explanation for their anger. The authors speculated that chronic distress such as the mothers' pain could result in accentuation or containment of the transmission process. Findings supported the distress containment model such that mothers with

RSDS reported higher levels of anger than the control mothers, but transmission was contained because the mothers were less likely to let their anger result in negative behaviors and kids of mothers with RSDS were also less reactive to mothers' anger.

Additional research has indicated that individuals use their mood to evaluate the behavior of others unless they are reminded of the source of their mood (Cervone, 1994; Schwartz & Clore, 1983); however, if they are reminded they can correct both their mood and evaluation of the other person. The mothers and children in the RSDS group of the Downey study seemed to have re-evaluated their reactions based on the context of the mothers' anger. Therefore, emotion transmission from osteoarthritis patients to their spouses might be weaker if negative affect is attributed to the daily arthritis experience.

2.1.8 Current Study

The current study attempts to understand the potential transmission of both positive and negative emotions from osteoarthritis patients to their spouses. Although millions of individuals have been diagnosed with OA, the individual living with OA is not the only person affected by the illness. As noted earlier, spouses are especially likely to be impacted by their partner's illness (eg. Bigatti & Cronan, 2002) and considering transmission of both positive and negative emotions will illuminate one way that individuals influence one another. Although emotion and affect are often used synonymously, they are not necessarily the same. Charles (2010) defines emotion as an adaptive experience that elicits experiential, behavioral, cognitive and physiological responses but considers affect to be an individual's report of their subjective state. Additionally, Davidson (1994) asserts that the important difference between emotion and mood is the nature of the antecedent events, where emotions are the results of a precipitating event that occurs quickly and without warning whereas moods/affect may accumulate over time. The data

for the current study does not include information on the responses to possible emotions or the precipitating events, and therefore, the current study will use affect as a marker for emotions and emotion transmission.

The data for the current study were collected on 22 consecutive days where osteoarthritis patients and spouses reported on their positive and negative affect three times daily. A strength of the current study is that the multiple data points per day makes it possible to utilize the prospective change model to test for within-day emotion transmission from OA patients to their spouses.

2.1.9 Hypotheses

The hypotheses for the current study were as follows:

H₁: It was expected that negative affect would be transmitted from patients to spouses within the day (beginning of day to end of day) and result in increased negative affect.

H₂: It was expected that negative affect would be transmitted from patients to spouses within the day (beginning of day to end of day) and result in decreased positive affect.

H₃: It was expected that negative transmission paths would be moderated by gender such that transmission would be stronger for female spouses.

H₄: It was expected that negative transmission paths would be moderated by marital satisfaction such that transmission would be stronger for spouses with high marital satisfaction.

H₅: It was expected that positive affect would be transmitted from patient to spouse and result in increased positive affect. Positive affect transmission was assessed across two time lags within the day, beginning of day to afternoon and afternoon to end of day.

H₆: It was expected that positive affect would be transmitted from patient to spouse and result in decreased negative affect. Again, positive affect transmission was considered from beginning of day to afternoon and afternoon to end of day.

2.2 Method

2.2.1 Study Design

Data for the current study were drawn from a larger study of knee osteoarthritis patients and spouses that combined in-person interviews with a daily diary component. The in-person interviews were conducted over an 18 month period (i.e., T1, T2 at 6 month follow up and T3 at 18 month follow up) with the 22 day daily assessment immediately following the T1 interview. To complete the daily assessment protocol, patients and spouses used a hand held computer to answer questions related to health and affect three times a day (ie, beginning of day, afternoon and end of day). Additionally, participants reported on marital interactions and patient pain levels as part of the end of day assessment. The current study utilized data from the T1 interview and all three daily assessment points (ie, beginning of day, afternoon, and end of day).

2.2.2 Participants

To be eligible for participation in the study, patients had to have received a knee osteoarthritis diagnosis from a physician, experience usual knee pain of moderate or greater intensity, be at least 50 years of age and be married or in a long term relationship (self-defined) in which they shared a residence with their partner. Exclusion criteria included having a comorbid diagnosis of fibromyalgia or rheumatoid arthritis, use of a wheelchair, and a plan to have hip or knee surgery in the next six months. Additionally, couples were excluded from participation if the spouse reported arthritis pain of moderate or greater intensity, required use of

a wheelchair or required assistance with personal care activities. Both partners also had to be cognitively intact which was determined by the accuracy of their answers to questions about the current date, day of the week, their age and birth date. Finally, both partners had to be free of any major hearing, speech or language problems that would interfere with their ability to comprehend and complete the data collection conducted in English.

Primary sources of recruitment were research registries for rheumatology clinic patients and older adults interested in research in the Pittsburgh area, flyers distributed to University of Pittsburgh faculty and staff and word of mouth. A total of 606 couples were screened for eligibility. Of these 606 couples, 221 couples declined participation with the most frequently cited reasons being lack of interest (N=87) and illness or death in the family (N=55). Another 233 couples were not eligible for participation and the most frequent reasons were lack of knee osteoarthritis (N=55) and knee OA pain that was mild (N=47). The total enrolled sample consists of 152 couples (ie, 304 individuals). A total of 145 couples completed the daily assessment and are included in the analytic sample for the proposed study. Demographic information is presented in Table 1.

2.2.3 Data Collection Procedures

Trained staff interviewed the patients and spouses separately at home. Following the T1 in-person interview, participants were trained to use the hand held computer (the Palm TX) as well as shown the format and sample content of the daily diary questions. The hand held computer and questionnaires were designed for easy use for older adults and individuals with minimal computer experience. Patients and spouses were provided with their own hand held computer and it was emphasized that it was important for all questionnaires to be completed independently. Surveys were intended to be in the general time frames of morning, afternoon and

evening but specifically participants were asked to complete assessments: 1) within 60 minutes of rising in the morning (ie, beginning of the day), 2) between 2:00 and 4:00 pm (ie, afternoon) and 3) upon retiring at night (ie, end of day). Assessments were dropped from the final analyses if the participant was considered to be non-compliant because they completed the assessments outside the time frame requested.

2.2.4 Measures

Negative Affect: Negative affect was assessed at the beginning of day, afternoon and end of day and referenced the prior 30 minutes (Thomas & Diener, 1990). For example, patients and spouses answered “to what extent have you felt [unhappy] over the past 30 minutes?” Negative affect was measured with five items assessing whether the participant felt depressed or blue, frustrated, angry or hostile, unhappy and worried or anxious. Participants reported their emotional experiences on a numerical rating scale where 0 = not at all and 6 = extremely. The total score for the scale was a sum score. Means and standard deviations for each time point are presented in Table 2.

Positive Affect: Positive affect was assessed at the beginning of day, afternoon and end of day and referenced the prior 30 minutes (Thomas & Diener, 1990). For example, patients and spouses answered “to what extent have you felt [happy] over the past 30 minutes?” Positive affect was measured with four items assessing whether the participant felt happy, joyful, pleased and enjoyment. The scale included a slight adaptation from the Thomas and Diener measure by deleting fun from the enjoyment/fun pairing. Like negative affect, participants rated their emotional experiences on a numerical rating scale where 0 = not at all and 6 = extremely. The total score for the scale was a sum score. Means and standard deviations for each time point are presented in Table 2.

Covariates: Demographic information collected during the initial in-person interview, specifically spouse race, education, and age, were tested as covariates. In addition to demographic variables, patient level of pain was selected as a covariate for its conceptual relationship to emotion transmission.

Pain : As previously noted, emotion transmission may be impacted when an individual's emotions have a contextual explanation and in the current study, patient's level of pain served as a marker of the daily arthritis experience.

At each of the three daily time points, patients assessed their level of pain and tenderness in various joints in the last 30 minutes. Specifically, patients were asked to report on the pain and tenderness in their shoulders, elbows, wrists, hand knuckles, finger knuckles, hips, knees, ankles, ball of their foot and toe knuckles. The ten items were answered on a 4 numerical rating scale where 0 = none, 1 = mild, 2 = moderate and 3 = severe. The patient's total pain score for each time point was a sum of the 10 items. Patient's report of their pain was included in the final analyses because spouses only provided a report of pain at the end of the day.

Marital satisfaction: At baseline, both patients and spouses reported on various aspects of their relationship with 10 items (Spanier, 1976). For example, participants were asked "how often do you discuss or have you considered divorce, separation, or terminating your relationship", "do you confide in your spouse" and "how often do you and your spouse quarrel." For seven items of this nature, participants used a 6 point numerical rating scale where 1 = all the time, 3 = more often than not and 6 = never. Participants were also asked to rate whether they kiss their spouse on a scale of 0 = never to 4 = every day, the overall degree of happiness in their relationship on a scale of 0 = extremely unhappy to 6 = perfect and to choose the statement that most accurately describes their relationship, ranging from "I want desperately for my

relationship to succeed and would go to almost any length to see that it does” to “My relationship can never succeed and there is no more that I can do to keep the relationship going.” The total marital relationship quality score is a sum of all 10 items. Spouses’ report of marital satisfaction was included in the models because their emotion is the outcome of interest. Marital satisfaction quality was controlled in the positive emotion transmission models.

Gender: To further understand who is most impacted by the patient’s affect, spouse gender was included in the models as a moderator.

2.2.5 Data Analysis Plan

As an initial step, correlations were run to assess the strength of association between patient and spouse reports of daily affect at the same time point to test for evidence of the concurrent model of emotion transmission. Within couple correlations for the concurrent model are presented in Tables 3-5.

To accurately assess the prospective change model of emotion transmission in couples, multi-level modeling was utilized to account for the nested nature of the data (SAS PROC MIXED; Singer & Willett, 2003). Specifically, three level models were used to account for multiple reports nested in days, and days nested in individuals. In the multi-level models, emotion transmission was defined as when the spouse’s affect is predicted by the patient’s affect at a previous time point, controlling for his or her own previous level of affect.

For each dependent variable (ie, spouse negative and positive affect at various time points), a series of models were run. First, an unconditional means model, or empty model, with no predictors was tested to assess within and between person variance in each dependent variable. The estimates from this model were used to calculate the Intraclass Correlation

Coefficient (ICC). The ICC graph for spouse end of day positive affect is shown in Figure 1 and the intraindividual standard deviation of spouse end of day positive affect across days is shown in Figure 2. Additionally, the ICC graph for spouse end of day negative affect is represented in Figure 3 and the intraindividual standard deviation of spouse end of day negative affect across days is shown in Figure 4. Following the unconditional means model, demographic variables and control variables were entered in the model as predictors. Model statistics are presented in Table 6. The demographic variables of education, race and age were included as predictors but were not significant and therefore were not retained in the final models. Daily patient pain was included in the models as a covariate and in order to adhere to the properties of the prospective change model of emotion transmission, spouses' previous level of affect was controlled.

Although the multi-level models were initially conceptualized as 3 level models, the final models with all predictors, covariates and moderators included would not converge because there was not enough variance across the three levels. Therefore, the day level was dropped resulting in the final multi-level models including 2 levels. The final emotion transmission models included patient daily pain and spouses' previous level of affect as covariates, spouse gender and marital quality as moderators and patients' affect as the primary predictor. The equations for hypotheses 1-4 are as follows:

Level 1: Spouse EOD Affect = $\beta_{0j} + \beta_{1j} (\text{patient BOD NA}) + \beta_{2j} (\text{spouse/self BOD NA}) + \beta_{3j} (\text{patient BOD pain}) + e_{ij}$

Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01} (\text{spouse gender}) + \gamma_{02} (\text{spouse marital satisfaction}) + \gamma_{03} (\text{gender} * \text{marital satisfaction}) + \gamma_{054}(\text{day}) + U_{0j}$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{gender}) + \gamma_{12}(\text{marital satisfaction}) + \gamma_{13}(\text{gender} * \text{marital satisfaction}) + U_{1j}$$

$$\beta_{2j} = \gamma_{20} + U_{2j}$$

$$\beta_{3j} = \gamma_{30} + U_{3j}$$

Composite: Spouse EOD affect = $\gamma_{00} + \gamma_{01}(\text{spouse gender}) + \gamma_{02}(\text{spouse marital satisfaction}) + \gamma_{03}(\text{gender} * \text{marital satisfaction}) + \gamma_{04}(\text{day}) + \gamma_{10}(\text{patient BOD NA}) + \gamma_{11}(\text{gender} * \text{patient BOD NA}) + \gamma_{12}(\text{marital satisfaction} * \text{patient BOD NA}) + \gamma_{13}(\text{gender} * \text{marital satisfaction} * \text{patient BOD NA}) + \gamma_{20}(\text{spouse BOD NA}) + \gamma_{30}(\text{patient BOD pain}) + e_{ij} + U_{0j} + U_{1j} + U_{2j} + U_{3j}$

The equations depict that it was expected that the spouse's end of day affect would be a function of the patient's beginning of day affect controlling for previous levels of affect. The interaction terms test whether the emotion transmission paths are moderated by gender and marital satisfaction.

For each dependent variable associated with Hypothesis 5 and 6 (ie, increased positive affect and decreased negative affect), a series of models was run. Again, an unconditional means model was run. The ICC graph for spouse positive affect in the first lag (ie, beginning of day to afternoon) is shown in Figure 5 and the intraindividual standard deviation graph of spouse afternoon positive affect across days is shown in Figure 6. Additionally, the ICC graph for spouse negative affect in the first lag (ie, beginning of day to afternoon) is shown in Figure 7 and the intraindividual standard deviation graph of spouse afternoon negative affect across days is shown in Figure 8. Following the unconditional means model, a model including demographic and other control variables was completed. As with previous hypotheses, the final model

included significant demographic and control variables along with previous levels of positive affect. One difference is that for Hypothesis 5 and 6, there were two sets of final equations: one set for the first lag of the day (beginning of day to afternoon) and one set for the second lag of the day (afternoon to end of day). The equations for the first lag of the day were as follows:

Level 1: Spouse AFT affect = $\beta_{0j} + \beta_{1j} (\text{patient BOD PA}) + \beta_{2j} (\text{spouse/self BOD PA}) + \beta_{3j} (\text{patient BOD pain}) + e_{ij}$

Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01} (\text{day}) + U_{0j}$

$$\beta_{1j} = \gamma_{10} + U_{1j}$$

$$\beta_{2j} = \gamma_{20} + U_{2j}$$

$$\beta_{3j} = \gamma_{30} + U_{3j}$$

Composite: Spouse AFT affect = $\gamma_{00} + \gamma_{01} (\text{day}) + \gamma_{10}(\text{patient BOD PA}) + \gamma_{20}(\text{spouse/self BOD PA}) + \gamma_{30}(\text{patient BOD pain}) + e_{ij} + U_{0j} + U_{1j} + U_{2j} + U_{3j}$

The equations for the second lag were as follows:

Level 1: Spouse EOD affect = $\beta_{0j} + \beta_{1j} (\text{patient AFT PA}) + \beta_{2j} (\text{spouse/self AFT PA}) + \beta_{3j} (\text{patient AFT pain}) + e_{ij}$

Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01} (\text{day}) + U_{0j}$

$$\beta_{1j} = \gamma_{10} + U_{1j}$$

$$\beta_{2j} = \gamma_{20} + U_{2j}$$

$$\beta_{3j} = \gamma_{30} + U_{3j}$$

Composite: Spouse EOD affect = $\gamma_{00} + \gamma_{01}(\text{day}) + \gamma_{10}(\text{patient AFT PA}) + \gamma_{20}(\text{spouse/self AFT PA}) + \gamma_{30}(\text{patient AFT pain}) + e_{ij} + U_{0j} + U_{1j} + U_{2j} + U_{3j}$

As with Hypotheses 1-4, the equations depict that it was expected that spouses' affect at a given time point during the day is a function of patients' previous affect controlling for their previous affect.

2.3 Results

2.3.1 Concurrent Model of Emotion Transmission

Correlations between patient and spouse affect at beginning of day, afternoon and end of day were small but significant and therefore, support the concurrent model of emotion transmission. Patient and spouse positive affect were significantly correlated at each of the three time points (BOD: $r = .142$, $p < .001$; AFT: $r = .168$, $p < .001$ and EOD: $r = .160$, $p < .001$). Additionally, patient and spouse negative affect were significantly correlated at each of the three time points (BOD: $r = .075$, $p < .001$; AFT: $r = .105$, $p < .001$ and EOD: $r = .244$, $p < .001$). Across domains (ie, positive affect associated with negative affect), patient and spouse affect were significantly correlated at each of the three time points (BOD: $r = -.070$, $p < .001$; AFT: $r = -.106$, $p < .001$ and EOD: $r = -.142$, $p < .001$). However, across time points spouses' positive and negative affect were more strongly correlated with their own previous affect and therefore, the prospective change model is necessary to detect emotion transmission with certainty.

2.3.2 Prospective Change Model - Negative Affect Transmission

The negative emotion transmission hypothesis was that the patient's beginning of day negative affect would predict the spouse's end of day negative affect and positive affect. It was not assumed that impacting one valence of affect would automatically alter the other affect

valence. Because there were two moderation hypotheses, the analyses further allowed for a three way interaction between spouse gender, spouse marital satisfaction and patient affect. The three way interaction provides a more complete picture of the relationships between the two moderator variables and patient affect which cannot be derived from two separate two way interactions. It was predicted that evidence of emotion transmission would be most prominent in female spouses who reported high satisfaction marriages. The three way interaction between patient beginning of day negative affect, spouse gender and spouse marital satisfaction was significant in predicting spouse end of day negative affect ($\beta = -.02$, $SE = .0095$, $p < .05$), which indicates that the transmission path was moderated by both gender and marital satisfaction. However, the direction of the moderation hypotheses was only partially supported. Evidence of transmission was seen in female spouses who reported low marital satisfaction but not high marital satisfaction. Additionally, the direction of the spouses' end of day negative affect was not expected. Specifically, on occasions when the patient reported higher beginning of day negative affect, the female spouses in low satisfaction marriages reported less end of day negative affect. The slope for females in low satisfaction marriages is the only slope significantly different from zero ($\beta = -.200$, $SE = .071$, $p < .01$) and therefore driving the interaction effect. Full model statistics are presented in Table 7. Figure 9 depicts the interaction for couples where the spouse reported lower levels of marital satisfaction and Figure 10 show the interaction for couples where the spouse reported higher levels of marital satisfaction.

Additionally, there was evidence of the patient's beginning of day negative affect predicting the spouse's end of day positive affect and the path was moderated by spouse marital satisfaction ($\beta = -.015$, $SE = .006$, $p < .05$). Again, transmission only occurred in marriages where the spouse reported low satisfaction which was contrary to the direction of the moderation

hypothesis. Specifically, on occasions when the patient reported higher beginning of day negative affect, the spouses reported higher end of the day positive affect. The slope for low satisfaction marriages was significantly different from zero ($\beta = .0147$, $SE = .041$, $p < .05$). The gender moderation hypothesis was not supported. Figure 11 shows the graphical depiction of the two way interaction. Full model statistics are presented in Table 7.

2.3.3 Prospective Change Model – Positive Affect Transmission

The positive affect transmission hypothesis was that patient positive affect would predict the spouse's positive affect and negative affect. The first time scale considered was whether the patient's beginning of day positive affect predicted the spouse's afternoon positive affect and negative affect. From beginning of day to afternoon, the patient's positive affect was a not a significant predictor of the spouse's afternoon positive affect or negative affect. Model statistics are presented in Table 8.

The second positive affect transmission time scale considered was whether the patient's afternoon positive affect predicted the spouse's end of day positive and/or negative affect. Again, the patient's afternoon positive affect was not a significant predictor of the spouse's end of day positive affect or the patient's end of day negative affect. Model statistics are presented in Table 9.

2.4 Discussion

Emotion transmission provides one way of understanding the affective experience of individuals with osteoarthritis and their spouses and provides an explanation of how spouses influence one another on a daily level. In the current study, emotion transmission was defined as when one individual's emotional experience leads to subsequent emotions in another person

(Larson & Almeida, 1999) and was investigated through the use of the prospective change model. Results from the current study reveal that emotion transmission occurs in certain contexts for some spouses.

2.4.1 Negative Affect Transmission

In the current study, negative affect transmission in that the patient's beginning of day negative affect predicted their spouse's end of day negative affect and positive affect. The findings demonstrate that while negative affect is transmitted between osteoarthritis patients and their spouses, transmission does not occur in the same manner equally for all couples. The patient's beginning of day negative affect predicts the spouse's end of day negative affect but only for female spouses who report lower levels of marital satisfaction. Although the occurrence of emotion transmission for wives in low satisfaction marriages was contrary to the moderation hypothesis (it was expected that transmission would occur in high satisfaction marriages), the results parallel some previous findings. Jacobson and colleagues (1982) found that distressed couples were more reactive to their partners' positive and negative behaviors. These findings provide an explanation as to why emotion transmission would be present in marriages that are less satisfying to the spouse compared to higher satisfaction marriages where it would be expected that the couples are more connected and in tune with each other. The current findings do suggest more reactivity to partners' affect in low satisfaction marriages but not in the direction expected.

It was expected that the higher patient beginning of day negative affect would result in higher end of day negative affect for their spouses; however, the results show the opposite. On occasions when the patient reported higher beginning of day negative affect, the female spouses reported less end of day negative affect. Although unexpected, there are explanations for this

somewhat surprising finding. First, the finding could be the result of demand-withdrawal patterns of communication. In the demand withdraw pattern one member of the dyad makes demands on the other while the other partner withdraws in an effort to avoid confrontation (Elridge, Sevier, Jones, Atkins & Christensen, 2007). Previous literature has often detected gender links attached to these roles, with males most often being the withdrawer, but it has also been suggested that females could be the withdrawer because roles might be determined by who wants change and who has the burden of making that change (Elridge et al, 2007). The current study cannot address whether interactions in the day have one partner placing demands on the other but it is possible that regardless of interactions, the female spouses might have withdrawn (perhaps emotionally and physically) from their partner simply because of the partner's increase in negative affect.

Additionally, in order to “catch” the emotions of another person, one has to be aware of and responsive to the emotions and experiences of the other individual. In marriages with lower satisfaction, it is possible that the female spouses are disconnected from their spouse and are apathetic to the experiences of their partner resulting in transmission that is not in the expected direction.

It was also expected that negative affect would reduce positive affect but the hypothesis was not directly supported. For couples where the spouse has reported high marital satisfaction, the patient's beginning of day negative affect did not impact the spouse's end of day positive affect. However, in marriages of lower marital satisfaction the transmission path was opposite of what was expected. On occasions when the patient reported more beginning of day negative affect, the spouse reported more end of day positive affect. These findings suggests that spouses in less satisfying marriages are able to maintain higher levels of positive affect during times of

stress. Additionally, they also increase in positive affect as their partner increases in negative affect which seems to suggest that they may take some pleasure in seeing their partners in negative emotion states.

2.4.2 Positive Affect Transmission

In the current study, positive affect transmission would be present if the patient's level of positive affect predicted the spouse's level of positive affect or negative affect. Although there was no evidence of emotion transmission at the daily level, the findings do suggest that the patient's average level of positive affect impacts the spouse's level of positive affect. Specifically, a trend suggests that patients who on average reported more afternoon positive affect had spouses who on average reported more end of day positive affect (see table 12). Although not suggestive of transmission this finding further supports previous literature that positive emotions are experienced in chronic illness (eg. Folkman, Moskowitz, Ozer & Park, 1997) and suggests that positive affect may play an important role in the adjustment of couples through the benefits that accompany the experience of positive affect (Pressman & Cohen, 2005; Steptoe, Wardle & Marmont, 2005; Fredrickson et al, 2003).

2.4.3 Role of Context

Findings from the current study indicate that the context of marriage impacts affect in two main ways: first, through patients' affect predicting spouse affect and second, through the negative emotion transmission paths being moderated by spouse gender and marital satisfaction. For some spouses, their partner's affect predicts their affect at a subsequent time point which suggests that the interplay between spouses is critical in understanding the affective experience of these spouses. Additionally, the emotion transmission paths from patient negative affect to spouse negative affect and from patient negative affect to spouse positive affect were both

moderated by marital satisfaction which strongly validates the notion that marriage is an influential context in understanding daily experiences of couples. Taken together, the findings from the current study suggest that an individual's affective experience cannot be fully understood without considering their spouse's affective experience and their reported satisfaction in their marriage.

