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Relationship Quality and 5-Year Mortality Risk

Jamila Bookwala, Trent Gaugler

Lafayette College

Abstract

Objective—The present study examined positive and negative aspects of relationship quality with one’s spouse/partner as predictors of mortality and the role of gender in moderating this link.

Method—Data were drawn from two waves, five years apart, of the National Social Life, Health, and Aging Project (N=1,734). Positive aspects of relationship quality (frequency of opening up to the partner to talk about worries and relying on the partner) and negative aspects (frequency of the partner making too many demands and criticism by the partner) were assessed. Survival/mortality status was recorded at the time of Wave 2 data collection five years later (1,567 alive; 167 deceased). Covariates included sociodemographic variables, relationship type, health status, and the network size of close family relationships and friendships.

Results—Logistic regression analyses showed that negative relationship quality with one’s spouse or partner was associated with significantly higher odds for mortality after five years (OR=1.20, CI [95%]=1.03 to 1.38; $p < .001$), after including the statistical covariates; age, gender, education, self-rated health, and medication use also were significantly related to mortality. Propensity score matching replicated these findings. Follow-up analyses revealed that criticism from one’s spouse or partner, in particular, was linked to a higher mortality risk (OR=1.44, CI [95%]=1.10 to 1.88). Gender did not moderate the relationship quality-mortality link.

Conclusions—Negative relationship quality, notably, criticism received from one’s spouse or partner, heightens older adults’ risk of mortality. These results suggest the value of developing interventions that target reducing expressed criticism in couple relationships.

The risk of mortality during adulthood increases sharply by chronological age (Institute for Health Metrics and Evaluation [IHME], 2017) with the risk approximately tripling from young adulthood (25–45 years) to middle adulthood (45–65 years) and then quadrupling from middle adulthood to late adulthood (65+ years). Given these statistics, identifying mortality risk factors as people age is an important goal for health outcomes research. Partnered relationship status as a predictor of mortality has received extensive empirical attention in recent decades. Research consistently shows that being married or in a marriage-like relationship is associated with a lower mortality risk than being non-partnered (e.g., Choi & Marks, 2011; Liu & Reczek, 2012; Robards, Evandrou, Falkingham, & Vlachantoni, 2012). However, studies on the effects of the *quality* of the relationship with one’s spouse or partner on mortality are relatively few in number (see review by Robles, Slatcher,

Trombello, & McGinn, 2014) even though this relationship is typically the most salient among close relationships for individuals' health and well-being (Anderson & McCulloch, 1993; Birditt & Antonucci, 2008; Robles & Kiecolt-Glaser, 2003). That past research has demonstrated the significance of the quality of social relationships broadly speaking in predicting mortality (e.g., Murberg, 2004; Murberg & Bru, 2001) further underscores the importance of investigating the mortality implications of the quality of the relationship with one's spouse or partner. The goal of the present study was to examine the role of partnered relationship quality (i.e., the relationship quality with one's spouse, cohabiting partner, or romantic/sexual/intimate partner) in predicting mortality during the middle and late adulthood years.

Relationship Quality and Health

In general, relationship quality in married adults has been consistently identified as significantly related to physical health using a wide range of health indicators (see Robles et al., 2014). Among middle-aged and older adult samples, lower marital satisfaction, poor marital interaction, greater marital strain, more negative behaviors displayed by the spouse, and feeling bothered or upset in the marriage have been found to be significantly associated with greater morbidity (e.g., Birditt, Newton, Cranford, & Ryan, 2016; Bookwala, 2005; Choi & Marks, 2008; Donoho, Seeman, Sloan, & Crimmins, 2015; Umberson, Williams, Powers, Liu, & Needham, 2006). Theoretical frameworks explain the link from relationship quality to health outcomes by way of a complex set of mediating influences such as social-cognitive and affective processes related to appraisal, compromised mental health, and subclinical pathways as well as moderating influences such as individual and gender differences (e.g., Burman & Margolin, 1992; Kiecolt-Glaser & Newton, 2001; Robles & Kiecolt-Glaser, 2003; Robles et al., 2014).

