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Marital Quality and Health Over 20 Years: A Growth Curve Analysis

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Abstract
Although there is substantial evidence linking marital quality to physical health, few studies have been longitudinal. This study examined data from the Marital Instability Over the Life Course Study; 1,681 married individuals followed for 20 years were included in these analyses. In order to control for life course effects, participants were divided into 2 cohorts: early life and midlife. On the basis of latent growth curve analysis, the results indicated that initial values of marital happiness and marital problems were significantly associated with the initial value of physical health among both cohorts. In addition, the slope of marital happiness was significantly associated with the slope of physical health among the younger cohort, and the slope of marital problems was significantly associated with the slope of physical health among the midlife cohort. These results provide evidence of the significant association between positive and negative dimensions of marital quality and physical health over the life course.

Keywords: longitudinal research, marital satisfaction, physical health

There is substantial empirical evidence that marital distress is a significant risk factor for physical health problems. Research using large, nationally representative data sets has consistently found a negative association between marital distress and global measures of self-reported health (Bookwala, 2005; Hawkins & Booth, 2005; Ren, 1997; Ryff, Singer, Wing, & Love, 2001; Umberson, Williams, Powers, Liu, & Needham, 2006; Whisman & Uebelacker, 2006).

Most of this evidence, though, is based on cross-sectional data, rather than longitudinal data. Of those studies that have used longitudinal designs, all but two studies (Umberson et al., 2006; Wickrama, Lorenz, Conger, & Elder, 1997) used only two waves of data collection. An advantage of including at least three waves of data collection is the ability to use growth curve analysis, which allows researchers to estimate the trajectories of marital quality and physical health over time (Karney, 2001).

Moreover, most longitudinal studies cover less than a 10-year span of study (Levenstein, Ackerman, Kiecolt-Glaser, & Dubois, 1999). The two longitudinal studies that included three

waves of data spanned 3 years (Wickrama et al., 1997) and 8 years (Umberson et al., 2006). The relatively short duration of the existing longitudinal research limits the ability of researchers to follow the trajectories of marital quality and physical health over a significant portion of adulthood. Including more waves of data would allow a closer examination of the trajectories of marital quality and health, and having a longer period of data collection would enable a better examination of the effects of marital quality on health over the life course. The purpose of this study was to build on the existing research literature of marital quality and physical health by conducting a growth curve analysis using nationally-representative panel data that were collected at six points of time and spanned 20 years.

Review of Literature

Burman and Margolin (1992) proposed a stress/social support hypothesis to explain the relationship between marital distress and health problems. A satisfying relationship provides substantial social support to spouses, but a distressed relationship is a significant source of stress, which makes a person susceptible to health problems. Kiecolt-Glaser and Newton (2001) expanded on this model, suggesting that there are three primary pathways that link marital dynamics with health outcomes. First, because people in distressed relationships are more likely to experience stress (Holt-Lunstad, Birmingham, & Jones, 2008), they are more prone to suffer from psychological distress (Brock & Lawrence, 2011), which is a significant risk factor for poor health (Sandberg, Miller, Harper, Robila, & Davey, 2009). For example, there is a large research literature indicating that spouses in low quality marriages are more likely to experience general symptoms of depression (Whisman & Baucom, 2012) and anxiety (Cano, Gillis, Heinz, Geisser, & Foran, 2004). Specifically, adults in distressed relationships are more likely to be diagnosed with generalized anxiety disorder, social phobia, post-traumatic stress disorder, major depression, and bipolar disorder (Whisman, 2007).

Second, there is evidence that adults in unsatisfying marital relationships are more likely to engage in risky health behaviors. For example, lower marital quality is related to poorer adherence to continuous positive airway pressure (CPAP) among adults with obstructive sleep apnea (Baron, Smith, Czajkowski, Gunn, & Jones, 2009), as well as with poor eating habits (Wickrama et al., 1997) and inadequate sleep (Prigerson, Maciejewski, & Rosenheck, 1999). There is also evidence that marital distress is predictive of smoking (Fleming, White, & Catalano, 2010), alcohol abuse (Whisman, Uebelacker, & Bruce, 2006), and the nonmedical use of prescription drugs (Homish, Leonard, & Cornelius, 2010).

