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Widening the social context of disablement among married older adults: Considering the role of nonmarital relationships for loneliness

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Abstract

Utilizing the stress process and life course perspectives, we investigated the influence of non-spousal social support on the associations between marital quality, physical disability, and loneliness among married older adults. Using data from the National Social Life, Health, and Aging Project (NSHAP), we found that the association between physical disability and loneliness was partially accounted for by the fact that physical disability was associated with less supportive nonmarital relationships. While physically-disabled older adults in higher-quality marriages were buffered from loneliness, supportive non-marital relationships did not offset elevated loneliness among those in low-quality marriages. These associations were largely similar for men and women. Thus, although both marital and nonmarital relationships are important for loneliness, when confronted with a stressor such as disablement it is the marital relationship alone that matters.

Keywords: disability, marriage, marital quality, social support, life course, gender

1. Introduction

Disablement is a physiological phenomenon that unfolds in one's social environment (Fried et al., 2004). Thus, by presenting challenges to routine functioning (Korporaal et al., 2008; Verbrugge and Jette, 1994), disablement is a significant stressor that may not only result in a loss of independence and autonomy, but may also impede interpersonal relations and ultimately exert negative consequences on mental health (Bookwala and Franks, 2005; Booth and Johnson, 1994; Turner and Noh, 1988). Indeed, prior studies demonstrate that physically-disabled older adults report lower-levels of well-being on a myriad of mental health outcomes, including depressive symptoms (Bierman and Statland, 2010; Yang, 2006), self-esteem (Reitzes and Mutran, 2006), and life satisfaction (Ducharme, 1994). Nevertheless, our understanding of the psychosocial consequences of disablement remains limited because research has only recently begun to explore its social context.

The utility of situating disablement in its social context is demonstrated in a recent study by Warner and Kelley-Moore (2012). They found that disabled older adults in marriages characterized by higher levels of positive marital quality were effectively buffered from loneliness. Casting marital quality as a potential resource, this finding highlights the importance of interpersonal relations for mitigating the consequences of later-life disablement. While the marital dyad is the central social context in which disablement occurs—given that until very advanced ages most older adults are married (Cooney and Dunne, 2001)—married older adults are embedded in a wider circle of interpersonal relations that include non-spouse family and friends (Antonucci et al., 2009; Liebler and Sandefur, 2002). Yet, it is unclear from existing studies whether family and friends offer support that, above and beyond the marital relation-

ship, can also serve as buffering resources to physically-disabled married older adults. The availability of such support may be especially important to those older adults whose marriages are less supportive, potentially offering protection from the deleterious health consequences of being unhappily married (Hawkins and Booth, 2005).

Therefore, the purpose of the current study was to consider the wider social context of disablement, examining how nonmarital interpersonal relations, separately from or in combination with marital quality, affect the association between physical disability and loneliness among married older adults. To do this, we used data from the nationally representative National Social Life, Health, and Aging Project (NSHAP). We focus our examination on the consequences of disablement for loneliness because it is a subjective assessment of the adequacy of one's social environment that is relatively independent of actual instances of social contact (Cacioppo et al., 2003; Cornwell and Waite, 2009). Moreover, loneliness is an important gauge of well-being, predicting declines in self-rated health, cardiovascular disease, increased depression, cognitive decline, use of health services, institutionalization, and mortality (Cacioppo et al., 2003; Hughes et al., 2004).

2. Background

2.1. *The social context of disablement*

A number of prior studies have focused on the socioemotional well-being of functionally-impaired older adults. Physically-disabled older adults report lower levels of well-being on a number of mental health outcomes, including depressive symptoms (Bierman and Statland, 2010; Turner and Noh, 1988; Yang, 2006), self-esteem (Reitzes and Mutran, 2006), and life satisfaction (Ducharme, 1994). Despite this body of evidence, however, our understanding of the socioemotional consequences of disablement remains incomplete because prior studies have given inadequate attention to the fact that poor health and functional limitations are experienced not in isolation, but in a social context that is comprised of a web of interpersonal relations (Fried et al., 2004; Warner and Kelley-Moore, 2012).

As most older adults are married until very advanced ages (Cooney and Dunne, 2001), the spouse is the central figure in this web of interpersonal relations (Antonucci and Akiyama, 1987; Cooney and Dunne, 2001) connecting married persons to others and serving as one's most significant source of companionship and social support (Waite and Lehrer, 2003). The spouse plays an even more central role in social network of physically-disabled older adults. Indeed, with marital quality a generally stable property of the relationship (Johnson et al., 1992; Kamp Dush et al., 2008) and little empirical evidence that disablement among older adults is associated with lower marital quality (Bookwala and Franks, 2005), the quality of the marital relationship serves as a resource to physically-disabled older adults. For example, Warner and Kelley-Moore (2012) found that older adults in marriages characterized by high levels of positive marital quality – emotional support, companionship, and openness in communication – were effectively protected from the deleterious effects of functional impairment, exhibiting levels of loneliness similar to non-disabled married older adults.

However, in addition to one's spouse, married individuals move through the life course with both strong and weak ties to various other persons, and those relationships characterized by strong ties (e.g. family, and close friends) are where meaningful support exchanges typically occur (Antonucci et al., 2009). By late midlife and older adulthood, the patterns of exchange with nonmarital relations are well-established (Liebler and Sandefur, 2002). As theorized by the stress-process and life course perspectives (George, 2003; Pearlin et al., 1981), these relationships can provide social resources to older adults that can facilitate positive coping with the stressor of disablement; at the same time, such interpersonal relations may also place demands on older adults that exacerbate the socioemotional consequences of physical disability.

Yet, mid- to late-life disablement, by presenting challenges to routine functioning and activities of daily living (Korporaal et al., 2008; Verbrugge and Jette, 1994), may not only result in a loss of independence and autonomy but may also necessitate changes in the structure and quality of nonmarital social relations (Thompson and Heller, 1990). Thus, consistent with the life course perspective's emphasis on linked lives (George, 2003), understanding the socioemotional consequences of disablement requires examining the web of relationships in which older adults are embedded. It is unclear from extant studies whether family and friends offer support that, above and beyond the marital relationship, can serve as resources to physically-disabled married older adults.

2.2. *Relationships with family and friends*

While the marital dyad is central to the social context in which disablement occurs, older adults often are embedded in a wider circle of social relations that include non-spouse family and friends (Antonucci et al., 2009; Liebler and Sandefur, 2002). The size and composition of social networks varies considerably, meaning that the quantity of social ties accessible from different relationship domains (e.g. family, friends, coworkers) varies among individuals (Antonucci and Akiyama, 1987; Seeman, 1996). Nevertheless, access to a greater number of social ties does not necessarily imply that an individual's social needs, such as affection, advice, and care, are being met through these interpersonal relations (Cornwell and Waite, 2009). A thorough understanding of the social context of disablement thus requires the consideration of the *quality* of nonmarital relationships.¹ Overall, prior studies have found that having access to more supportive social ties has a protective mental health effect, especially with respect to depression (Kawachi and Berkman, 2001).

However, the *stress-deterioration hypothesis* (Pearlin et al., 1981) predicts that declining health, especially with respect to mobility, will produce negative changes in the dynamics of relationships with non-spouse family and friends. Social relationships may be vulnerable because disability challenges routine functioning (Korporaal et al., 2008; Verbrugge and Jette, 1994) and often results in a loss of autonomy. Indeed, prior studies find that functionally impaired older adults tend to reduce their amount of participation in activities (Williamson and Schultz, 1992) and experience isolation from family and friends (Thompson and Heller, 1990). As a result of such changes, physically-disabled older adults may find their social ties with family and friends less satisfying and therefore experience lower levels of perceived social support (Berkman et al., 2000; Kahn, 1994; Taylor and Lynch, 2004).² That is, in the stress-deterioration framework, interpersonal relations may *mediate* the link between physical disability and increased loneliness among older adults.

Several studies of depression produce findings that illustrate the mediating role of nonmarital relationships consistent with the stress-deterioration hypothesis, with availability of support from one's social network a robust intermediary in the relationship between functional impairment and depressive symptoms (Allen et al., 2000; Taylor and Lynch, 2004; Yang, 2006). In other words, physical disability is associated with higher levels of depression because it reduces perceived social support. Nevertheless, although Taylor and Lynch (2004) implied that perceived support is inversely related to strain in one's interpersonal relationships, none of the prior findings regarding the mediating effect of social support mentioned are based on an explicit examination of *both* non-spousal social support *and* strain. It is thus unclear if physical disability is associated with higher levels of strain in interpersonal relationships, as would be expected from the stress-deterioration hypothesis.