That intimate relationships, such as marriage and similar partnered relationships, would play a key role in health and well-being is in keeping with the larger social support literature (Cohen, 2004) and the extensive body of findings linking social relationships to health (e.g., Berkman, Glass, Brissette, & Seeman, 2000; Uchino, 2009). Partnered relationships are multidimensional in nature (Bradbury, Fincham, & Beach, 2000; Lawrence, Brock, Barry, Langer, & Bunde, 2008; Sandberg & Harper, 2000), marked by both positive and negative characteristics that correspond with social support and strain, respectively. Empirical research on relationship quality confirms its multidimensional nature – research has shown that individuals routinely make both positive and negative evaluations about their marital relationship (Fincham & Linfield, 1997), and this is the case even as people age (Bookwala, 2012). For example, mixed relationship evaluations – e.g., feeling both bothered by and close to one's spouse (Fingerman et al., 2004) and reporting both high levels of marital satisfaction as well as unfairness in marital role allocation, disagreements, and heated arguments (Bookwala & Jacobs, 2004), have been reported in samples of partnered individuals in their middle and late adulthood years.

Although research shows that as people age they are less likely than their younger peers to describe the relationship with their spouse as both close and problematic (Fingerman et al., 2004), negative aspects of relationship quality when reported, such as a spouse

being critical, excessively demanding, or getting on one's nerves, have been found to be significantly associated with poorer health (Bookwala, 2005; Bookwala, 2012; Newsom, Nishiba, Morgan, & Rook, 2003; Newsom, Rook, Nishishiba, Sorkin, & Mahan, 2005; Umberson et al., 2006). A plausible explanation for this is that such negative behaviors on the part of a spouse or partner act as interpersonal stressors (Newsom et al., 2003; 2005) and these, as explained by the stress process model (Pearlin, 1989), can take a toll on health. These findings suggest that it is important when examining the role of partnered relationship quality in mortality that both positive and negative aspects be included.

Relationship Quality and Mortality

The quality of partnered relationships is likely to be relevant to mortality as a health outcome given that the quality of social relationships in general have been found to play a significant role in mortality (Holt-Lunstad, Smith, & Layton, 2010). Relative to the research on relationship quality and morbidity, the evidence on the link between aspects of partnered relationship quality and *mortality* is somewhat mixed. As can be expected, the vast majority of studies have been conducted on middle-aged or older samples (i.e., mean age 45+ years; see Robles et al., 2014) inasmuch as mortality risk increases with age (IHME, 2017; Whisman, Gilmour, & Salinger, 2018). Some of these studies have found that positive aspects of relationship quality are associated with lower mortality risk (Coyne et al., 2001; Rohrbaugh, Shoham, & Coyne, 2006; Whisman, Gilmour, & Salinger, 2018; Zhu & Gu, 2010); these studies either did not include measures of negative aspects of relationship quality or used a single composite measure of relationship quality (e.g., relationship satisfaction) that did not distinguish between positive and negative dimensions analytically. Research that has specifically examined the link between negative aspects of relationship quality and mortality have observed significant associations between these variables. For example, Birditt and Antonucci (2008) found that individuals who reported their spouses as consistently not listening or as expressing increasing levels of criticism over time had higher mortality risk at follow-up. Other studies have found conflict resolution strategies such as self-silencing (Eaker, Sullivan, Kelly-Hayes, & D'Agostino, 2007) and low quality marital interaction (Bulanda, Brown, & Yamashita, 2016) to be associated with a higher mortality risk but among married women only, not men. In still other studies, neither positive nor negative aspects of relationship quality with one's spouse were associated with mortality risk (Antonucci, Birditt, & Webster, 2010) and, in some instances, lower levels of spousal love (Birditt & Antonucci, 2008) and more conflict or spousal criticism (Choi & Marks, 2011) were associated with better survival odds in general or in specific subgroups, contrary to hypothesized relationships.

One reason for the mixed evidence on the link between relationship quality and mortality may be that the relatively small body of research assesses and treats marital quality in a variety of ways. For example, some studies do not uniformly include both positive and negative aspects of relationship quality (e.g., Choi & Marks, 2011); some use either composite indices of marital quality that combine positive and negative aspects (e.g., Coyne et al., 2001; Rohrbaugh et al., 2006) or individual items measuring dimensions of relationship quality (e.g., Birditt & Antonucci, 2008) but not both. Another reason is that studies vary in the type of samples included in the study. For example, some studies

have focused on clinical samples with a diagnosed health condition such as cardiovascular disease (e.g., Coyne et al., 2001; Eaker et al., 2007; Rohrbaugh et al., 2006) and others have relied on probability samples (e.g., Birditt & Antonucci, 2008; Bulanda et al., 2016; Zhu & Gu, 2010). Finally, some studies include married individuals only (e.g., Bulanda et al., 2016; Rohrbaugh et al., 2006) while others combine those in marriage and cohabiting relationships (e.g., Antonucci et al., 2010; Birditt & Antonucci, 2008; Eaker et al., 2007), not distinguishing between relationships types. As a result, the need for more systematic and careful study remains if we are to more fully understand whether and how the quality of the relationship with one's spouse or partner plays a role in mortality. We offer that such a study would rely on a national probability-based sample that assesses the role of positive and negative aspects of relationship quality as separate dimensions and with their composite form and individual components; distinguishes among available types of partnered relationships; examines the role of relationship quality in mortality net of the role of other social resources; and assesses the role of gender within this more comprehensive analysis. The current study, as described below, meets these criteria.

