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**Marital Satisfaction and Health of Older Adults with Chronic Pain and their Spouses: The Role of Individual Differences in Attachment**

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A thesis submitted to the Graduate Faculty of Yale School of Public Health for fulfillment of the requirements for the Degree of Master of Public Health

### **Abstract**

Attachment theory provides a useful framework for understanding how caregiving dyads maintain feelings of security in reaction to a loved one's chronic condition. To our knowledge, no existing research has examined associations among individual differences in attachment (anxiety, avoidance), health, and relationship satisfaction in later-life marriages in which one individual suffers from chronic pain. In this study, we examined similarity of attachment orientation between spousal caregivers and care recipients, and the influence of one's attachment orientation on one's own, as well as their partner's, depressive symptoms, physical conditions, and marital satisfaction.

Seventy-seven individuals with chronic pain and their spousal caregivers both completed self-report measures of attachment, physical conditions, depressive symptoms, and marital satisfaction.

The Actor Partner Interdependence Model was used to analyze the data. Results showed that attachment anxiety in caregivers was associated with attachment avoidance in care recipients. Next, we found intrapersonal effects of attachment on well-being such that more avoidantly attached caregivers had more physical conditions, more anxiously attached caregivers and care recipients experienced more depressive symptoms, and more avoidantly attached caregivers and care recipients had lower marital satisfaction. We also found interpersonal effects such that caregiver's attachment avoidance was associated with more depressive symptoms and physical conditions in care recipients, caregivers experienced lower marital satisfaction when care recipients were more anxiously attached, and both caregivers and care recipients had lower marital satisfaction when their partners were more avoidantly attached.

This study highlights the importance of taking into account the intra- and interpersonal effects of attachment insecurity on physical and psychological health and marital satisfaction among elder spouses. Our results suggest that dyads in which caregivers are insecurely attached may be at a heightened risk for negative mental and physical health outcomes, and they may benefit from targeted, tailored caregiver interventions that address issues of attachment security.

**Keywords:** caregiving; attachment; chronic pain; marriage; physical conditions, depressive symptoms, marital satisfaction

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## **Marital Satisfaction and Health of Older Adults with Chronic Pain and their Spouses: The Role of Individual Differences in Attachment**

As the life expectancy and the number of senior people increases in the population, a large number of caregivers are being demanded, especially spousal caregivers who provide care to their spouse with chronic illnesses (Neri et al., 2012). Both caregivers and care recipients face challenges in terms of relationship functioning, physical and psychological stress, making caregiving a critical public health issue (Marks, 1998; Feeney & Hohaus, 2001; Neri et al., 2012). In the present study, we examine the caregiving context of older adults suffering from chronic pain conditions, including osteoarthritis and lower back pain. Osteoarthritis affects the musculoskeletal system and hampers people's physical activities on a daily basis (Karantzas & Cole, 2011). People with osteoarthritis usually need support from their partners to deal with the physical and emotional aspects of their chronic illness, providing a real world setting to examine the extent to which attachment orientation relates to the well-being of care recipients and caregivers (Karantzas & Cole, 2011).

### **Attachment Orientation**

Attachment is a "lasting psychological connectedness between human beings" (Bowlby, 1969, p.194). There are two fundamental dimensions with regard to attachment orientation (Brennan et al., 1998). The anxiety dimension reflects the extent to which an individual feels unworthy of love and the extent to which the individual is worried about being rejected by others (Brehm et al., 2002). The avoidance dimension assesses the extent to which individuals are uncomfortable with dependency and intimacy of others (Brennan et al., 1998; Brehm et al., 2002). Securely attached individuals score low on both anxiety and avoidance dimensions.



It has been suggested that individual differences in attachment have vital implications for the well-being of both care recipients and caregivers (Feeney & Hohaus, 2001). Research shows that spouses with secure orientation (an attachment style that reflects comfort with intimacy and interdependence) report high levels of proximity (physical and psychological), less conflict, greater acceptance of their partners, more interdependence, and more stable and satisfying romantic relationships than insecurely attached individuals (Feeney & Noller, 1996; Feeney & Hohaus, 2001; Brehm et al., 2002). Interestingly, the majority of studies on “attachment” and “bonding” have been conducted with young adults. Fewer studies have examined how these factors relate to health in later life marriages (Szalavitz, 2011).

Research on close relationships among young adults shows that individuals prefer partners with similar attachment orientations, and this occurs most often among securely-securely attached couples (Feeney, 1996; Kahn & Kram, 1994; Chappell & Davis, 1998; Klohnen & Luo, 2003; Keller, 2003; Holmes & Johnson, 2009). Securely attached adults choose other securely attached partners to share their comfort in romantic relationships, and they are less able to tolerate avoidantly attached marital partners (Senchak & Leonard, 1992). Conversely, attachment insecurity within couples tends to be associated. Attachment avoidance in one partner has been shown to be associated with attachment avoidance and attachment anxiety in the other partner (Senchak & Leonard, 1992; Feeney, 1994; Feeney, 1996). Thus, we hypothesize that attachment anxiety and avoidance in one partner will be associated with attachment anxiety and avoidance in the other partner (Hypothesis 1).