Whether nonmarital relationships mediate the association between physical disability and loneliness, as is the case with depression, is uncertain. While a risk factor for depression (Cacioppo et al., 2006), loneliness reflects an underlying social process and thus there are limits to what we can determine from studies of depression. Nevertheless, we would expect non-spousal social support and strain to mediate the association between functional limitations given that, as opposed to marriage, relationships with family and friends are unlikely to be coresidential and, especially among friends, to lack the institutional basis for sustained interaction and support in the face of a stressor such as disablement.

While the limited prior studies examining functional limitations, non-spousal social support, and socioemotional well-being have specified the main effect of social support (Allen et al., 2000; Taylor and Lynch, 2004), few have considered an alternative hypothesis offered by the stress-process perspective (Pearlin et al., 1981): social support and/or strain from family and friends may *moderate* the association between physical disability and feelings of loneliness. The *stress-buffering hypothesis* posits that supportive interpersonal relations—particularly long-lasting ones in which there is a shared history of exchange—ameliorate the effects of illness and physical disability on socioemotional well-being, whereas the lack of support and/or the presence of strain may exacerbate their negative socioemotional effects (Cohen, 2004). Social support is an especially important buffer in later life when health-related changes intensify the need for supportive relationships (Kahn, 1994).

Thus, according to the stress-buffering hypothesis, the perceived availability or absence of social support from non-spouse family and friends may moderate the effects of physical limitations on loneliness among married older adults. Although prior studies showing such an effect with loneliness are absent, several studies find that perceived social support can ameliorate the effect of functional limitations on depressive symptoms among older adults (e.g., Jang et al., 2002; Thompson and Heller, 1990). However, if disabled older adults find their nonmarital relations are less supportive or characterized by greater levels of strain (as also predicted by the stress-deterioration hypothesis), this would seem to undermine their ability to serve as a buffering resource and may actually exacerbate feelings of loneliness.

Therefore, to summarize so far, prior theory and research leads to two different expectations as to how nonmarital relations may affect loneliness among physically-disabled married older adults. One expectation, according to the *stress-deterioration hypothesis*, is that interpersonal relations may mediate the link between physical disability and increased loneliness because functional impairment undermines nonmarital relations (Thompson and Heller, 1990; Williamson and Schultz, 1992), leading to lower levels of non-spousal support and/or higher levels of non-spousal strain (Berkman et al., 2000; Kahn, 1994; Taylor and Lynch, 2004), and thus increased loneliness. A second expectation, based on the *stress-buffering hypothesis*, is that the perceived availability of social support (or presence of strain) from non-spouse family and friends may moderate the effects of physical disability on loneliness among married older adults, with supportive non-spousal relations ameliorating the effect of functional impairment leading lower levels of loneliness and strained non-spousal relations exacerbating the effects of functional limitations and leading to increased loneliness.

1. While social support and strain from relationships with family and friends may have unique effects on well-being (Berkman et al., 2000; Procidano and Heller, 1983), our preliminary analyses (described below) indicated that a combined measure of interpersonal relations with family and friends better fit the data than did separate measures. Thus, we refer to nonmarital relationships with family and friends.

2. It is important to note the difference between received and perceived social support. The former refers to supportive behavior that the individual has experienced, whereas the latter refers to an individual's subjective assessment of support available from particular persons. Of the two, perceived social support is a stronger predictor of socioemotional outcomes (Wethington and Kessler, 1986). The measures available in NSHAP, as we describe below, are a mix of perceived support and received strain.

2.3. *The interplay of marital and nonmarital relationships*

Prior studies on the socioemotional consequences of disablement have largely examined the effects of social resources from either marital (e.g. Bookwala and Franks, 2005; Warner and Kelley-Moore, 2012) or nonmarital relationships (e.g. Allen et al., 2000; Taylor and Lynch, 2004) but have not considered how the marital and nonmarital relationships may interact. It is therefore unclear from extant studies how marital and nonmarital relationships combine to affect loneliness among older disabled adults. Nevertheless, non-spousal social support may be especially important for the psychosocial well-being of disabled older adults when marital resources are lacking.

The *cross-domain buffering hypothesis*—essentially an extension of the stress-buffering hypothesis—posits that high levels of social support in one social domain can offset the negative health effects of low support/high strain in another social domain (Lepore, 1992). Prior studies have found limited evidence for cross-domain buffering. For example, drawing on a sample of partnered (overwhelmingly married) persons from the Midlife in the United States study (MIDUS), Walen and Lachman (2000) found that non-spousal support ameliorated the negative association between partner strain and mood. Thus, in the context of the present study, we might expect that non-spousal support may be of increased importance for disabled older adults in low quality marriages—with non-spousal support potentially compensating for (and strain potentially amplifying) the deleterious effects of a low quality marriage (Hawkins and Booth, 2005). Conversely, the *cross-domain buffering hypothesis* also implies that non-spousal strain may exacerbate the effects of a low quality marriage on loneliness among disabled older adults.

However, it is also possible that persons in low quality marriages may have only limited opportunities to invest in nonmarital relations that could serve in such a cross-domain buffering manner, given institutional expectations for marital partners to combine their social networks, resulting in shared, condensed social ties—a phenomenon known as dyadic withdrawal (Johnson and Leslie, 1982). Indeed, prior research shows that marital partners are more likely to interact with their shared social networks and the number of shared network ties was greater among older adults (Kalmijn, 2003). For persons in low-quality marriages, there may be limited investment in both joint nonmarital ties—because low-quality marriages are characterized by less interaction (Bookwala, 2005; Hawkins and Booth, 2005)—and independent nonmarital ties, because of institutional expectations for dyadic withdrawal. Therefore, disabled older adults in low quality marriages, despite potentially having a greater need for non-spousal support, may have less access to and be less able to engage nonmarital relationships. Given that interaction with social ties is a structural antecedent of social support (George, 2003), disabled older adults in lower quality marriage may consequently perceive less availability of non-spousal support, precluding (even limited) nonmarital relationships from compensating for the absence of a high quality marital relationship.

Additionally, even if older adults in lower quality marriages do have access to nonmarital ties, it is not clear that non-spousal support (strain) would ameliorate (exacerbate) feelings of loneliness when physically disabled. The expectations of the marital institution are that one's spouse is primarily responsible for caregiving and is thus the central source of emotional and physical support when one confronts illness (Spitze and Ward, 2000; Waite and Lehrer, 2003). As such, nonmarital ties may be ill-suited to meeting the emotional and physical needs of disabled older adults, because friends, family, and, older adult themselves are operating under the expectation that one's spouse is the principal source of support. In short, there may be something distinctive about marriage, which nonmarital ties cannot replace. It is perhaps for this reason that Holt-Lunstad et al. (2008) found that having supportive nonmarital ties did *not* buffer the negative cardiovascular effects associated with being unhappily married.

We thus have competing expectations for how marital and nonmarital relationships may jointly affect loneliness among older disabled adults based on nuanced theorizing about the interaction between marital and nonmarital relationships as put forth in the *cross-domain buffering hypothesis*. On the one hand, non-spousal support may ameliorate the negative effect low marital quality, while nonmarital strain may exacerbate it. On the other hand, such cross-domain buffering may *not* occur, either because older adults in low-quality marriages have less access to nonmarital ties or because even where such ties do exist the normative expectation that one's spouse is the primary source of support renders non-spousal support less effective. The complexity associated with conceptualizing the interplay of marital and nonmarital relationships further demonstrates the importance of broadening our perspective on the social context of disablement and its impact on loneliness. To our knowledge, the current study is the first to examine explicitly how assessments of both marital and nonmarital relationships affect the association between functional limitations and loneliness, independently and interactively.

2.4. *Gender, interpersonal relationships, and loneliness*

The life course perspective emphasizes that, like other forms of social activity, the ways in which individuals engage in and appraise their interpersonal relations is gendered (Moen, 2001). In general, women have more potential sources of social support to draw upon than men. Women report larger social networks across the life course (Haines and Hurlbert, 1992; Kahn, 1994; Turner, 1994) and, despite the tendency toward dyadic withdrawal described above, women's larger network size holds among the married as well (Cooney and Dunne, 2001), with women having a greater number of ties independent of their spouses (Kalmijn, 2003). Therefore, married men and women experience different constellations of nonmarital relationships that may influence feelings of loneliness when physically disabled.