The Current Study

The present study examined the role of partnered relationship quality as a risk factor for mortality and the extent to which gender moderates this link. We used data from the first two waves of the National Social Life, Health, and Aging Project (Waite et al., 2010), simultaneously examining both positive and negative aspects of partnered relationship quality as predictors of mortality. We conducted the analyses with composite measures for positive and negative aspects of partnered relationship quality as done in some studies (e.g., Antonucci et al., 2010; Coyne et al., 2001; Rohrbaugh et al., 2006) as well as with the individual components of each dimension as favored by other researchers (Birditt & Antonucci, 2008). Based on past research on mortality, we statistically controlled for its other known predictors including participants' sociodemographic characteristics and health status. We also included the size of close family relationship and friendship networks as covariates given the extensive evidence showing that a larger network size is linked to lower mortality risk (Holt Lundstad et al., 2015; Holwerda et al., 2016; Kauppi et al., 2018; Seeman, Kaplan, Knudsen, Cohen, & Guralnick, 1987; Shye, Mullooly, Freeborn, & Pope, 1995). This allows us to isolate the role of the quality of the relationship with one's spouse or intimate partner as a mortality risk, net of other available social relationships. Finally, given the emerging complexity of partnered relationships in late life (Bookwala, 2012, 2016), we used an inclusive definition of being partnered, where participants who reported being married, living together, or having an intimate/sexual/romantic partner were included in the sample and also in the analytic models.

We hypothesized that lower partnered relationship quality at baseline would be associated with greater odds of death at follow-up five years later in this sample of older adults. In light of the stronger link between negative relationship quality and health (e.g., Birditt & Antonucci, 2008; Bookwala, 2005; Umberson et al., 2006), we expected stronger associations with mortality at follow-up for negative aspects of relationship quality than positive aspects. Finally, studies have found that women can be at greater risk for mortality than men in the context of poorer marital quality predicting mortality (Bulanda et al., 2016;

Coyne et al., 2001; Eaker et al., 2007). Although not all studies have obtained support for such moderation (e.g., Whisman et al., 2018), we considered it important to examine whether the predictive role of positive and negative aspects of marital quality in mortality varied for women and men; we expected that, in the presence of a moderation effect, these associations would be stronger for women than men.

Method

Sample

The sample was drawn from two waves of data from the National Social Life, Health, and Aging Project (NSHAP), which uses a national area probability sample of community residing adults in the United States who were born between 1920 and 1947 (aged 57 to 85 years at the time of Wave 1), and includes an oversampling of African-American and Hispanic areas (Waite et al., 2010). The NSHAP sample was built on the foundation of the national household screening carried out by the Health and Retirement Study (HRS) in 2004 via a collaborative agreement (Waite et al., 2010). Wave 1 data were collected in 2005–06 via in-home interviews with 3,005 community-dwelling adults. The sample was selected using a multi-stage area probability design that oversampled by race/ethnicity, age, and gender and yielded a response rate of 75.5 percent at Wave 1 (Cornwell & Laumann, 2015). In 2010–11, NSHAP conducted a second wave of data collection. The sample for the present analyses consisted of older adults who were in marital or other partnered relationships at Wave 1 (N=2,013). Of these married/partnered individuals, mortality status at Wave 2 was verified for 99.75% (N=2,008). Analyses were conducted both by treating as alive the five individuals for whom mortality status was indeterminate and by excluding them from the analysis. As results did not vary meaningfully, only the results for the analyses assuming these individuals were alive at Wave 2 are presented below. Of the 2,013 participants, 1,734 had complete data on the predictor variables; 279 participants had missing data on one or more study variables and were excluded from the analyses. We considered the appropriateness of using multiple imputation methods in light of the missing data by examining the randomness of the missing data. We know that imputation methods are appropriate in situations where data can be reasonably concluded to be missing completely at random (MCAR) or at least missing at random (MAR), but such methods should not be applied when the data are missing not at random (MNAR) (see, e.g., Dettori, Norvell, & Chapman, [2018]; Jakobsen, Gluud, Wetterslev, & Winkel [2017]; Rubin [1976]). Our analysis strongly points to the current data being MNAR, and as such, they are not appropriate for the use of imputation methods. Data are considered MNAR when there is a relationship between the propensity of a value to be missing and the value that would have been observed if the data had been complete. To determine the nature of the missing data, we created two groups: those with complete data, and those with at least one piece of missing data and compared them on key study variables. In order to conclude that the data are MNAR, the two groups would have to be systematically and significantly different on these key study variables. The comparison confirmed this, showing that those who did not have complete data had significantly worse self-assessed physical health ($p < .001$) on average and had a 20.1% mortality rate at follow-up, significantly higher than the group with complete data (9.6% mortality rate, $p < .001$); in addition, the former group had