2.4.4 Implications

The findings from the current study highlight implications for both future research and intervention work. The cross valence findings further support the notion that positive and negative affect should be considered together to have a holistic understanding of the chronic illness experience. If the current study had only considered transmission between patient negative affect and spouse negative affect or only considered transmission between patient positive affect and spouse positive affect, the findings would have provided a less than full depiction of the daily experience. In addition to having implications for the way future research considers the relationship between positive and negative affect, the current study also has important intervention implications.

Results demonstrate that negative emotion transmission paths are moderated by gender and marital satisfaction and therefore, are not the same for all couples which suggests that a one size fits all approaches to interventions will not be successful. If an intervention aimed to target the daily emotional experience of couples in chronic illness, the intervention would need to consider marital satisfaction as an additional context. Even after considering marital satisfaction as a context, the intervention content would also need to be adapted for the various experiences of husbands and wives.

2.4.5 Limitations

One limitation of the current study is that the three report periods do not assess recent interactions or whether the patient and spouse have been together during the reporting period. The work of Jacobson and colleagues (1982) suggest that individuals in low satisfaction marriages are more reactive to behaviors of their partners and Scott, Sliwinski and Blanchard-Fields (2013) found that negative affect was associated with reporting a stressor event in the same reporting period. Therefore, when assessing emotion transmission it is important to know if the partner has been exhibiting behaviors that are representative of their current affect because the transmission process might be mediated by behaviors. Furthermore, reports of recent interactions could potentially provide information regarding whether the patient has been demanding which results in the spouse withdrawing. Additionally, emotion transmission paths might be stronger or more evident if the patient and spouse have spent more time together during the reporting period. In the current sample, a portion of patients and spouses were employed and therefore, are likely to have more time apart during work days. However, we do not have reports of which study days are work days or what portion of the day they are working on work days.

A second limitation of the current study is that the reports of positive and negative affect are a combination of both frequency and intensity and therefore, it is not clear what aspect is more prominent in emotion transmission. To obtain a clearer picture of the emotion transmission processes in spouses, it is important to distinguish whether the spouses' emotion is being impacted by patients reporting more types of affect (frequency) or reporting more intense affect.

Finally, the construct of emotion transmission as it is conceptualized in the current study assumes that affect has been expressed in a way that spouses would recognize and be aware of. However, there are many instances where transmission appears to not be present which may be

the result of the patients feeling various components of positive and negative affect but not expressing it or expressing it in a way that was not clear to their spouses.

2.4.6 Future Directions

The current study only considered paths flowing from patient to spouse because in the chronic illness context spouses often take on the caregiving role and it was well-known that the patient's illness impacts caregivers (Vitaliano, Young, Zhang, 2004; Anthony-Bergstone, Zarit & Gatz, 1988; Gaugler et al, 2005). Additionally, Bigatti and Cronan (2002) note that illness negatively impacts the spouse's physical and mental health even when they are not providing care. However, as with most processes in marriages, the paths are most likely bidirectional and cyclical. Instead of a direct linear path, emotion transmission presumably flows from one partner to the other and then back again. Thus, future studies should also consider the potential for transmission from spouse to patient.

Additionally, future work should further refine the proper time scale for detecting emotion transmission. Positive affect transmission is less often found in the literature which may be the result of considering time scales that are too long for chronic illness populations where positive emotions might be less intense and more short term. The three time points during the day from the current study is a step toward assessing positive affect transmission on a shorter scale, but even shorter time scales might be necessary to fully see the development of positive emotion transmission paths.

Finally, Jacobson et al (1982) and Margolin and Wampold (1981) reported that couples in distressed marriages were more reactive to recent events than couples in non-distressed marriages and Jacobson et al (1982) found that couples in distressed marriages were more reactive to their partner's positive and negative behaviors than couples in non-distressed

marriages. These findings suggest that in addition to considering each person's reported emotions throughout the day, events and behaviors throughout the day should also be considered. Although reaction to an event or behavior would not constitute emotion transmission by a strict standard, the transmission paths might be mediated by behavior of the partner such that the process occurs when the patient's behavior reflects their mood and emotions which then predicts the spouse's emotion.

2.4.7 Conclusion

Although results do not indicate that emotion transmission exists for all couples in all contexts, the findings do show that for some osteoarthritis patients and spouses emotion transmission exists. However, not all emotion transmission paths would be considered to be harmful (ie, patient's positive affect increasing the spouse's positive affect or reducing negative affect) while other emotion transmission paths might be especially detrimental (ie, patient's negative affect increasing the spouse's negative affect or reducing positive affect) and therefore, it is important to understand which contexts promote each type of path. A deeper recognition of the contextual factors and consequences associated with emotion transmission will provide an important step in understanding how couples influence one another on the daily level and how they adapt to the chronic illness experience.

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Table 2.1

Demographic Characteristics of Patients and Spouses (N= 145)

| Variable | Patients <i>Mean (SD) or N %</i> | Spouses <i>Mean (SD) or N %</i> |
|-----------------------------|-------------------------------------|------------------------------------|
| Age | 65.67 (9.8) | 65.44 (11.4) |
| Male Gender | 43% | 58% |
| White Race | 87% | 85% |
| Years of Education | 16.05 (2.0) | 15.83 (2.1) |
| Duration of Knee OA (years) | 12.78 (11.3) | |
| Marital Satisfaction | 39.64 (6.2) | 39.06 (6.4) |

Table 2.2

Descriptive Statistics of Primary Measures-Mean of Sum Scores Across Study Days

| Variable | Patient <i>Mean (SD)</i> | Spouse <i>Mean (SD)</i> |
|------------------|-----------------------------|----------------------------|
| Beginning of Day | | |
| Negative Affect | 2.57 (4.1) | 2.19 (4.1) |
| Positive Affect | 9.54 (6.4) | 9.03 (6.0) |
| Afternoon | | |
| Negative Affect | 2.65 (4.3) | 2.39 (4.1) |
| Positive Affect | 11.27 (6.0) | 10.77 (5.9) |
| End of Day | | |
| Negative Affect | 2.33 (4.2) | 2.02 (4.1) |
| Positive Affect | 11.54 (6.2) | 10.63 (5.9) |

Table 2.3

Correlations between Patient and Spouse Beginning of Day Affect (N=145, Observations=6300)

| | PT_PA | PT_NA | SP_PA | SP_NA |
|-------|-------|---------|---------|--------|
| PT_PA | 1.00 | -.396** | .142** | -.53** |
| PT_NA | | 1.00 | -.070** | .075** |
| SP_PA | | | 1.00 | -.378 |
| SP_NA | | | | 1.00 |

*Note ** $p < .01$*

Table 2.4

Correlations between Patient and Spouse Afternoon Affect (N=145, Observations=6300)

| | PT_PA | PT_NA | SP_PA | SP_NA |
|-------|-------|---------|--------|---------|
| PT_PA | 1.00 | -.413** | .168** | -.077** |
| PT_NA | | 1.00 | -.106 | .105** |
| SP_PA | | | 1.00 | -.445** |
| SP_NA | | | | 1.00 |

*Note ** $p < .01$*

Table 2.5

Correlations between Patient and Spouse End of Day Affect (N=145, Observations=6300)

| | PT_PA | PT_NA | SP_PA | SP_NA |
|-------|-------|---------|---------|---------|
| PT_PA | 1.00 | -.434** | .160** | -.141** |
| PT_NA | | 1.00 | -.142** | .244** |
| SP_PA | | | 1.00 | -.418** |
| SP_NA | | | | 1.00 |

*Note ** $p < .01$*

Table 2.6

Multi-Level Models Predicting Spouse Affect with only demographic controls

| | Afternoon NA b(SE) | Afternoon PA b(SE) | End of Day NA b(SE) | End of Day PA b(SE) |
|------------------------|-----------------------|-----------------------|------------------------|------------------------|
| Intercept | 2.54 (2.58) | 10.203* (4.16) | 1.3659 (2.627) | 10.303*(4.238) |
| Previous Level of Pain | .009 (.03) | -.038 (.039) | .0498 (.03) | -0.027 (.038) |
| Spouse Age | -.029 (.023) | .031 (.037) | -.017 (.023) | .009 (.037) |
| Spouse Education | .104 (.124) | -.117 (.20) | .092 (.129) | -.064 (.209) |
| Spouse Race | .201 (.734) | 0.627 (1.19) | .1672 (.77) | .927(1.24) |

* $p < .05$

Table 2.7

Multi-Level Models of Negative Emotion Transmission (N=136)

| | End of Day NA b (SE) | End of Day PA b(SE) |
|--|-------------------------|------------------------|
| Intercept | 1.74 ** (.475) | 8.167*** (.693) |
| Between Person Predictors | | |
| Gender | -.864 * (.406) | -.142 (.576) |
| Marital Satisfaction | -.203 * (.093) | .079 (.049) |
| Person Mean Patient BOD NA | .105 * (.050) | -.360 ** (.101) |
| Within Person Predictors | | |
| Spouse BOD Affect | .223 *** (.037) | .316 *** (.030) |
| Patient BOD NA | -.089 (.052) | .070 (.061) |
| Patient Afternoon Pain | -.007 (.024) | -.018 (.041) |
| Moderation | | |
| Patient NA * Gender | .098 (.058) | -.038 (.069) |
| Patient NA * Marital Satisfaction | .017 * (.008) | -.015* (.006) |
| Gender * Marital Satisfaction | .153 (.107) | -.078 (.100) |
| Patient NA * Gender * Marital Satisfaction | -.022 * (.001) | .014 (.008) |
| Fit Indices | | |
| -2 Res Log Likelihood | 8664.1 | 9307.2 |
| AIC | 8668.1 | 9311.2 |
| BIC | 8673.9 | 9317 |

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. Day was also included as a covariate and estimates were obtained for each day of the study. Only days 13 and 21 were significant in the model predicting negative affect and day 9 was significant in the model predicting positive affect

Table 2.8

Multi-Level Models for the First Lag of Positive Emotion Transmission (N=138)

| | Afternoon NA b (SE) | Afternoon PA b(SE) |
|----------------------------------|------------------------|-----------------------|
| Intercept | 1.505 ** (.454) | 7.130 *** (.576) |
| Between Person Predictors | | |
| Marital Satisfaction | -.025 (.023) | .003 (.043) |
| Person Mean Patient BOD PA | .0002 (.036) | .073 (.056) |
| Within Person Predictors | | |
| Spouse BOD Affect | .320 ** (.045) | .384 *** (.030) |
| Patient BOD PA | -.025 (.023) | -.0009 (.032) |
| Patient Beginning of Day Pain | -.012 (.031) | -.005 (.036) |
| Fit Indices | | |
| -2 Res Log Likelihood | 9508.9 | 10327.1 |
| AIC | 9512.9 | 10331.1 |
| BIC | 9518.7 | 10337 |

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. Day was also included as a covariate and estimates were obtained for each day of the study. Only day 9 was significant in the model predicting negative affect and day 2 was significant in the model predicting positive affect

Table 2.9

Multi-Level Models for the Second Lag of Positive Emotion Transmission (N=138)

| | End of Day NA b (SE) | End of Day PA b(SE) |
|----------------------------------|-------------------------|------------------------|
| Intercept | 1.205 ** (.362) | 7.017 *** (.639) |
| Between Person Predictors | | |
| Marital Satisfaction | -.068 * (.033) | .036 (.044) |
| Person Mean Patient AFT PA | -.017 (.029) | .112 (.057) |
| Within Person Predictors | | |
| Spouse AFT Affect | .358 *** (.053) | .370 *** (.030) |
| Patient AFT PA | -.028 (.018) | .014 (.024) |
| Patient Afternoon Pain | .009 (.025) | -.009 (.042) |
| Fit Indices | | |
| -2 Res Log Likelihood | 9945.5 | 10596.3 |
| AIC | 9949.5 | 10600.3 |
| BIC | 9955.4 | 10606.1 |

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. Day was also included as a covariate and estimates were obtained for each day of the study. Only day 9 was significant in the model predicting positive affect

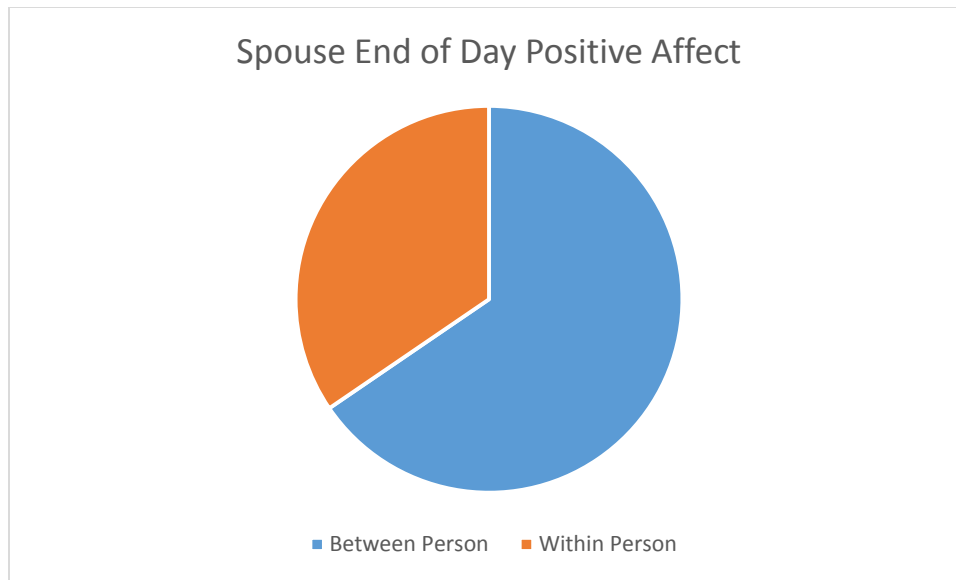


Figure 2.1 Between and Within Person Variability in Spouse End of Day Positive Affect

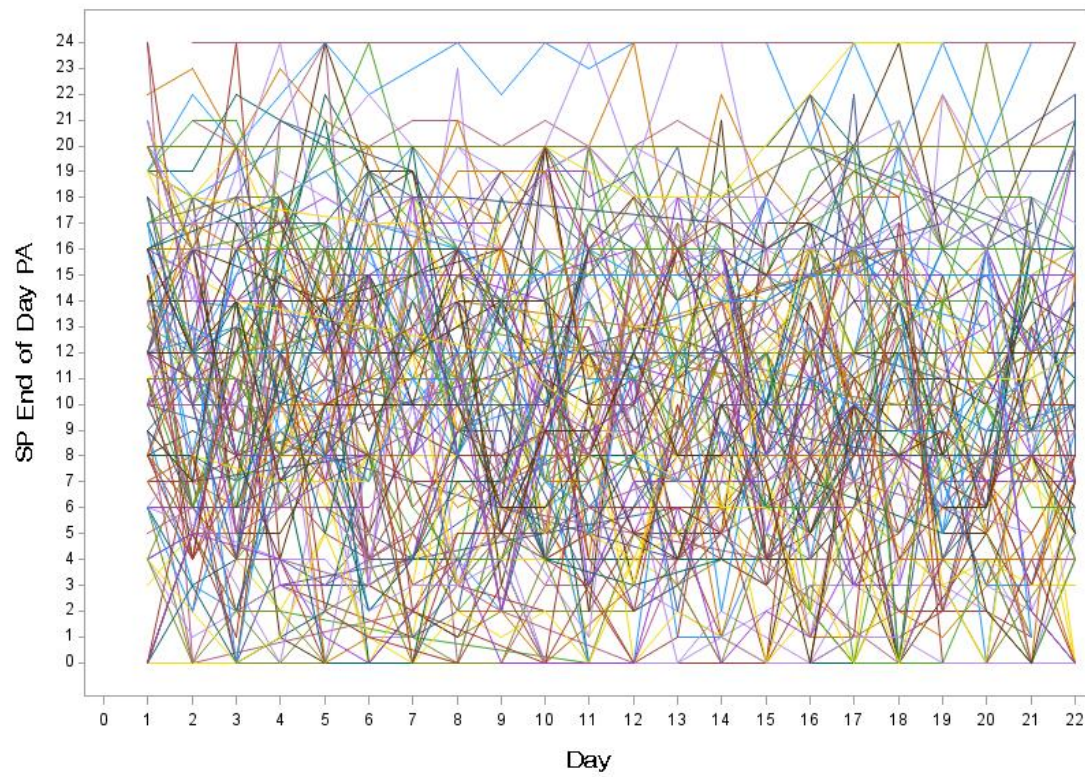


Figure 2.2 Daily Variability in Raw Scores of Spouse End of Day Positive Affect

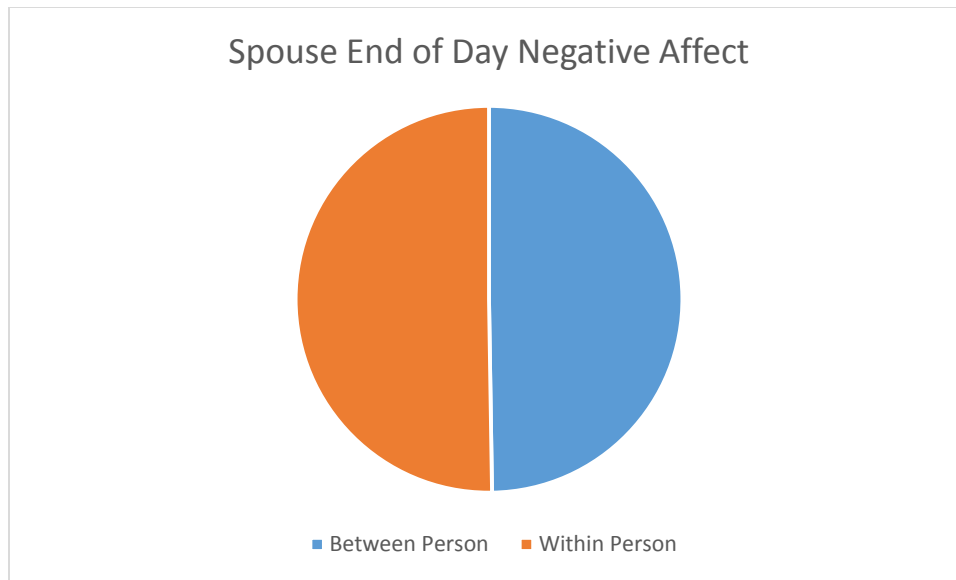


Figure 2.3 Between and Within Person Variability in Spouse End of Day Negative Affect

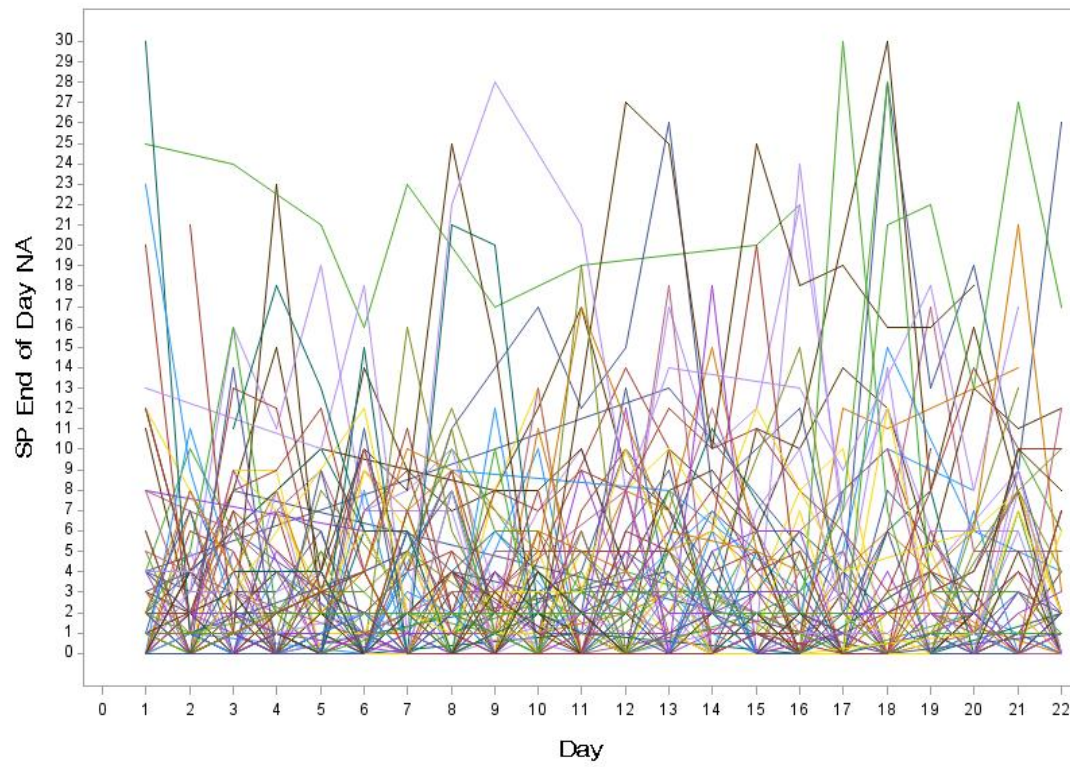


Figure 2.4 Daily Variability in Raw Scores of Spouse End of Day Negative Affect

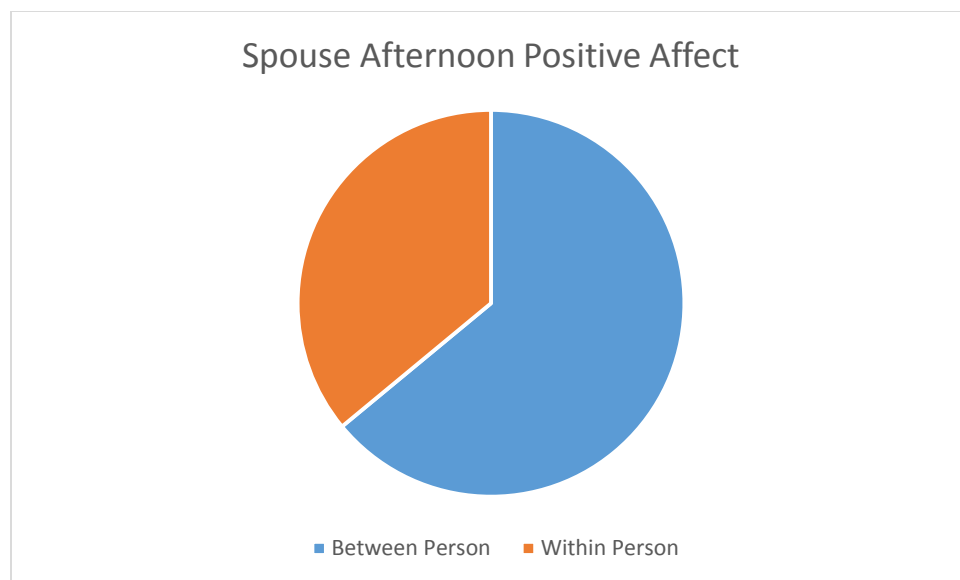


Figure 2.5 Between and Within Person Variability in Spouse Afternoon Positive Affect