### **Attachment and Mental Health**

Individual differences in attachment have been shown to have important consequences for one's own mental health. For example, attachment style has been linked with the ability to manage stress (Mikulincera & Horesha, 1999). People with attachment security have positive self-perceptions, report high levels of emotion regulation (Raque, 2011), and experience greater levels of psychological well-being (Raque, 2011). In contrast, anxiously attached people exacerbate distress, facilitating the spread of the stress to other individuals (Mikulincera & Horesha, 1999; Mikulincer & Orbach, 1995). Avoidantly attached people tend to hide any display of distress, and suppress their bad feelings (Mikulincera & Horesha, 1999; Mikulincer & Florian, 1998). Taken together, past findings suggest that for both caregivers and care recipients dealing with chronic pain, attachment anxiety and avoidance will negatively affect one's own mental health (Hypothesis 2a).

Attachment theory is also a useful framework for maintaining feelings of security in reaction to a partner's chronic illness (Monin et al., 2012). Most empirical studies on attachment and health have taken an intrapersonal perspective in which one partner's attachment orientation is linked to his or her own outcomes. Little research has examined partner effects of attachment on mental health outcomes. We hypothesized that each spouse's attachment anxiety and avoidance will impact the mental health of the other (Hypothesis 2b). The quality of the support provided by caregivers might be a pathway through which a caregiver's attachment orientation affects a care-recipient's well-being (Kunce & Shaver, 1994; Solomon & George, 1999). Anxiously attached caregivers may be too intrusive; whereas avoidantly attached caregivers may not be involved enough (Feeney & Collins, 2001). Also, care recipients' attachment orientation may affect caregivers' well-being, for example, because anxiously attached care recipients are more likely to express pain and vulnerability (McWilliams & Holmberg, 2010; Simpson et al., 1992).

In contrast, caregivers who have care recipients who are high in attachment avoidance may be less willing to share their emotions, negatively impacting caregivers' well-being (Wei et al., 2005).

### **Attachment and Physical Health**

Attachment orientation has also been linked to physical health outcomes, such as physiological responses to stress (Raue, 2011; Maunder & Hunter, 2008), and reports of pain, fatigue, and sickness (Raue, 2011; Feeney, 2000). People with secure attachment orientations usually engage in preventive health behavior, which in turn decrease their long-term risk of negative health consequences (Huntsinger & Luecken, 2004). Attachment orientation also affects physical well-being depending on one's ability to regulate negative emotions, obtain social support, and respond to stressful events (Raue, 2011; Feeney, 2000). Attachment insecurity can negatively affect physical health by changing physiological states, such as elevated cortisol levels and an increased vagal nerve tone (Raue, 2011; Feeney, 2000). However, previous research shows inconsistent results on how attachment orientation relates to one's own physical health. We hypothesize that more attachment anxiety and avoidance will be associated with one's own poorer physical health for both caregivers and care recipients (Hypothesis 3a).

No research has examined how each partner's attachment orientation is linked with the other partner's physical health. We hypothesized that more attachment anxiety and avoidance will not only be associated with one's own poor health but also the partner's (Hypothesis 3b). Consistent partner unavailability or rejection may also lead to more physical symptoms, particularly for anxiously attached individuals who may exaggerate their symptoms in order to induce more attention and caring from their partner (Ryan, 2012; Carmichael & Reis, 2005).

## **Attachment and Marital Satisfaction**

Little research has examined the link between attachment orientation and marital satisfaction in older samples. It has generally been found that attachment security correlates positively, and attachment insecurity negatively, with marital relationship quality among younger adults (Collins & Read, 1990; Simpson, 1990; Barse, 2004). Romantic partners have mutual influence on each other (Carnelley et al., 1996). They can either provide each other with happiness and support, or cause each other to experience insecurity and distress (Carnelley et al., 1996). Compared to insecurely attached couples, couples with attachment security have more adaptive strategies or constructive problem-solving interactions which play an important role in marital satisfaction (Senchak & Leonard 1992). Thus, we hypothesize that less attachment anxiety and avoidance will be associated with one's own marital satisfaction in older adult spousal caregiving relationships (Hypothesis 4a).

Past research on the dyadic effects of adult attachment and marital satisfaction shows that individuals report less satisfaction if their partners are high in attachment anxiety (Barse, 2004). Past studies have also shown that partners have reduced marital satisfaction when wives are anxiously and husbands are avoidantly attached (Feeney, 1994; Barse, 2004). This may be because avoidantly attached individuals are less likely to seek or accept support (Feeney & Hodaus, 2001). In contrast, marital adjustment is reported to be better when both partners are securely attached (Feeney, 1996). In the present study, we hypothesize that partners with low attachment anxiety and avoidance will be associated with the other partner's marital satisfaction in older spousal caregiving relationships (Hypothesis 4b).