significantly smaller friend and family networks (p s of .017 and .021, respectively) than those with complete data. Because these analyses show that the data are MNAR, we follow the recommendation to present the complete case analysis (Dettori et al., 2018; Jakobsen et al., 2017).

In the final analytic sample of 1,734 participants, 1,567 were alive and 167 (9.6%) were deceased at Wave 2. The sample had a mean age of 67.8 years ($SD=7.3$) at Wave 1. Almost 90% of the sample was married (89.7%, $n=1,556$), 3% was living as married with a partner ($n=52$), and the remaining participants indicated that they had a romantic, intimate, or sexual partner (7.3%, $n=126$). Women made up approximately 41% of the sample (40.8%, $n=707$) and 82.2% of participants ($n=1,425$) had a high school education or better. Almost 19% of the sample identified as non-White ($n=326$) and the remaining identified as White ($n=1,408$).

Measures

Quality of Relationship with Spouse/Partner.—Using a 3-point scale (1=hardly ever or never, 2=some of the time, 3=often), two items were used to measure positive aspects of relationship quality (frequency with which the participant could open up to the partner if s/he needed to talk about worries and could rely on the partner; $r=.429$, $p<.001$) and two items were used to measure negative aspects of relationship quality (frequency with which the participant felt the partner made too many demands of him/her and criticized him/her; $r=.432$, $p<.001$). These variables have been included in other large-scale studies to measure relationship quality (such as the Health and Retirement Study, the Americans' Changing Lives Study, and the National Survey of Midlife Development in the US) and are widely used as indicators of relationship support and strain, respectively (e.g., Birditt & Antonucci, 2008; Bookwala, 2005; Chen & Feeley, 2014; Ryan, Wan, & Smith, 2014). The two items in each scale were summed; the mean summed value for positive relationship quality was 5.56 ($SD=.82$) and for negative relationship quality was 3.05 ($SD=1.14$).

Mortality status.—At Wave 2 of the NSHAP, the mortality status of Wave 1 participants was determined by one of the following strategies: speaking with the participant (alive) or either conducting a proxy interview with a family member/neighbor or examining public records/news sources (deceased) (Pinto, Wroblewski, Kern, Schumm, & McClintock, 2014). Of the 2,013 participants who were partnered at Wave 1, mortality status was verified for 2,008. Of these 2,008 participants, 223 (11.1%) were deceased at Wave 2 and the remaining 1,785 were still alive at Wave 2; the mortality status of the remaining five Wave 1 participants in partnered relationships who did not partake in Wave 2 could not be determined. As noted above, study findings did not change measurably whether the five individuals for whom mortality status could not be determined were retained in or excluded from the analyses; hence, we conservatively treated these individuals as alive at Wave 2 and retained them in the analytic sample. Complete data on predictor variables assessed at Wave 1 were available for 1,734 participants: 1,567 surviving participants and 167 (9.6%) deceased participants at Wave 2.