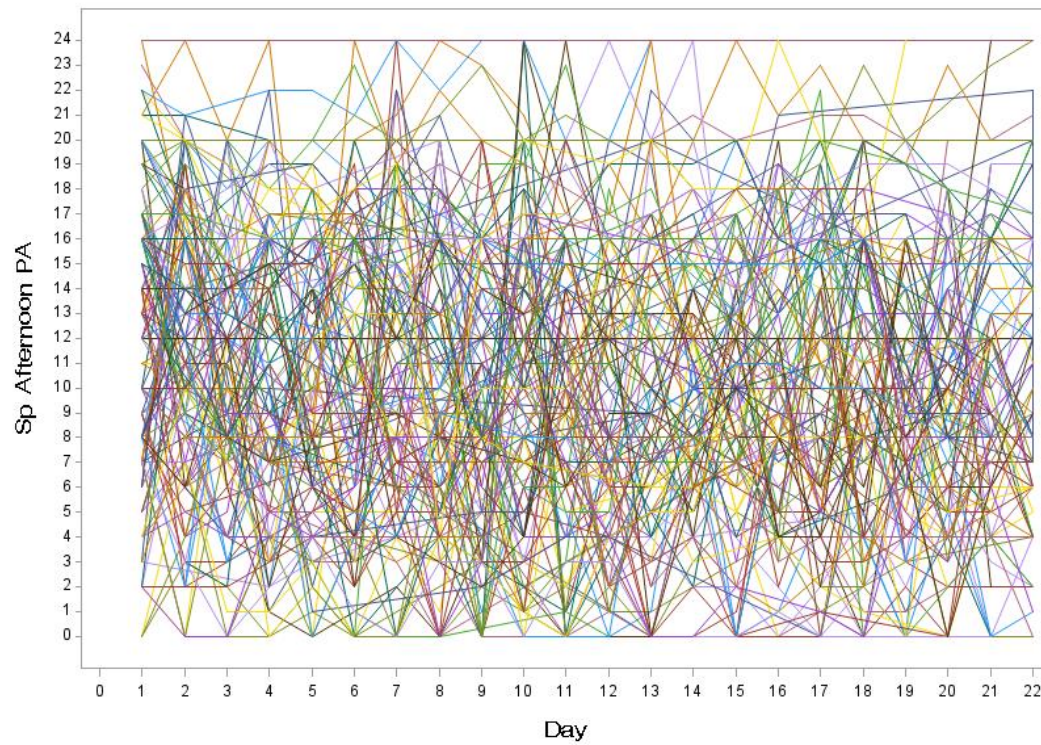


Figure 2.6 Daily Variability in Raw Scores of Spouse Afternoon Positive Affect

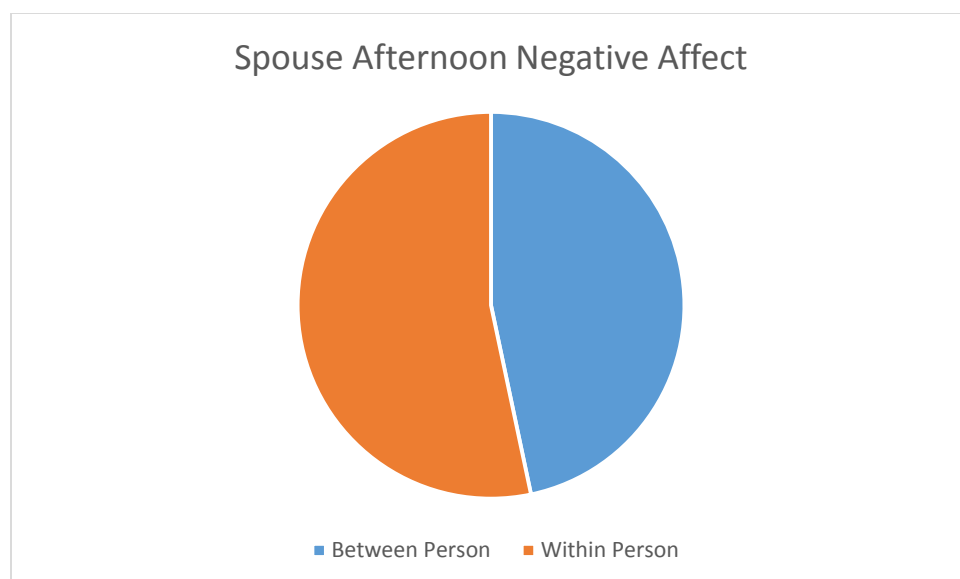


Figure 2.7 Between and Within Person Variability in Spouse Afternoon Negative Affect

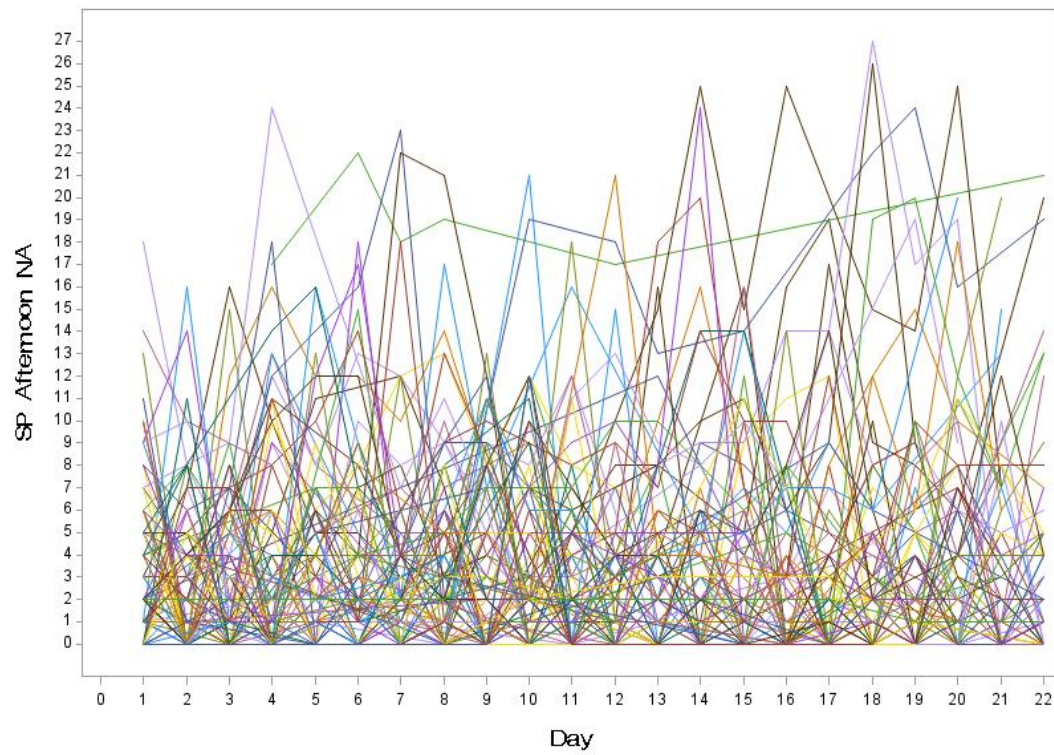


Figure 2.8 Daily Variability in Raw Scores of Spouse Afternoon Negative Affect

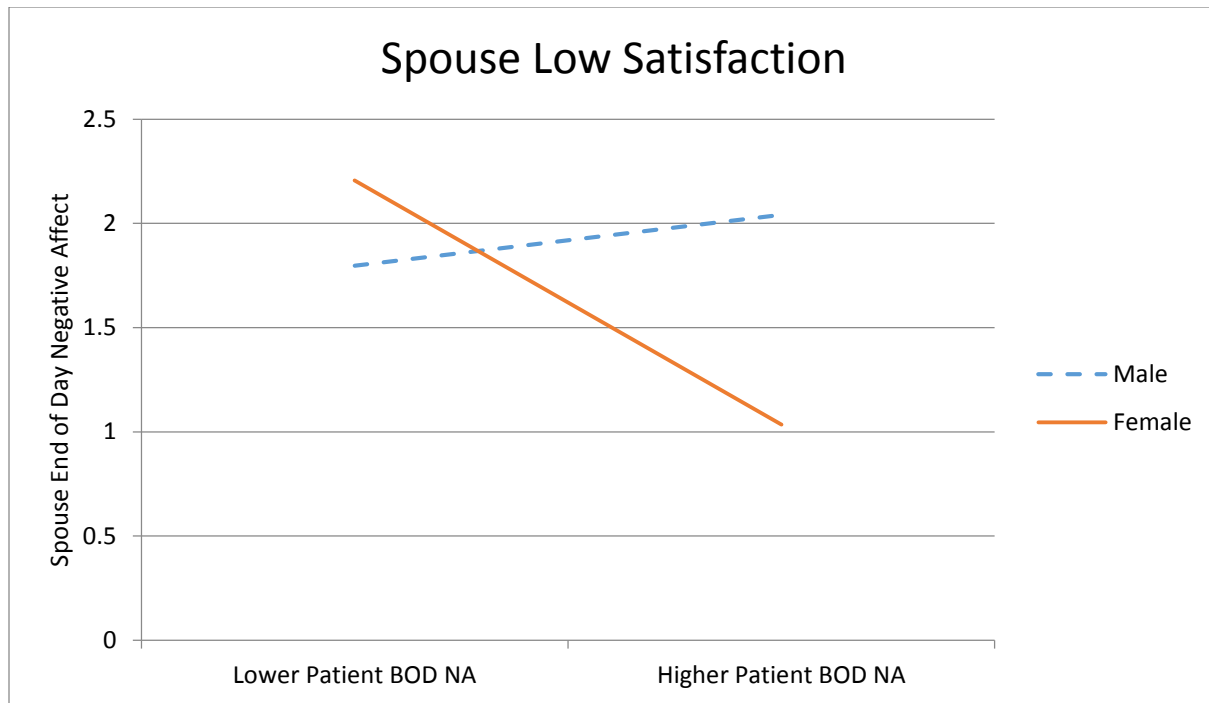


Figure 2.9 Three way interaction of patient beginning of day negative affect, gender and marital satisfaction in predicting spouse end of day negative affect in couples where the spouse reported low marital satisfaction

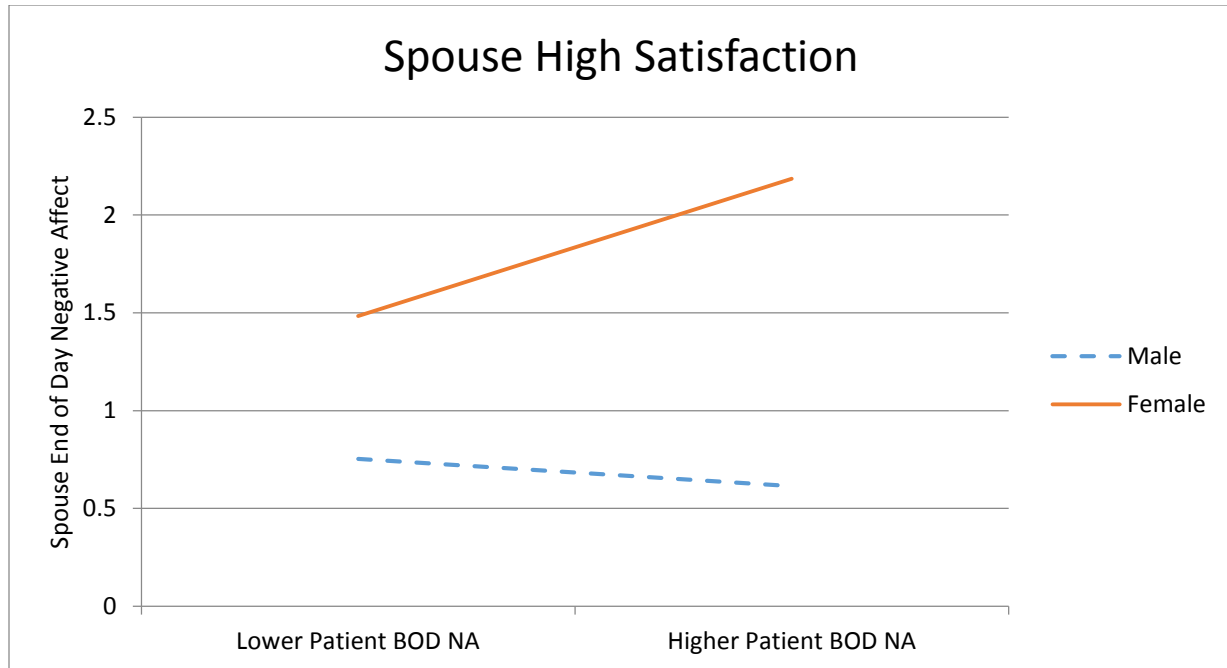


Figure 2.10 Three way interaction of patient beginning of day negative affect, gender and marital satisfaction in predicting spouse end of day negative affect in couples where the spouse reported high marital satisfaction

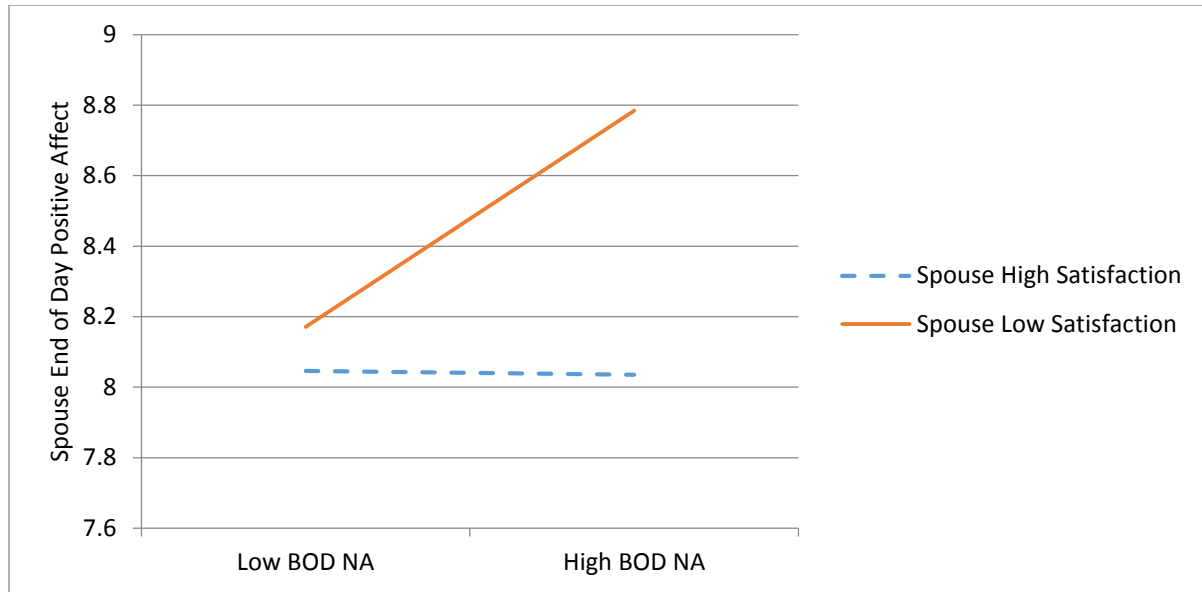


Figure 2.11 Two way interaction of patient beginning of day negative affect and marital satisfaction in predicting spouse end of day positive affect

CHAPTER 3. STUDY 2

Affect Balance in Prostate Cancer Patients and their Spouses

3.1 Introduction

Cancer patients and their family members may experience psychological distress (Fang, Manne & Pape, 2001) including fear (Gotay, 1984), hopelessness (Northouse, Laten & Reddy, 1995), anxiety (Segrin, Badger, Dorros, Meek & Lopez, 2007), and depression (Segrin, Badger, Meek, Lopez, Bonham & Sieger, 2005) as they attempt to navigate the journey that follows the diagnosis. However, they may also report positive emotions (Dow et al, 1996; Han et al, 2008) and positive changes following their diagnosis such as experiencing enhanced relationships (Petrie, Buick, Weinman & Booth, 1999; Andrykowski et al, 1993), and having a new outlook on life (Andrykowski et al, 1993; Cordova et al, 2001). Although the consequences of negative affect on health have been well-documented (e.g, Watson, 1988; Cohen et al, 1993; Brown & Moskowitz, 1997), it is also important to understand the role of positive affect in chronic illness because higher levels of positive affect are beneficial for health and psychological growth (Pressman & Cohen, 2005; Steptoe, Wardle & Marmot, 2005; Fredrickson et al, 2003). Additionally, the absence of positive affect is highly associated with the incidence of depression (Lewinsohn & Graf, 1973; Ritterband & Spielberger, 2001). In order to fully understand the adjustment of cancer patients and their family members, both positive and negative affect need to be considered jointly because a cancer diagnosis has the potential for both positive and negative changes (Andrykowski et al, 1993).

3.1.1 Negative and Positive Affect: Two Factors or One Dimension

When considering positive and negative affect there is an ongoing debate regarding whether the affect valences exist on a single continuum or are two separate factors. Watson and

Tellegen's (1985) Positive Activation-Negative Activation model asserts that positive and negative affect lie at opposite ends of a bipolar dimension. Barrett and Russell's (2003) valence arousal model also contends that positive and negative affect are mutually exclusive. Numerous empirical findings have suggested, however, that the affect valences are not independent (Hammen & Glass, 1975; Moss, Lawton & Glicksman, 1991; Reich & Zautra, 1981; Zautra & Reich, 1983; Zeiss, Lewinsohn & Munoz, 1979; Meeks, Teri, van Hattis & Looney, 2006; Meeks, Looney, van Hattis & Teri, 2008). Further, there is work that challenges the assertion that positive and negative affect exists on a single factor. The Evaluative Space Model (Cacioppo & Berntson, 1994) conceptualizes positive and negative affect as "separable," that is, any pattern of positive and negative affect could potentially occur and empirical work has also supported the independence of the affect valences (Bradburn & Caplovitz, 1965; Diener, Larson, Levin & Emmons, 1985; Watson & Clark, 1992; Zevon & Tellegen, 1982). Taken together, the overall literature suggests that there is not one clear answer to whether positive and negative affect exist on a single continuum or as separate dimensions; and this debate plays an important role in how the relationship of positive and negative affect is considered and understood. If the affect valences are two separate constructs then an individual could experience both simultaneously; yet, if positive and negative affect exist on a single continuum they cannot be experienced concurrently because the presence of one would naturally indicate the absence of the other.

3.1.2 Emotional Complexity

Traditionally, positive and negative affect have been researched separately perhaps under the assumption that the presence of one indicates the absence of the other thereby consideration of one indirectly provides information about the other. However, the suggested independence of the affect valences and their unique associations with detriments and benefits suggests a need to

consider, not only positive and negative affect individually, but also the relationship between the two. Assessing the relationship between positive and negative affect is the only way to have a truly holistic understanding of an individual's affective experience. One way of conceptualizing the relationship between positive and negative affect is through the lens of emotional complexity. Although emotional complexity can be defined in a number of ways, the two most prominent definitions are the co-occurrence of positive and negative affect (Carstensen et al, 2000) and the structural complexity of adults' emotions (Chipperfield et al, 2003; Larsen and Cutler, 1996). The co-occurrence of positive and negative affect has also been called poignancy (Carstensen et al, 2000) and indicates that individuals have the capacity to experience emotions of separate valences at the same time. Research most often operationalizes emotional complexity as the co-occurrence or covariation of positive and negative affect. Gruhn, Lumley, Diehl and Labouvie-Vief (2013) define a covariation score as an individual's correlation between positive affect and negative affect. A covariation score approaching zero is interpreted as indicating that the individual experiences positive and negative affect independently whereas a covariation score approaching minus one suggests that the individual experiences positive and negative affect on a single dimension (Gruhn et al, 2013).

Understanding the co-occurrence of positive and negative affect begins to answer the question of whether the affect valences are separate factors or a single dimension and provides information about the relationship between positive and negative affect. Considering the relationship between positive and negative affect also provides information that is missed when the valences are assessed individually. Specifically, when only one affect is evaluated the potential effects of the other are missed. For example, if an individual experiences low levels of negative affect then it would be expected that they would fare well in terms of well-being and

health. However, it is not clear if their outcomes would be the same if they were also low on positive affect. Similarly, an individual who reports high positive affect would also be expected to fare well in terms of well-being and health but will those benefits still hold if they also experience high levels of negative affect.

However, interpretation of the single correlation or covariation score is challenging. For example, if emotional complexity is defined as the co-occurrence of positive and negative affect, it is assumed that the data truly show that the affect valences are co-occurring (i.e., experienced simultaneously). However, many studies ask participants to recall affect for a specific time frame (i.e., the past week, the past 30 minutes, or since the last beep), rather than determining what the participants are feeling in that exact moment. These retrospective reports do not indicate if the emotions were actually experienced at the same moment and these reports are also subject to biases such as peak effects (Hedges, Jandorf & Stone, 1985). A peak effect bias may result in the participant reporting the most salient instances of positive and negative affect experienced even if they occurred at distinct times during the measurement point (Scott, Sliwinski, Mogle & Almeida, 2014). Therefore, what appears to be emotional co-occurrence may actually be a summary of the experiences that the participant had during the reporting period. While vacillating between emotions is not inherently a problem, it does make conclusions regarding the affective experience difficult when data are only collected once a day.

3.1.3 Affect Balance

Affect balance has been defined as the relative levels of negative and affect (Hassett et al, 2008) and is the more fitting approach to understanding the relationship between positive and negative affect when data are only collected once a day. This approach is more fitting because affect balance provides an opportunity to assess the relationship between positive and negative

affect without making an assumption that the affect valences have actually co-occurred. Both the Bradburn Affect Balance Scale (Bradburn, 1969) and the Balanced States of Mind model (Schwartz & Garamoni, 1989) are measures that have been utilized for evaluating affect balance. Using the Bradburn Affect Balance Scale, affect balance is calculated using a difference score between the number of positive and negative affect items endorsed, specifically, negative affect minus positive affect (Hassett et al, 2008). The Balance States of Mind model considers the ratio of items endorsed between positive affect and total affect (Hassett et al, 2008).

3.1.4 Improvements to Affect Balance – Need for Considering Intensity

While the traditional manner of calculating affect balance (i.e., difference score between number of negative and positive affect items endorsed) overcomes certain challenges in the literature, this approach does not take into account the intensity of reports. A more complete understanding of affective experience can be gained by considering intensity together with number of endorsements (Schimmack & Diener, 1997). For example, if person A and person B endorsed equal numbers of positive and negative affect items and the same as each other, they would both appear to be perfectly balanced in their affect and they would be exactly the same in their balance levels. However, a very different affective experience would be shown if person A endorsed all the items at intensity of 5 and person B endorsed all the items at an intensity level of 1. Based on intensity, these two individuals would no longer have similar affective experiences. It is expected that the experience of frequent but not intense emotions would be quite different than the experience of less frequent but very intense emotions. Therefore, it is important to assess both the individual's frequency of positive and negative affect (i.e., number of items endorsed during the day) and intensity of positive and negative affect experienced during the day.

3.1.5 The Importance of Context

In addition to investigating both count and intensity of affect, context should also be assessed because the relationship between positive and negative affect appears to shift under various contexts. The Dynamic Model of Affect (Zautra, Potter and Reich, 1997) asserts that most of the time, positive and negative affect are separate factors and independent of one another but the degree of the relationship is somewhat dependent on the individual's context at the time. In this case, context is often operationalized as what events the individual has been experiencing. Furthermore, Diener and Emmons (1984) and Diener and Iran-Nejad (1986) asserted that the degree of the relationship between positive and negative affect depends on the level of emotional intensity and during times of high emotional intensity the inverse correlation between the two will increase. Zautra, Potter and Reich (1997) propose that the type of emotional intensity most likely to exert influence on the relationship between positive and negative affect is stress.

During times of stress, it is believed that the affect systems are merged in order to simplify coping options and to maintain homeostasis that has been disrupted by the uncertainty of stress (Davis, Zautra & Smith, 2004). For example, Zautra, Potter and Reich (1997) assessed life events, positive and negative affect and pain over 12 consecutive weeks in 41 female arthritis patients. When the correlation between positive and negative affect was assessed across conditions (low negative weeks and high negative weeks), the correlation was modest but significant ($r = -.153$, $p = .002$). In order to assess the difference in correlation strength in various contexts, the correlation was calculated for each condition (weeks with low negative affect and weeks with high negative affect). The low negative weeks still showed a small correlation ($r = -.115$, $p = .023$) however, during high negative weeks the correlation between positive and negative affect was more strongly inversely correlated ($r = -.558$, $p = .001$). A Fisher's z

transformation also demonstrated that the two correlations were significantly different from one another ($z = 2.70$, $p = .006$). This change in covariation would most often be interpreted as the affect dimensions becoming more strongly inversely correlated because the affective space is being narrowed and simplified to focus attention on one affect valence (Davis, Zautra & Smith, 2004). However, according to Scott et al (2014) this interpretation might be imprecise. Scott and colleagues (2014) asserted that the opposite happens and that under stress, individuals are more likely to experience positive and negative affect together. Specifically, Scott and colleagues (2014) reported that when assessing a study of daily experiences (NSDE, National Study of Daily Experiences as part of MIDUS II), participants were 3 times more likely to report co-occurring positive and negative emotions on days when they reported stressors. Additionally, in momentary data (Scott, Sliwinski and Blanchard-Fields, 2013), participants were 4 times more likely to report co-occurring positive and negative affect in moments where they also reported stressors. Although the interpretations are contradictory, taken together these findings advocate the need for considering the impact that stress has on the relationship between positive and negative affect.