## **Summary of Hypotheses**

Past research provides preliminary evidence that (a) individuals with similar attachment orientations are more likely to match, which mostly occurs among securely-securely attached couples, but discrepancies exist among insecurely-insecurely attached couples; (b) individual differences in attachment plays an important role in one's own mental and physical well-being and relationship satisfaction; (c) individual differences in attachment may also influence the mental and physical well-being and perceived relationship satisfaction of one's partner. In the present study, we hypothesizes that attachment anxiety and avoidance in one partner will be related to attachment anxiety and avoidance in the other (Hypothesis 1); attachment anxiety and avoidance will negatively affect the mental health of one's own (Hypothesis 2a) and one's partner (Hypothesis 2b); more attachment anxiety and avoidance will be associated with poorer physical health of one's own (Hypothesis 3a) and one's partner (Hypothesis 3b); less attachment anxiety and avoidance will be associated with marital satisfaction of one's own (Hypothesis 4a) and one's partner (Hypothesis 4b) in older adult spousal caregiving relationships.

## **Method**

### **Participants**

Seventy-seven care recipients with a musculoskeletal condition (i.e. osteoarthritis, lower back pain) and their caregiving spouses were recruited from the internet, newspaper advertisements and community bulletins. In order to be eligible to participate, 1) care recipients had to be over 50 years old; 2) care recipients and caregivers must be married or in a marriage-like relationship; 3) care recipients and caregivers live together; 4) care recipients have experienced at least moderately intense pain over the past month. Participants completed the Short Portable Mental Status Questionnaire - Mini-Mental State Examination (MMSE; Folstein

et al., 1975), to evaluate their cognitive functioning. And only those who correctly answered at least 7 out of 10 items were considered to be eligible for the study. Caregivers, who were taking beta-blockers, a class of drug affecting the heart rate, were excluded because of the aims of the parent study. See Table 1 for participant characteristics.

## **Procedure**

After signing informed consent, a background questionnaire was given to both caregivers and care recipients in separate rooms. The data from background questionnaires was used for the purposes of measuring the variables in the present study. These questionnaires were given after an experiment to examine caregivers' physiological stress in response to their partner's chronic pain condition.

## **Measures**

### *Attachment orientation*

Care recipients and caregivers rated their feelings about their relationship with their current romantic partner, using a modified 12-item version of the Experiences in Close Relationships Scale (Brennan et al., 1998). This measure assesses two dimensions of adult attachment: attachment anxiety (i.e. "I worry a lot about my relationship with my partner.") and attachment avoidance (i.e. "I am nervous when my partner gets too close to me."). Participants responded using a 7-point scale for each item (i.e., 1=disagree strongly; 7=agree strongly). Relationship-specific attachment was measured, which has been reported to be more accessible than trait attachment during interactions with romantic relationship partners (Baldwin et al., 1996). For caregivers, the cronbach's alpha for attachment avoidance measurement was 0.77 ( $M = 2.36$ ,  $SD = 1.03$ ), and for attachment anxiety, it was 0.79 ( $M = 2.46$ ,  $SD = 0.96$ ). For care recipients, the

cronbach's alpha for attachment avoidance was 0.61 ( $M = 2.34$ ,  $SD = 1.03$ ); for attachment anxiety, it was 0.82 ( $M = 2.33$ ,  $SD = 1.02$ ).

### *Mental Health*

We used the 20-item version of the Center for Epidemiological Studies-Depression scale (CES-D) to measure caregivers and care recipients' depressive symptoms during the past week (Irwin et al., 1999). Examples of items included "I was bothered by things that don't usually bother me" and "I felt depressed". Participants indicated how often they felt this way using scale from 0 (rarely or none of the time) to 3 (most or all of the time). For caregivers, the Cronbach's alpha was 0.84 with a mean score of 9.60 ( $SD = 7.94$ ). For care recipients, the Cronbach's alpha was 0.76 with a mean score of 7.72 ( $SD = 6.07$ ).

### *Physical Health*

The physical condition index (PCI) was used to evaluate physical health (Katz et al., 1996). The PCI is a self-report survey with 24 items which determines number of chronic conditions. Questions include respondents' history with cardiovascular, respiratory, digestive problems, surgery and cancer among other physical health issues. Scores range from 0 to 24. For caregiver's physical conditions, the mean score was 2.91 ( $SD = 1.95$ ). For care recipients' physical conditions, the mean score was 3.69 ( $SD = 2.47$ ).

### *Marital Satisfaction*

Both partner self-reported marital satisfaction was assessed using the 16-item Locke and Wallace Marital Adjustment Test (MAT; Locke & Wallace, 1959). Several aspects of their relationship quality were measured: 1) their general level of marital happiness, using a scale

from 0 (very unhappy) to 6 (perfectly happy); 2) agreement on items (i.e. handling family finances, matters of recreation, friends, sex relations, etc.), using a scale from 0 (always disagree) to 5 (always agree); and 3) questions on whether or not they give in when disagreements arise, their engagement in outside interests, and their views to current partner. Scores range from 28 to 119. The higher the MAT score, the higher level of marital satisfaction. For caregivers, the mean was 95.69 ( $SD = 19.35$ ). For care recipients, the mean was 96.36 ( $SD = 15.99$ ).