In fact, men are more likely to depend on their wives exclusively for instrumental support, emotional support, and connections to others (especially family), than women are to depend on their husbands (Antonucci and Akiyama, 1987; Spitze and Ward, 2000; Umberson et al., 1996). Moreover, men report more positive assessments of spousal support compared to their wives (Neff and Karney, 2005). This would suggest that the quality of the marital relationship would be more important than that of nonmarital relations for loneliness among married men; this may be particularly true among physically-disabled married men given that spouses tend to be the primary care providers (Spitze and Ward, 2000). Although Warner and Kelley-Moore (2012) found that marital quality similarly moderated feelings of loneliness among physically-disabled married men or women, they did not examine nonmarital relationships.

Even though marital quality may affect loneliness similarly among physically-disabled older men and women, the fact that women are socially less dependent on marriage than men (Antonucci and Akiyama, 1987; Kalmijn, 2003) means that women have significantly more non-spousal sources of support upon which to draw. Yet, because of this, the *stress-deterioration hypothesis* would therefore predict that disablement would result in a lower non-spousal social support and/or greater non-spousal strain among women than men.

Besides having more ties, however, women engage in behaviors that should facilitate more supportive relationships with network members. Women report more frequent contact with network members, more confidants, higher levels of empathy, and greater emotional exchange than men (Liebler and Sandefur, 2002; Turner, 1994) and consequently are more satisfied with the support they receive from others (Kahn, 1994). Given that women's non-spousal relations are qualitatively better than are men's, non-spousal social support may more effectively moderate the effect of functional limitations on loneliness among older women. Indeed, Walen and Lachman (2000) found that only among women did friend support buffer the effect of marital partner strain on life satisfaction, negative mood, and positive mood. Of course, women's nonmarital relationships may not be uniformly beneficial. Women experience more negative interactions with social ties (Turner, 1994), and such interpersonal strain, especially with respect to relationships with family, leads to more negative mood among women (Walen and Lachman, 2000). Thus, we might expect that greater strain in nonmarital relations may exacerbate loneliness among physically-disabled women more so than men.

As we noted above, how marital and nonmarital interpersonal relations interact to affect loneliness among physically-disabled older adults has not been well-studied, thus whether there are gender differences in any combinatory effects is also unclear. Given that married women are significantly more likely to possess multiple nonmarital sources of support (Cooney and Dunne, 2001) and to exchange support with these ties (Liebler and Sandefur, 2002) than married men, when faced with a chronic stressor such as disablement older married women in low quality marriages may be in a more advantageous position relative to men in the same marital circumstances. At the same time, higher levels of non-spousal strain may exacerbate the negative consequences of physical disability among women in low quality marriages.

3. Research questions

Guided by the stress process (Pearlin et al., 1981) and life course perspectives (George, 2003), the current study addresses four broad research questions that advance our knowledge of the wider social context of disablement among married older adults by examining how the nonmarital interpersonal relations affect the association between physical disability and loneliness, independently of and interactively with the marital relationship. Specifically, among married older adults, we ask:

1. Does non-spousal social support mediate the association between physical disability and loneliness, as predicted by the *stress-deterioration hypothesis*?
2. Does non-spousal social support moderate the association between physical disability and loneliness, as predicted by the *stress-buffering hypothesis*?
3. Does non-spousal support moderate the association between marital quality and loneliness among the physically disabled, as suggested by the *cross-domain buffering hypothesis*?
4. Do the associations between physical disability, non-spousal support, marital quality, and loneliness differ for married women and men?

4. Methods

We used data from the *National, Social Life, Health and Aging Project (NSAHP)*, a nationally representative sample of 3005 community-dwelling individuals aged 57–85 in the contiguous United States (Waite et al., 2007). To collect information across a wide-range of life domains, NSHAP used a modularized design where some questions were included in a mail-back Leave-Behind Questionnaire. The return rate for the LBQ was 84% (O'Muircheartaigh et al., 2009). NSHAP is well-suited to the aims of the present study because it is, to our knowledge, the only nationally-representative dataset to collect extensive information from current cohorts of older adults on the quality of both their marital and nonmarital relationships.

4.1. Analytic sample

We defined our analytic sample according to several criteria. First, respondents had to be married or cohabiting. This excluded 1144 respondents (38.01% of the sample) who were not living in a coresidential partnership.³ Second, respondents had to have a valid score on our dependent variable, the UCLA Short Loneliness Scale (described below), and this was asked in the LBQ. Consequently, an additional 248 respondents who did not return the questionnaire were ineligible for inclusion. We also excluded 91 respondents because of item non-response on any of the three UCLA items. Altogether, we excluded 18.2% of the remaining sample ($n = 339$) due to missing information on the dependent variable.⁴

Third, respondents had to have complete information on the constituent items comprising the marital quality and nonmarital social support measures (described below). Four respondents were missing at least one marital quality item and 26 respondents were missing on at least one nonmarital social support item. Finally, we excluded 18 respondents without complete information in the remaining study variables.

Our final analytic sample included 1474 married older adults. This sample was 44% women, 85% non-Hispanic White, and had mean age of approximately 67 years. A little over two-thirds (68%) of respondents were in their first marriages. These characteristics generally reflect the distributions in the full NSHAP sample (not shown) and are consistent with the distributions in the population aged 57–85 from which NSHAP was drawn. Overall, our analytic sample is representative of older women and men in long-term first marriages.

4.2. Measures

Our dependent variable *loneliness* was measured with the UCLA Short Loneliness Scale, a three-item summated scale validated for use in surveys of older adults (Hughes et al., 2004). Respondents were asked how frequently they felt they “lacked companionship,” were “left out,” and were “isolated” from others. Responses included “hardly ever (or never),” “sometimes,” and “often,” which we coded from zero to two (0–2), respectively. The summated scale ranged from zero to six (0–6; $\alpha = .82$). Note that while prior studies have differentiated perceived adequacy of one’s social network from intimate companionship (e.g., de Jong Gierveld et al., 2009), the UCLA Short Loneliness Scale is an indicator corresponding to overall feelings of emptiness, isolation and abandonment (Hughes et al., 2004).

Our primary independent variables were physical disability, nonmarital social support, and marital quality. We measured physical disability with a count of *functional limitations*. Respondents were asked whether, because of a condition expected to last at least 3 months, they had “no difficulty” = 0, “some difficulty” = 1, “much difficulty” = 2, or were “unable to do” = 3 with seven Activities of Daily Living (ADL): walking one block; walking across a room; dressing, bathing, or showering; eating; getting in and out of bed; and using the toilet. As ADL limitations represent relatively severe impairments (Katz, 1983), we dichotomized each item so that reports of any difficulty were coded one and summed the seven items for a range of zero to seven (0–7); higher scores indicate more functional limitations ($\alpha = .81$). The sum of dichotomous indicators yielded a better model fit than did other coding schemes, including a single dichotomous variable for any of the seven limitations. Approximately 30% of respondents had at least one impairment.

Eight questions gauged the positive and negative aspects of respondents’ nonmarital relationships. Four items assessed relationships with family (excluding the spouse) and asked respondents about the frequency with which they can “talk about... worries” with their family, they can “rely on [their family] if [they] have problems,” whether their family made “too many demands,” and whether their family “criticize[d]” them. A parallel set of four questions was asked concerning relationships with friends. Responses to all items were coded “hardly ever (or never)” = 1, “some of the time” = 2, and “often” = 3. Respondents reporting that they did not have any family and/or friends were not asked the respective items about those relationships. To retain those cases in the analysis, we coded these respondents as the lowest value (“hardly ever (or never)”) on each item based on the premise that respondents without such relationships could not talk to or rely on such persons, nor would such persons make demands on or criticize the respondent. Two variables were included in preliminary analyses to control for the absence of these ties. However, the control for the absence of family was not statistically significant in any model, and in fact was collinear with other variables, and was therefore dropped from the final models. All models controlled for the absence of friends.