3.1.6 Stressors and Affect

Previous research has established a clear link between stressors and affect, such that higher stress is typically associated with more negative affect or poorer mood (Affleck, Tennen, Urrows & Higgins, 1994; DeLongis, Folkman & Lazarus, 1998; Watson, 1988; Bolger, DeLongis, Kessler & Schilling, 1989). Given the vast literature linking stress processes to affect and the theoretical underpinnings of the Dynamic Model of Affect, the role that stressors play in altering affect balance should be assessed. It is important to establish the link between stressors and affect balance and to understand daily stress in the broader chronic stress context.

Pearlin (1989) noted that stress is the result of two main types of circumstances, life events and chronic strains (see also Almeida's distinction between daily stressors and chronic stressors, Almeida, 2005). Daily stress and chronic stress might interact in the same three main ways that life events and chronic strains may interact: (1) events lead to chronic strains, (2) chronic strains lead to events or (3) strains and events provide contexts for each other (Pearlin, 1989). For example, Stawiski, Sliwinski, Almeida and Smyth (2008) found that level of global perceived stress was associated with greater reported exposure to daily stressors in older adults. The link between daily stress and chronic stress and the relationship between stress and affect suggests a need to consider the impact of daily stress on affect balance in chronic illness. It is especially important to consider daily stress in cancer populations because the effects stress has on health and well-being may be especially detrimental for individuals already experiencing the major health stressor of cancer. For example, Chida, Hamer, Wardle and Steptoe (2008) reported that stressful life experience was associated with poorer survival in cancer patients and was also associated with higher cancer mortality in population samples. Furthermore, it is ideal to assess affect balance in the broader context of chronic illness as it is the case that stressors and distress vary on a daily level and therefore, affect balance might also fluctuate on a daily basis.

3.1.7 Current Study

The current study assesses the relationship between positive and negative affect by considering affect balance and the relationship between stressors and affect balance. The data for the current study were collected on 14 consecutive days with prostate cancer patients and their spouses, where both individuals reported on positive and negative affect and bothersome events that occurred during the day. Specifically, participants were asked to write a sentence about the most bothersome event that happened during the day, which resulted in stressors being reported

on most days. Therefore, the current study utilizes appraisal of stressful events as a maker of the stress context, specifically stressor severity and perception that the event was due to prostate cancer.

Prostate cancer is the most commonly diagnosed cancer in men with one in six men diagnosed in their lifetime (American Cancer Society, 2013). Prostate cancer is an important context for older adults, because following the diagnosis, both patients and spouses often report stressors related to the physical symptoms of cancer, treatment side effects, and concern over treatment and doctor's appointments (Berg et al, 2008). In some samples, spouses report more psychological distress than the patients (Kornblith et al, 1994). Furthermore, Northouse et al (2007) found that patients and spouses were more similar to one another in terms of psychosocial variables than different. It is important to understand how patients and spouses are adjusting on a daily level and assessing the relationship between positive and negative affect and that relationship with stressors provides one way of understanding the adjustment of patients and spouses. The study also provides a unique opportunity to assess the role that daily stress plays in relation to affect balance in a population that is already experiencing a chronic stress situation.

3.1.8 Study Objectives and Hypotheses

The hypotheses for the current study are as follows:

H₁: It was expected that there would be an association between affect balance and reported stress severity of daily bothersome events.

H₂: It was expected that there would be an association between affect balance and the perception that the daily bothersome event was due to prostate cancer.

3.2 Method

3.2.1 Study Design

Data for the proposed study were drawn from a larger investigation of men diagnosed with prostate cancer and their spouses. Data were collected through three components: a take home packet, an in-person interview and a 14-day daily diary study.

3.2.2 Participants

The men were recruited through local oncology and radiation therapy clinics (93%) with the goal of recruiting men newly diagnosed (within one year) who were currently making treatment decisions and initiating treatment for prostate cancer. Additional recruitment was done through ads in the local newspapers (7%). The exclusion criteria for the study included a history of cancer other than skin cancer, current psychiatric care or if there was not a significant other to also participate.

One hundred and two eligible men were approached about participation, and 29 (28%) men declined to participate due to various reasons such as living too far away, wife did not want to participate, other serious illness or busy with other commitments. Of the remaining 73 men who initially agreed to participate, nine (12%) withdrew before any data collection and five (7%) withdrew following the baseline interview. The final sample is therefore, fifty nine men diagnosed with localized prostate cancer (Stage I) and their spouses. The men were 40 to 84 years of age ($M = 67.5$, $SD = 9.16$) and had been married for between 1 to 59 years ($M = 38.40$, $SD = 13.66$). Ninety five percent of the patient sample was White and 32.2% were employed. The spouses were 38 to 80 years of age ($M = 64.78$, $SD = 9.23$) and 20.3% were employed. Complete demographics are also presented in Table 1.

3.2.3 Data Collection Procedure

The research staff met with potential participants at the clinics when they were receiving consultations for treatment of prostate cancer or the staff spoke with interested individuals when they called the study office. Following a description of the study, the men who were eligible and interested were invited to participate in the study and were provided a consent form. After agreeing to participate in the study, the men were included on a participant tracking sheet that followed completion of each study component.

The first component of the study was completion of a take home packet, which included demographic questions along with assessments of perceptions of collaboration, mood, adjustment and social support. The participants received their packets at a consultation appointment or in the mail and both patients and their spouses completed take home packets. The second component of the study was an in person interview with each couple that was scheduled approximately one to two weeks after the take home packet was completed. During the in home assessment, the research staff administered two standard cognitive tasks, an activity of daily living (ADL) scale, and a self-identity scale. During this in home interview, the couples were also trained on the protocol and procedures associated with the daily diary component of the study. The final component was comprised of completing a diary at the end of 14 days. Each daily assessment asked participants to describe a bothersome event that occurred during the day and then answer several follow up questions regarding the event. Participants also answered a daily mood questionnaire and the patients completed a symptom checklist. In order to encourage compliance and completeness of the daily diary measures, research staff called the couples on Days 1, 3, 5, 7, 9 and 11 to remind them to complete their assessments and the individual diaries were mailed back individually which allowed research staff to review them for completeness and

provide feedback to the couples. The current study will utilize data from the take home packet and the daily diary component.

3.2.4 Measures

Demographics: Demographic information about both spouses was collected with the initial take home packet. Both husbands and wives answered questions related to their date of birth, racial and ethnic background, education level, employment status, religious affiliation and number of children.

Affect: Positive and negative affect were measured in the daily diary component using the Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988). Participants were asked the extent to which they experienced each of 10 possible positive emotions during the day. Specifically they were asked to report if they experienced feeling alert, inspired, active, interested, excited, strong, enthusiastic, determined, proud and attentive. Additionally, participants were asked the extent to which they experienced each of 10 possible negative emotions during the day. Specifically, they were asked to report if they experienced feeling irritable, ashamed, nervous, jittery, afraid, guilty, distressed, upset, scared, and hostile. Participants rated their experiences on a numerical rating scale ranging from 1= not at all to 5 = extremely. Mean and standard deviations for count and intensity of positive and negative affect are presented in Table 2.

Stressful Events: The assessment of stressful or bothersome events was the main component of the daily diary portion of the study. To assess everyday stress associated with cancer, participants were asked to write a brief sentence that outlined the most bothersome event that occurred during the day. Participants were asked to think about prostate cancer related events but it was not required that the event be related to prostate cancer. Following the report of

the bothersome event, participants were asked an additional nine items related to appraisal of the event. Bothersome events were reported on most days and therefore, two follow-up items were used as markers of the stress experience.

Stress Severity: Following the report of the bothersome event, participants were asked to report how stressful they would rate the experience. Stress severity was rated on a 7-point numerical rating scale, where 1 = minor annoyance and 7 = equal to the death of a family member or friend.

Stress due to Prostate Cancer: Participants were also asked to rate the extent to which the bothersome event due to their/your husband's prostate cancer on a 7 point numerical rating scale where 1 = not at all due to prostate cancer and 7 = completely due to prostate cancer.

3.2.5 Data Preparation

Affect Count Variables: Affect count variables were calculated by recoding the raw affect data, such that affect items that were initially endorsed as being experienced none of the day (1) were coded to 0 for not endorsed. Any affect items that were initially endorsed as being experienced a little of the day (2) to all day (5) were coded as 1 to indicate they had been endorsed. All the items endorsed were summed to create a total score. Total scores were calculated for negative affect and positive affect and were created separately for patients and spouses. The total scores were then divided into descriptive groups to assess the various combinations of positive and negative affect, and thus the various combinations of balance, exhibited in the current sample. The total scores for negative affect and positive affect were then grouped into 3 levels: low, medium or high. The levels were determined by mean and $\frac{1}{2}$ standard deviation of each construct. A half standard deviation was used instead of a full standard deviation because for some scales, a full standard deviation was outside the possible range of

responses which would automatically eliminate the people for a high or low group. Scores from the lowest possible score to $\frac{1}{2}$ standard deviation below the mean were coded as 0 = low, scores between $\frac{1}{2}$ a standard deviation below the mean and $\frac{1}{2}$ a standard deviation about the mean were coded as 1 = medium and scores above $\frac{1}{2}$ standard deviation above the mean were coded as 2 = high. Groups represented individuals who reported both high negative affect and high positive affect, individuals who reported both mid-range positive and negative affect, individuals who reported both low negative affect and low positive affect, individuals who reported more negative affect than positive affect and individuals who reported more positive affect than negative affect. The final two groups will be represented as Lower NA, Higher PA and Higher NA, Lower PA even though reports may be in the medium range, these groups simply represent reports where the count of negative affect and positive affect items endorsed is dissimilar relative to the other valence. The representations of the groups do not speak to the adaptive quality or how healthy any combination of negative affect and positive affect is, the groups simply provide a description of the type of days experienced by prostate cancer patients and their wives.

Affect Intensity Variables: Affect intensity variables were calculated by creating interaction variables between the created affect count variables and the raw affect data. With the interaction variable, items that had been initially endorsed as none of the day (1) become zero after being multiplied by the count variable (ie 0 = not endorsed multiplied by 1 = none of the day = zero). Therefore, these instances were not included in the intensity variables because they were not experienced during the day. The intensity from all the items endorsed were summed to create a total score. Total scores were calculated for negative affect and positive affect and were calculated separately for positive and negative affect. Group membership for the affect intensity

variables was calculated in the same manner as for the affect count variables (see above). As with the affect count variables, the groups are purely descriptive.

3.2.6 Data Analysis Plan

As an initial step, daily affect balance scores were calculated for both patients and spouses. To calculate daily affect balance scores, the number of positive affect items endorsed and the number of negative affect items endorsed were summed and then level of positive affect was subtracted from the level of negative affect. Affect intensity balance scores were calculated by subtracting total intensity of positive affect from the total intensity of negative affect. To further probe affect balance in the current sample, the daily experiences of the patients and spouses will be described using the created groups. Specifying the various groups of balance will be important for distinguishing individuals who will look similar on balance but have quite different experiences (ie, high PA and NA compared to low PA and NA).

To assess the manner in which context, specifically stress, is associated with affect balance (study objective 2), multi-level modeling was utilized to account for the nested nature of the data (SAS PROC MIXED; Singer & Willett, 2003). Specifically, two level models were used to account for multiple days nested within individuals where level 1 was the day level and level 2 was the person level. Although individuals were nested in dyads, models were run separately for patients and spouses and therefore, only two levels were needed. A series of models were run to determine the manner in which stress was associated with affect balance. First, an unconditional means model, or empty model, with no predictors was completed to assess within and between person variance in the dependent variable. The estimates from this model were used to calculate the Intraclass Correlation Coefficient (ICC). Fifty three percent of the variability in patients' count affect balance was between person variability and 55% of variability in intensity affect

balance was between person variability. Intraindividual standard deviation graphs of the within person variability across days in patient affect balance count and intensity are seen in Figures 1 and 2. Forty four percent of the variability in spouses' affect balance count was between person variability and 45% of the variability in spouses' affect balance intensity was between person. Intraindividual standard deviation graphs of the within person variability across day in spouse affect balance count and intensity are seen in Figures 3 and 4. Second, at level 2 demographic variables and control variables were entered in the model as predictors. Complete model statistics are presented in Table 3 for husbands and Table 4 for wives. Third, the final models included significant demographic and control variables along with the primary predictors, in this case, stressor severity and the degree to which the bothersome event was due to prostate cancer. Additional multi-level models were run to assess whether the association between affect balance and stressor context was the result of an association with negative affect, positive affect or both.

The general equations (without additional control variables) are the same for balance count and balance intensity and the equations are as follows:

Level 1: Affect Balance = $\beta_{0j} + \beta_{1j} (\text{Stress Severity}) + \beta_{2j} (\text{Due to Prostate Cancer}) + e_{ij}$

Level 2 : $\beta_{0j} = \gamma_{00} + \gamma_{01} + U_{0j}$

$$\beta_{1j} = \gamma_{10} + U_{1j}$$

$$\beta_{2j} = \gamma_{20} + U_{2j}$$

Composite Equation: Affect Balance_{ijk} = $\gamma_{000} + \gamma_{10}(\text{Stress Severity}) + \gamma_{20}(\text{Due to Prostate Cancer}) + e_{ij} + U_{0j} + U_{1j} + U_{2j}$

3.3 Results

Multi-level models were run to assess whether perception of stress was associated with both balance of affect count and balance of affect intensity. Separate models were run for count balance and intensity balance and for patients and spouses.

Balance of Affect Count : The multi-level models demonstrated that for patients' affect balance in the number of items endorsed was significantly associated with report of stressor severity ($\beta = .669$, $SE = .082$, $p < .001$) and the perception of the bothersome event as being related to prostate cancer ($\beta = .218$, $SE = .216$, $p < .05$). Findings support hypotheses one and two which that the relationship between positive and negative affect is associated with the patients' perception of stress. Complete model statistics are presented in Table 5. For the wives, multi-level models revealed that affect balance in the number of affect items endorsed was significantly associated with report of stressor severity ($\beta = .30$, $SE = .066$, $p < .001$), which support hypothesis 1. Complete model statistics are presented in Table 6.

Previous research has demonstrated that stress is often accompanied by an influx of negative affect and therefore, an additional series of multi-level models was run to assess if the association between stressor severity and affect balance was due to an association with negative affect, positive affect or both. For the patients, individual affect analyses showed that stress severity was associated with both the number of negative affect items endorsed ($\beta = .503$, $SE = .061$, $p < .0001$) and the number of positive affect items endorsed ($\beta = -.166$, $SE = .049$, $p < .0001$). Complete model statistics are presented in Table 7. These findings indicate that for husbands, on occasions when the bothersome event was perceived as more stressful, more negative affect items were endorsed and fewer positive affect items were endorsed. For wives, the additional analyses demonstrated that stress severity was associated with the number of

negative affect items endorsed ($\beta = .2669$, $SE = .049$, $p < .0001$) but was not associated with the number of positive affect items endorsed. Complete model statistics are presented in Table 8.

Therefore, on occasions when the wives perceived the bothersome event as more stressful, more negative affect items were endorsed.

Balance of Affect Intensity: The multi-level models revealed that for the patients balance in the intensity of affect reported was significantly associated with stress severity ($\beta = 2.657$, $SE = .299$, $p < .0001$) and the perception of the bothersome event as being related to prostate cancer ($\beta = .407$, $SE = .199$, $p < .05$). Complete model statistics are presented in Table 5. For wives, analyses demonstrated that affect balance in the intensity of affect reported was significantly associated with stress severity ($\beta = .126$, $SE = .256$, $p < .0001$). See Table 6 for complete model statistics. The additional analyses show that for patients, stress severity is associated with both intensity of negative affect reported ($\beta = 1.79$, $SE = .185$, $p < .0001$) and the intensity of positive affect reported ($\beta = -.863$, $SE = .211$, $p < .0001$). These findings indicate that on occasions when the bothersome event is perceived as more stressful, the intensity of reported of negative affect increases and the intensity of positive affect decreases. Additionally, the perception of the event being caused by prostate cancer is associated with a reduction in the intensity of positive affect experienced ($\beta = -.28$, $SE = .14$, $p < .05$; see table 9). For wives, stress severity was only associated with intensity of negative affect ($\beta = 1.076$, $SE = .17$, $p < .0001$). Additionally, these findings suggest that positive and negative affect are more independent for the spouses because a change in one affect valence does not result in a change in the other. Complete model statistics are presented in Table 10.

3.4 Discussion

In the current study, affect balance was defined as the relative levels of positive and negative affect (Hassett et al, 2008), specifically level of negative affect minus level of positive affect. Although the majority of affect balance studies only consider the count of affect items endorsed (i.e., frequency), the current study considered frequency as well as intensity of affect endorsed. The consideration of affect balance count and affect balance intensity provide two ways of characterizing the affective experience of prostate cancer patients and their spouses. Additionally, considering the relationship of stress with positive and negative affect provides another dimension to understanding the daily adjustment of chronic illness patients and their spouses.

3.4.1 The Association between Stress and Affect Balance

The current study sought to understand whether stress was associated with the relationship between positive and negative affect. In the current study, bothersome/stressful events were reported on most days and therefore, appraisal of stress severity and appraisal of the degree to which the event was due to prostate cancer were used to characterize the stress experience. Perceived stressor severity was significantly associated with both affect balance count and affect balance intensity for both patients and spouses; however, the mechanism of change in balance was different for patients and spouses. For patients, stress severity was associated with changes in both positive and negative affect. Additionally, stress severity was associated with affect balance intensity through increasing the intensity of negative affect endorsed and decreasing the intensity of positive affect endorsed. However, for spouses stress severity was only associated with changes in negative affect; specifically, stress severity was

associated with endorsement of more negative affect items and inducing more intense negative affect.

Additionally, the perception of the degree to which the bothersome event was due to prostate cancer was associated with affect balance count and intensity but only for patients. Interestingly, the association between this perception and affect balance intensity is accounted for solely through a change in positive affect. The association between affect balance count and perception of the stressor being due to prostate cancer is only seen when the relationship between positive and negative affect is considered, and not when the affect valences are considered separately. These findings are especially vital to understanding the experience of cancer patients because a reduction of positive affect could put them at an increased risk of depression but also seems to suggest that their broader health context is combining, to some degree, with their perception of daily stressors.

Finally, the findings present interesting implications for understanding the Dynamic Model of Affect. Interpretations of the Dynamic Model of Affect primarily assert that during times of stress, the affective space shrinks and positive and negative affect are more inversely correlated. However, findings from the current study suggest that this interpretation is not always accurate. In some instances, it seems that the affect space has shrunk because both positive and negative affect were associated with the perceived severity of the daily stressor (ie, patients' count and intensity of affect). On occasions when the perceived stressor severity is associated with an increase in negative affect and a decrease in negative affect, it does seem that the affect valences exist on a single continuum. However, other findings from the current study suggest that this is not always the case. For spouses, perceived stressor severity is only associated with increases in negative affect and therefore, the affective space has not shrunk and the valences do

not appear to be on a single continuum. Taken together, the findings from the current study suggest that the Dynamic Model of Affect may provide an explanation for a part of understanding the relationship between positive and negative affect. However, additional characteristics, such as gender or patient status, may also have an important explanatory function in understanding the relationship between positive and negative affect and the relationship between stressors and affect.

3.4.2 Implications

As previously mentioned, it is important to assess positive and negative affect jointly because individual assessments of one affect valence omits an explanation of the effects of the other valence. Although, the current study did not consider what outcomes are associated with affect balance, findings from the current study demonstrate that affect balance provides information above and beyond what is revealed when positive and negative affect are modeled individually. Specifically, when the number of positive and negative affect items endorsed were analyzed separately it appears that there is not an association between affect and perception that the daily stressor is the result of prostate cancer. However, for patients there is an association between affect balance and the perception that the stressor is due to prostate cancer. This association is important for understanding the experiences of patients and for understanding one way that their diagnosis impacts their daily experiences which could have easily been missed if the relationship between positive and negative affect had not be analyzed. Not only does this association provide an understanding of the experiences of prostate cancer patients but it also has implications for the manner in which care is provided to these patients. Clinicians should be aware that the experience of having received a prostate cancer diagnosis is associated with the patients' perception of stressors which impacts their affect balance in a potentially detrimental

manner. Although the clinician cannot change that the patient has received a cancer diagnosis, they may be able to help the patient reappraise daily stressors in a way that weakens the tie to prostate cancer and therefore, might not be a detrimental to their affective well-being.

3.4.3 Limitations

Affect balance provides information about the daily experience of prostate cancer patients that cannot be obtained by considering positive and negative separately; however, difference scores are not without limitations. Ratios and difference scores are often criticized for failure to distinguish individuals who appear to have the same experience but are actually quite different (ie, high PA and high NA compared to low PA and low NA). Hassett et al. (2008) and Robertson et al. (2007) considered distinct profiles of balance through grouping individuals or experiences based on the various combinations of levels of positive and negative affect endorsed. These groups do not address the adaptive quality of any balance combination but they do provide a description of participants' experiences and distinguish various levels of affect reports.

A second limitation is that the current study does not include a measure of personality but it is likely that the personality traits, mainly neuroticism or extraversion, would impact both an individual's reporting tendencies of stress severity and levels of affect. Neuroticism has consistently been associated with reports of negative affect and extraversion has been associated with positive affect (Schimmack & Diener, 1997; Rusting & Larsen, 1997). Additionally, Rusting and Larsen (1997) found that extraversion was additionally associated with negative mood. Studies have also demonstrated interactions among stress, neuroticism and affect (Mroczek & Almeida, 2004; Suls, Green & Hillis, 1998).

Another limitation is that the sample is small and primarily White and therefore, findings might not generalize to a broader population. Additionally, the study sought to recruit

participants immediately following diagnosis when they were making treatment decisions, which provides critical information on their decision making process; however, the experiences of the current sample may be quite different than the experiences of individuals in more advanced phases of the cancer experience. Prostate cancer dyadic samples inherently includes a gender role confound and therefore, the association seen between the perception of stress being due to cancer and affect balance that is only seen in patients might not be seen in other cancer samples or it may also be seen in spouses in other cancer samples.

Finally, stress context could not be presented in the manner that is traditional for stress in daily diary studies. In the current study, stress severity and whether the bothersome event was due to prostate cancer were used as markers of daily stress; however, these markers only provide information on stress reactivity to a single event. Analyses were not able to assess stress exposure, either in the number of stressors experienced in a day or how many days were considered “stressor” days. In future studies, it would be important to consider both stress exposure and stress reactivity because it is likely that both are associated with affect balance in potentially different ways.

3.4.4 Future Directions

The current study has extended the previous affect balance literature by considering both count and intensity in the relative levels of positive and negative affect but future work should continue to refine the best way to present affect balance as a construct. Characterizing different combinations of positive and negative as “balanced” or “unbalanced” are ambiguous as it relates to the adaptive quality of those combinations. The term balanced suggests equality and equilibrium between positive and negative affect but the adaptive quality of the “balanced” days might not actually be more beneficial to the cancer patients and their spouses. For example, it is

beneficial to experience low negative affect but what is the experience of someone who also reports low positive affect and therefore, is balanced. Zautra, Johnson and Davis (2005) report that positive affect produces additional vulnerabilities and low positive affect has also been considered to be a primary determinant of depression (Lewinsohn & Graf, 1973; Ritterband & Spielberger, 2001). Additionally, Robertson and colleagues (2007) found that compared to other caregivers, caregivers with low NA and low PA had significantly lower levels of caregiving rewards. Therefore, it seems that low PA might be detrimental even when paired with lower NA.

Conversely, what would appear to be an “unbalanced” combination of high PA and low NA would likely be advantageous based on previous literature (Pressman & Cohen, 2005; Steptoe, Wardle & Marmot, 2005; Robertson et al, 2007). Therefore, it seems imprecise to label such different groups as both “unbalanced” when the adaptive quality of this combination is likely more beneficial than “balanced” days. Therefore, future work should continue to refine the construct and consider the associations between affect balance and constructs such as health and well-being because until that is done, it will not be empirically known which combinations of affect are most beneficial or most detrimental.