### **Analysis Plan**

First, we examined the descriptive statistics and interrelations between all study variables. For our main analyses, we used a dyadic data analytic technique, the actor-partner interdependence model (APIM; Kashy & Kenny, 1999) using the mixed procedure in SPSS, to deal with the non-independence of the data and address questions on mutual influence. APIM is a dual-intercept model ensuring to calculate two effects: “actor effects” and “partner effects”. “Actor effect” represents the influence that an individual’s score on a predictor variable has on his/her own score on a dependent variable (e.g. the association of caregiver’s attachment anxiety on the caregiver’s depression). A partner effect represents the influence that an individual’s score on a predictor variable has on his/her partner’s score on a dependent variable (e.g. the association of caregiver’s attachment avoidance on the care recipient’s marital satisfaction). To examine whether or not each effect was specific to the caregivers or care recipient’s outcome, we tested for interactions with a “role” variable, where caregivers were coded as -1 and care recipients were coded as 1. In our analyses, we centered all independent variables (attachment dimensions) on the group mean. We also conducted correlation analysis to identify covariates of the independent variables. As shown in Table 2, caregivers’ age was associated with care-recipient



attachment anxiety. Therefore, we included both partners' age in the regression models testing our hypotheses.

## **Results**

### **Preliminary Analysis**

First, we conducted descriptive analysis to characterize the care recipients in terms of their pain condition. Care recipients were asked to choose which parts of your body are currently affected by arthritis (i.e. feet / ankles, knees, hips, back, neck, etc.), as well as how long they have had arthritis. On average, care recipients reported that they were experiencing consistent pain at low to medium levels. The mean rating of care recipient's pain was 3.65 on scale of 10 ( $SD = 2.49$ ,  $Range = 0 - 10$ ). Care recipients also reported that they had been experiencing chronic pain for 123.77 months on average ( $SD = 129.79$ ,  $Range = 0 - 636$ ). Sixty seven (87.01%) care recipients reported that they had been suffering from osteoarthritis in at least one location. Fifty (64.90%) care recipients reported arthritis in a second location, most often 13 (26.00%) of them had back pain, 10 (20.00%) of them had hips pain, and 9 (18.00%) of them had hands / fingers pain. The remaining care recipients did not report having osteoarthritis but did report having lower back pain.

### **Similarity of partners' attachment orientation**

Correlation analyses among our independent variables (attachment dimensions) were conducted. Consistent with hypothesis 1, as shown in Table 3, care recipient attachment avoidance was significantly positively associated with caregiver attachment anxiety. However, care recipient attachment avoidance was not related to caregiver attachment avoidance. Further,

care recipient attachment anxiety was not related to caregiver attachment avoidance or caregiver attachment anxiety.

### **Mental Health**

As shown in Table 4, supporting hypothesis 2a, we found an actor effect, such that attachment anxiety was associated with more depressive symptoms for both caregivers and care recipients. There was also a significant interaction between role (caregiver versus care-recipient) and partner's attachment avoidance, predicting actor depressive symptoms. Supporting hypothesis 2b, caregiver's attachment avoidance was associated with more care recipient's depressive symptoms (see Figure 1). According to the guidelines of Aiken and West (1991), follow-up analyses revealed for care recipients, partner attachment avoidance was significantly positively associated with care recipient's depressive symptom ( $B = 1.55, SE = 0.66, t(69) = 2.33, p < 0.05$ ). However, for caregivers, partner attachment avoidance was negatively but not significantly related to caregiver's depressive symptom ( $B = -1.53, SE = 0.91, t(69) = -1.68, ns$ ). There were no other significant associations predicting mental health of caregivers or care recipients.

### **Physical Conditions**

As shown in Table 4, there was a significant interaction between role and actor's attachment avoidance, predicting actor physical conditions. Supporting hypothesis 3a, caregivers' attachment avoidance was associated with more physical conditions of their own (see Figure 2). Follow-up analyses revealed that for caregivers, actor attachment avoidance was positively associated with caregiver's physical condition ( $B = 0.61, SE = 0.22, t(68) = 2.76, p < .01$ ).

However, for care recipients, actor attachment avoidance was not significantly associated with care recipient's physical condition ( $B = -0.26$ ,  $SE = 0.30$ ,  $t(69) = -0.84$ , ns).

There was also a significant interaction between role and partner's attachment avoidance, predicting actor's physical conditions (see Figure 3; hypothesis 3b). Follow-up analyses revealed that for care recipients, partner attachment avoidance was positively but not significantly related to care recipient's physical conditions ( $B = 0.44$ ,  $SE = 0.29$ ,  $t(69) = 1.48$ , ns). For caregivers, partner attachment avoidance was negatively but not significantly associated with caregiver's physical conditions ( $B = -0.41$ ,  $SE = 0.23$ ,  $t(68) = -1.78$ , ns). There were no other significant associations predicting physical health.