Covariates.—Sociodemographic variables, relationship type, health status, and social network size were used as statistical covariates. *Sociodemographic variables* included gender; education (using a 4-point scale: 1=less than high school, 2=high school or equivalent, 3=some college or post-HS education, 4=bachelor’s degree or higher); age; and race/ethnicity (1=White; 2=Non-White). Three *relationship types* were present in the sample, coded as 1=married, 2=living as married, and 3=had a romantic/intimate/sexual partner. The sociodemographic and relationship type profile of the sample is provided in the sample description above. *Health status* was measured using three indicators including body mass index (BMI, measured weight in kgs divided by height in meters-squared; $M=29.0$, $SD=6.0$); self-rated health measured with a single item variable (1=poor to 5=excellent; $M=3.38$, $SD=1.06$); and medication use (count of total number of medications taken on a regular basis, e.g., daily or weekly; $M=4.96$, $SD=3.87$). Finally, *social network size* was assessed using two items. The number of close family members or relatives (other than their spouse or partner) to whom they felt close was assessed using the following 6-point scale: none, one, 2–3, 4–9, 10–20, and more than 20. Participants also reported the number of people they considered to be their “closest” or “pretty good” friends other than their spouse/partner or close family members or relatives reported upon earlier; responses were made using the same 6-point scale. For the number of close family members or relatives, 6.8% of the sample had none, 25.6% had one, 44% had 2–3, 16.7% had 4–9, and 6.9% had 10–20, while no respondent reported have more than 20 (corresponding to a mean of 2.93 and a $SD=.98$ on the ordinal 6-point scale); for the number of closest or pretty good friends, 6.6% of the sample had none, 18.8% had one, 30.4% had 2–3, 23.6% had 4–9, and 20.6% had 10–20, while no respondent reported having more than 20 (corresponding to a mean of 3.35 and a $SD=1.18$ on the ordinal 6-point scale).

Data analysis

Logistic regression was conducted using the PROC LOGISTIC procedure in SAS Studio 3.6 (SAS Institute, Cary NC) to measure the mortality risk associated with partnered relationship quality over the 5-year period; the Firth correction method (Firth, 1993) was used to adjust for the low incidence of deaths in the sample so as to reduce small-sample bias that can occur with rare events in maximum likelihood estimation. All of the analyses were first conducted with composite measures for both positive and negative aspects of partnered relationship quality and repeated again with the individual components of each dimension separately as variables. The composite measures are the sums of the two individual components for both the positive and negative aspects. The analyses included participants’ sociodemographic factors (gender, race/ethnicity, age, and education), relationship type, health status, and social network size as statistical covariates. Because some studies have shown gender differences in the mortality risk associated with partnered relationship quality, follow-up analyses were conducted to determine whether gender moderated the link between partnered relationship quality and mortality; this was accomplished by including in the model interaction terms between gender and each of the relationship quality variables.

Furthermore, given that the data we use are observational and we cannot use the findings to suggest a causal link between partnered relationship quality and mortality risk, we

conducted further follow-up analyses using propensity score weighting to allow for the estimation of average causal effects (see Imbens, 2000; and, for example, Foster, 2003). In a two-group randomized controlled study, the random assignment to groups implies that baseline characteristics will on average be the same across the two groups. In observational studies such as this, however, it is often the case that groups to be compared have significantly different baseline characteristic profiles, and therefore any differences between them cannot be attributed to causal effects of the “independent” variable(s) of interest because of these confounding variables. A common method to allow for causal inference is propensity score matching, wherein the confounding variables are used to estimate a subject’s propensity to be assigned to one of two groups, and two participants from the different groups with very similar propensity scores are matched as a pair for inclusion in the analysis. In doing so, the analysis ensures that, as in a randomized controlled study, the two groups now have similar average baseline characteristics. Because we have “independent” variables with more than two levels in the current study, we employ the method of propensity score weighting, which is a generalization of this technique to data when the independent variable(s) have more than two levels. In this case, we use weighted model fitting to match participants across different levels of “independent” variables. These propensity score weights were obtained using the R package ‘twang’ (see Ridgeway et al., 2017), and the resulting weights were incorporated into the model itself using the SVYGLM function of the R package ‘survey’ (see Lumley, 2004).

Results

Table 1 provides bivariate correlations between study variables. We used logistic regression to model mortality status as a function of positive and negative aspects of the quality of partnered relationship ($R^2=.397$; Nagelkerke, 1991). Table 2 shows the results of the model using the two-item composite measures of relationship quality with sociodemographic variables, relationship type, health status variables, and social network size included as covariates. An examination of generalized variance inflation factors for the model showed that multicollinearity was not a factor of concern in the model (all GVIFs < 1.22, consistent with the low correlations among predictors as seen in Table 1). On the key question of the link between measures of partnered relationship quality and mortality status, we observed that the composite measure of negative relationship quality was linked with a significant increase in mortality risk. For each unit increase on the composite measure of negative relationship quality, participants had a 20.0% increased risk of being deceased ($p=.0146$, OR 95% CI: 1.03, 1.38). In contrast, the composite positive measure of partnered relationship quality did not have a significant relationship with mortality risk ($p=.312$). (We also note here that we conducted a test to determine whether the levels of positive and negative relationship quality interacted with one another in their effect on mortality. When this interaction term was included in the model, the resulting OR was not significantly different from 1 (OR = .971, 95% CI (.830, 1.135), $p= .708$.)