Additionally, future work should consider the relationship between stress and affect balance across days instead of just within the day. Currently, the results demonstrate that there is an association between stress severity and affect balance on the same day but the direction of influence cannot be definitely concluded. It is assumed that stress is altering the affective experience but it is possible that the affect experienced earlier in the day resulted in the participants reporting greater stress severity in the evening.

Finally, future analyses could attempt to link the affect balance literature and the emotion transmission literature by considering whether affect balance is transmitted between patients and

spouses. In the same sample, Berg et al (2011) found evidence of negative affect covariation when the patients and spouses reported the same daily stressors; given the relationship between stress and affect balance from the current study and the findings from Berg and colleagues (2011) it seems plausible that affect balance would also be transmitted.

3.4.5 Conclusions

The construct of affect balance utilized in the current study provides additional support to the pursuit of understanding the relationship between positive and negative affect and extends the previous literature by considering both count and intensity of affect balance. Findings from the current study also demonstrate that assessing the relationship between positive and negative affect provides information about the daily experiences of prostate cancer patients above and beyond what would be revealed by considering positive and negative affect separately. Finally, findings from the current study indicate that the stressor context is associated with daily affect balance for patients and spouses, and the illness context is associated with daily affect balance for patients. Taken together, the findings from the current study demonstrate the importance of considering the relationship between positive and negative affect instead of simply assessing the affect valences separately along with emphasizing the need for considering the various contexts that influence an individual's daily experience.

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Table 3.1

Demographic Characteristics of Patients and Spouses (N=59)

| Variable | Patients | Spouses |
|--------------------|------------------------|------------------------|
| | <i>Mean (SD) or N%</i> | <i>Mean (SD) or N%</i> |
| Age | 67.56 (9.16) | 64.78 (9.23) |
| White Race | 91.5% | 94.9% |
| Length of Marriage | 38.40 (13.6) | |
| Subjective Health | 3.54 (.90) | 3.27 (.87) |

Table 3.2

Descriptive Statistics of Primary Measures

| Variable | Patient <i>Mean (SD)</i> | Spouse <i>Mean (SD)</i> |
|-----------------|-----------------------------|----------------------------|
| Positive Affect | | |
| Count | 8.055 (2.504) | 7.638 (2.592) |
| Intensity | 26.815 (10.838) | 25.204 (10.548) |
| Negative Affect | | |
| Count | 3.733 (2.996) | 4.815 (2.960) |
| Intensity | 10.114 (9.619) | 14.202 (10.983) |

Table 3.3

Multi-level models with only demographics in predicting affect balance count and intensity – Patients

| | Balance Count b (SE) | Balance Intensity b (SE) |
|--------------------|-------------------------|-----------------------------|
| Intercept | 10.033 (6.534) | 34.435 (24.071) |
| Age | -.132 * (.065) | -.489 * (.239) |
| Education | .030 (.220) | -.380 (.810) |
| Length of Marriage | .002 (.021) | .065 (.078) |
| Income | .048 (.204) | .223 (.752) |
| Employment Status | -1.656 (1.233) | -7.189 (4.541) |
| Race | .033 (1.67) | .447 (.614) |
| Health | -1.018 (.5261) | -3.551 (1.938) |

* $p < .05$

Table 3.4

Multi-level models with only demographics in predicting affect balance count and intensity – Spouses

| | Balance Count b (SE) | Balance Intensity b (SE) |
|--------------------|-------------------------|-----------------------------|
| Intercept | .886 (8.494) | 22.120 (33.133) |
| Age | .037 (.029) | .132 (.114) |
| Education | .201 (.366) | .231 (1.429) |
| Length of Marriage | -.018 (.025) | -.042 (.010) |
| Income | .228 (.179) | 1.486 * (.696) |
| Employment Status | .150 (.260) | .169 (1.013) |
| Race | -1.379 (1.617) | -8.840 (6.306) |
| Health | -.177 (.4574) | -1.527 (1.784) |

* $p < .05$

Table 3.5

Multi-level models with Stress Predicting Patient Affect Balance – Count and Intensity

| | Balance Count b (SE) | Balance Intensity b (SE) |
|------------------------------------|-------------------------|-----------------------------|
| Intercept | -3.624 * (1.62) | -14.516 * (6.721) |
| Between Person Factors | | |
| Age | -.078 (.046) | -.297 (.193) |
| Health | -.987 * (.428) | -3.825 * (1.779) |
| Person Mean Stress Severity | .241 (.292) | 1.002 (1.207) |
| Person Mean Due to Prostate Cancer | .218 (.216) | .913 (.893) |
| Within Person Factors | | |
| Stress Severity | .669 ** (.082) | 2.657 ** (.299) |
| Due to Prostate Cancer | .118 * (.054) | .407 * (.199) |
| Fit Indices | | |
| -2 Res Log Likelihood | 2704.3 | 4119.2 |
| AIC | 2708.3 | 4123.2 |
| BIC | 2712.1 | 4126.9 |

* $p < .05$ ** $p < .01$

Table 3.6

Multi-level models with Stress Predicting Spouse Affect Balance – Count and Intensity

| | Balance Count b (SE) | Balance Intensity b (SE) |
|------------------------------------|-------------------------|-----------------------------|
| Intercept | -5.333 ** (.886) | -23.859 ** (3.391) |
| Between Person Factors | | |
| Age | .030 (.027) | .140 (.102) |
| Income | .222 (.153) | 1.387 * (.583) |
| Person Mean Stress Severity | .272 (.258) | .969 (.986) |
| Person Mean Due to Prostate Cancer | .227 (.231) | .645 (.885) |
| Within Person Factors | | |
| Stress Severity | .301 ** (.066) | 1.263 ** (.256) |
| Due to Prostate Cancer | .014 (.049) | .076 (1.92) |
| Fit Indices | | |
| 2 Res Log Likelihood | 2792.9 | 4259.5 |
| AIC | 2796.9 | 4263.5 |
| BIC | 2800.7 | 4267.3 |

* $p < .05$ ** $p < .01$

Table 3.7

Multi-Level Models Predicting Negative Affect and Positive Affect Count Separately – Patients

| | Negative Affect b (SE) | Positive Affect b (SE) |
|------------------------------------|---------------------------|---------------------------|
| Intercept | 4.336 ** (1.268) | 7.974 ** (1.196) |
| Between Person Factors | | |
| Age | -.076 * (.036) | .002 (.034) |
| Health | -.716 * (.335) | .266 (.317) |
| Person Mean Stress Severity | .116 (.228) | -.125 (.214) |
| Person Mean Due to Prostate Cancer | .064 (.169) | -.153 (.159) |
| Within Person Factors | | |
| Stress Severity | .503 ** (.061) | -.166 ** (.049) |
| Due to Prostate Cancer | .064 (.041) | -.054 (.032) |
| Fit Indices | | |
| -2 Res Log Likelihood | 2397.9 | 2165.5 |
| AIC | 2401.9 | 2169.5 |
| BIC | 2405.7 | 2173.3 |

* $p < .05$ ** $p < .01$

Table 3.8

Multi-Level Models Predicting Negative Affect and Positive Affect Count Separately – Spouses

| | Negative Affect b (SE) | Positive Affect b (SE) |
|------------------------------------|---------------------------|---------------------------|
| Intercept | 2.960 ** (.659) | 8.288 ** (.757) |
| Between Person Factors | | |
| Age | .016 (.020) | -.014 (.023) |
| Income | .145 (.114) | -.084 (.134) |
| Person Mean Stress Severity | .325 (.192) | .058 (.221) |
| Person Mean Due to Prostate Cancer | .015 (.036) | .040 (.199) |
| Within Person Factors | | |
| Stress Severity | .267 ** (.048) | -.029 (.036) |
| Due to Prostate Cancer | .015 (.036) | .003 (.027) |
| Fit Indices | | |
| -2 Res Log Likelihood | 2462 | 2199.5 |
| AIC | 2466 | 2203.5 |
| BIC | 2469.8 | 2207.3 |

* $p < .05$ ** $p < .01$

Table 3.9

Multi-Level Models Predicting Negative Affect and Positive Affect Intensity Separately – Patients

| | Negative Affect b (SE) | Positive Affect b (SE) |
|------------------------------------|---------------------------|---------------------------|
| Intercept | 11.112 ** (4.033) | 25.683 ** (5.666) |
| Between Person Factors | | |
| Age | -.163 (.116) | .133 (.164) |
| Health | -2.197 * (1.067) | 1.610 (1.505) |
| Person Mean Stress Severity | .057 (.725) | -.949 (1.012) |
| Person Mean Due to Prostate Cancer | .493 (.536) | -.419 (.751) |
| Within Person Factors | | |
| Stress Severity | 1.794 ** (.185) | -.863 ** (.211) |
| Due to Prostate Cancer | .126 (.123) | -.281 * (.140) |
| Fit Indices | | |
| -2 Res Log Likelihood | 3595 | 3759.5 |
| AIC | 3599 | 3763.5 |
| BIC | 3602.8 | 3767.3 |

* $p < .05$ ** $p < .01$

Table 3.10

Multi-Level Models Predicting Negative Affect and Positive Affect Intensity Separately – Spouses

| | Negative Affect b (SE) | Positive Affect b (SE) |
|------------------------------------|---------------------------|---------------------------|
| Intercept | 7.362 ** (2.354) | 31.195 ** (2.791) |
| Between Person Factors | | |
| Age | .076 (.071) | -.065 (.086) |
| Income | .399 (.406) | -1.009 * (.491) |
| Person Mean Stress Severity | 1.318 (.684) | .364 (.813) |
| Person Mean Due to Prostate Cancer | .679 (.615) | .019 (.733) |
| Within Person Factors | | |
| Stress Severity | 1.076 ** (.172) | -.173 (.155) |
| Due to Prostate Cancer | .137 (.129) | .063 (.116) |
| Fit Indices | | |
| -2 Res Log Likelihood | 3836 | 3751.1 |
| AIC | 3840 | 3755.1 |
| BIC | 3843.8 | 3758.8 |

* p < .05 ** p < .01

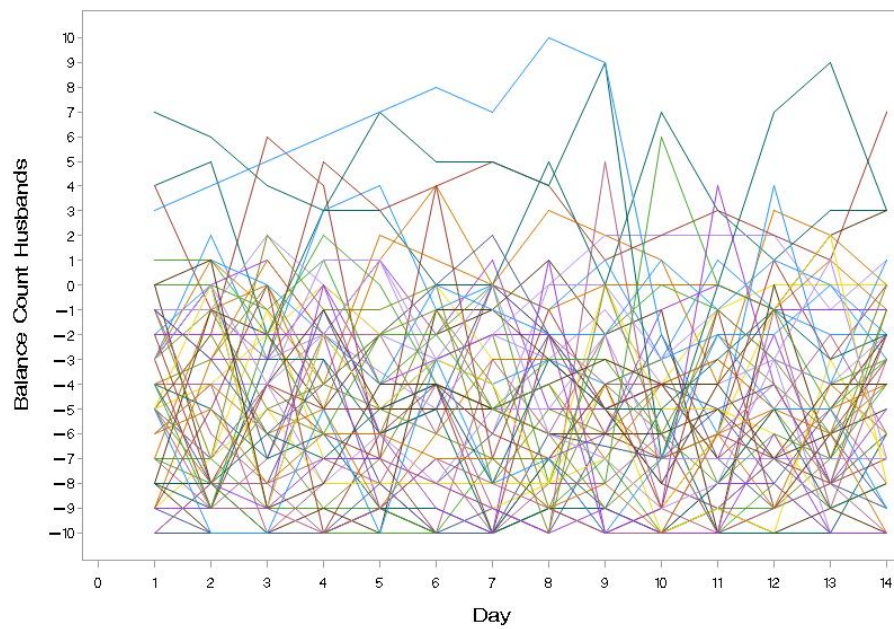


Figure 3.1. Intraindividual variability across days in Husbands/Patients Affect Balance - Count

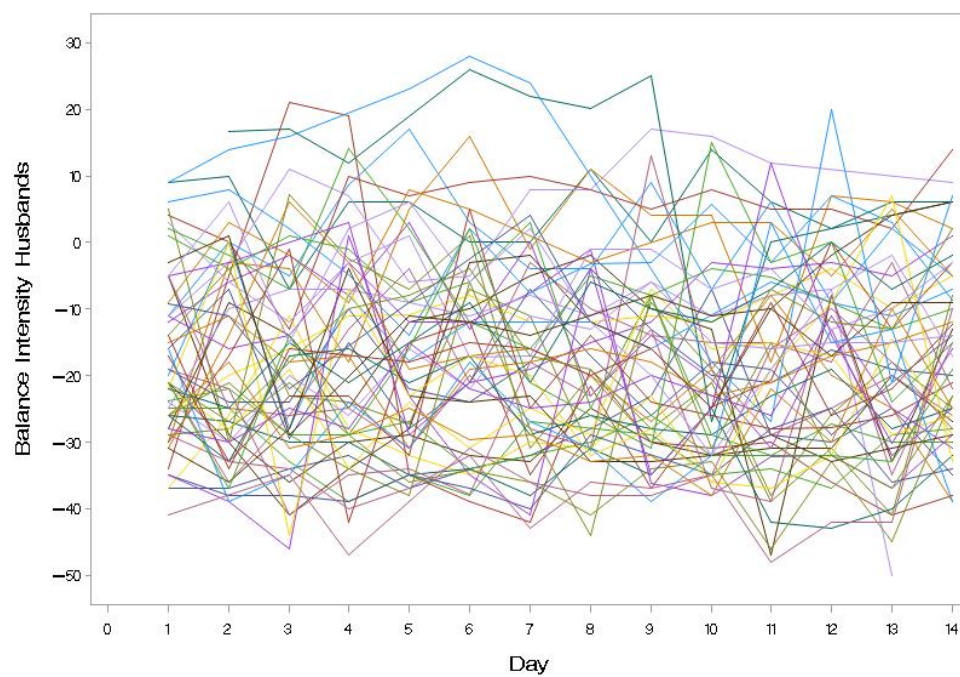


Figure 3.2. Intraindividual variability across days in Husbands/Patients Affect Balance – Intensity

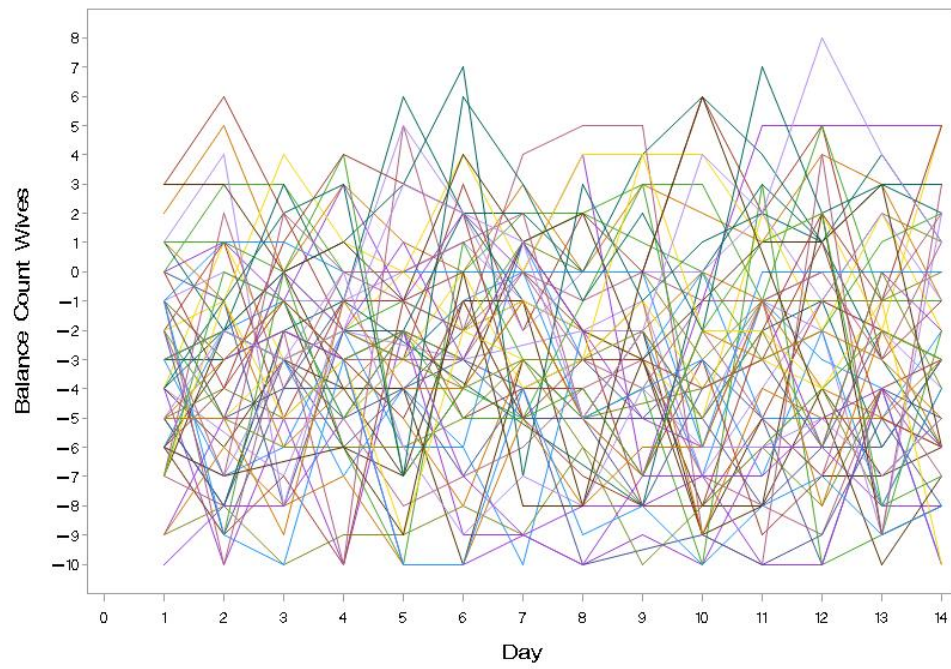


Figure 3.3. Intraindividual variability across days in Spouse Affect Balance – Count

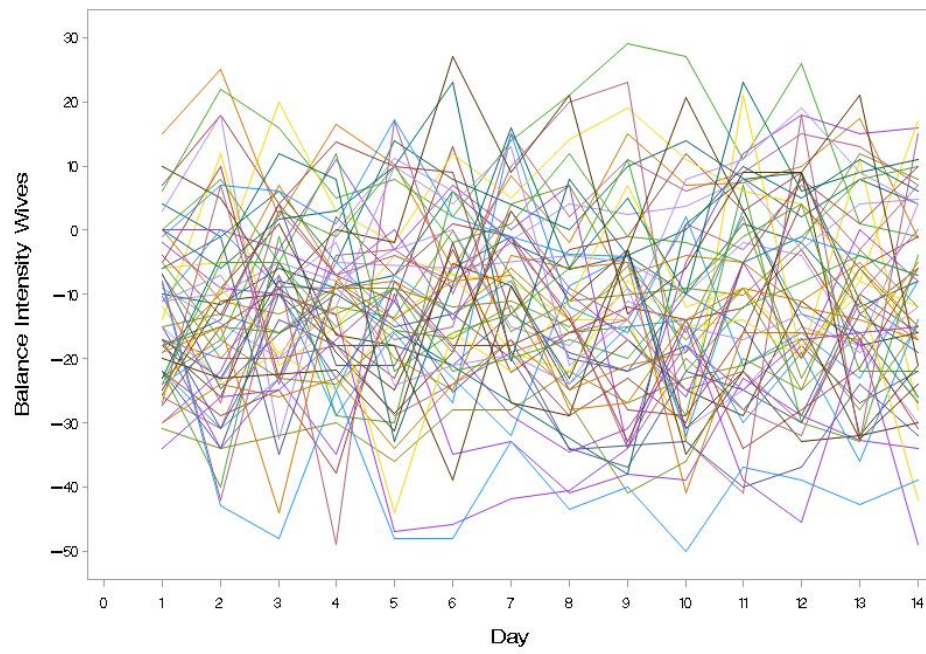


Figure 3.4. Intraindividual variability across days in Spouse Affect Balance – Intensity

CHAPTER 4. STUDY 3

Affect Balance in Caregivers of Relatives with Dementia

4.1 Introduction

Northouse (2005) defines an informal caregiver as anyone who is providing care to another adult who is having difficulty with at least one activity of daily living. Research shows that providing care to an individual with a neurocognitive disorder such as dementia is more stressful than providing care to an individual with a physical impairment (Schulz & Martire, 2004) perhaps because of the cognitive, behavioral and affective symptoms associated with dementia, along with feeling a lack of control and loss of the person and relationship. Dementia caregiving has also been considered to be the prototypic chronic stressor (Vitaliano, Young & Zhang, 2004) and it has been well documented that the chronic stress of being a caregiver is likely to be detrimental to an individual's physical and emotional health. For example, Stambor (2006) noted that compared to non-caregivers, caregivers exhibited elevated blood pressure and glucose levels. Additionally, caregiving has been associated with inadequate rest, inadequate exercise, missing doctor's appointments, forgetting to take medications and the inability to slow down when it is needed (Burton, Newsom, Schulz, Hirsch & German, 1997). Caregiving is also associated with emotional distress impairments in emotional well-being. Specifically, Carter and Chang (2000) found that out of 51 caregivers, 27 had depression at a level that was high enough to be considered clinical depression. Zarit, Stephens, Townsend and Greene (1998) also noted that caregivers may experience a range of emotional distress such as role captivity, overload, worry and strain, anger and anxiety.

While caregiving has been shown to be associated with poor health and emotional well-being, it is also possible for positive emotions and experiences to occur or be derived from the role. Cohen, Colantonio and Vernich (2002) found that 73% of their participants could identify at

least one positive aspect of caregiving and an additional 7% identified more than one positive experience. Positive experiences do not equate to positive emotions but the presence of these positive experiences may have important implications for what valence of affect is reported and for understanding the relationship between positive and negative emotions. Robertson and colleagues (2007) found that caregiving rewards was the strongest contributor to the discriminant function distinguishing caregivers with what they called ambiguous emotional balance (low negative affect (NA) and low positive affect (PA)) from caregivers with intense balance (high PA and high NA). The caregivers in the intense balance group reported the highest levels of caregiving rewards which suggest that positive experiences co-occur with positive affect.

Assessing the relationship between positive and negative affect provides information that is missed when the valences are considered separately and is the only way to have a complete understanding of an individual's affective experience. Specifically, when only one affect valence is evaluated the potential effects of the other valence are missed. For example, an individual who reports low levels of negative affect is likely to fare well in terms of health and well-being but it is not clear if their trajectory would be the same if they are also low on positive affect. Similarly, an individual who experiences high levels of positive affect would also be expected to fare well in terms of health and well-being but it is not clear if those benefits remain if high positive affect is also accompanied by high negative affect.

4.1.1 Mixed Emotions: Two Factors or One Dimension

Positive and negative affect are often considered individually but instances where both positive and negative affect are assessed jointly raises the issue of a current debate in the literature. Mainly, whether the affect valences exist as two distinct constructs or are opposite ends of a single dimension. Watson and Tellegen's (1985) Positive Activation-Negative

Activation model asserts that the affect valences are perfectly negatively correlated. Barrett and Russell's (2003) valence arousal model also contends that positive and negative affect are mutually exclusive. Furthermore, Zautra and Reich (1983) found that in a review of 17 studies that assessed life events and affect, negative life events increased negative affect along with decreasing positive affect. The fact that negative life events could increase negative affect at the same time as decreasing positive affect suggests the affect valences may not be completely independent and may exist on a single dimension.

However, there is also work that challenges the assertion that positive and negative affect are linked on a single continuum. For example, the Evaluative Space Model (Cacioppo & Berntson, 1994) conceptualizes positive and negative affect as "separable" such that any pattern of positive and negative affect could occur. Additional empirical work has also suggested the independence of the affect valences (Bradburn & Caplovitz, 1965; Diener, Larson, Levin & Emmons, 1985; Watson & Clark, 1992; Watson, Clark & Tellegen, 1984; Zevon & Tellegen, 1982). The debate has not yet been resolved but even so, the two sides of the debate are critical for understanding the relationship between positive and negative affect. Specifically, if the affect valences are two separate constructs then an individual could experience both positive and negative affect simultaneously; yet, if they are linked on a single continuum then positive and negative affect cannot be experienced concurrently because the presence of one would naturally indicate the absence of the other.

4.1.2 Emotional Complexity

One step forward in attempting to resolve the current debate has been to consider the relationship between positive and negative affect through the lens of emotional complexity. Emotional complexity has typically been defined as the co-occurrence of positive and negative

affect (Carstensen et al, 2000) or the structural complexity of adults' emotions (Chipperfield et al, 2003, Larsen & Cutler, 1996). The co-occurrence of positive and negative affect has also been called poignancy (Carstensen et al, 2000) and indicates that individuals have the capacity to experience emotions of separate valences at the same time. Most often emotional complexity is calculated as the simple co-variation or correlation of positive and negative affect.

Emotional complexity is an important first step in understanding the relationship between positive and negative affect; however, there are challenges associated with research that conceptualizes emotional complexity as a simple co-variation between positive and negative affect. Research that conceptualizes emotional complexity as a co-variation score between positive and negative affect is interpreted as positive affect and negative affect actually co-occurring. However, many cases this cannot actually be known. In most instances, participants are asked to retrospectively report on their emotions for a specific time frame (i.e., the last 24 hours, the last 30 minutes or since the last EMA beep) and it is impossible to know if positive and negative affect actually co-occurred. At best, it is known that both positive and negative affect both occurred at some point during the reporting period. It is likely that what appears to be emotional complexity or emotional co-occurrence may be a summary of all the emotions that the participants vacillated between during the measurement period (Barrett & Bliss-Moreau, 2009). Vacillating between emotions is not inherently problematic but interpreting co-occurrence based on retrospective recall over hours or days is not warranted by the available data. Rather, co-occurrence needs to be demonstrated as the simultaneous experience of positive and negative emotions. In other words, interpretation of the relationship between positive and negative affect should accurately match the time scale of the data.