We employed exploratory factor analysis to determine how best to capture the positive and negative dimensions of nonmarital relationships. The principle factor method was used to extract the factors. A Scree test (Hatcher, 1994) suggested two meaningful factors and we retained these for oblique rotation. We considered an item with a loading of 0.35 or greater significant in interpreting the rotated factors. We calculated estimated factor scores (Hatcher, 1994) and included these as independent variables in our models.⁵ We labeled Factor 1 as *Non-Spousal Support* ($\alpha = 0.69$)

3. Approximately 3% of NSHAP respondents were cohabiting. As preliminary analyses indicated that cohabitators evaluated their relationships similarly to marrieds (see also Brown and Kawamura, 2010), we refer to married persons and marital quality throughout the text to simplify the discussion.

4. Preliminary analyses indicated Male, Black, Hispanic, unmarried, less educated, low income, and working respondents were less likely to return completed questionnaires; these items are controlled in our multivariate models. Importantly, neither functional limitations, nor positive and negative marital quality, nor nonmarital social support or strain were significantly associated with non response.

and Factor 2 as *Non-Spousal Strain* ($\alpha = 0.57$). The inter-factor correlation was -0.02 . While there is evidence that interpersonal relationships with family and friends have different properties (Berkman et al., 2000; Procidano and Heller, 1983), the exploratory factor analysis suggested combined measures. Moreover, preliminary analyses indicated that forcing separate measures for relationships with family and friends did not fit the data as well as the combined estimated factor scores.⁶ Appendix Table A1 summarizes the results of the exploratory factor analysis for the two factor solution. Due to constraints of the available data, our non-spousal measures are a mix of both perceived support and received strain—assessing, for example, whether respondents “can” rely on others or how often members “do” make too many demands (see note 3).

To capture the positive and negative aspects of marital quality, we used six indicators available in NSHAP. Four items asked about the frequency with which respondents could “talk about... worries” with their spouses, they could “rely on [their spouses] if [they] have problems,” whether their spouses made “too many demands,” or “criticize[d]” them. Responses were coded “hardly ever (or never)” = 1, “some of the time” = 2, and “often” = 3. A fifth item asked respondents whether they and their spouses “spend free time doing things together, or doing things separately,” with responses of “together” = 1, “some together, some different” = 2, and “different/separate things” = 3, which we reverse coded so that higher scores indicated more time spent together. The sixth item was a standard global assessment of marital happiness where responses ranged from “very unhappy” = 1 to “very happy” = 7, which we recoded into “Unhappy (1, 2, 3, 4)” = 1, “Happy (5, 6)” = 2, and “Very Happy (7)” = 3 to adjust for left skewness ($r = 0.91$ with original measure) and to obtain consistent response categories across all six marital quality measures.

As described in Warner and Kelley-Moore (2012), exploratory factor analysis identified two factors: *Positive Marital Quality* ($\alpha = 0.62$) and *Negative Marital Quality* ($\alpha = 0.60$).⁷ The inter-factor correlation was -0.54 . We included estimated factor scores as explanatory variables in our models. Appendix Table A2 summarizes the results of the exploratory factor analysis for the two factor solution.

We included several additional demographic and socioeconomic controls in our analysis based on findings from previous studies (Bookwala and Franks, 2005; Hawkey et al., 2008; Korporaal et al., 2008). Demographic characteristics included *age*, *female*, *race/ethnicity*, whether the respondent was *cohabiting*, and the number of *times previously married*. We measured socioeconomic status with *education* and *household income*. We tested a measure of household wealth in preliminary models, but because the findings were unchanged we excluded this measure from the final models. Although objective and subjective indicators of social isolation are independent (Cornwell and Waite, 2009), we also included measures of social integration to control for opportunities for social interaction that may mediate physical disability and loneliness (Thompson and Heller, 1990; Williamson and Schultz, 1992), including whether the respondent was *working* for pay, the frequency of *religious service attendance*, and *network size*. We present the full list of the variables, their coding, and descriptive statistics in Table 1.

4.3. Analytic strategy

We estimated Tobit regression models (Long, 1997) to examine the associations between physical disability, non-spousal support and strain, marital quality, and loneliness. Tobit regression models account for the restricted measurement of our dependent variable: 65% of respondents scored zero (0) and 22% scored one or two (1–2), and the remaining 13% scored three or higher (3–6) on the UCLA Short Loneliness Scale (not shown). This clustering occurs because the lowest category on the scale—“hardly ever (or never)” —is not specific enough to capture variation in the unobserved continuous latent loneliness construct and thus some responses are censored at zero. Failure to recognize the censored nature of the theoretically continuous underlying dependent variable by using OLS techniques results in downwardly biased parameter estimates (Long, 1997).

Our Tobit regression models provide maximum likelihood estimates of the theoretically continuous and normally distributed underlying loneliness construct (y_i), where the observed loneliness measure (y_i^*) is censored at zero (τ):

$$Y_i = \begin{cases} y_i^* = x_i\beta + \varepsilon_i & \text{if } y_i^* > \tau \\ \tau_y & \text{if } y_i^* \leq \tau \end{cases} \quad (1)$$

5. Estimated factor scores rely on the optimal regression weights derived from the factor analysis procedure to determine the relative loading of each item on the factor—as opposed to a factor-based summated scale that assumes each item is of equal weight in determining the respondent’s score. Given that the items that gauged the positive and negative aspects of respondents’ nonmarital relationships were skewed toward favorable/less negative appraisals, the standardization achieved with the estimated factors scored is desirable.

6. Though direct comparisons are difficult given our use of estimated factor scores, preliminary analyses suggested that the effects of non-spousal support and strain in our models were not being driven primarily by either relationships with family or with friends but by both sources combined.

7. The internal reliability values for our measures of marital quality are similar to those in other published studies, including those from the Marital Instability over the Life Course Study, where Booth and colleagues (Booth and Johnson, 1994; Johnson et al., 1992) have used latent indicators of marital interaction and conflict with $\alpha = 0.63$ and $\alpha = 0.54$, respectively.

Table 1. Model variables, coding, and descriptive statistics, analytic sample of married older adults ($N = 1474$).^a

| Variable | Description and coding | Mean | S.D. | Corr. |
|------------------------------------|--|------|------|----------|
| <i>Dependent variable</i> | | | | |
| Loneliness | UCLA Short Loneliness Scale. Summated score of three items assessing the frequency that R felt "lack [of] companionship," "left out," and "isolated from others" with responses to each of 1 = "hardly ever (or never)," 2 = "some of the time" and 3 = "often". ($\alpha = 0.82$). Items were recoded by subtracting one: range 0–6 | 0.75 | 1.29 | 1.00 |
| <i>Independent variables</i> | | | | |
| Functional limitations | Count of any difficulty with seven activities of daily living, including walking one block, walking across a room, dressing, bathing, eating, getting and out of bed, and using the toilet ($\alpha = 0.81$): range 0–7 | 0.70 | 1.51 | 0.07** |
| <i>Social support</i> | | | | |
| Non-spousal support | Estimated factor score; ($\alpha = 0.69$): range -2.04 to 1.23 | 0.00 | 0.81 | -0.15*** |
| Non-spousal strain | Estimated factor score; ($\alpha = 0.57$): range -0.66 to 4.44 | 0.00 | 0.73 | 0.22*** |
| <i>Marital quality</i> | | | | |
| Positive marital quality | Estimated factor score; ($\alpha = 0.62$): range -3.40 to 0.69 | 0.00 | 0.77 | -0.40*** |
| Negative marital quality | Estimated factor score; ($\alpha = 0.60$): range -0.75 to 2.51 | 0.00 | 0.73 | 0.36*** |
| <i>Control variables</i> | | | | |
| Age | Age of respondent mean centered: range -9.88 to 18.12 | 0.00 | 7.52 | -0.05† |
| Female | Female (1 = yes; 0 = otherwise) | 0.44 | – | 0.05† |
| <i>Race/ethnicity</i> | | | | |
| White ^b | Non-Hispanic White (1 = yes; 0 = otherwise) | 0.85 | – | -0.10*** |
| Black | Black (1 = yes; 0 = otherwise) | 0.07 | – | 0.12*** |
| Hispanic | Hispanic (1 = yes; 0 = otherwise) | 0.06 | – | -0.01 |
| Other | Other/race ethnicity (1 = yes; 0 = otherwise) | 0.02 | – | 0.06* |
| Cohabiting | Relationship legal status. 1 = currently cohabiting, 0 = currently married | 0.03 | – | -0.02 |
| Times previously married | Number of times previously married: range 0 to ≥ 2 | 0.41 | – | 0.08** |
| <i>Education</i> | | | | |
| Less than high school | Less than a high school (1 = yes; 0 = otherwise) | 0.13 | – | 0.06* |
| High school ^b | High school or equivalent (1 = yes; 0 = otherwise) | 0.25 | – | 0.01 |
| Some college | Some post-secondary education (1 = yes; 0 = otherwise) | 0.33 | – | 0.03 |
| College and beyond | Four-year degree or more (1 = yes; 0 = otherwise) | 0.29 | – | -0.08** |
| <i>Household income</i> | | | | |
| Less than \$25,000 | Less than \$25,000 last year (1 = yes; 0 = otherwise) | 0.14 | – | 0.08** |
| \$25,000 to <\$50,000 ^b | \$25,000 to <\$50,000 last year (1 = yes; 0 = otherwise) | 0.28 | – | 0.04 |
| \$50,000 to <\$100,000 | \$50,000 to <\$100,000 last year (1 = yes; 0 = otherwise) | 0.31 | – | -0.09*** |
| \$100,000 or more | \$100,000 or more last year (1 = yes; 0 = otherwise) | 0.18 | – | -0.04 |
| Income missing | Income missing (1 = yes; 0 = otherwise) | 0.08 | – | 0.04† |
| <i>Social integration</i> | | | | |
| Working | Working for pay (1 = yes; 0 = otherwise) | 0.37 | – | 0.01 |
| Religious attendance | Frequency attended religious services in the past 12 months: responses coded from 0 = never to 6 = a few times per week | 3.30 | 2.25 | -0.04 |
| Network size | Number of persons in respondent's discussion network, excluding spouse: range 0–5 or more | 2.77 | 1.60 | -0.06* |