Several covariates also were significantly related to mortality status. As Table 2 shows, with each additional year of aging, participants were 8.0% more likely to die ($p<.0001$, OR 95% CI: 1.05, 1.10). Women were at significantly lower mortality risk (39% lower) than men ($p=.007$, OR 95% CI: .42, .87, corresponding to 13% to 58% lower mortality risk). Higher

levels of education significantly attenuated the risk of death (by 23%, $p=.0031$, OR 95% CI: .65, .92, corresponding to 8% to 35% lower mortality risk). Two health status variables significantly predicted mortality status. Higher levels of self-reported physical health were associated with significantly reduced risk of death (31% lower, $p<.0001$, OR 95% CI: .59, .82, corresponding to 18% to 41% lower mortality risk). Secondly, for each additional daily medication, we observed a 5.0% increase in the risk of death ($p=.0175$, OR 95% CI: 1.01, 1.10). Race, relationship type, BMI, and network size of family and friends were not significantly linked to mortality status at Wave 2.

Because past research has found that gender can moderate the link between relationship variables and health, we conducted analyses that included two interaction variables (gender x positive partnered relationship quality; gender x negative partnered relationship quality) to the original model to determine whether gender moderated the association between partnered relationship quality and mortality. Both of these interaction effects were statistically non-significant ($p>.197$; OR=.973, CI: .67, 1.47 and OR=.807, CI: .58, 1.12, respectively, for the interactions of gender with the positive and negative quality interactions). Thus, we did not find evidence in the current study that the link between partnered relationship quality and mortality risk varies as a function of gender.

As explained earlier, we conducted a parallel analysis using propensity score weighting as a means to approximate a causal analysis (see data analysis section above). A re-run of the original model above with sociodemographic variables, relationship type, health status variables, and network size as covariates confirmed the results obtained in the original model run: an increase in negative partnered relationship quality by 1 unit yielded a 27% increase in risk of death at Wave 2 ($p=.017$, OR 95% CI: 1.044, 1.537).

Next, we examined whether the individual items measuring negative and positive partnered relationship quality were differentially linked to mortality. To that end, we modeled mortality status as a function of the four individual items assessing partnered relationship quality and used the same covariates as in the original model. This model revealed that only criticism from one's spouse or partner was significantly predictive of mortality status after controlling for the remaining variables in the model ($R^2=.3995$). As Table 3 shows, an increase of 1 point on the 3-point scale was associated with a 44% increase in risk of death ($p=.008$, OR 95% CI: 1.10, 1.88). Spouse or partner demands were unrelated to mortality risk as were the two items assessing positive aspects of relationship quality (all $p>.473$). The role of sociodemographic variables, relationship type, health status measures, and network size variables in predicting mortality risk remained unchanged.

Discussion

This study examined the role of both positive and negative aspects of partnered relationship quality in predicting mortality at a five-year follow-up using a national probability-based sample of older adults. Logistic regression results showed that, consistent with past studies (Birditt & Antonucci, 2008; Eaker et al., 2007), more negative partnered relationship quality was associated with a significantly greater risk of mortality at follow-up. This association was evident after controlling for the role of participants' sociodemographic

variables, relationship type, health variables, and size of family and friendship networks. The use of propensity score weighting to assess causal effects also showed that negative partnered relationship quality was linked to increased odds for mortality, further adding to the statistical validity of the results. The current findings are consistent with prior research that shows that relationship quality with one's spouse or partner is a key contributor to poorer health outcomes in general (Birditt et al., 2016; Donoho et al., 2015; Robles et al., 2014) and that negative aspects of relationship quality are especially salient in this regard (Birditt & Antonucci, 2008; Bookwala, 2005; Umberson et al., 2006). The current findings extend this body of research by showing that negative aspects of partnered relationship quality also are significantly associated with higher risks of mortality, a link that has received relatively little attention in the literature (see Robles et al., 2014). Also as seen in other studies on health (e.g., Bookwala, 2005; Umberson et al., 2006) and mortality (Birditt & Antonucci, 2008; Eaker et al., 2007), negative aspects of partnered relationship quality outweigh positive aspects of relationship quality as contributors with the latter unrelated to these health outcomes when negative aspects of relationship quality are also included. In this way, the current study reiterates the importance of paying attention to both positive and negative aspects of partnered relationship quality as proposed in the literature (Bradbury et al., 2000; Lawrence et al., 2008; Sandberg & Harper, 2000).