4.1.3 Affect Balance

Compared to emotional complexity, affect balance is a more fitting approach for considering the relationship between positive and negative affect when affect is assessed across longer time scales. Affect balance is the relative levels of positive and negative affect across a designated recall period (Hassett et al, 2008) and does not make any assumptions regarding the actual co-occurrence of positive and negative affect. Traditionally, affect balance has been calculated as the difference score between the number of negative affect items endorsed and the number of positive affect items endorsed. Specifically, the Bradburn Affect Balance Scale (Bradburn, 1969) has been used to calculate a difference score between the number of negative affect items endorsed minus the number of positive affect items endorsed. Additionally, the Balanced States of Mind model (Schwartz & Garamoni, 1989) considers the ratio of positive affect to total affect endorsed.

Affect balance provides a clearer and more precise approach to assessing the relationship between positive and negative affect and yet an important component of the affective experience is missed. Commonly, affect balance scores have only considered the number of affect items endorsed which ignores the intensity of affect experienced. The complete affective experience cannot be understood without considering intensity because a difference score between the count of affect items endorsed can result in two very different individuals appearing to have the same experience (Schimmack & Diener, 1997). For example, with the traditional calculation of affect balance, if person A and person B both endorsed five negative affect items and five positive affect items, they would appear to be perfectly balanced in their affect and they would be exactly the same in their balance levels. However, a very different affective experience would be shown if person A endorsed all the items at an intensity of 5 and person B endorsed all the items at an

intensity level of 1. Based on this additional component of the affective experience, these two individuals would no longer have similar experiences which suggests the need and importance of considering both balance in the number of affect items endorsed and the intensity of affect experienced.

4.1.4 Context and Affect Balance

In addition to assessing both frequency and intensity of affect, it is important to consider contextual factors that may influence the relationship between positive and negative affect. Previous research findings have revealed a link between stressors and affect, mainly higher stress is typically associated with more negative affect or poorer mood (Affleck, Tennen, Urrows & Higgins, 1994; DeLongis, Folkman & Lazarus, 1998; Watson, 1988; Bolger, DeLongis, Kessler & Schilling, 1989). The Dynamic Model of Affect (Zautra, Potter & Reich, 1997) asserts that most of the time, positive and negative affect are independent of one another. However, it is also the case that the degree of relationship between positive and negative affect is somewhat dependent on the individual's context at the time, mainly what type of events have been experienced. Diener and Emmons (1985) and Diener and Iran-Nejad (1986) asserted that the degree of the relationship between positive and negative affect depends on the level of emotional intensity and during times of high emotional intensity the inverse correlation between the two will increase. Zautra, Potter and Reich (1997) propose that the type of emotional intensity most likely to exert influence on the relationship between positive and negative affect is stress. During times of stress, it is believed that the affect systems are merged in order to simplify coping options and to maintain homeostasis that has been disrupted by the uncertainty of stress (Davis, Zautra & Smith, 2004). Zautra, Potter and Reich (1997) assessed life events, positive and negative affect and pain over 12 consecutive weeks in 41 female arthritis patients and found that

during low negative affect weeks the correlation between the affect valences was $-.115$ compared to a stronger correlation of $-.558$ during high negative affect weeks. A Fisher's z transformation also showed that the two correlations were significantly different from one another. This change in co-variation would most often be interpreted as the affective space being narrowed and simplified to focus attention, which results in a strong inverse correlation (Davis, Zautra & Smith, 2004). Thus, findings indicate that the stressor context is associated with the affect valences individually but also the relationship between positive and negative affect.

Given the literature linking stressors to affect and the theoretical underpinnings of the Dynamic Model of Affect, it is important to assess the association between daily stressors and affect balance within the broader chronic stress context. Daily stress and chronic strains may interact in three main ways: (1) events (i.e., daily stress) lead to chronic strains, (2) chronic strains lead to events of (3) strains and events provide contexts for each other (Pearlin, 1989). For example, Stawski, Sliwinski, Almeida and Smyth (2008) found that level of global perceived stress was associated with greater reported exposure to daily stressors in older adults.

4.1.5 Caregiving Interventions and Affect Balance

Based on findings demonstrating an association between stressors and affect or affect balance, it is also likely that an association exists between interventions focused on stress reduction and affect balance. The caregiving role is particularly stressful and thus provides a good context for studying the association between stressors and affect balance. Further, interventions for caregivers are designed to improve their management of stressors and provide resources (e.g., respite care) that reduce stressors exposure and may also impact affect balance.

Psycho-social interventions such as the New York University Caregiver Counseling and Support Intervention and the Resources for Enhancing Alzheimer's Caregiver Health II have been beneficial in improving caregivers' management of stressors, providing resources and promoting positive experiences. The New York University Caregiver Counseling and Support Intervention combined individual counseling, family counseling, support groups and ad hoc counseling to impact multiple domains. Specifically, individuals who received the intervention showed a 28.3% reduction in nursing home placement of the care recipient and 61.2% of the benefit of the intervention was explained by improvements in the caregiver's appraisal of social support, response to behavior problems and symptoms of depression (Mittelman, Haley, Clay & Roth, 2006). The intervention also had a positive impact on depression. Specifically, in the first year of the study, the control group became more depressed while the treatment group remained stable and eventually the treatment group was significantly less depressed than individuals in the control group (Mittelman, Ferris, Shulman, Steinberg, Ambinder, Mackell & Cohen, 1995). The treatment group also experienced better physical health which was maintained for two years (NREPP).

Additionally, caregivers who received treatment in the Resources for Enhancing Alzheimer's Caregiver Health II (REACH II) reported better self-reported health, sleep quality, physical health, and emotional health (Elliott, Burgio & DeCoster, 2010). The condensed intervention translated for use in Area Agencies on Aging (REACH Out) also showed positive pre-post intervention effects on caregiver subject burden, caregiver frustration, social support, depression, health, and positive aspects of caregiving (Burgio, Collins, Schmid, Wharton, McCallum & DeCoster, 2009). Other interventions have also been shown to improve the

caregiver's efficacy in providing care, confidence in dealing with caregiving situations along with increasing use of problem solving and reframing (Ducharme et al, 2011).

In addition to psychoeducational interventions, respite for caregivers is also effective in reducing caregiver burden. One prominent way that caregivers may receive respite is through the use of adult day services (ADS). Adult day service programs provide away from the home care services such as socializing, medical care and therapeutic activities (Weissert et al, 1990) and provides caregivers with time away from their care responsibilities which allows them to focus on other areas of life and utilize social and psychological resources important for well-being (Zarit et al, 1998). Zarit et al (1998) found that use of adult day services by dementia caregivers reduced caregiver related burden and improved psychological well-being compared to the experiences of caregivers who were not using adult day services. Specifically, after 3 months of day care use, the treatment group showed significantly lower scores on the primary appraisals of overload and strain along with demonstrating significantly lower scores on depression and anger. Wimo et al (1990) also found that 62% of the relatives in their sample reported that using adult day services had improved their situation because they could "see friends, go shopping and take a rest without being worried" (page 284). Additionally, caregivers who were utilizing adult day services and also reported less hours with memory problems were more likely to report decreases in role overload in a 3 month interval (Gaugler et al, 2003). Taken together it is clear that there are multiple ways for interventions to change a caregiver's stressor context, which may also alter the association between positive and negative affect.

Interventions are capable of reducing stressor exposure may impact affect balance over time; however, the benefits of ADS have also been assessed on the daily level. Zarit and colleagues (2011) found that compared to non-ADS days, on ADS days total exposure to

stressors and stressor appraisals were significantly decreased (Zarit, Kim, Femia, Almeida, Savla & Molenaar, 2011) and recent findings from the same sample (the Daily Stress and Health Study; DaSH) demonstrate that use of adult day services alter the caregiving context through a reduction in care related stressors and an increase in more positive experiences on days that they utilized in ADS (Zarit, Kim, Femia, Almeida & Klein, 2013). On days when ADS is used, positive events are higher and negative affect is lower (Zarit, Kim, Femia, Almeida & Klein, 2013), which suggest a same day effect might exist between ADS use and affect balance.

It is clear that ADS use alters the stressor context for dementia caregivers, but it is also possible that the anticipation of ADS use and thus a regular relief in providing care impacts affect balance above and beyond a reduction in stressor exposure. For example, Zarit and colleagues (2014) found that caregivers with a blunted cortisol awakening response seemingly recover on ADS days and show a more normative awakening response. The awakening responses occurs before the adult day service program and therefore, the effect is not due to a change in stressors but instead is likely due to anticipation of the day and the benefits that will occur. Thus, adult day service use may be associated with affect balance above and beyond the association between stressors and affect balance.

In addition to an anticipatory effect, there may also be a lagged or next day effect of adult day services on affect balance. Dehydroepiandrosterone-sulfate (DHEA-S) is a hormone responsive to acute stressors that has been found to be associated with positive mood and health (Wolf & Kirschbaum, 1999; Van Niekerk, Huppert & Herbert, 2001;). Comparing caregivers on days they used and did not use ADS, Zarit and colleagues (Zarit, Whetzel, Kim, Femia, Almeida, Rovine & Klein, 2014) found that DHEA-S levels increased on the day following ADS use as

did positive affect. Thus, the association between ADS use and affect balance might also be lagged.

4.1.6 Current Study

The current study assessed affect balance (both count of items endorsed and intensity of affect endorsed) in family caregivers of individuals with dementia and considered how an intervention providing respite impacts affect balance. Using data from the Daily Stress and Health of Caregivers Study (see Zarit, Kim, Femia, Almeida & Klein, 2013) caregivers reported on positive and negative affect, stressors, stressor appraisals, and health symptoms on 8 consecutive days. Across the 8 study days the caregivers used adult day services (ADS) some days and on other days provided all the needed care at all and therefore, a strength of the current study is that affect balance can be assessed along with testing how an intervention may alter affect balance.

4.1.7 Study Objectives and Hypotheses

The primary study objective was to assess how affect balance (both count and intensity) is associated with ADS use above and beyond the impact of stressor exposure reduction. The hypotheses were as follows:

H₁: It was expected that the intervention of ADS will be associated with affect balance (both count and intensity) on the same day.

H₂: It was also expected that the intervention of ADS will be associated with affect balance (both count and intensity) on the following day, regardless of whether or not the following day is an ADS day.

4.2 Methods

4.2.1 Study Design

The study was a within person repeated measure design made up of four components: baseline in person interview, 8 day daily diary, 6 month follow up and 12 month follow up. The daily diary component included an intervention where on a portion of the days the caregivers received respite from providing care while the individual with dementia was attending adult day services. The study uses an A-B-A design, where on some days the intervention is introduced and on other days the intervention is not present (Barlow, Nock, & Hersen, 2009). This design allows for a within person comparison of how daily use of adult day services (ADS) impacts the health and well-being of caregivers compared to days when caregivers provide most or all of the care. The proposed study utilized data from the in person baseline interview and the daily diary component.

4.2.2. Data Collection Procedures

Participants were recruited through ADS programs throughout New Jersey, in the Pittsburgh and Philadelphia areas, in Arlington, Alexandria and Fairfax counties in Northern Virginia and from one program in Denver, Colorado. ADS programs that were interested in participating in the study attended a training meeting where they were provided study information along with learning the responsibilities of their program. The ADS program staff provided caregivers with study information both verbally and with printed flyers and then with the caregiver's permission, contact information was referred to the research staff to be screened for eligibility. If the caregiver was deemed eligible for the study, a research interviewer was assigned to conduct the initial interview.

The initial interview was conducted in person and in addition to collecting the baseline data, the interviewer also provided the caregivers with instructions on completing the daily diary forms and on providing the saliva samples. The interviewer also confirmed their planned schedule of ADS use over the next 8 days. On the day of the initial interview or the following day, caregivers received a call from the Survey Research Center (SRC) at The Pennsylvania State University to set up their daily schedule for evening phone calls. The daily diary component of the study was 8 consecutive days and was completed through evening phone calls from the SRC. Each daily interview lasted approximately 15 to 20 minutes and each day the caregivers also provided 5 saliva samples. Data from the baseline interview and daily diary component will be used in the proposed study, bio marker data will be not included in the analyses.

4.2.3 Participants

To be eligible for participation, individuals had to be a family member holding primary responsibility for providing care for an individual with dementia, and they had to be living in the same household as the individual with dementia in order to assure a difference in stressor exposure between treatment and control days. Additionally, the individual with dementia had to have received a physician's diagnosis of dementia, be attending an adult day services program at least 2 days a week and have been enrolled in the ADS program for at least one month.

Figure 1 shows the recruitment of the sample. 200 caregivers were deemed eligible for the study. However, six caregivers decided (3%) not to participate, ten caregivers (5%) did not complete the initial baseline interview, and two caregivers (1%) did not complete any daily interviews. One hundred eighty-two caregivers (91% of those eligible) completed the study; however, nine cases (4.5%) had to be dropped from the present analysis because they only had

ADS days ($n=3$, 1.5%) or they only had non ADS days ($n=4$, 2%) and two cases (1%) were dropped because they were sisters splitting the care responsibilities. Therefore, 173 caregivers are included in the sample for the current study. The majority of the caregivers were female (86.7%) and were providing care for a parent or parent in law (51.4%). Additionally, 37.6% of caregivers were providing care for their spouse. The caregivers ranged in age from 39 to 89 years old with a mean age of 62. See table 1 for complete demographic information.

4.2.4 Measures

Positive Affect: Positive affect was assessed daily using an adapted version of the Non Specific Psychological Distress Scale (Kessler et al., 2002; Mroczek & Kolarz, 1998). The positive emotions reported on were close to others, in good spirits, cheerful, extremely happy, calm and peaceful, full of life and satisfied. Additionally, two items (interested and attentive) were added from the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). Participants rated how often they felt each emotion in the last 24 hours using a 5 point numerical rating scale ranging from 1 = none of the day to 5 = all of the day. Cronbach's alpha for the current sample is .92. Mean and standard deviation is provided in Table 2.

Negative Affect: Negative affect was assessed daily using an adapted version of the Non Specific Psychological Distress Scale (Kessler et al, 2002; Mroczek & Kolarz, 1998). The 11 items (4 items were dropped for failing to adequately load on a factor) assessed three domains: anxiety, anger and depression. The anxiety scale included items of restless or fidgety, nervous and jittery. The anger scale assessed anger, frustrated and irritable and the depression scale included worthless, hopeless, ashamed, upset and so sad nothing could cheer you up. Participants rated how often they felt each emotion in the last 24 hours using a 5 point numerical rating scale ranging from 1=none of the day to 5 = all of the day. Cronbach's alphas for each domain are as

follows: anger (.83), anxiety (.84) and depression (.84). Mean and standard deviation is provided in Table 2.

Intervention: In the proposed study, days are considered a non-intervention day if the caregiver is providing care to their relative at home. A “low-stress day” or an intervention day is if the caregiver received respite while their relative attended adult day services. It was considered to be an ADS (or intervention) day if during the evening telephone call the caregiver answered in the affirmative to the question, “Did your relative attend day care today?” Daily stress will also be considered through reports of care related and non-care related stressors.

Care related stressors: Care related stressors were assessed using the Daily Record of Behavior designed for use in a daily format (Fauth, Zarit, Femia, Hofer, & Stephens, 2006; Femia, Zarit, Stephens, & Greene, 2007) and focused primarily on the behavioral and psychological symptoms of dementia. Specifically, caregivers reported on 19 items across 6 domains: resistance to help with activities of daily living (ADL), restless behaviors, reality problems, depressive behaviors, disruptive behaviors, and memory-related behaviors. Caregivers responded on 4 different time periods: waking to 9:00 am, 9:00 am to 4:00 pm, 4:00 pm to bedtime and overnight. For each time period, caregivers endorsed if the specific issue occurred and then rated how stressful they found the event to be on a numerical rating scale of 1 = not at all stressful to 5 = very stressful.

Non care related stressors: In addition to care related stressors, caregivers may also experience daily stressors in other domains of life. Daily stressors not related to providing care were assessed using the Daily Inventory of Stressful Events (DISE; Almeida, 1998; Almeida, Wethington, & Kessler, 2002). Caregivers reported on 8 stressors for the past 24 hours using a numerical rating scale of 1= not at all stressful to 5 = very stressful. Items including arguments,

avoiding arguments, network stressors, health related stressors, financial stressors and work related stressors.

Covariates: Both demographic and conceptual covariates were included in the models. Demographic variables included age and work status. Additional conceptual covariates included ADL impairment and duration of care.

ADL Disability: Participants were asked to report how much help their relative needed with a series of personal activities of daily living (PADL; Katz, Ford, Moskowitz, Jackson & Jaffe, 1963) and instrumental activities of daily living (IADL; Lawton & Brody, 1969). Specifically, caregivers were asked about 7 IADL items (taking medications, housework/housecleaning, shopping for food, cooking/preparing food, laundry, driving or using public transportation and money issues) and 6 PADL items (eating, dressing/undressing, grooming/hygiene, bathing/showering, going to the bathroom and getting in and out of bed). Caregivers rated the degree of assistance required on a four point numerical rating scale where 1= does not need help, 2 = needs a little help or reminders, 3 = needs a lot of help and 4 =cannot do without help. The scale used was a standard scale of impairment but the response options were slightly modified for dementia, specifically the supervision component was included to reflect that often dementia patients can do something alone with someone “talking them through it”. The total impairment score was an average of the 13 items. ADL disability was included in the models to control for dementia severity.

Duration of Care: Participants were asked “how long has it been since you began assisting our loved one because of his/her illness” and therefore, duration of care was calculated as the number of months they have been providing care.

4.2.5 Data Preparation

Affect Count Variables: Affect count variables were calculated by recoding the raw affect data, such that affect items that were initially endorsed as being experienced none of the day (1) were coded to 0 for not endorsed. Any affect items that were initially endorsed as being experienced a little of the day (2) to all day (5) were coded as 1 to indicate they had been endorsed. All the items endorsed were summed to create a total score. Total scores were calculated for negative affect, positive affect and the three subscales of negative affect (anxiety, anger and depression). The total scores were then divided into groups to assess the various profiles of balance exhibited in the current sample. The total scores for negative affect and positive affect were then grouped into 3 levels low, medium or high. The levels were determined by mean and $\frac{1}{2}$ standard deviation of each construct. A full standard deviation above and below the mean could not be used because on certain constructs (positive affect), a full standard deviation above the mean was outside the range of possible values and therefore, the high group would not be possible. Scores from the lowest possible score to $\frac{1}{2}$ standard deviation below the mean were coded as 0 = low, scores between $\frac{1}{2}$ a standard deviation below the mean and $\frac{1}{2}$ a standard deviation about the mean were coded as 1 = medium and scores above $\frac{1}{2}$ standard deviation above the mean were coded as 2 = high. The groups are descriptive and provide additional information regarding the profiles of balance but are not included in the primary analyses. Group distributions are presented in Table 3.

Affect Intensity Variables: Affect intensity variables were calculated by creating interaction variables between the created affect count variables and the raw affect data. With the interaction variable, items that had been initially endorsed as none of the day (1) become zero after being multiplied by the count variable (ie 0 = not endorsed multiplied by 1 = none of the

day = zero). Therefore, these instances were not included in the intensity variables. The intensity from all the items endorsed were summed to create a total score. Total scores were calculated for negative affect, positive affect and the three subscales of negative affect (anxiety, anger and depression). Group membership for the affect intensity variables was calculated in the same manner as for the affect count variables (see above). Group distributions are presented in Table 4

4.2.6 Data Analysis Plan

As an initial step, daily affect balance scores were calculated for caregivers. The number of positive and negative affect items endorsed was standardized to avoid inaccurate balance scores because more negative items were asked. To calculate daily affect balance count scores, the number of positive affect items endorsed and the number of negative affect items endorsed were summed and then level of positive affect was subtracted from the level of negative affect. To calculate daily affect balance intensity scores, the level of negative affect intensity was summed and the level of positive affect intensity was summed and then the level of positive affect intensity was subtracted from the level of negative affect intensity.

To assess the manner in which stressor context is associated with affect balance (study objective 2), multi-level modeling was utilized to account for the nested nature of the data (SAS PROC MIXED; Singer & Willett, 2003). Specifically, two level models will be used to account for multiple days nested in individuals, where level 1 is the day level, and level 2 is the person level. A series of models were run to determine the manner in which a change in stressor exposure (specifically an intervention day) impacts or alters affect balance. Interactions between stressors and affect balance were also considered. First, an unconditional means model, or empty model, with no predictors was completed to assess within and between person variance in the dependent variable. The estimates from this model will be used to calculate the Intraclass

Correlation Coefficient (ICC). The intraclass correlation indicates that 63% of the variation in affect balance in the number of items endorsed is between person variation. A representation of the intraindividual standard deviation variability across days of affect balance count is presented in Figure 2. The intraclass correlation shows that 69% of the variation in affect balance in the intensity of affect endorsed is between person variation. A representation of the intraindividual standard deviation variability across days of affect balance intensity is presented in Figure 3. Second, at level 2 demographic variables and control variables were entered in the model as predictors. Complete model statistics are provided in Table 5. Third, the final models include significant demographic and control variables along with the primary predictors, in this case, whether the day is an intervention or non-intervention day. The general equation (without additional control variables) is as follows:

Level 1: $\text{Affect Balance}_{ij} = \beta_{0j} + \beta_{1j} (\text{ADS}) + \beta_{2j} (\text{Care Stressors}) + \beta_{3j} (\text{Non Care Stressors}) + \beta_{4j} (\text{ADS} * \text{Care Stressors}) + e_{ij}$

Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01} (\text{Total ADS days}) + U_{0j}$

$$\beta_{1j} = \gamma_{10} + U_{1j}$$

$$\beta_{2j} = \gamma_{20} + U_{2j}$$

$$\beta_{3j} = \gamma_{30} + U_{3j}$$

$$\beta_{4j} = \gamma_{40} + U_{4j}$$

Composite Equation: $\text{Affect Balance}_{ijk} = \beta_{00k} (\text{Total ADS days}) + \beta_{10k} (\text{ADS}) + \beta_{20k} (\text{Care Stressor}) + \beta_{30k} (\text{Non Care Stressors}) + \beta_{4j} (\text{ADS} * \text{Care Stressors}) + e_{ijk} + V_{0jk}$

The general equation for the lagged analyses is as follows:

Level 1: Affect Balance_{ij} = $\beta_{0j} + \beta_{1j} (ADS) + \beta_{2j} (Care\ Stressors) + \beta_{3j} (Non\ Care\ Stressors) + \beta_{4j} (ADS * Yesterday\ ADS) + e_{ij}$

Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01} (Total\ ADS\ days) + U_{0j}$

$$\beta_{1j} = \gamma_{10} + U_{1j}$$

$$\beta_{2j} = \gamma_{20} + U_{2j}$$

$$\beta_{3j} = \gamma_{30} + U_{3j}$$

$$\beta_{4j} = \gamma_{40} + U_{4j}$$

Composite Equation: Affect Balance_{ijk} = $\beta_{00k} (Total\ ADS\ days) + \beta_{10k} (ADS) + \beta_{20k} (Care\ Stressor) + \beta_{30k} (Non\ Care\ Stressors) + \beta_{4j} (ADS * Yesterday\ ADS) + e_{ijk} + V_{0jk}$

4.3 Results

Multi-level models were run to assess whether use of adult day services (ADS) predicts affect balance on the daily level. Separate models were run for count balance and intensity balance.

Balance of Affect Count: The multi-level models demonstrated that affect balance in the number of items endorsed was significantly predicted by number of non-care related stressors that day ($\beta = .2549$, $SE = .03$, $p < .0001$) and the number of care related stressors that day ($\beta = .05441$, $SE = .009$, $p < .0001$). Complete model statistics are provided in Table 6. The within person effect of ADS (whether the day is an ADS day or not) is not a significant predictor of affect balance.

Because affect balance is a standardized difference score between positive and negative affect interpretation of the direction of effects is difficult. Therefore, another series of multi-level models were run to assess whether the predictors were altering negative affect count and positive

affect count separately, to assist with understanding how balance is moving. Negative affect count is individually predicted by number of non-care related stressors ($\beta = .56$, $SE = .05$, $p < .0001$) and number of care related stressors ($\beta = .1215$, $SE = .015$, $p < .0001$), such that reporting more daily stressors is associated with endorsing more negative affect items. Positive affect count is also individually predicted by number of non-care related stressors ($\beta = -.1054$, $SE = .041$, $p = .0095$) which suggests that the number of non-care related stressors alters balance by both increasing negative affect and decreasing positive affect. Complete model statistics are presented in Table 7.