### **Marital Satisfaction**

Also as shown in Table 4, we found significant actor and partner effects for attachment avoidance, such that individuals who were more avoidantly attached and had partners who were avoidantly attached had lower marital satisfaction (Hypotheses 4a and 4b). This was true for both caregivers and care recipients. There was also a significant interaction between role and partner attachment anxiety predicting actor marital satisfaction. Supporting hypothesis 4b, care recipient attachment anxiety was associated with lower caregiver marital satisfaction (see Figure 4). Follow-up analyses revealed that for care recipients, partner attachment anxiety was not significantly related to care recipient's marital satisfaction ( $B = 1.36$ ,  $SE = 1.72$ ,  $t(69) = 0.79$ , ns). However, for caregivers, partner's attachment anxiety was significantly and negatively associated with caregiver's marital satisfaction ( $B = -3.79$ ,  $SE = 1.68$ ,  $t(69) = -2.25$ ,  $p < .05$ ). There were no other significant associations predicting marital satisfaction.

### **Discussion**

The results of our study revealed that, as hypothesized, there were intrapersonal and interpersonal effects of attachment on mental and physical health and relationship satisfaction in spousal caregiving relationships dealing with chronic pain conditions.

Our first aim was to examine whether individuals high in attachment insecurity tend to pair with each other. Consistent with previous research (Kirkpatrick & Davis, 1994), we found that care recipients' level of attachment avoidance was significantly positively associated with caregivers' level of attachment anxiety. Previous research states that maintaining consistent model of self is the goal in long term relationships (Holmes & Johnson, 2009). For this reason, an anxiously attached individual might be more likely to maintain a long term relationship with an avoidantly attached partner. An avoidantly attached individual (high in independence, low in intimacy) would fit the negative model of the anxiously attached partner as "unworthy of love", and the "expectation of others as distant" (Collins & Read, 1990; Kirkpatrick & Davis, 1994; Holmes & Johnson, 2009). In the same way, an anxiously attached individual would fit with the avoidantly attached partner's "positive model of self as worthy of love", and the "expectation of others as needy and dependent" (Holmes & Johnson, 2009; Collins & Read, 1990; Kirkpatrick & Davis, 1994). However, the partner of a similar insecure attachment dimension could violate one's expectation of how an attachment partner should behave, such that anxiously attached individuals expect their spouse to be rejecting, while avoidantly attached individuals expect their spouse to be clingy (Kirkpatrick & Davis, 1994). Particularly, among our sample of older spouses who have stable marriage and long caregiving journey, it is less likely for spousal caregivers to ignore the physical and emotional needs of spousal care-recipients. Instead, spousal caregivers may tend to provide more caring and even force their partners to share their physical and emotional needs with them. Anxiously attached caregivers may be too intrusive, which

heightens care recipients' attachment response in the long term, such that avoidantly attached care recipients are more resistant of burdening their partners and sharing their emotional needs by expecting spousal caregivers as distant. On the other hand, the more distance and pulling away caregivers bearing heightens their attachment response in the long term, such that anxiously attached caregivers may become clingier and increase their level of attachment anxiety.

Our second aim was to examine the association between one's own attachment dimension on one's own depressive symptoms, physical conditions, and marital satisfaction. First, we found that caregivers' attachment avoidance was associated with more physical symptoms for the caregiver. This is consistent with findings by Sadava and colleagues (2009) and McWilliams & Bailey (2010) showing that attachment insecurity is considered as a risk factor of various chronic diseases, particularly heart disease. We also found that both caregivers and care recipients who were anxiously attached experienced more depressive symptoms. This finding also supports the idea that insecurely attached individuals have an increased susceptibility to stress and have more extreme physical responses to stress; they may use negative methods to regulate affect (i.e. substance abuse); and they are less likely to seek help effectively (i.e. social support, medical assistance), all of which may lead to chronic diseases (i.e. heart disease, diabetes) in the long-term (McWilliams & Bailey, 2010; Maunder & Hunter, 2001). Thirdly, we found that both caregivers and care recipients who are more avoidantly attached have lower marital satisfaction. This fits with prior research showing that the increase of both spouse's attachment avoidance in marriage is associated with the decreased marital satisfaction (Slavinskienė et al., 2012).

Our third aim was to examine the influence of the partner attachment dimension on one's depressive symptoms, physical conditions, and marital satisfaction. Most of previous studies investigated the relationship between one partner's personality and his or her own well-being.

Limited research has examined partner effects of attachment on health outcomes (Monin et al., 2012). In our study, we found that caregiver's attachment avoidance was associated with more care recipient's depressive symptoms. The quality of the support provided by caregivers might be a good explanation for this association (Kunce & Shaver, 1994). Care recipients with chronic pain may be more vulnerable to mental stress that results from low quality support from avoidantly attached caregivers, and caregivers who are avoidantly attached may be less responsive to care recipients' mental vulnerability (Whiffen, 2005). Past research has shown that perceived avoidance is related to depressive symptoms (Whiffen, 2005). It has been suggested that caregivers who are avoidantly attached may devalue care recipients' emotional expression which can be perceived as unresponsive to their care recipient's vulnerability, having adverse effects on care recipient's mood (Whiffen, 2005).