The third pathway consists of negative physiological changes in cardiovascular, endocrine, and immune functioning (Robles & Kiecolt- Glaser, 2003). For example, in one study, after participating in a marital problem-solving task, couples who engaged in hostile interactions had significantly heightened blood pressure compared with couples whose interactions were neutral or positive (Holt-Lunstad et al., 2008). In a study of newlywed couples, researchers found that, after engaging in a 30-minute conflict resolution exercise, couples who had higher levels of negative interaction had declines in immune functioning (Kiecolt-Glaser et al., 1993). More recent research has found an association between marital distress and inflammation (Black, 2006; Kiecolt-Glaser, Gouin, & Hantsoo, 2010).

Marital Quality and Health Over the Life Course

The aging process interacts with the relationship between marital quality and physical health in two ways. First, there is evidence that older adults in distressed relationships are at greater risk for health problems than younger adults (Kiecolt-Glaser, Glaser, Gravenstein, Malarkey, & Sheridan, 1996). Socioemotional selectivity theory argues that as adults get older, emotions become more salient to them, and they are motivated to increasingly seek positive emotions and interactions, while finding negative emotions and interactions more aversive (Carstensen, Isaacowitz, & Charles, 1999). Because older adults' immune systems decline with age (Kiecolt-Glaser & Newton, 2001), and they are at increased risk for health problems (Blackwell & Tonhat, 2002), the increased negative reactivity to marital stress could place them at higher risk for health problems when they are in distressful marital relationships.

Second, there is evidence that the accumulative impact of marital stress over time can have a negative impact on physical health (Umberson et al., 2006).Marital distress is best characterized as chronic strain (Aldwin & Gilmer, 2003).Marital problems are rarely a single event; instead, they are typically long-standing patterns of conflict and resentment. Research indicates that chronic stress has a negative effect on health (Webster-Marketon & Glaser, 2008; Wickrama, Lorenz, Fang, Abraham, & Elder, 2005). In addition, Dannefer (2003) argued that cumulative disadvantage is predictive of declines in health. Evidence for this was found in research that identified chronic financial stress over the life course as having a negative effect on health in later life, even when controlling for current financial well-being (Kahn & Pearlin, 2006). In a similar way, the negative effects of low levels of marital quality could be expected to accumulate over time and negatively affect health over the life course.

Previous Research

Karney (2001) has argued that two-wave longitudinal designs are not effective in studying the effect of change of one variable on change in another variable. With only two waves of data, researchers are limited to using cross-lagged models that essentially estimate the association between initial levels of an independent variable and the regressed change in the dependent variable (Bradbury, Cohan, & Karney, 1998). One of the problems with using this approach is that the model for estimating change assumes that the independent and dependent variables have the same basic pattern of change. Recent research has found that the majority of marital relationships are characterized by generally stable patterns of marital quality over the life course, (Anderson, Van Ryzin, & Doherty, 2010), but physical health deteriorates throughout middle and later adulthood (National Center for Health Statistics, 2012). The differences in change patterns can produce results that cloud the true picture of influence and change between the two variables. In addition, using two waves of data may produce unreliable results about how one variable affects another variable over time (Rogosa, Brant, & Zimowski, 1982). Studies that include at least three waves of data allow the use of growth curve analysis, which overcomes many of the limitations of analytic strategies used in two-wave analyses (Karney, 2001).

Two previous studies have used growth curve analysis on three-wave panel data to examine the influence of marital quality on physical health. Wickrama et al. (1997) analyzed data from 356 husbands and wives living in the rural Midwest. Using a measure of health that assessed self-reported physical symptoms and diseases, they found that marital quality had a significant impact on physical illness over a 3-year span, after controlling for initial levels of physical illness, education, income, and work-related stress. In the second study, Umberson et al. (2006) analyzed three waves of panel data, spanning 8 years, from the Americans' Changing Lives survey. They examined the association between marital quality and physical health among 1,049 continuously married people who ranged in age from 24 to 96. They analyzed negative and positive marital interaction separately and found that positive marital interaction was associated with self-reported global health at the beginning of the survey, but positive marital interaction was not related to subsequent change in health over the eight years of the study. On the other hand, negative marital interaction was significantly associated with both initial levels of health and subsequent changes in health. Moreover, the effect of negative marital interaction on health was greater among older persons.

Demographic Predictors of Marital Quality and Health

Previous research has indicated that some demographic variables are associated with marital quality and physical health. There is substantial evidence that education (Karney & Bradbury, 1995) and race (Umberson et al., 2005) are associated with marital quality. There is also research indicating that gender (Whiteman, McHale, & Crouter, 2007) and age (Umberson et al., 2005) are related to marital quality. National health data indicate that education, race, gender, and age are all related to physical health among adults (National Center for Health Statistics, 2012).