Balance of Affect Intensity: These multi-level models demonstrated that affect balance in intensity of affect endorsed was significantly predicted by severity of non-care related stressors ($\beta = .1241$, $SE = .01$, $p < .001$) and severity of care related stressors ($\beta = .049$, $SE = .009$, $p < .001$). Additionally, whether the day is an ADS day also predicts balance of affect intensity ($\beta = -.44$, $SE = .2118$, $p = .0378$). Complete model statistics are presented in Table 8.

An additional series of models were also run for balance of affect intensity to assess the predictive power of the variables of interest for predicting negative affect intensity and positive affect intensity separately. Negative affect intensity was individually predicted by severity of non-care related stressors ($\beta = .6976$, $SE = .052$, $p < .0001$) and severity of care related stressors ($\beta = .3064$, $SE = .045$, $p < .001$) such that reporting higher stress severity for non-care related and care related stressors is associated with endorsing more intense negative affect. Additionally, negative affect intensity is also predicted by whether the day is an ADS day ($\beta = -2.2974$, $SE = 1.04$, $p = .028$), indicating that on ADS days the intensity of negative affect reported is less. Positive affect is also individually predicted by non-care related stressor severity ($\beta = -.402$, $SE = .06$, $p < .001$) and care stressor severity ($\beta = -.124$, $SE = .055$, $p = .024$) which suggests that

perceived stressor severity is impacting balance by both increasing negative affect intensity and decreasing positive affect intensity. Complete model statistics are presented in Table 9.

Subscale Analyses: Although affect balance is conceptualized as the relationship between positive and negative affect, it may be more informative to consider the relationship between positive affect and the subscales of negative affect because anger, anxiety and depression are very different components of negative affect. In terms of balance count, all three subscales (anxiety, anger and depression) follow the same pattern as overall balance, such that number of non-care stressors and care stressors predict balance. Complete model statistics are presented in Table 10. There is also a different picture revealed when balance of affect intensity is considered. Again all three subscales follow the pattern of overall intensity balance being predicted by both non-care and care stressors severity ($p < .01$ in all cases). However, only depression intensity balance is predicted by ADS ($\beta = -.4248$, $SE = .2155$, $p < .0001$). Complete model statistics are presented in Table 11. The subscales are not extremely different in terms of count balance but it seems especially important to consider the subscales when examining the balance of affect intensity.

Lagged Analyses: It was also expected that use of adult day services would impact balance on the following day regardless of whether the current day is an ADS day. The multi-level models show that the ADS lag was not a significant predictor of balance count. Complete model statistics are presented in Table 12. However, the ADS lag was a significant predictor of balance intensity ($\beta = .1699$, $SE = .0839$, $p = .0432$) such that whether yesterday was an ADS day predicts balance. The interaction between whether today is an ADS day and whether yesterday was an ADS day was also significant ($\beta = -.3042$, $SE = .1232$, $p = .0137$). See Table 13 for complete model statistics. When positive affect intensity and negative affect intensity were considered

individually, the ADS lag does not predict positive affect intensity. However, the ADS lag ($\beta = .9219$, $SE = .4015$, $p = .0219$) and the interaction of ADS lag and ADS ($\beta = -1.5137$, $SE = .5893$, $p = .0104$) significantly predict negative affect intensity which demonstrates that whether yesterday was an ADS day impacts affect balance through altering negative affect. The higher order interaction indicates that the benefits of ADS accumulate because negative affect intensity is lowest when yesterday and today are ADS day. See Table 14 for complete model statistics and Figure 4 for the visual representation of the interaction.

4.4 Discussion

The current study assessed the associations between daily stressors, an intervention providing respite from caregiving and the relationship between positive and negative affect in chronically stressed dementia caregivers. Affect balance was defined as the relative levels of positive and negative affect (Hassett et al, 2008), specifically level of negative affect minus level of positive affect. Although the majority of studies only consider the count of affect items endorsed (ie, frequency), the current study considered frequency as well as intensity of affect endorsed. For the caregivers, affect balance in the number of items endorsed was predicted by daily stressors but not whether the day was an ADS day. However, affect balance in the intensity of affect experienced was predicted by daily stressors and also whether the day was an ADS day. These findings suggest that ADS use provides benefits to caregiver above and beyond a reduction in stressor exposure which is evidenced when assessing affect balance intensity. The differential association between ADS and the two measures of affect balance underscore the importance of considering both frequency and intensity of affect in order to have a complete understanding of the affective experience. Additionally, the findings highlight the necessity of considering positive and negative affect jointly because the affect valences are not linked in all

instances and therefore, to fully understand the affective experience both positive and negative affect need to be investigated.

4.4.1 Intervention Effects

Results indicate that as it relates to affect balance of the number of items endorsed, whether today is an ADS day is not a significant predictor. However, both number of care and non-care related stressors are significant predictors of affect balance, which suggests that indirectly ADS is having an impact on balance because ADS use changes the stressor context. More specifically, results indicate that ADS use has its impact on balance through increasing the number of positive affect items endorsed and decreasing the number of negative affect items endorsed. Additionally, the total number of ADS days predicts number of positive affect items endorsed at the trend level which suggests that individuals who use ADS more frequently are also individuals who endorse more positive affect items. When considering balance of affect intensity, whether the day is an ADS day is a significant predictor of balance as are the severity of non-care related stressors and care stressors. Furthermore, non-care related stressors and care stressors exert their impact through decreasing negative affect intensity and increasing negative affect intensity but ADS is only altering the level of negative affect severity. The benefits of ADS use also seem to accumulate as the current findings show that negative affect intensity is lowest when yesterday and today are ADS days. Taken together, the results are consistent with previous research that has demonstrated that ADS use is beneficial for reducing stressors and improving aspects of well-being (Zarit, Kim, Femia, Almeida & Klein, 2013).

4.4.2 Implications

One important implication from the current study is that whether today is an ADS day predicts balance of affect intensity above and beyond the association between affect balance and

stressor context. It is not clear at this point what other benefits of ADS are associated with affect balance but it is essential to understand that ADS is holding benefits for caregivers above and beyond a change in stressor context.

Although the current study assessed the impact of a naturalistic within person intervention (ie, dementia caregivers utilizing adult day services), the results also have implications for more traditional interventions. Specifically, caregivers with a certain patterns of affect balance (mainly high negative affect and low positive affect) may need to learn to “uncouple” (Reich et al, 2003) or “undo” (Fredrickson & Levenson, 1998) the connection between positive and negative affect. Robertson et al (2007) notes that effective emotion regulation would allow caregivers to stop negative emotions before their level of positive affect is impacted through coupling. Being able to control the connection between the affect valences or regulate the impact of negative affect may allow caregivers to maintain beneficial levels of positive affect even in times of stress.

4.4.5 Limitations

Affect balance provides information about the daily affective experience of dementia caregivers that would not be known if positive and negative affect were considered individually but difference scores are not without limitations. Ratios and difference scores are often criticized for failure to distinguish between individuals who appear to have the same experience but are actually quite different (i.e., high PA and high NA compared to low PA and low NA). However, using groups as outlined by Hassett et al. (2008) and Robertson et al. (2007) provides additional information regarding the profiles of balance that are lost with the ratio score.

While the current study assessed many dimensions of the caregivers’ daily experiences, the study did not include a measure of personality. However, personality is likely to be an

important indicator for understanding an individual's tendencies on reporting affect. For example, Schimmack and Diener (1997) found that neuroticism was consistently associated with the intensity of unpleasant affect whereas extraversion was associated primarily with the intensity of pleasant affect. Additionally, Rusting and Larsen (1997) found that neuroticism was a significant positive predictor of negative affect but not a predictor of positive mood whereas extraversion was a significant positive predictor of positive mood and a negative predictor of negative mood. Therefore, certain personality traits might be inherently linked to an individual's mood and their reporting tendencies.

4.4.6 Future Directions

The current study was primarily focused on the stressor context and the role that stress and reductions of stress through intervention plays in impacting affect balance; however, similar models could be run to assess how positive events impact affect balance. Robertson et al (2007) found that perception of caregiving rewards was the strongest contributor to the discriminant function that distinguished the ambiguous group (low positive affect and low negative affect) and the intense group (high positive affect and high negative affect). Additionally, numerous studies have shown that pleasant events are important for reduction of depressive symptomology (Lewisohn & Libet, 1972; Meeks, Looney, van Haitsma & Teri, 2008; Meeks, Teri, van Haitsma & Looney, 2006) and therefore, it would be important to understand how positive events might also impact affect balance.

The results demonstrated that affect balance in dementia caregivers can be altered by receiving respite from providing care but the current analyses do not provide information regarding the outcomes of affect balance (ie, which groups are most detrimental or what does affect balance predict). Therefore, future work should consider what pattern of affect balance is

most adaptive for caregivers. For example, it would be expected that experiencing high NA in combination with low PA would be detrimental for health and well-being and Robertson et al (2008) found that the distressed caregiver group was characterized by higher objective and subjective stress and poorer health status than other caregivers. Additionally, it is expected that the combination of high PA and low NA would be beneficial based on the numerous studies documenting the benefits of positive affect (Pressman & Cohen, 2005; Steptoe, Wardle & Marmot, 2005; Fredrickson et al, 2003). Robertson and colleague's (2007) findings also demonstrated that the well-adjusted group had the best general health status and lower levels of role captivity and role overload to compared to caregivers in other balance groups. However, although previous research has characterized the groups experiencing both high PA and NA and both low PA and NA, it seems less clear the outcomes associated with those groups. Therefore, future research should further consider which combination is most detrimental to caregivers since a large literature suggests the healthiest profile would be low NA and high PA.

Results indicate that ADS predicts affect balance intensity through decreasing negative affect intensity and increasing positive affect intensity and indirectly predicts affect balance count through a reduction in stressors. However, it is possible and likely the pattern of prediction is not equivalent for all the various groups of balance. Therefore, future research could utilize group analyses or moderation analyses to assess how the balance groups are differentially impacted by stress and ADS use.

4.4.7 Conclusions

Findings from the current study demonstrate that affect balance of dementia caregivers is largely defined by their stressor context, specifically non-care related stressors and care stressors because both non-care related stressors and care stressors alter balance through increasing

negative affect and decreasing positive affect. However, use of adult day services may reverse those impacts. Adult day services alters the caregivers' stressor context, which then in turn decreases negative affect and increases positive affect. Taken together, the findings show that use of adult day services can be beneficial for caregivers in multiple affective domains.

4.5 References

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Table 4.1

Demographic Characteristics, Mean (SD) or N% (N=173)

| | |
|---------------------------|---------------|
| Age | 61.97 (10.66) |
| Gender (% Female) | 86.7% |
| Race | |
| White | 72.8% |
| Black | 25.4% |
| Relation to Care Receiver | |
| Spouse | 37.6% |
| Daughter/Daughter in Law | 51.4% |
| Son/Son in Law | 6.9% |
| Sibling | 1.2% |
| Other | 2.9% |
| Marital Status | |
| Married/Partner | 69.4% |
| Widowed | 2.9% |
| Divorce | 11.6% |
| Separated | 0.6% |
| Never Married | 15.6% |
| Self-Rated Health | 3.24 (.99) |

Table 4.2

Descriptive Statistics of Primary Measures

| Variable Name | ADS | Non-ADS |
|-----------------|------------------|------------------|
| | <i>Mean (SD)</i> | <i>Mean (SD)</i> |
| Positive Affect | 3.09 (.91) | 2.93 (.96) |
| Negative Affect | 1.42 (.49) | 1.48 (.54) |

Table 4.3

Affect Count Variables (N = 178 caregivers, 1424 days)

| | N of Days | % of Total Days |
|----------------------|-----------|-----------------|
| Low NA, Low PA | 60 | 4.2% |
| Medium NA, Medium PA | 150 | 10.5% |
| High NA, High PA | 147 | 10.3% |
| Lower NA, Higher PA | 694 | 48.7% |
| Higher NA, Lower PA | 373 | 26.2% |

Table 4.4

Affect Intensity (N = 178 caregivers, 1424 days)

| | N of Days | % of Total Days |
|----------------------|-----------|-----------------|
| Low NA, Low PA | 72 | 5% |
| Medium NA, Medium PA | 232 | 16.3% |
| High NA, High PA | 21 | 1.5% |
| Lower NA, Higher PA | 621 | 43.6% |
| Higher NA, Lower PA | 478 | 33.6% |

Table 4.5

Multi-Level Models Predicting Balance Count and Balance Intensity with only demographics

| | Balance Count | Balance Intensity |
|-------------------|-----------------|-------------------|
| | b (SE) | b (SE) |
| Intercept | .927 (.983) | 1.22 (1.085) |
| Gender | .047 (.294) | .168 (.605) |
| Age | -.006 (.011) | -.010 (.012) |
| Race | -.124 (.139) | -.165 (.153) |
| Education | -.015 (.086) | -.013 (.095) |
| Employment Status | -.583 ** (.223) | .638 * (.246) |
| Income | -.008 (.005) | -.008 (.005) |

* p < .05 ** p < .01

Table 4.6

Multi-Level Model Predicting Affect Balance – Count

| | Balance Count b (SE) |
|---|-------------------------|
| Intercept | .699 (.291) |
| Between Person Effects | |
| Care Recipient ADL impairment | -.151 (.195) |
| Number of ADS days | -.112 (.067) |
| Duration of Care | -.003 (.002) |
| Employment Status | -.385 (.211) |
| Age | .009 (.010) |
| Person Mean of Non- Care Stressful Events | .061 (.606) |
| Person Mean of Care Related Stressful Events | -.011 (.017) |
| Within Person Effects | |
| Number of Non-Care Stressful Events | .255 ** (.031) |
| Number of Care Related Stressful Events | .054 ** (.009) |
| ADS day | -.110 (.074) |
| Interaction | |
| ADS * Number of Care Related Stressful Events | .005 (.008) |
| Fit Indices | |
| -2 Res Log Likelihood | 3660.8 |
| AIC | 3664.8 |
| BIC | 3671.1 |

* p < .05 ** p < .01

Table 4.7

Multi-Level Models Predicting Negative Affect Count and Positive Affect Count Separately

| | Negative Affect Count b (SE) | Positive Affect Count b (SE) |
|---|---------------------------------|---------------------------------|
| Intercept | 4.34 ** (1.03) | 7.040 ** (.894) |
| Between Person Effects | | |
| Care Receipt ADL impairment | -.481 (.303) | -.049 (.265) |
| Number of ADS days | -.097 (.103) | .156 (.090) |
| Duration of Care | -.005 (.003) | .002 (.003) |
| Employment Status | -.728 * (.328) | .246 (.287) |
| Age | .006 (.016) | -.014 (.014) |
| Person Mean of Non- Care Stressful Events | .271 (.184) | .077 (.160) |
| Person Mean of Care Related Stressful Events | .005 (.016) | .025 (.023) |
| Within Person Effects | | |
| Number of Non-Care Stressful Events | .56 ** (.050) | - .105 ** (.041) |
| Number of Care Related Stressful Events | .122 ** (.015) | -.021 (.012) |
| ADS day | -.049 (.121) | .188 (.098) |
| Interaction | | |
| ADS * Number of Care Related Stressful Events | .006 (.013) | -.006 (.010) |
| Fit Indices | | |
| -2 Res Log Likelihood | 4805 | 4333.4 |
| AIC | 4809 | 4337.4 |
| BIC | 4809.1 | 4343.7 |

* p < .05 ** p < .001

Table 4.8

Multi-Level Model Predicting Affect Balance – Intensity

| | Balance Intensity b (SE) |
|---|-----------------------------|
| Intercept | -1.04 (.734) |
| Between Person Effects | |
| Care Receipt ADL impairment | -.182 (.209) |
| Number of ADS days | -.112 (.070) |
| Duration of Care | -.004 (.002) |
| Employment Status | -.321 (.223) |
| Age | .011 (.309) |
| Person Mean of Non- Care Stress Severity | .043 (.045) |
| Person Mean of Care Related Stress Severity | .021 (.023) |
| Within Person Effects | |
| Non-Care Stress Severity | .124 ** (.010) |
| Care Related Stress Severity | .049 ** (.009) |
| ADS day | .440 * (.212) |
| Interaction | |
| ADS * Care Related Stress Severity | .015 (.009) |
| Fit Indices | |
| -2 Res Log Likelihood | 3553.9 |
| AIC | 3557.9 |
| BIC | 3564.2 |

* $p < .05$ ** $p < .01$

Table 4.9

Multi-Level Model Predicting Negative Affect Intensity and Positive Affect Intensity Separately

| | Negative Affect Intensity b (SE) | Positive Affect Intensity b (SE) |
|---|-------------------------------------|-------------------------------------|
| Intercept | 1.286 (3.246) | 28.011 ** (4.875) |
| Between Person Effects | | |
| Care Receptient ADL impairment | -1.739 (.912) | -.294 (1.403) |
| Number of ADS days | -.127 (.305) | .977 * (.468) |
| Duration of Care | -.018 (.010) | .019 (.015) |
| Employment Status | -1.759 (.973) | 1.095 (1.497) |
| Age | .049 (.046) | -.048 (.070) |
| Person Mean of Non- Care Stress Severity | .392 (.199) | .049 (.303) |
| Person Mean of Care Related Stress Severity | .122 (.100) | -.065 (.149) |
| Within Person Effects | | |
| Non-Care Stress Severity | .698 ** (.052) | -.402 ** (.062) |
| Care Related Stress Severity | .306 ** (.045) | -.124 * (.055) |
| ADS day | -2.297 * (1.044) | 1.645 (1.262) |
| Interaction | | |
| ADS * Care Related Stress Severity | .086 * (.043) | -.051 (.052) |
| Fit Indices | | |
| -2 Res Log Likelihood | 7248.4 | 7768.4 |
| AIC | 7252.4 | 7772.4 |
| BIC | 7258.7 | 7778.7 |

* p < .05 ** p < .01

Table 4.10

Multi-Level Model Subscale Analyses – Affect Balance Count

| | Balance - Anger b (SE) | Balance - Anxiety b (SE) | Balance - Depression b (SE) |
|---|------------------------------|--------------------------------|-----------------------------------|
| Intercept | .769 (.625) | .337 (.647) | .714 (.670) |
| Between Person Effects | | | |
| Care Receipt ADL impairment | -.136 (.185) | -.073 (.191) | -.137 (.198) |
| Number of ADS days | .135 * (.063) | -.057 (.065) | -.121 (.068) |
| Duration of Care | -.003 (.002) | -.002 (.002) | -.003 (.002) |
| Employment Status | -.299 (.200) | -.417 * (.207) | -.284 (.215) |
| Age | .001 (.010) | .011 (.010) | .015 (.010) |
| Person Mean of Non- Care Stressful Events | -.001 (.113) | .030 (.115) | .096 (.120) |
| Person Mean of Care Related Stressful Events | .023 (.017) | .003 (.017) | -.012 (.018) |
| Within Person Effects | | | |
| Number of Non-Care Stressful Events | .248 ** (.032) | .175 ** (.029) | .217 ** (.033) |
| Number of Care Related Stressful Events | .053 ** (.010) | .038 ** (.009) | .046 ** (.010) |
| ADS day | -.150 (.077) | -.085 (.071) | -.082 (.080) |
| Interaction | | | |
| ADS * Number of Care Related Stressful Events | .005 (.008) | .005 (.008) | .004 (.008) |
| Fit Indices | | | |
| -2 Res Log Likelihood | 3744.6 | 3575 | 3829.7 |
| AIC | 3748.6 | 3579 | 3833.7 |
| BIC | 3754.9 | 3585.3 | 3840 |

* p < .05 ** p < .01

Table 4.11

Multi-Level Model Subscale Analyses – Affect Balance Intensity

| | Balance - Anger b (SE) | Balance - Anxiety b (SE) | Balance - Depression b (SE) |
|---|------------------------------|--------------------------------|-----------------------------------|
| Intercept | -1.070 (.731) | -.791 (.725) | -.837 (.724) |
| Between Person Effects | | | |
| Care Receptient ADL impairment | -.144 (.206) | -.113 (.207) | -.174 (.206) |
| Number of ADS days | -.138 * (.069) | -.064 (.069) | -.122 (.069) |
| Duration of Care | -.004 (.002) | -.003 (.002) | -.004 (.002) |
| Employment Status | -.260 (.010) | -.398 (.221) | -.207 (.219) |
| Age | -.0004 (.010) | .010 (.010) | .018 (.010) |
| Person Mean of Non- Care Stress Severity | -.008 (.045) | .046 (.045) | .064 (.045) |
| Person Mean of Care Related Stress Severity | .013 (.023) | .030 (.022) | .013 (.022) |
| Within Person Effects | | | |
| Non-Care Stress Severity | .123 ** (.011) | .094 ** (.010) | .110 ** (.011) |
| Care Related Stress Severity | .051 ** (.010) | .033 ** (.009) | .044 ** (.009) |
| ADS day | -.437 (.229) | -.309 (.203) | -.425 * (.216) |
| Interaction | | | |
| ADS * Care Related Stress Severity | .014 (.009) | .010 (.008) | .016 (.009) |
| Fit Indices | | | |
| -2 Res Log Likelihood | 3710.8 | 3460.7 | 3583.2 |
| AIC | 3714.8 | 3464.7 | 3587.2 |
| BIC | 3721.2 | 3471 | 3593.5 |

* $p < .05$ ** $p < .01$

Table 4.12

Multi-Level Models Predicting Affect Balance – Count with an ADS Lag

| | Balance Count b (SE) |
|--|-------------------------|
| Intercept | .612 (.679) |
| Between Person Effects | |
| Care Receipt ADL impairment | -.174 (.201) |
| Number of ADS days | -.097 (.069) |
| Duration of Care | -.003 (.002) |
| Employment Status | -.402 (.218) |
| Age | .010 (.010) |
| Person Mean of Non- Care Stressful Events | .052 (.122) |
| Person Mean of Care Related Stressful Events | -.016 (.018) |
| Within Person Effects | |
| Number of Non-Care Stressful Events | .280 ** (.035) |
| Number of Care Related Stressful Events | .061 ** (.010) |
| ADS day | .104 (.089) |
| ADS yesterday | .052 (.089) |
| Interaction | |
| ADS * ADS yesterday | -.209 (.130) |
| Fit Indices | |
| -2 Res Log Likelihood | 3178.9 |
| AIC | 3182.9 |
| BIC | 3189.2 |

* p < .05 ** p < .01

Table 4.13

Multi-Level Models Predicting Affect Balance – Intensity with an ADS Lag

| | Balance Intensity b (SE) |
|---|-----------------------------|
| Intercept | -1.329 (.750) |
| Between Person Effects | |
| Care Receipt ADL impairment | -.196 (.213) |
| Number of ADS days | -.102 (.071) |
| Duration of Care | -.004 (.002) |
| Employment Status | -.350 (.227) |
| Age | .011 (.011) |
| Person Mean of Non- Care Stress Severity | .042 (.047) |
| Person Mean of Care Related Stress Severity | .021 (.023) |
| Within Person Effects | |
| Non-Care Stress Severity | .131 ** (.012) |
| Care Related Stress Severity | .057 ** (.009) |
| ADS day | .170 * (.084) |
| ADS yesterday | .086 (.083) |
| Interaction | |
| ADS * ADS yesterday | -.304 * (.123) |
| Fit Indices | |
| -2 Res Log Likelihood | 3103.1 |
| AIC | 3107.1 |
| BIC | 3113.4 |

* $p < .05$ ** $p < .01$

Table 4.14

Multi-Level Models Predicting Negative Affect and Positive Affect Intensity with an ADS Lag

| | Negative Affect Intensity b (SE) | Positive Affect Intensity b (SE) |
|---|-------------------------------------|-------------------------------------|
| Intercept | .205 (3.310) | 24.363 ** (4.748) |
| Between Person Effects | | |
| Care Receptient ADL impairment | -1.997 * (.931) | -.763 (1.410) |
| Number of ADS days | -.050 (.313) | .993 * (.481) |
| Duration of Care | -.016 (.010) | .021 (.015) |
| Employment Status | -1.990 * (.990) | 1.339 (1.524) |
| Age | .052 (.047) | -.040 (.073) |
| Person Mean of Non- Care Stress Severity | .411 * (.205) | .188 (.844) |
| Person Mean of Care Related Stress Severity | .127 (.103) | .091 (.122) |
| Within Person Effects | | |
| Non-Care Stress Severity | .712 ** (.059) | -1.026 ** (.197) |
| Care Related Stress Severity | .346 ** (.045) | -.212 ** (.055) |
| ADS day | .481 (.398) | -.381 (.496) |
| ADS yesterday | .481 (.398) | -.618 (.498) |
| Interaction | | |
| ADS * ADS yesterday | -1.514 * (.589) | 1.248 (.732) |
| Fit Indices | | |
| -2 Res Log Likelihood | 6183.7 | 6676.6 |
| AIC | 6187.7 | 6680.6 |
| BIC | 6193.9 | 6686.9 |