Furthermore, the present results demonstrate that negative aspects of one's relationship with a spouse or partner in particular are detrimental in terms of mortality risk for partnered older adults independent of the availability of close relationships of other kinds such as family relationships and friendships. The vast literature on the role of social support and social networks in mortality has widely established that poor social relationships in general are key predictors of mortality risk (Holt-Lundstad et al., 2010), comparable to other well-known risk factors such as cigarette smoking and lack of exercise. The present study shows that poor (i.e., negative aspects of) relationships with one's spouse or partner are uniquely linked to mortality, net of other close social relationships. More interestingly, the type of intimate relationship was not found to be significantly associated with mortality – in other words, being in a marriage did not confer advantages for survival relative to living as married or having a romantic/intimate/sexual partner. Thus, although research has found that being partnered has benefits for the odds of survival relative to being without a partner (Liu & Reczek, 2012; Robards, Evandrou, Falkingham, & Vlachantoni, 2012), relationship quality appears to be more salient to mortality risk than the type of intimate relationship among partnered middle-aged and older adults. It should be noted that the subgroups of participants living as married or in a romantic relationship were very small in size, however, and replication of this finding with larger subgroups is warranted.

Furthermore, the current study found that, in particular, partner criticism from one's spouse or partner (but not too many demands made by them) is associated with a significantly increased risk of mortality at follow-up. This is consistent with other research on negative relationship quality and mortality (Birditt & Antonucci, 2008) and both supports and extends a large body of research that links perceived criticism to poorer clinical outcomes (Masland & Hooley, 2015; Renshaw, 2008). Criticism perceived from a significant other such as one's spouse or partner has been found to be linked to poorer clinical outcomes in the context of psychopathology, greater propensity to relapse, and shorter time to relapse. Such

criticism, argue Masland, Drabu, and Hooley (2019), should not be viewed as a proxy for some other variable but instead as an independent construct that is uniquely related to health outcomes in its own right. The current study's findings show that the negative impact of criticism extends beyond psychopathology to risk of mortality. As such, these findings have important clinical implications because they point to the value of developing interventions that target lowering negative aspects of relationship quality with one's spouse or partner, especially as related to criticism within the relationship. This is especially important given that criticism and similar hostile behaviors are often complementary in couples such that criticism between spouses becomes reciprocal (Smith & Baron, 2016). Interventions that aim at lowering the expression of criticism within partnered relationships may have beneficial effects for morbidity and mortality. Future research in the field should focus on the pathways through which criticism impacts mortality including subclinical (e.g., involvement of the HPA axis) and behavioral (e.g., engagement in maladaptive health practices) mechanisms. These are promising areas of research inasmuch as criticism during marital conflict has been found to be related to heightened HPA and cardiovascular reactivity (Robles & Kiecolt-Glaser, 2003; Rodriguez & Margolin, 2013) and criticism from close social ties has been linked to more unhealthy health behaviors such as cigarette smoking, lack of exercise, and a high-fat diet (Fiscella & Campbell, 1999).

We had expected that the relationship between negative partnered relationship quality and mortality would be stronger for women than men in the sample, based on some past studies that showed similar moderation effects by gender (Bulanda et al., 2016; Coyne et al., 2001; Eaker et al., 2007). However, like Whisman et al. (2018) instead, the current findings did not find differences by gender in the link between partnered relationship quality and mortality. Given the inclusion of a wide range of covariates in the data analyses, we conclude that criticism from one's spouse or partner may be equally relevant for mortality across older men and women. Accordingly, we recommend that intervention efforts to reduce the expression and perception of criticism be targeted at both genders.

The current study makes important contributions to the literature on partnered relationship quality and mortality by showing that higher negative relationship quality, notably criticism from one's spouse or partner, significantly predicts deceased status five years later for both older men and women. The study is marked by several strengths including the use of a national probability-based sample, the inclusion of relationship type and known correlates of mortality as covariates (sociodemographic factors, health, and the size of other close relationships), and the use of propensity score weighting to approximate a causal analysis. Nevertheless, the study has some limitations that should be noted. First, the study examines the mortality risk associated with partnered relationship quality using a complete-case analysis due to the missing not at random (MNAR) nature of the missing data. Our missing data analysis showed that respondents with missing data on any variable were significantly more likely to be deceased at follow-up, rate their health more poorly, and have social networks of a smaller size than those with complete data. Because those with missing data were systematically different from those in the final analytic sample, we can expect the generalizability of the study findings to be more limited. Second, the study had a relatively short follow-up period of five years. Future waves of the NSHAP will allow establishing mortality risk associated with partnered relationship quality over a longer period of time. In

addition, no data are available on the length of duration or chronicity of negative relationship quality or partner criticism in the relationship. Our goal in this study was to examine the whether the propensity to die varied as a function of scores on negative relationship quality. We recommend that future research with as-yet restricted NSHAP data using the date and cause of death explore related research questions such as a comparison of survival curves associated with negative relationship quality and a comparison of the role of negative relationship quality as a risk factor in disease-specific mortality.