The purpose of this study was to build on Umberson et al.'s (2006) study by conducting a growth curve analysis on data from the Marital Instability Over the Life Course Study, which consists of panel data that were collected at six

points of time over a 20 year period. On the basis of theory and previous research, the first hypothesis for this study was that baseline levels of marital quality, conceptualized as marital happiness and marital problems, would be related to baseline levels of self-reported global physical health. The second hypothesis was that baseline levels of marital quality would be associated with subsequent change in respondents' health over the 20 years of the study.

Method

Sample

This study used data from the Marital Instability Over the Life Course Study. The study is a six-wave national longitudinal study spanning 20 years, with researchers collecting data in 1980, 1983, 1988, 1992, 1997, and 2000. Data were collected by telephone interviews, and participants were selected in 1980 by random digit dialing sampling procedures. For inclusion in the initial wave of the study, participants had to be married and between ages 18 and 55. Random assignment was used to choose either husband or wife within the household to interview. Of eligible households, the response rate for the first wave was 65%, resulting in a sample size of 2,034 married individuals. Subsequent response rates were 78, 84, 88, 90, and 82%, respectively. The initial sample was determined to be representative of the U.S. married population with respect to race, household size, presence of children, and age (Booth & Johnson, 1985).

Participants who divorced during the course of the study were omitted from these analyses. Research indicates that the growth curve trajectories for marital quality among couples who eventually divorce are significantly different from those of couples who remain married (Karney & Bradbury, 1995; Kurdek, 1999). In addition, the stress associated with the divorce process, including the predivorce process (Kitson & Langley, 1984), has been linked to health outcomes, including health behaviors, mental health, physical health, and mortality (Lorenz, Wickrama, Conger, & Elder, 2006; Sbarra, Law, & Portley, 2011), especially among men (Williams & Umberson, 2004). Thus, the effect of the divorce process on health could be a confounding factor in the analysis of the longitudinal association between marital quality and health. Consequently, the 353 (17.3%) participants who divorced during the course of the study were omitted from these analyses, resulting in a final sample size of 1,681.

We made comparisons between individuals who were eliminated from the sample because of divorce and those who remained in the sample, to test for sample selection bias. The results indicated that there were few differences between the two groups at the first wave of data collection in 1980, with no differences in age, gender, level of education, number of marriages, age at first marriage, and health. The only demographic difference was that non-European Americans were more likely to eventually divorce, (χ^2 (1, 2,034) = 5.12, $p < .05$). Not surprisingly, the divorced group had lower levels of marital happiness ($t(119) = 5.63$, $p < .001$) and higher levels of marital problems ($t(116) = 3.52$, $p < .01$) in 1980.

Consistent with findings from Umberson et al.'s study (2006) that found that the relationship between marital interaction and health differs by age cohorts, the sample was divided into two age cohorts. There is substantial evidence that midlife adults experience increasing physical changes due to aging (Whitbourne, 2001), and they are at higher risk, compared to young adults, for chronic diseases, such as heart disease, cancer, and type 2 diabetes (Spiro, 2001). Because midlife has generally been defined as beginning at age 40 (Lachman & Bertrand, 2001; Martin & Zimprich, 2005), the sample was divided into one cohort of young adults (N = 1,084), between the ages of 18 and 39, and a second cohort of adults in midlife (N = 597), between the ages of 40 and 55, at the time of the first wave of data collection. In terms of marriage, the younger cohort was married for an average of 7.81 years, and the older cohort was married for an average of 21.95 years (see Table 1.) On the basis of the standard deviations, the majority of the younger cohort married between 1966 and 1978, and the majority of the midlife cohort married between 1951 and 1965.

The mean ages of the two cohorts at Time-1 were 29.96 and 46.35, respectively. As indicated in Table 1, 60.9% of the younger cohort and 54.1% of the older cohort were female, and over 85% (85.9 and 89.8%, respectively) were European American. The average level of education was 13.49 and 13.20 years of school, respectively, and most of

Table 1. Characteristics of Sample at Time 1 (1980)

	18–39 (n = 1084)		40–55 (n = 597)	
	Mean	*SD*	Mean	*SD*
Age	29.96	5.25	46.35	4.25
Gender (% female)	60.90		54.1	
Race (% White)	85.9		89.8	
Education (years of school)	13.49	2.52	13.20	2.91
Length of current marriage (in years)	7.81	5.55	21.95	7.48
Total family income	25,410	11,989	31,332	14,525
Percentage in first marriage	86.5		82.2	
Number of children	1.61	1.30	3.11	1.76
Initial health[a]	3.41	0.02	3.27	0.03
Initial level of marital happiness[a]	28.47	0.11	28.70	0.15
Initial level of marital problems[a]	2.73	0.16	2.15	0.09

a. Statistics for marital happiness and marital problems and health represent initial latent means and standard errors.

the participants were in their first marriage (86.5 and 82.2%, respectively). The median total family income in 1980 was $25,410 for the younger cohort and $31,332 for the older cohort.