In addition, we found that caregivers' attachment avoidance was associated with more physical conditions of care recipients. Researchers have suggested that consistent unavailability from a partner may lead to more physical symptoms of an individual, particularly those who are insecurely attached (Ryan, 2012; Carmichael & Reis, 2005). They may either intent to falsely report more physical symptoms to induce more caretaking from their partner to a desired degree, or they may really experience more physical conditions resulting from rejection from partners and emotional vulnerability of their own (Ryan, 2012; Carmichael & Reis, 2005). Also, care recipients with more physical conditions require heavier caregiving activities from caregivers, leading to more responsibility and stress of caregivers. Especially, the more stress and pressure caregivers bearing heightens their attachment response, so that avoidantly attached caregivers can change and increase their level of attachment avoidance in the long term caregiving activities.

This explanation is also consistent with our finding that both caregivers and care recipients who have avoidantly attached partners have lower marital satisfaction.

Finally, it is widely accepted that marital satisfaction is reported higher when both partners have low levels of anxiety and avoidance attachment orientations (Kirkpatrick & Davis, 1994; Bpanse, 2004; Feeney, 1999; Ben-Ari & Lavee, 2005). And we found that marital satisfaction was reported lower in caregivers when care recipients were high in attachment anxiety. The reason for lower self-reported marital satisfaction with anxiously attached partners may be that anxiously attached partners tend to exert pressure, display greater hostility, use physical and verbal aggression, feel hurt after conflict and lack mutual understanding (Shi, 2003; Corcoran & Mallinckrodt, 2000; Simpson et al., 1996; Feeney et al., 1994). This may be particularly harmful in a chronic pain context.

There are some limitations with our study design and interpretation. First of all, the small sample size, and unbalanced ethnicity of our sample limit power to detect any more significant effects. Second, the cross-sectional study design of questionnaire limits the ability to infer the causality from this type of data. For example, it is not clear whether attachment is influencing health outcomes or health status is predictive of attachment orientation of individuals. Finally, the physical conditions and depressive symptoms were measured based on self-reports. Objective medical measures should also be applied.

Although our study presents interesting findings on the effects of attachment on physical conditions, depressive symptoms, and marital satisfaction, it would be ideal to have more information collected from participants to get a comprehensive picture of the influence of attachment on specific diseases (i.e. cardiovascular disease, cancer, stroke). We can further

conduct longitudinal study to assess the stability and change of marital relationship progress, the depressive symptoms over time, and the relationship between length of marriage and attachment ratings, as well as the effects of changes of attachment insecurity over time on individual's health and relationships (Feeney, 1994; Ryan, 2012). Whether people mate based on similar attachment dimensions, or whether their attachment orientations become more similar over the course of the relationship (i.e. dating, married), should be further assess by longitudinal data (Carnelley et al., 1996).

Findings from this study have implications for spousal caregiving interventions for older adults suffering from chronic pain conditions. These findings provide clinical therapist and health care workers a richer picture of the associations between attachment insecurity and individual's self-reported health and marital satisfaction in a nonclinical and natural setting. Issues on attachment should be paid particular attention in marital therapy (Shi, 2003). Clinical therapists can assess the inner sense of insecurity and help change negative attachment models of partners (Shi, 2003). Such marital therapy may also be an effective treatment for depression with the presence of marital distress (Whiffen, 2001). Also, taking an attachment theoretical perspective can help health care providers establish counseling for insecurely attached caregiving dyads, who are less likely to seek social support than securely attached dyads (Karantzas et al., 2010). One of the empirically based interventions is EFT (Emotionally Focused Couple Therapy) which is suggested to be helpful in enhancing marital satisfaction for caregiving dyads (Monin et al., 2012; Johnson, 2003).

In summary, this study highlights the important of taking into account the influence of both partners' attachment insecurity on depressive symptoms, physical conditions, and marital satisfaction among elder spouses with osteoarthritis pain. On the journey of long-term caregiving



activities, how to effectively regulate emotion and maintain a secure personality is the determinant of the well-being of one's own and his or her partner. Taking attachment theory as a perspective can help guide preventive, clinical and policy interventions to improve caregiving dyad's well-being.

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**Appendix**

**Table 1. Sample Characteristics**

	Care Recipient (N=77)		Caregiver (N=77)	
Age (Years ±SD)	65.90±(7.88)		64.81 ±(8.41)	
Months Married*			372.67±(196.46)	
Length of osteoarthritis (Months±SD)	123.77±(129.79)			
Gender				
Female (%)	45	(58)	32	(42)
Male	32	(42)	45	(58)
Race				
White, Caucasian	75	(97)	72	(94)
Black, African American	1	(1)	1	(1)
American Indian, Alaskan Native	0	(0)	1	(1)
Other	1	(1)	3	(4)
Education				
Less than high school	4	(5)	5	(7)
High school	22	(29)	24	(31)
Some college credit	16	(21)	12	(16)
Associate's degree	7	(9)	5	(7)
Bachelor's degree	12	(16)	9	(12)
Some graduate school	6	(8)	13	(17)
Professional degree (eg. Ph.D, MD, etc.)	10	(13)	9	(12)
Employment				
Employed for pay, full time	13	(17)	13	(17)
Employed for pay, part time	14	(18)	17	(22)
Homemaker, not working for pay	2	(3)	3	(4)
Retired	40	(52)	35	(46)
Unemployed	8	(10)	8	(10)
Household Income*				
< \$10,000			3	(4)
\$10,000 - \$39,999			25	(32)
\$40,000 - \$69,999			24	(32)
\$70,000 - \$99,999			14	(18)
\$100,000 or more			7	(9)