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed tests).

a. All estimates were weighted to account for differential probabilities of selection and differential non-response; Mean is equivalent to the proportion coded 1 for dummy variables; S.D. = Standard Deviation (omitted for dummy variables); Correlation between variable and UCLA Short Loneliness Scale; α = Cronbach's alpha for internal reliability.

b. Serves as reference category in multivariate analyses.

Source: National Social Life, Health, and Aging Project (NSHAP).

For cases above the censoring value zero, the Tobit model estimates the effect of a vector of covariates ($x_i\beta$) on the observed loneliness measure (y_i^*) using a standard linear model, while for cases at or below the censoring value zero the probability of being censored is estimated and this quantity is used in the likelihood equation. Here we focus on changes in the latent outcome (y_i^*), where the effect of any covariate is interpreted linearly (Long, 1997).

We performed our analysis in four steps parallel to our above described research questions. First, we estimated a simple model to establish the baseline association between disability and loneliness and then added the measures of nonmarital social support and marital quality to ascertain whether less support/greater strain in nonmarital interpersonal relationships mediated that association between disability and loneliness as predicted by the *stress-deterioration hypothesis*. Second, we examined whether non-spousal social support and/or strain moderated the association between physical disability and loneliness as predicted by the *stress-buffering hypothesis*. To test for the moderating effect, we specified an interaction term between each measure of non-spousal support and physical disability. Third, drawing on the *cross-domain buffering hypothesis*, we tested whether non-spousal support and/or strain moderated the association between marital quality and loneliness among functionally limited married older adults by specifying the appropriate three-way interaction terms.

Finally, we examined whether the associations between functional limitations, marital quality, non-spousal social support, and loneliness documented in the prior three steps differed between men and women. To do this, we stratified by gender and re-estimated the previous models. We tested for significant differences between the estimated effects for women and men using a *t*-test for equality of regression coefficients (Clogg et al., 1995). All estimates were weighted to account for differential probabilities of selection and differential non-response.

5. Results

5.1. Descriptive statistics

We present the mean (\bar{x}) and standard deviation (S.D.) for each study variable, as well as the bivariate correlation (r) with the UCLA Short Loneliness Scale, in Table 1. Respondents in our sample of married older adults report low levels of loneliness ($\bar{x} = .75$) and few functional limitations ($\bar{x} = .70$). Functional limitations and loneliness are weakly positively correlated ($r = .07, p < .01$). Respondents overwhelming indicated that their nonmarital relationships were generally supportive and marked by low levels of strain and that their marriages were characterized by high levels of positive marital quality and low levels of negative marital quality. The measures of non-spousal social support and marital quality were each inversely correlated with loneliness. The correlation between the study control variables and loneliness were largely consistent with prior studies: older respondents, men, non-Hispanic Whites, the better educated, those with higher incomes, and those with larger networks reported lower levels of loneliness. By contrast, Black and remarried respondents reported higher levels of loneliness.

We examined whether women and men significantly differed on our study variables using Welch-Satterthwaite *t*-tests for difference in means with unequal variances (not shown). Women had marginally higher levels of loneliness ($p = .06$). The differences in our primary independent variables reflect the established patterns concerning married women's and men's social worlds. Women reported higher levels of non-spousal support, which corresponds to the fact that they also had more members in their discussion network. Men reported slightly higher levels of both positive and negative marital quality, although the latter was only marginally significant ($p = .06$). Notably, the married women and men in our sample did not have a significantly different number of functional limitations. Differences in the demographic and socioeconomic controls were generally as expected – men had higher levels of education and income, were more likely to be working for pay, and attended religious services less frequently.

5.2. Multivariate results

Our first research question asked whether, as predicted by the *stress-deterioration hypothesis*, non-spousal support mediated the association between physical disability and loneliness among older adults. Model 1 of Table 2 shows the Tobit model estimates of the baseline association between functional limitations and loneliness. Each additional functional impairment was associated with a 0.16 ($p < 0.01$) point increase in feelings of loneliness among married older adults. Considering the full-range of impairment observed in our sample, this translates into slightly more than a one-point difference in loneliness between those married older adults with no limitations and those with seven limitations.

Non-spousal social support and marital quality were added to Models 2 and 3, respectively, of Table 2. The results from Model 2 indicate that non-spousal social support partially mediated the association between functional limitations and loneliness (Model 2). Among married respondents generally, we found the expected association between non-spousal social support and loneliness. Respondents who characterized their non-spousal interpersonal relations as more supportive were less lonely, with a one unit increase in support associated with about a two-thirds of a point decrease in loneliness ($b = -0.68, p < 0.001$). By contrast, respondents who found their non-spousal relationships more stressful were lonelier, with a one unit increase in strain associated with a half point increase in loneliness ($b = 0.53, p < 0.001$). The addition of non-spousal support to the model reduced the effect of functional limitations on loneliness by approximately 16.5% ($[(0.1635 - 0.1365)/0.1635] = 0.1651$), indicating that part of the association between loneliness

Table 2. The association between functional limitations, marital quality, non-spousal social support, and loneliness among married older adults, Tobit regression estimates ($N = 1474$).^{a, b}

| | Model 1 | Model 2 | Model 3 | Model 4 |
|------------------------------------|----------|----------|----------|----------|
| Functional limitations | 0.16** | 0.14* | 0.14** | 0.11** |
| Non-spousal support | | -0.68*** | -0.46*** | -0.54*** |
| Non-spousal strain | | 0.53*** | 0.45*** | 0.35** |
| Positive marital quality | | | -0.93*** | -0.85*** |
| Negative marital quality | | | 0.61*** | 0.66*** |
| Age ^c | | | | -0.04** |
| Female | | | | 0.32* |
| Race/ethnicity | | | | |
| White ^d | | | | - |
| Black | | | | 0.60* |
| Hispanic | | | | -0.40 |
| Other | | | | 1.17** |
| Cohabiting | | | | -0.59 |
| Times previously married | | | | 0.30** |
| Education | | | | |
| Less than high school | | | | 0.33 |
| High school ^d | | | | - |
| Some college | | | | -0.08 |
| College and beyond | | | | -0.10 |
| Household income | | | | |
| Less than \$25,000 | | | | 0.03 |
| \$25,000 to <\$50,000 ^d | | | | - |
| \$50,000 to <\$100,000 | | | | -0.36† |
| \$100,000 or more | | | | -0.50* |
| Income missing | | | | 0.13 |
| Social integration | | | | |
| Working | | | | 0.09 |
| Religious attendance | | | | 0.02 |
| Network size | | | | 0.01 |
| Intercept | -1.09*** | -1.06*** | -0.96*** | -1.18*** |
| Sigma | 2.74 | 2.68 | 2.39 | 2.32 |
| Log likelihood | -2029.53 | -2003.65 | -1893.64 | -1865.95 |

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed tests).

a. All estimates were weighted to account for differential probabilities of selection and differential non-response.

b. Models also control for reporting no friends.

c. Variable is mean-centered.

d. Serves as reference category.