Measurement

Marital quality. Research has consistently found differences in the degree of association between positive and negative aspects of marital quality and physical health (Gouin et al., 2009; Kiecolt-Glaser & Newton, 2001). Moreover, confirmatory factor analysis has revealed that positive and negative dimensions of marital quality measure distinct aspects of the relationship and should be assessed separately (Johnson, White, Edwards, & Booth, 1986). With Umberson et al. (2006) finding similar results in their longitudinal study, positive and negative dimensions of marital quality were measured independently.

The positive dimension of marital quality was measured by an 11-item scale based on respondent's feelings about the happiness of their relationship, including global evaluations of the relationship, in addition to evaluations of specific aspects of the relationship. The response options ranged from 1 = (*very happy*) to 3 = (*not too happy*). The marital happiness scale has been shown to be valid (Johnson et al., 1986), and it has been used in previous studies (Anderson et al., 2010; VanLaningham, Johnson, & Amato, 2001). For this analysis, the average Cronbach's alpha over the six waves of the study was .88. The scale scores were reverse coded so that higher scores on the marital happiness scale reflect higher marital happiness.

The negative dimension of marital quality was measured by a marital problems scale, which consisted of 13 questions about specific relationship problems, such as jealousy, criticalness, irritating habits, moodiness, sexual relations with others, financial irresponsibility, and anger. The scale has been shown to be valid measure of the negative dimension of marital quality (Johnson et al., 1986). Four response options were given indicating that (a) *the couple does not have a problem with that item*, (b) *that the respondent has a problem*, (c) *that the partner has a problem*, and (d) *that both have problems with that item*. For the purposes of this study, the response options were coded so that no problem was coded as 0, a problem on the part of either self or partner was coded as 1, and problem on the part of both spouses was coded as 2. The scale was created by summing the score on each of the 13 items. The scale has been used in past research (Amato, Booth, Johnson, & Rogers, 2007) and been found to have a Cronbach's alpha of .78. Higher scores on the marital problems scale reflect a higher number of marital problems.

Health. Respondents assessed their physical health by responding to a global health question that asked, ''In general, would you say your own health is excellent, good, fair, or poor?'' Responses ranged from 1 = (*excellent*) to 4 = (*poor*). The use of self-report global measures of health

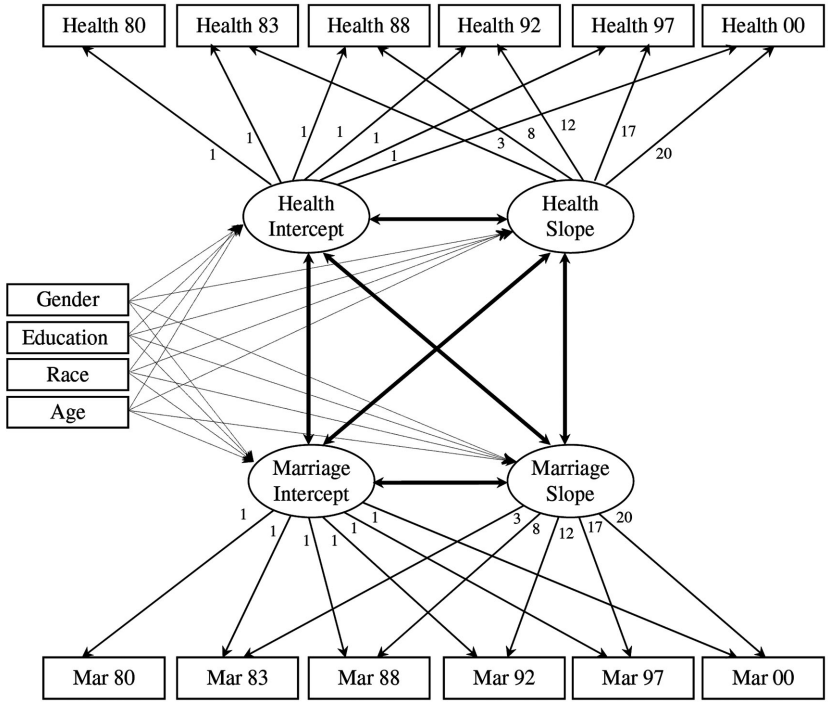

Figure 1. A latent growth curve model of marital quality and health.