Note. \* Only reported by Caregivers

**Table 2. Correlation Matrix Between Potential Covariates and Independent Variables**

		Care-Recipient		Caregiver	
		Anxiety	Avoidance	Anxiety	Avoidance
Caregiver	Age	-.259*	-.160	-.042	.052
	Gender	-.222	-.004	-.140	.026
	Marital Length	.120	-.042	-.227	-.072
	Education	-.045	-.036	-.049	.007
	Income	-.024	.225	-.043	-.043
	Race	-.090	-.044	.011	.098
Care-Recipient	Age	-.121	.014	.115	.105
	Education	-.074	.116	-.059	.006

\*. Correlation is significant at the 0.05 level (2-tailed).

**Table 3. Correlation Matrix of Caregivers and Care-recipients Variables**

		Care-Recipients				
		Avoidance	Anxiety	Marital Satisfaction	Depressive symptoms	Physical conditions
Caregivers	Avoidance	.165	.187	-.244*	.295**	.208
	Anxiety	.279*	.136	-.109	.045	.110
	Marital Satisfaction	-.296**	-.433**	.465**	-.280*	-.031
	Depressive symptoms	-.095	-.036	-.058	.143	.013
	Physical conditions	-.211	-.171	.083	.133	.090

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\*. Correlation is significant at the 0.01 level (2-tailed).

**Table 4. Actor-Partner Interdependence Model**

	Physical Conditions		Depressive Symptoms		Marital Satisfaction	
	B	SE	B	SE	B	SE
Intercept	1.14	2.51	-3.65	6.53	84.50**	14.07
Role	-.32	1.11	7.39**	2.57	11.03*	5.32
actor age	.04	.02	-.18*	.07	.48**	.14
partner age	-.01	.02	.11	.07	-.08	.14
actor anxiety	.10	.19	1.83**	.57	-1.53	1.18
partner anxiety	-.08	.19	-.54	.57	5.23	3.39
actor avoidance	-.90	.60	1.04	.54	-8.01**	1.12
partner avoidance	1.43*	.59	4.01**	1.47	-2.35*	1.12
Role * partner anxiety	—	—	—	—	-4.35*	2.10
Role* actor avoidance	.74*	.35	—	—	—	—
Role*partner avoidance	-.93**	.35	-2.65*	1.02	—	—

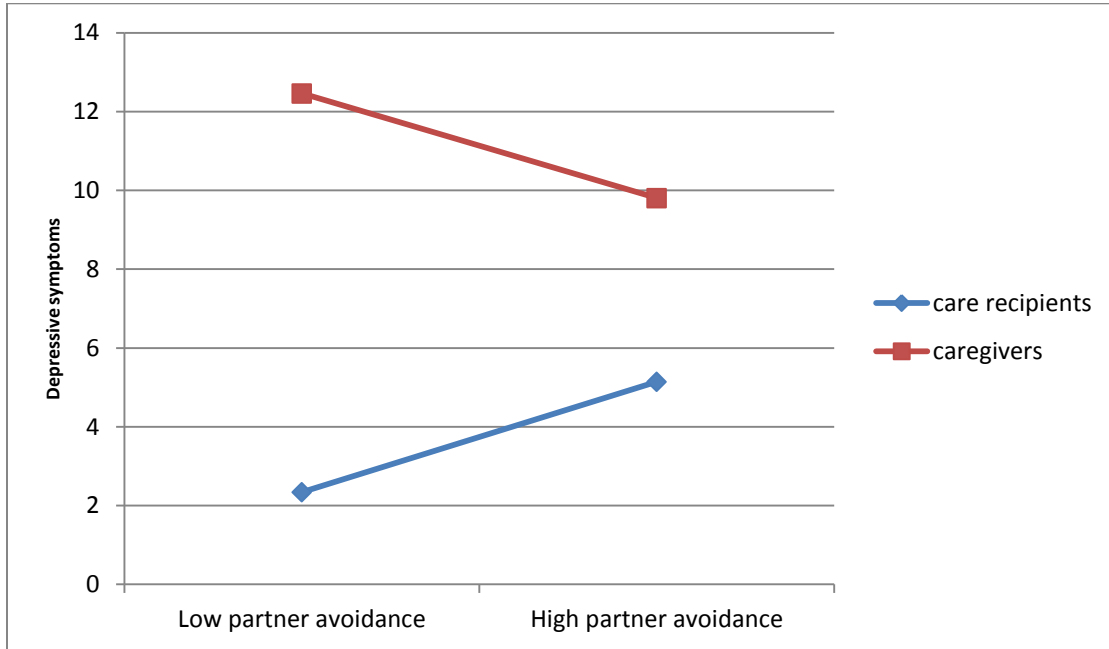
Notes: All variables were centered on the mean and simultaneously entered into the models.

CR = care-recipient = actor, CG = caregiver = partner, anx = attachment anxiety, avd = attachment avoidance.

\*\* $p < 0.01$ .