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Correlations among Study Variables

Table 1.

	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Mortality (<i>Deceased=1</i>)	.20	-.06	-.11	.00	.00	.00	-.05	.11	-.15	-.02	-.03	-.02	.07
(2) Age		-.03	-.15	.01	-.03	.03	-.15	.16	-.10	.07	.05	-.09	.03
(3) Gender (<i>Female=1</i>)			-.06	.00	.03	-.02	-.04	.11	-.02	.07	-.04	-.06	-.12
(4) Education				.21	-.03	.02	-.06	.03	.28	-.03	.11	.08	.01
(5) Race (<i>White=1</i>)					-.04	-.12	-.07	.08	.16	-.08	.18	.06	-.06
(6) Living as married						-.05	.00	-.04	-.03	-.04	-.05	.00	-.05
(7) Intimate relationship							-.04	.00	.05	.00	-.03	-.06	-.11
(8) BMI								.08	-.17	.03	.00	.05	.03
(9) # Medications									-.30	.02	.05	.03	-.01
(10) Self-rated health										-.01	.08	.09	-.05
(11) # Close family relationships/relatives											.29	.08	-.08
(12) # Close friendships												.15	-.08
(13) Positive RQ w/spouse or partner													-.18
(14) Negative RQ w/spouse or partner													

Note: RQ=relationship quality; for continuous variables, higher scores indicate being older, more educated, higher BMI, more medication use, better self-reported health, larger network of family members and friends, higher positive relationship quality, and higher negative relationship quality.

Note: $|r| > .05$ were significant at the .05 level.

Table 2.

Partnered Relationship Quality as a Predictor of Mortality

	B	SE	t	OR	P	CI
Age	.075	.012	6.33	1.08	<.0001	1.05–1.10
Female (male coded as 0)	-.503	.186	-2.70	.61	.0069	.42–.87
Education	-.256	.086	-2.96	.77	.0031	.65–.92
White (non-White coded as 0)	.253	.234	1.08	1.29	.2796	.82–2.06
Relationship type (married=reference group)						
Living as married	-.530	.445	-1.19	.70	.2331	.25–3.84
Intimate relationship	.171	.337	.51	1.19	.6119	.59–2.22
BMI	-.031	.016	-1.91	.97	.057	.94–1.00
# Medications	.051	.022	2.38	1.05	.0175	1.01–1.10
Self-rated health	-.367	.086	-4.26	.69	<.0001	.59–.82
# Close family members or relatives	-.069	.091	-0.76	.93	.4464	.78–1.1
# Close friends	-.068	.076	-0.89	.93	.3742	.80–1.1
Positive RQ – Spouse/partner	.105	.104	1.01	1.11	.3122	.91–1.37
Negative RQ – Spouse/partner	.181	.074	2.44	1.20	.0146	1.03–1.38

OR=odds ratio; RQ=relationship quality; CI=95% confidence interval

Note: alive=0, deceased=1; for continuous variables, higher scores indicate being older, more educated, higher BMI, more medication use, better self-reported health, larger network of family members and friends, higher positive relationship quality, and higher negative relationship quality.

Note: |t| > .05 were significant at the .05 level.

Table 3.

Item-Specific Analysis of Partnered Relationship Quality as a Predictor of Mortality

	B	SE	t	OR	p	CI
<u>Positive Aspects of RQ with Spouse/partner</u>						
Can open up to spouse/partner	.125	.174	0.72	1.13	.4728	0.81–1.61
Can rely on spouse/partner	.034	.212	0.16	1.03	.8742	0.69–1.59
<u>Negative Aspects of RQ with Spouse/partner</u>						
Spouse/partner is critical	.364	.137	2.65	1.44	.0080	1.10–1.88
Spouse/partner makes too many demands	.003	.136	.022	1.00	.9822	0.77–1.30

OR=odds ratio; RQ=relationship quality; CI=95% confidence interval

Note: alive=0, deceased=1. The same covariates were included as in the original model (see Table 2); the covariate effects remained stable across both models.

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