* p < .05 ** p < .01

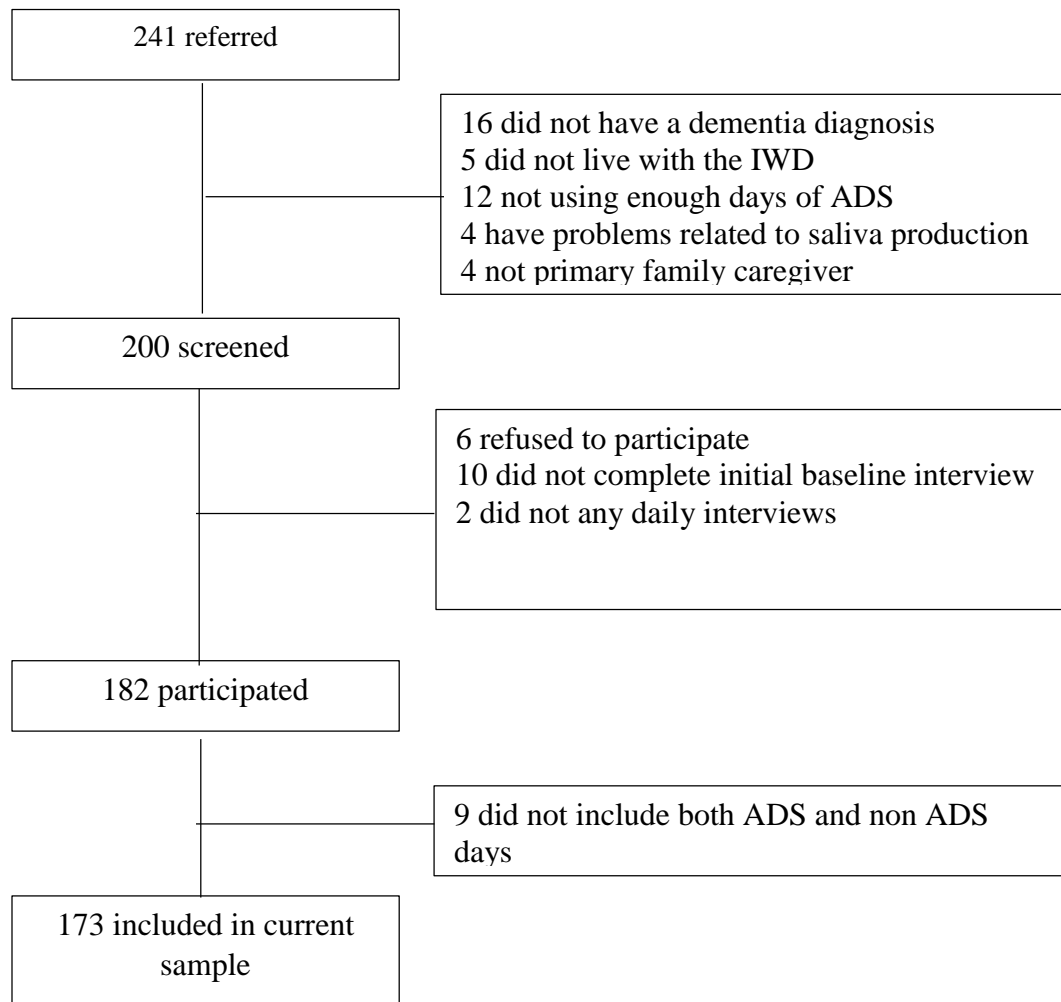


Figure 4.1 Flow Chart of Participant Recruitment and Eligibility

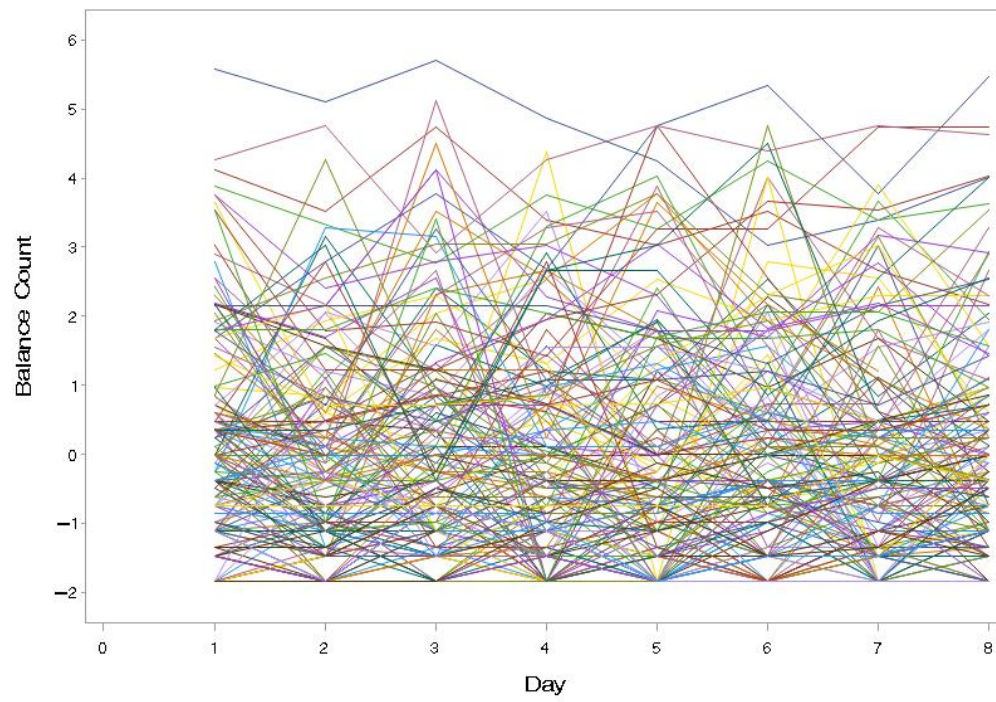


Figure 4.2 Intraindividual Standard Deviations of Within Person Variability across Days in Affect Balance – Count

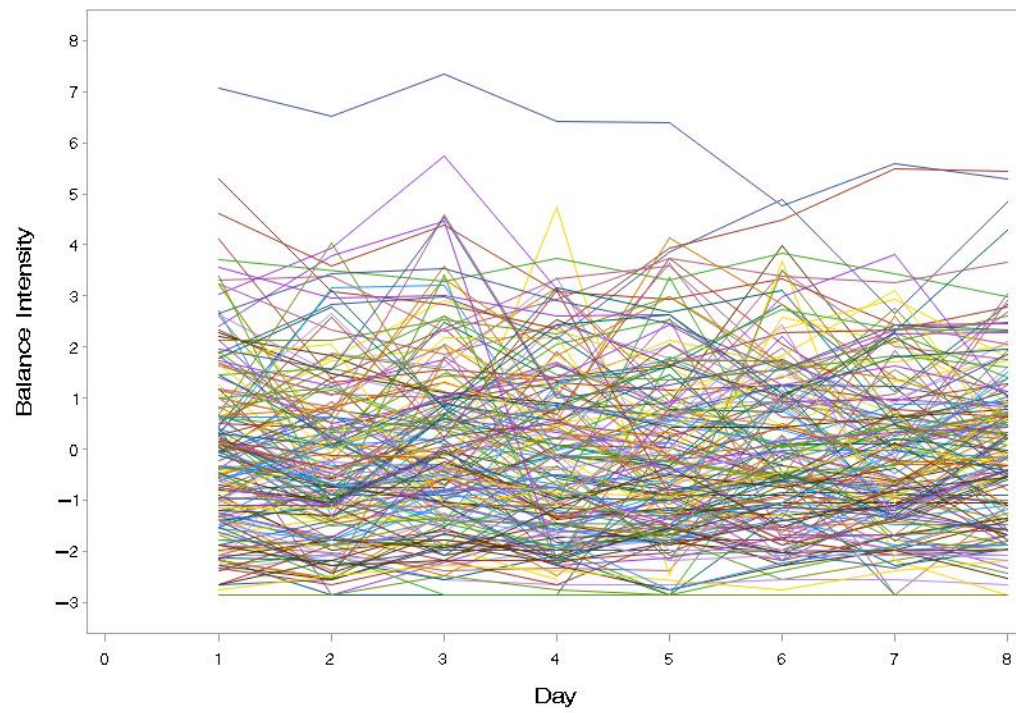


Figure 4.3 Intraindividual Standard Deviations of Within Person Variability across Days in Affect Balance – Intensity

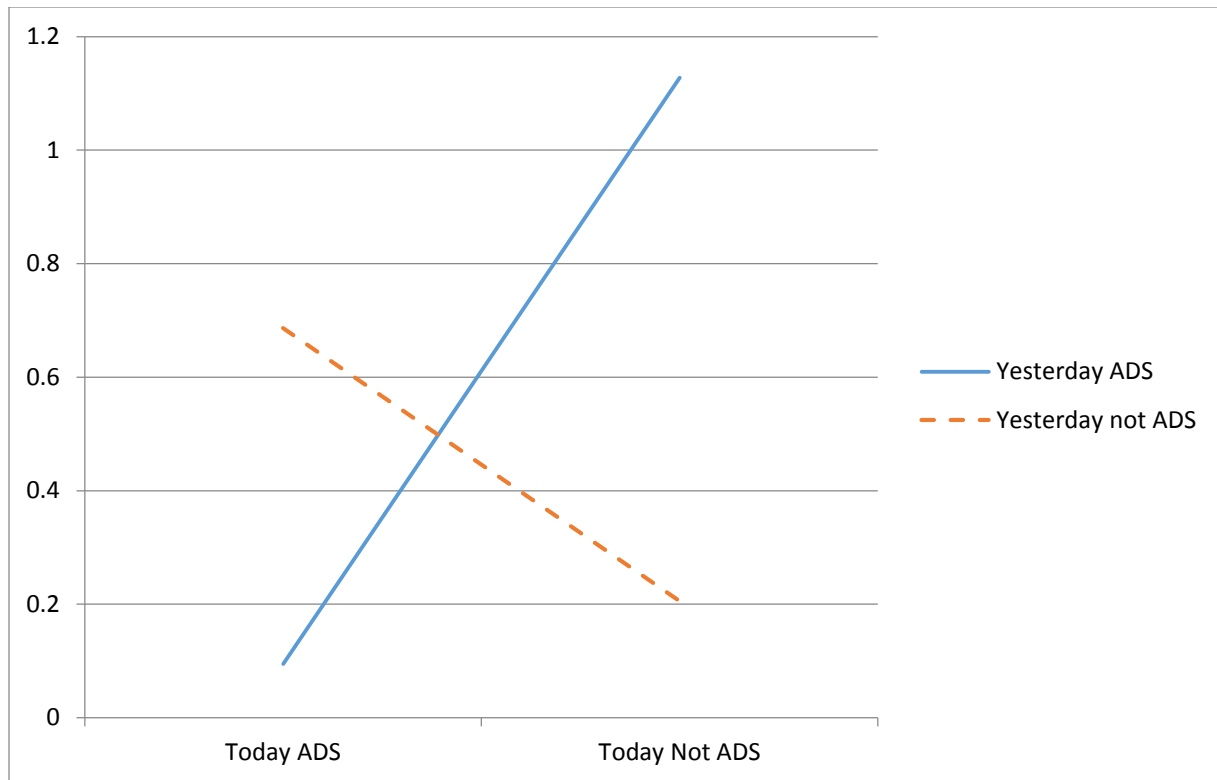


Figure 4.4 Interaction of ADS use and yesterday's ADS use in predicting Negative Affect Intensity

CHAPTER 5. DISCUSSION

5.1 Overall Summary of Findings

The three papers of this dissertation sought to examine the affective experience of chronic illness patients and their family members through an investigation of the good (positive affect), the bad (negative affect) and the balanced (relationship between positive and negative affect).

Study 1 assessed the affective experience of individuals with osteoarthritis and their spouses through an examination of emotion transmission. This study contributes to the broader literature by considering both positive and negative emotion transmission and by attempting to further refine the time scale appropriate and necessary for measuring transmission for each affect valence. The negative emotion transmission paths (i.e., negative affect predicting negative or positive affect) revealed that patient beginning of day affect predicted spouse end of day negative affect but was moderated by both gender and marital satisfaction. Therefore, evidence of transmission is primarily seen in female spouses in marriage with lower satisfaction. Additionally, patient beginning of day negative affect also predicted spouse end of day positive affect but was again moderated by marital satisfaction. In the current investigation, there was no evidence of positive affect transmission.

Study 2 assessed the direct relationship between positive and negative affect in a different configuration by calculating affect balance in prostate cancer patients and their spouses. This study contributes to the broader literature by not only considering affect balance in the number of affect items endorsed, which is the traditional calculation, but also by considering the balance in intensity of affect experienced. The study also sought to understand the impact that perceived stress would have on daily affect balance, which provides an additional dimension to

understanding how individuals navigate the chronic illness experience on a daily basis. Findings demonstrate that affect balance in the number of items endorsed and affect balance in the intensity of affect was associated with perceived stress severity for both patients and spouses. However, the change in balance was not only due to a change in negative affect. Patients' balance was altered both by stress related increases in negative affect and decreases in positive affect. Spouses' balance was altered only through changes in negative affect.

Finally, Study 3 investigates affect balance in dementia caregivers and assesses changes in affect balance brought on by stressor context and the impact of an intervention that provides respite care. This study advances the broader literature because to my knowledge there are no studies that have investigated an intervention's impact on the direct association between positive and negative affect. Findings demonstrate that exposure to care related and non-care related stressors predicted affect balance count and stress reactivity to care related and non-care related stressors predicted affect balance intensity. Additionally, affect balance intensity was directly predicted by ADS use. Findings also reveal that there seems to be an accumulation in the benefits of ADS use because negative affect intensity was lowest when both yesterday and today were ADS days.

5.2 Chronic Illness and Families

Multiple theoretical frameworks fuse to describe how family members influence one another. Family systems theory asserts that families function as an interdependent unit and Larson and Almeida (1999) note that family members interact within and outside of the system and these interactions accumulate resulting in family members being influenced by and influencing others. As an extension of this broader theory, dyadic theories further explain the mechanisms through which family members are interrelated and influence one another. Berg and

Upchurch's (2007) developmental contextual model considers coping, appraisal, and adjustment through a dyadic perspective and Rashick and Ingersoll-Dayton (2004) discuss social exchange theory as the notion that within dyads the behavior of each individual influences the psychological costs and rewards of the other individual.

In addition to the various theoretical underpinnings, empirical findings have also demonstrated that both patients and family members are impacted by chronic illness. For example, it has been reported that cancer patients may experience fear (Gotay, 1984), hopelessness (Northouse, Laten & Reddy, 1995), anxiety (Segrin, Badger, Dorros, Meek & Lopez, 2007), and depression (Segrin, Badger, Meek, Lopez, Bonham & Sieger, 2005). Additionally, AIDS patients who reported frequent or persistent pain also reported psychological distress, depression, hopelessness and lower quality of life (Rosenfeld, Breitbart, McDonald, Passik, Thaler & Portenoy, 1996). In addition to the experiences of the patients, research has demonstrated that providing care for a family member has been associated with inadequate rest, inadequate exercise, missing doctor's appointments, forgetting to take medications and the inability to slow down when it is needed (Burton, Newsom, Schulz, Hirsch & German, 1997). Zarit, Stephens, Townsend and Greene (1998) also noted that caregivers may experience a range of emotional distress such as role captivity, overload, worry and strain, anger and anxiety. Compared to non-caregivers, caregivers had 23% more stress hormones and also exhibited elevated blood pressure and glucose levels (Stambor, 2006). Additionally, Carter and Chang (2000) found that out of 51 caregivers, 27 had depression at a level that was high enough to be considered clinical depression.

Taken together, the evidence advocates the need for understanding the experiences of both patients and family members because dyads may jointly experience some aspects of the

chronic illness journey but they may also have unique individual experiences. Each paper in this dissertation addresses the experiences of family members and studies 1 and 2 also address the experiences of the patients. Findings from studies 1 and 2 indicate that patients and family members do in fact have some experiences that are similar while also having some experiences that are unique to each individual.

Emotion transmission findings from study 1 indicate that in some circumstances and for some spouses their emotional experience is linked to the patients' emotional experience. Specifically, there is evidence of transmission in couples where the spouses rated their marriage as low in satisfaction. Although the presence of emotion transmission does not indicate that the experiences are fully joint, there does seem to be a degree of shared quality based on the ability of the patients' emotions to predict the spouses' emotions. Findings from study 2 also indicate a similarity between experiences because the profiles of affect balance seen for patients and spouses are similar. For both patients and spouses, the majority of days showed unequal reports of positive and negative affect items endorsed and unequal levels of intensity. Specifically, the greatest number of days had more positive affect items endorsed and positive affect endorsed more intensely. Plus, for both patients and spouses stress severity has a significant association with affect balance.

Conversely, findings from this dissertation also stress that family members have their own unique experiences that are not dependent or perhaps even related to the patients' experiences. The spouses' affect is unique in the instances where we do not see evidence of transmission, mainly in couples where marital satisfaction is high. Additionally, in paper 2, the patients' affect balance is associated with both stress severity and their perception of the bothersome event being due to prostate cancer; however, this is only partly true of the spouses'

experiences. Spouses' affect balance is not predicted by perception of the event being due to prostate cancer which may indicate that although both patient and spouse are dealing with prostate cancer, the spouse is not experiencing the stressors exactly the same as the patients are. Finally, patients' affect balance is altered through changes in negative affect and positive affect; however, the mechanisms are different for spouses' because stress severity does not alter their positive affect.

5.3 Affect: The Relationship between Positive and Negative Affect

The consequences of higher negative affect have been noted extensively through research, often with a focus on the association between negative affect and health. For example, Watson (1988) reported that between person differences in negative affect were associated with perceived stress and physical complaints and within person differences were also associated with perceived stress. Cohen and colleagues (1993) also reported that independent of health behaviors, negative affect was associated with developing a cold. Both Brown and Moskowitz (1997) and Billings, Folkman, Acree and Moskowitz (2000) noted an association between negative affect and reports of physical symptoms.

A primarily separate line of research has outlined the benefits of experiencing positive affect. A review by Pressman and Cohen (2005) found that trait positive affect was associated with increased longevity and lower morbidity. Additionally, both state and trait positive affect was associated with decreased physical symptoms and pain (Pressman & Cohen, 2005). Furthermore, positive affect has been shown to be associated with lower levels of cortisol independent on the association between negative affect and cortisol (Steptoe, Wardle & Marmot, 2005). In terms of non-health related outcomes, positive affect has also been shown to be associated with psychological growth following a crisis (Fredrickson et al, 2003).

Although the effects of positive and negative affect have been documented in the literature, the two affect valences seem to rarely be considered jointly perhaps because one view often held is that the presence of one indicates the absence of another thereby considering one indirectly tells you about the other. However, if positive and negative affect are not considered together, we do not truly have a holistic understanding of the individual or their current experience.

The dissertation takes two approaches to understanding the relationship between positive and negative affect: cross domain transmission and affect balance. In study 1, transmission was assessed within domain (i.e., negative to negative and positive to positive) and across domains (i.e., negative to positive and positive to negative), which provides information regarding the relationship between the two affect valences. Findings demonstrate that patient negative affect predicted spouse end of day negative affect and spouse positive affect. The fact that patients' negative affect was predictive of both the spouses' negative and positive affect indicates that there is a connection between the two affect valences and that they are not entirely independent.

Studies 2 and 3 took another approach to considering the relationship between positive and negative affect by considering affect balance in both cancer patients and their spouses and in dementia caregivers. Affect balance is the relative levels of positive and negative affect and therefore, directly assessed the relationship between the two. In studies 2 and 3, all possible balance profiles were evident and these profiles were altered by daily experiences. These findings indicate that the connection between positive and negative can change across days.

5.4 Contextual Approach to Understanding the Affective Experience

All three studies of the current dissertation examine affect in the context of a different chronic illness. However, there are additional contexts that may interact with the chronic illness

context to influence the affective experience. The current dissertation sought to consider two specific contexts, the social context and the stress context. Specifically, study 1 considered the social context of marriage in the examination of emotion transmission in osteoarthritis patients and their spouses. Emotion transmission findings reveal that marriage impacts affect in the current sample in two main ways: first, through patients' affect predicting spouse affect and second, through the negative emotion transmission paths being moderated by the spouses' report of marital satisfaction. The emotion transmission paths from both patient negative affect to spouse negative affect and from patient negative affect to spouse positive affect were both moderated by marital satisfaction which strongly validates the notion that marriage is an influential context. Specifically, in the current sample, emotion transmission is primarily evident in couples where the spouse has reported low marital satisfaction. Although not all transmission paths are detrimental, the paths that are clear in the current sample (ie, patient negative affect increasing spouse negative affect and decreasing positive affect) are likely to be detrimental, which suggests that marriages that are low in satisfaction might introduce an additional vulnerability to individuals whereas a higher satisfaction marriage might provide resources to protect against harmful processes.

Both studies 2 and 3 considered the daily stressor context of cancer patients and their spouses and dementia caregivers. Study 2 was a study of affect balance in prostate cancer and their spouses and considered the role that stress reactivity plays in altering the relationship between positive and negative affect. For both cancer patients and spouses, daily stress reactivity was associated with balance in the number of affect items endorsed and the intensity of affect endorsed. Additionally, study 3 considered the role that stress exposure, stress reactivity and intervention based stress reduction plays in altering the relationship between positive and

negative affect. Similarly, to study 3, stress exposure and stress reactivity predicted affect balance and so did ADS use, which suggests that an intervention might undo the impacts that stress has on affect balance.

5.5 Future Directions and Conclusions

Although the three studies in the dissertation have taken initial steps toward contributing to the broader literature in important ways, each study proposes additional work that would further our understanding of affect in chronic illness.

Study 1 considered emotion transmission paths flowing from patients to spouse because in chronic illness the spouse often takes on a caregiving role and it has been established that the patient's illness impacts the caregivers (Vitaliano, Young, Zhang, 2004; Anthony-Bergstone, Zarit & Gatz, 1988; Gaugler et al, 2005). Additionally, Bigatti and Cronan (2002) note that illness negatively impacts the spouse's physical and mental health even when they are not providing care. However, as with most processes in marriages, the paths are most likely bidirectional and cyclical. Instead of a direct linear path, emotion transmission presumably flows from one partner to the other and then back again. Thus, future studies should also consider the potential for transmission from spouse to patient in order to fully understand the link between the affective experiences of patients and spouses.

Study 2 and 3 considered affect balance in two illness populations, and while considering the relative levels of positive and negative affect provides another dimension to understanding the relationship between positive and negative affect more work should be done to continue to refine the construct. Previous work (Hassett et al, 2008; Robertson et al, 2007) has labeled the various combinations of positive and negative affect but these labels might be misleading until more information is known about the outcomes associated with each combination. Future work

should consider the associations between affect balance and constructs such as health and well-being because until that is done, it will not be empirically known which combinations of affect are most beneficial or most detrimental.

Finally, all three studies focused on the daily experience of chronic illness patients and family members and therefore, were focused on within person (or daily) variation of the constructs. However, within person variation is likely at least partly anchored to between person differences. For example, in studies 2 and 3 affect balance was conceptualized as a daily construct but it is likely that daily fluctuations in balance are somewhat determined by an individual's overall balance tendencies. Therefore, future work should connect the within and between person variability in affect balance.

Overall, the findings of the dissertation validate previous findings; specifically, there is a dynamic relationship between positive and negative affect, and both social and stressor contexts impact the overall affective experience of individuals with chronic illness and their family members.

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