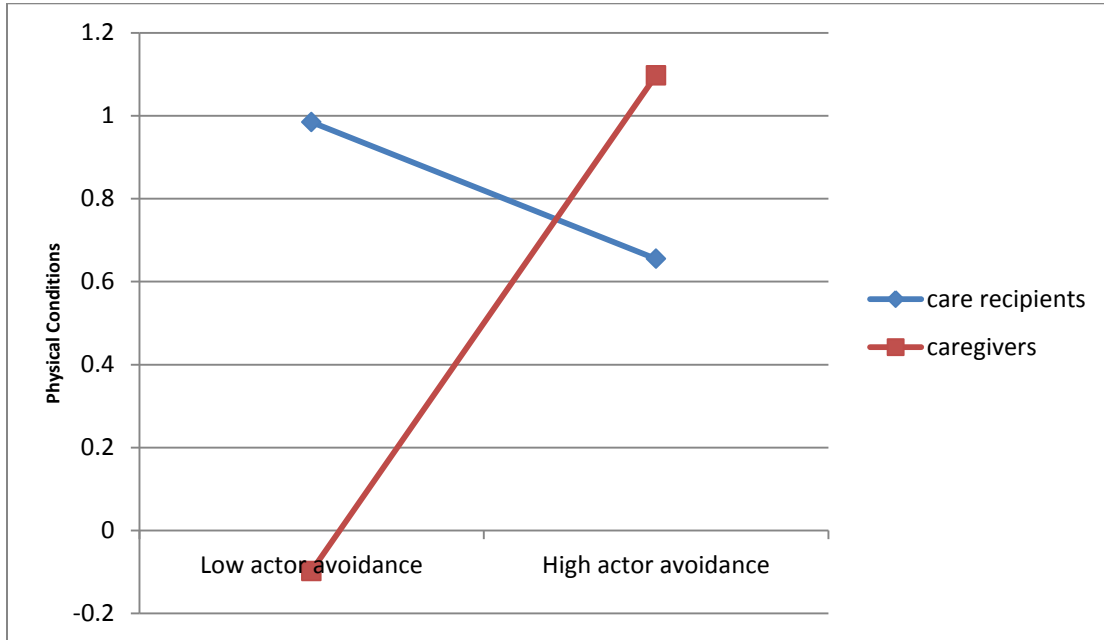
\* $p < 0.05$ .

**Figure 1. Interaction between partner attachment avoidance and relationship role predicting depressive symptoms**

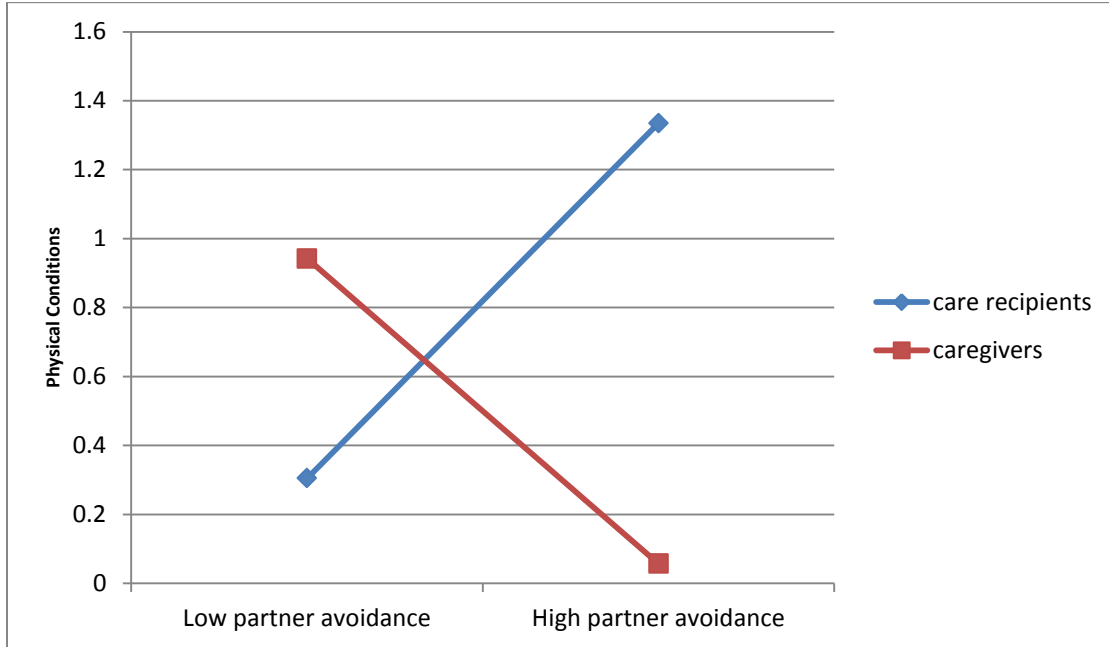




**Figure 2. Interaction between actor attachment avoidance and relationship role predicting physical conditions**



**Figure 3. Interaction between partner attachment avoidance and relationship role predicting physical conditions**



**Figure 4. Interaction between partner attachment anxiety and relationship role predicting marital satisfaction**