Source: National Social Life, Health, and Aging Project (NSHAP).

and functional limitations results from the negative association between physical disability and non-spousal social support, consistent with the stress-deterioration hypothesis. Additional analyses (not shown) revealed that this mediating effect was entirely due to lower levels of support (rather than increased strain) associated with functional limitations.⁸ In other words, physically-disabled married older adults are lonelier in part because they perceive relationships with non-spouse family and friends to be less supportive than their non-disabled counterparts.

When indicators for marital quality were added (Model 3), the associations previously described remained. Positive marital quality was associated with lower feelings of loneliness ($b = -0.93$, $p < 0.001$), whereas negative marital quality was associated with higher feelings of loneliness ($b = 0.61$, $p < 0.001$). The absence of any change in the estimated effect of functional limitations between Models 2 and 3 indicated that marital quality did not mediate the association between functional limitations and loneliness.⁹ However, the inclusion of marital quality reduced the effects

8. In supplemental analyses, we performed a more formal test of multiple mediation using the SAS[®] INDIRECT macro, which estimates the total and specific indirect effects along with associated significance tests (Preacher and Hayes, 2008). Although it does not account for the censored distribution of loneliness, this more formal test of multiple mediation revealed statistically significant direct and indirect effects consistent with our interpretation, including identifying non-spousal social support as the sole mediator of the association between functional limitations and loneliness (not shown).

9. Supplemental analyses employing a formal test of multiple mediation also showed no mediating effect of marital quality (see note 8).

Table 3. The moderating effects of functional limitations, marital quality, and non-spousal social support on loneliness among married older adults, Tobit regression estimates ($N = 1474$).^{a,b}

| | Model 1 | Model 2 | Model 3 |
|---|-------------------|-------------------|-------------------|
| Functional limitations | 0.10 [†] | 0.10 [†] | 0.09 [†] |
| Non-spousal support | -0.51*** | -0.54*** | -0.51*** |
| Non-spousal strain | 0.31* | 0.30* | 0.26 [†] |
| Positive marital quality | -0.86*** | -0.72*** | -0.75*** |
| Negative marital quality | 0.65*** | 0.74*** | 0.69*** |
| Interactions | | | |
| Non-spousal support × functional limitations | -0.04 | -0.04 | -0.05 |
| Non-spousal strain × functional limitations | 0.05 | 0.06 | 0.06 |
| Positive marital quality × functional limitations | | -0.20* | -0.22* |
| Negative marital quality × functional limitations | | -0.12 | -0.13 |
| Non-spousal support × positive marital quality | | | -0.25 |
| Non-spousal strain × positive marital quality | | | -0.01 |
| Non-spousal support × negative marital quality | | | -0.54* |
| Non-spousal strain × negative marital quality | | | 0.21 |
| Non-spousal support × positive marital quality × functional limitations | | | -0.04 |
| Non-spousal strain × positive marital quality × functional limitations | | | 0.22 |
| Non-spousal support × negative marital quality × functional limitations | | | 0.05 |
| Non-spousal strain × negative marital quality × functional limitations | | | 0.14 |
| Intercept | -1.18*** | -1.14*** | -1.14*** |
| Sigma | 2.32 | 2.31 | 2.29 |
| Log likelihood | -1865.57 | -1863.47 | -1857.85 |

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed tests).

a. All estimates were weighted to account for differential probabilities of selection and differential non-response.

b. Models also include controls for friend age, female, race/ethnicity, whether current partnership a cohabitation, the number of times previously married, education, household income, working for pay, religious service attendance, size of network (excluding spouse), and reporting no friends.

Source: National Social Life, Health, and Aging Project (NSHAP).

of non-spousal support by 32% and non-spousal strain by 15%. The parameter estimates for marital quality excluding the non-spousal social support measures were nearly identical to those presented in Model 3 (not shown). Overall, this pattern of effects suggests that, while nonmarital and marital relations have independent effects on loneliness, the marital relationship is more important than interpersonal relations with family and friends for feelings of loneliness because the quality of older adults' nonmarital relationships tend to reflect the quality of their marriages.¹⁰ Indeed, positive marital quality and non-spousal support were positively correlated ($r = 0.17$, $p < 0.01$) and negative marital quality and non-spousal strain were positively correlated ($r = 0.19$, $p < 0.01$). The fact that non-spousal relations mirror the quality of the marital relationship, while the converse is not true, is perhaps not surprising given the centrality of marriage for organizing one's social world (Antonucci et al., 2009; Waite and Lehrer, 2003).

In general, the associations between functional limitations, non-spousal social support, marital quality, and loneliness were robust to controls for demographic characteristics, socioeconomic status, and social integration (Model 4, Table 2). The inclusion of indicators for income attenuated the effect of functional limitations by about 16% (not shown), as persons with higher incomes had fewer functional limitations and felt less lonely. We also note that the modest changes in the estimated effects of non-spousal support and marital quality occurred when we controlled for the sex of the respondent (not shown) given that men and women have different assessments of the quality of their interpersonal relationships (Cutrona, 1996; Kahn, 1994), as we discuss below. Measures of social integration were not associated with loneliness, consistent with the finding of prior studies that objective indicators of social integration and perceptions of available support are distinct (Cornwell and Waite, 2009).

Our second research question considered whether non-spousal social support moderated the association between physical disability and loneliness among married older adults, as suggested by the *stress-buffering hypothesis*. To test this proposition, we specified interaction terms between non-spousal social support and functional limitations. As presented in Model 1 of Table 3, we found no support for the *stress-buffering hypothesis*. Neither non-spousal support nor non-spousal strain significantly moderated the association between functional limitations and loneliness among our sample of married older adults. As presented in Model 2, only positive marital quality significantly buffered the effect of functional limitations on loneliness.

10. The relative magnitude of the standardized regression coefficients is consistent with this interpretation (not shown; Long, 1997, p. 207)

Model 3 in Table 3 address our third research question: whether non-spousal support moderated the association between marital quality and loneliness among the physically disabled, as suggested by the *cross-domain buffering hypothesis*. To do this required specifying a series of three-way interaction terms as well as the constituent two-way interactions terms. These results suggest that for *non-disabled* older adults in marriages characterized by above average levels of negative marital quality, having more supportive relationships with family and friends offsets the elevated feelings of loneliness that accompany negative marital quality ($b = -0.54, p < 0.05$). However, despite the compensatory effects of non-spousal support among non-disabled married adults, we found no evidence that non-spousal social support moderated the association between marital quality and loneliness among physically-disabled married older adults. None of the three-way interaction terms in Model 3 of Table 3 were statistically significant. Thus, contrary to the *cross-domain buffering hypothesis*, physically-disabled older adults in marriages characterized by below average levels of positive marital quality had elevated loneliness irrespective of the quality of their relationships with family and friends. Considering the findings presented in Table 3 overall, it therefore appears that the marital relationship—and not relations with family and friends—is key to ameliorating the negative socioemotional consequences of disablement among older adults. We note that given the modest sample size and complexity of the interactive model, these findings should be interpreted with caution.

Lastly, we examined whether the associations between physical disability, loneliness, non-spousal social support, and marital quality differed for married women and men. We estimated gender-stratified models and tested the equality of regression coefficients to determine statistically significant gender differences in the parameter estimates (Clogg et al., 1995). Consistent with prior studies (Antonucci and Akiyama, 1987; Umberson et al., 1996), non-spousal social support and marital quality were associated with loneliness in different ways for women and men. Specifically, the effect of non-spouse support was significantly stronger for women overall ($t = 2.51$, with $df > 40, p < 0.01$) with a one unit increase in non-spousal support associated with a three-quarter point reduction in loneliness for women compared to just a one-quarter point reduction for men (not shown). By contrast, negative marital quality was associated with elevated feelings of loneliness only among men ($t = 2.48$, with $df > 40, p < 0.01$).

Although the pooled analyses suggested that non-spousal support partially mediated the positive association between functional limitations and loneliness, the gender-stratified analyses reveal that this effect only holds for women. While functional limitations were positively associated with loneliness similarly for married men and women, among women approximately 30% of this effect is due to lower levels of perceived support from family and friends (not shown).¹¹ Thus, our findings suggest that stress-deterioration applies only to physically-disabled married women, who have elevated levels of loneliness in part because they find their nonmarital relationships less supportive than do non-disabled women.

Notwithstanding the fact that non-spousal social support and marital quality were associated with loneliness in different ways for men and women, and that women with functional limitations have lower levels non-spousal support, we did find not any significant gender differences in the moderating effects of either non-spousal social support or marital quality described above (not shown; see also Warner and Kelley-Moore, 2012). Thus, our gender-stratified analyses indicate that the marital relationship alone is important for buffering the effect of disablement on loneliness for both men and women.

5.3. Discussion and conclusion

The current study advanced our knowledge about the social context of disablement among married older adults by considering the importance of nonmarital relationships for the association between physical disability and loneliness among married older adults. A self-evaluation of the degree to which an individual's social needs are being met, loneliness is a potentially adverse outcome of functional limitations inherently embedded in one's social world and thus an apt indicator with which to investigate the social context of disablement. Grounded in the stress process (Pearlin et al., 1981) and life course perspectives (George, 2003), and building on a prior study by Warner and Kelley-Moore (2012), we investigated the role of non-spousal social support in the association between physical disability and loneliness, assessing if it had an effect independently of or in combination with marital quality. We focused our investigation on married older adults because marriage is one of the primary and enduring adult social relationships (Cooney and Dunne, 2001; Umberson et al., 1996; Waite and Lehrer, 2003).

With data on 1474 married/partnered older adults from the National Social Life, Health, and Aging Project (NSHAP), we found that non-spousal social support mediated the relationship between functional impairment and loneliness. Thus, consistent with the stress-deterioration hypothesis, physical disability was associated with decreased levels of support (but not increased strain) from family and friends—although this appears only to be the case for married women. We found no evidence that nonmarital relationships moderate the association between functional impairment and loneliness as predicted by the stress-buffering hypothesis. This is in contrast to marital relationships, where positive marital quality offers protection from the deleterious socioemotional consequences of disablement for both men and women. Given the strength of the moderating effect of marital quality (combined with the deteriora-

11. Supplemental analyses employing a formal test of multiple mediation revealed statistically significant direct and indirect effects consistent with our interpretation (see note 8).

tion of non-spousal relations with disablement for women), we also found no evidence of cross-domain buffering—supportive non-spousal relationships do not counteract the negative effects of a weak marital relationship for functionally-impaired older men and women. Only among older adults without functional limitations does having above average supportive relations with family and friends appear to operate in a compensatory manner, offsetting the loneliness associated being in a poor quality marriage, and this applies equally to men and women.

Accordingly, while both marital and nonmarital relationships are important for socioemotional well-being among married older adults (Antonucci and Akiyama, 1987; Cutrona, 1996; Kahn, 1994), our findings reveal that—despite the greater number of ties and levels of non-spousal support enjoyed by women—when confronted with a stressor such as disablement it is the quality of the marital relationship that alone matters for both men and women. Marital quality reflects perceptions of the availability and adequacy of support from an intimate partner, based on the routinized social interactions and coping strategies developed over the course of the marriage (Warner and Kelley-Moore, 2012). As such, marital quality is a relatively stable property of older adults' marriages (Johnson et al., 1992; Kamp Dush et al., 2008), which, unlike relations with family and friends, appears relatively robust in face of challenges to routine functioning and activities of daily living (Korporaal et al., 2008) that accompany disablement. The apparent susceptibility of married women's non-spousal interpersonal relationships may reflect that relationships with family and friends, as opposed to marriage, are far less often coresidential, are less likely to possess routinized coping strategies, and—especially with friends—to lack the institutional basis for sustained interaction that become the foundation for the provision of social support. Thus, older married women's non-spousal interpersonal relationships, while important for socioemotional well-being in general, appear vulnerable to the loss of independence and autonomy with physical limitations and therefore do not serve as a resource for coping with disablement.

Across marital and nonmarital relationships, we find that it is positive appraisals that appear to be most consequential—even though married men report higher levels of negative marital quality. This pattern runs counter to prior studies that have documented, particularly with respect to marital relationships, that negative appraisals and indications of strain are more important for overall well-being (Carr and Springer, 2010; Marks, 1998), especially for women (Kiecolt-Glaser and Newton, 2001), and can exacerbate the detrimental socioemotional effects of disablement (Bookwala and Franks, 2005). As many of these prior studies have examined depression, the weaker effects of negative relationship appraisals may be indicative of the fact that loneliness and depressive symptoms are fundamentally different mental health indicators (Cacioppo et al., 2006). However, we also recognize that these differences may reflect the limits of our indicators of negative interpersonal relationship qualities. For both marital and nonmarital relationships, we were limited to indicators of whether respondents feel spouses/family/friends place too many demands on them or criticize them too often. It may be that older persons habituate to such characteristics in their relationships and thus they do not have as great an effect on their well-being. Moreover, NSHAP did not ascertain the frequency with which respondents argue or get into disagreements with spouses/family/friends—items that prior studies have shown to be a key component of negative marital quality (e.g., Johnson et al., 1992) and strain in nonmarital relationships (e.g., Piazza et al., 2007).

This study enhanced our understanding of the social context of disablement and the consequences for socioemotional well-being in several ways. First, drawing on the stress-process and life course perspectives, we examined how the web of interpersonal relationships in which older physically-disabled adults are embedded—with spouses, family, and friends—affect feelings of loneliness. Few prior studies have simultaneously examined both marital and nonmarital relationships to understand how the multiple aspects of older adults' social worlds intersect to shape the socioemotional well-being of physically-disabled older adults. Second, testing both the stress-deterioration and stress-buffering hypotheses, we examined both positive (support) and negative (strain) appraisals of non-spousal interpersonal relations to capture their complexity. Despite recognition that relationships have both positive and negative dimensions (Berkman et al., 2000), explicit examinations of both non-spousal social support and strain have been rare in prior studies of older adults' socioemotional well-being. Third, in accordance with the *cross-domain buffering hypothesis*, we tested whether non-spousal social support moderated the association between disablement, marital quality, and loneliness, casting non-spousal relationships as a potentially compensatory resource for older adults in marriages that lack positive emotional and social support. Taken as a whole, our findings indicate that not all interpersonal relationships are equally consequential for socioemotional well-being: for physically-disabled older married men and women the marital relationship is paramount.

Future research is needed to address a number of remaining questions about the social context of disablement. Longitudinal examinations of the social context of disablement among married older adults are required. The findings here are limited by the cross-sectional nature of the available data. While our interpretation that non-spousal relationships deteriorate (i.e., become less supportive) in response to functional impairment (at least among women) is consistent with several prior longitudinal studies examining depressive-symptoms (e.g., Taylor and Lynch, 2004; Yang, 2006), these studies are not directly comparable with ours given differences in samples and measurement of social support, as well as the outcome of interest. Our interpretation that positive marital quality is an important resource for buffering the effect of marital quality on loneliness is bolstered by the absence of any direct correlation between either dimension of marital quality and functional limitations (Baron and Kenny, 1986). Nevertheless, we cannot rule out alternative causal interpretations within the constraints of our data. Longitudinal data, though not definitive, is needed to improve further our understanding of the association between, non-spousal interpersonal relationships, marriage, and loneliness among physically-disabled older adults.

Greater attention to the range of non-spousal relationships is also needed. We examined non-spousal relations in general as preliminary analyses indicated that relationships with non-spouse family and friends were not distinctive among married older adults in NSHAP. Yet, such relationships have different properties and the effects of social support and strain from these separate sources may have unique effects on well-being (Berkman et al., 2000; Procidano and Heller, 1983; Walen and Lachman, 2000). Additional studies with more nuanced data on social support from non-spouse family and friends are therefore clearly required to offer a more refined examination of the wider social context of disablement. Studies examining the social support offered by adult children are especially needed because adult children are often important sources of social support to older adults, especially in the face of physical health declines (Silverstein et al., 2006).¹²

Future studies on the social context of disablement should also consider spouses' health status and what consequence this has for one's interpersonal relations and subsequent socioemotional well-being. Here, we focused on how marital and nonmarital relationships may moderate the effect of one's own functional impairment on loneliness. Yet, in accordance to the life course perspective's emphasis on linked lives, attention to how the non-disabled spouse's well-being is affected by the physical health of the other is needed (Korporaal et al., 2008). For example, caregiving responsibilities limit the time a non-disabled spouse spends with family and friends (Thompson et al., 1993). Yet, whether persons with more supportive non-spousal relationships and/or those in high quality marriages are better able to cope with having a physically-disabled spouse is unclear. Unfortunately, we cannot follow this line of inquiry as NSHAP did not collect information from spouses.

Finally, the social context of disablement among the non-married older adults needs to be examined. We centered our examination on the wider social context of disablement among married persons because the spouse is the most significant source of social support in a married person's social network (Antonucci and Akiyama, 1987; Waite and Lehrer, 2003). Indeed, as our findings show, when one is physically-disabled, supportive non-spousal relationships do not compensate for a weak marital relationship. However, a growing number of adults enter later life unmarried, particularly divorced or never married (Carr and Springer, 2010; Cooney and Dunne, 2001). Future studies that examine how social support from family and friends, perhaps cultivated to a greater extent than among married persons (Liebler and Sandefur, 2002), affects the socioemotional consequences of functional limitations among the non-married will substantially enhance our understanding of the social context of disablement.

Overall, this study demonstrates the importance of considering the wider social context, comprised of both marital and nonmarital relationships, in which disablement occurs. Consistent with numerous prior studies, older women and men in marriages characterized by high levels of positive marital quality and low levels of negative marital quality (Bookwala and Franks, 2005; Hawkins and Booth, 2005) and those whose relationships with non-spouse family and friends offer support and a minimum of strain (Kawachi and Berkman, 2001) have better socioemotional well-being. Yet, among physically-disabled older adults it appears that the quality of the marital relationship is crucial for feelings of loneliness. That is, while the marital relationship is a potential resource for coping with functional impairment and poor physical health (Cutrona, 1996; Kahn, 1994), we find that physically-disabled older adults in lower quality marriages—given normative expectations that spouses provide physical and emotional support—are at heightened risk of negative socioemotional outcomes (Warner and Kelley-Moore, 2012) because non-spousal relations do not compensate for the absence of a supportive spouse. This finding applies equally to women and men despite women's greater number of nonmarital ties and levels of perceived support. In fact, our findings indicate that disabled older women have less access to such non-spousal relationships, as relationships with family and friends are less supportive when functionally-impaired (Taylor and Lynch, 2004; Yang, 2006). Understanding the complexity of the social context of disablement is of increasing importance as institutional supports for marriage have waned, social connections to others based on affinity have increased, and interpersonal relationships overall have become more individualistic (Amato et al., 2007).

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12. Although NSHAP did not assess the quality of relations or frequency of contact with adult children, in supplemental analyses we included indicators for the number of children or having any living children in our models. As parent-child relationships may differ depending on the dyad gender composition, we also tested parallel measures specific to sons and daughters. None of these indicators of living children were significantly associated with loneliness net of covariates already in the model in either the pooled or gender-stratified analyses, nor did their inclusion fundamentally alter the magnitude or statistical significance of any of our findings (not shown).

Appendix A: Table A1 and Table A2.

Table A1. Exploratory factor analysis of non-spousal support and strain among married older adults, items and corresponding factor loadings from the rotated oblique factor pattern matrix and factor structure matrix for two-factor solution (N = 1474).^a

| Factor pattern ^b | | Factor structure ^c | | Questionnaire items |
|-----------------------------|-------|-------------------------------|-------|--|
| 1 | 2 | 1 | 2 | |
| 0.55* | 0.03 | 0.55* | 0.05 | 1. "How often can you open up to [family] if you need to talk about your worries?" ^d |
| 0.58* | -0.13 | 0.58* | -0.11 | 2. "How often can you rely on [family] for help if you have a problem?" ^d |
| 0.62* | 0.12 | 0.62* | -0.13 | 3. "How often can you open up to [friends] if you need to talk about your worries?" ^d |
| 0.58* | -0.03 | 0.58* | -0.01 | 4. "How often can you rely on [friends] for help if you have a problem?" ^d |
| 0.00 | 0.42* | 0.01 | 0.42* | 5. "How often do [family] make too many demands on you?" ^d |
| -0.05 | 0.53* | -0.04 | 0.53* | 6. "How often do [family] criticize you?" ^d |
| 0.04 | 0.47* | 0.05 | 0.47* | 7. "How often do [friends] make too many demands on you?" ^d |
| 0.01 | 0.48* | 0.02 | 0.48* | 8. "How often do [friends] make too many demands on you?" ^d |

- a. The eight-items were subjected to exploratory factor analysis with the principle factor method used to extract the factors. A Scree test suggested two meaningful factors and accordingly two factors were retained for oblique rotation. In interpreting the rotated factors, an item with a loading of 0.35 or greater was considered meaningful. Factor 1 was designated as "non-spousal support" ($\alpha = 0.69$) and Factor 2 was designated as "non-spousal strain" ($\alpha = 0.57$). The inter-factor correlation = -0.02. Standardized Scoring Coefficients were used to calculate estimated factor scores (Hatcher, 1994). Alternative solutions, including a single factor with all items, did not fit the data as well.
 - b. Factor pattern loadings are standardized regression coefficients for the unique contribution of each latent factor to the observed indicator—loadings greater than 0.35 are designated with a ^{*}.
 - c. Factor structure correlations between the observed indicators and the latent factors—correlations greater than .035 are designated with a [†].
 - d. Responses were: (1) "hardly ever (or never)," (2) "some of the time," or (3) "often".
- Source: National Social Life, Health, and Aging Project (NSHAP).

Table A2. Exploratory factor analysis of marital quality among married older adults, items and corresponding factor loadings from the rotated oblique factor pattern matrix and factor structure matrix for two-factor solution (N = 1474).^a

| Factor pattern ^b | | Factor structure ^c | | Questionnaire Items |
|-----------------------------|-------|-------------------------------|--------|--|
| 1 | 2 | 1 | 2 | |
| 0.36* | -0.04 | 0.38* | -0.23 | 1. "Some couples like to spend their free time doing things together, while others like to do different things in their free time... Do you [and partner] like to spend free time doing things together, or doing things separately?" ^d |
| 0.60* | 0.07 | 0.56* | -0.25 | 2. "How often can you open up to [partner] if you need to talk about your worries?" ^e |
| 0.55* | -0.01 | 0.56* | -0.31 | 3. "How often can you rely on [partner] for help if you have a problem?" ^e |
| -0.04 | 0.56* | -0.34 | 0.58* | 4. "How often does [partner] make too many demands on you?" ^e |
| 0.04 | 0.57* | -0.27 | 0.55* | 5. "How often does [partner] criticize you?" ^e |
| 0.42* | -0.25 | 0.55* | -0.47* | 6. "Taking all things together, how would you describe your [marriage/relationship] with [partner] on a scale from 1 to 7 with 1 being very unhappy and 7 being very happy?" ^f |

- a. The six-items were subjected to exploratory factor analysis with the principle factor method used to extract the factors. A Scree test suggested two meaningful factors and accordingly two factors were retained for oblique rotation. In interpreting the rotated factors, an item with a loading of 0.35 or greater was considered meaningful. Factor 1 was designated as "positive marital quality" ($\alpha = 0.62$) and Factor 2 was designated as "negative marital quality" ($\alpha = 0.60$). The factor pattern loadings and the factor structure correlations suggested factorial complexity with Item 6 and accordingly it is included in the reliability assessment of both factors. The inter-factor correlation = -0.54. Standardized Scoring Coefficients were used to calculate estimated factor scores (Hatcher, 1994). Alternative solutions, including a single factor with all items or one limited to items 1, 2, 3, and 6, did not fit the data as well.
 - b. Factor pattern loadings are standardized regression coefficients for the unique contribution of each latent factor to the observed indicator—loadings greater than 0.35 are designated with a ^{*}.
 - c. Factor structure correlations between the observed indicators and the latent factors—correlations greater than 0.35 are designated with a [†].
 - d. Responses were (1) "together," (2) "some together, some different," and (3) "different/separate things"—reverse coded so that higher scores indicate greater time spent together.
 - e. Responses were: (1) "hardly ever (or never)," (2) "some of the time," or (3) "often".
 - f. Item was recoded into 1 = "Unhappy (1,2,3,4)," 2 = "Happy (5,6)," and 3 = "Very Happy (7)" to adjust for positive skew of original responses ($r = 0.91$ with original measure).
- Source: National Social Life, Health, and Aging Project (NSHAP).

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