is common among large studies that address marital functioning and physical health (Ren, 1997; Ryff et al., 2001; Umberson et al., 2006; Whisman & Uebelacker, 2006). Previous research has demonstrated that self-reported health is highly correlated with objective measures of health (Ferraro & Farmer, 1999). Moreover, global self-reported health has been found to be a strong predictor of future doctors' visits (Miilunpalo, Vuori, Oja, Pasanen, & Urponen, 1997), disabilities (Lee, 2000), and mortality (Idler & Benyamini, 1997). Additional evidence of the validity of self-reported global health comes from a study on marital quality and health that used four measures of health; the results indicated that marital quality had similar effects on self-reports of physical symptoms, chronic illnesses, physical disability, and global health (Bookwala, 2005). We recoded this measure so that higher scores reflected better health.

Control variables. Age, gender, race, and education were included in the analyses as control variables. They were measured by standard demographic questions, with education being measured by the number of years of education.

Analysis

We used latent variable growth curve modeling (Duncan, Duncan, & Strycker, 2006) to analyze all of the available data obtained from the selected participants over the course of the study. Missing data across variables and time periods were handled with the full information maximum likelihood methods implemented in the Amos structural equation modeling software (Arbuckle, 2007). The structural equation model framework for calculating latent growth curve models estimates two latent variables, the intercept, or baseline value and the slope, or rate of change. The slope represents the latent variable's trajectory over time. We analyzed the growth curve model, illustrated in Figure 1, separately for marital happiness and marital problems, while simultaneously computing differences between age groups. Consequently, the model results included four sets of outcomes.

Results

Preliminary Analyses

As indicated in Table 1, the mean initial level of health was 3.41 for the younger cohort and 3.27 for the midlife cohort. The mean initial level of marital happiness was 28.47 and 28.70 for the younger and midlife cohort, respectively, and the mean initial level of marital problems was 2.73 for the younger cohort and 2.15 for the midlife cohort. Marital happiness and marital problems were significantly correlated with concurrent health at each wave of data collection for the younger cohort. The correlations among the younger cohort for marital happiness and health were .18 ($p < .01$) at Wave 1, .15 ($p < .01$) at Wave 2, .18 ($p < .01$) at Wave 3, .17 ($p < .01$) at Wave 4, .15 ($p < .01$) at Wave 5, and .15 ($p < .01$) at Wave 6. At each wave of data collection, higher levels of marital happiness were associated with better health. The correlations among the younger cohort for marital problems and health were −.10 ($p < .01$.) at Wave 1, −.14 ($p < .01$) at Wave 2, −.11 ($p < .01$) at Wave 3, −.09 ($p < .05$) at Wave 4, −.13 ($p < .01$) at Wave 5, and −.14 ($p < .01$) at Wave 6.

The results of the correlational analysis among the midlife cohort of marital problems and marital happiness with concurrent health yielded fewer significant results. The correlations among the midlife cohort for marital happiness and health were .12 ($p < .01$) at Wave 1, .18 ($p < .01$) at Wave 2, .10 ($p < .05$) at Wave 3, .11 ($p < .05$) at Wave 4, .06 ($p = .316$) at Wave 5, and .01 ($p = .854$) at Wave 6. The correlations among the midlife cohort for marital problems and health were −.11 ($p < .01$) at Wave 1, −.20 ($p < .01$) at Wave 2, −.09 ($p = .078$) at Wave 3, −.05 ($p = .381$) at Wave 4, −.01 ($p = 910$) at Wave 5, and −.06 ($p = .331$) at Wave 6.

Hypothesis Testing

The latent growth curve model fit statistics were consistent with standards for good-fitting models. Results of the goodness-of-fit analyses indicated that both the marital happiness model (χ^2 (192) = 472.20, $p < .001$, comparative fit index = .94, Tucker-Lewis index = 0.91, root-mean- square-error of approximation = .029) and the marital problems model (χ^2 (192) = 328.43, $p < .001$, comparative fit index = .97, Tucker- Lewis index = .96, root-mean-square-error of approximation = .021) had adequate goodness-of-fit.

The results supported the first hypothesis, which predicted that the initial values for health and marital quality would be significantly associated. Marital happiness and marital problem initial values were both associated with respondents' baseline health for young and midlife couples. As indicated in Table 2, the correlation between the marital happiness intercept and the health intercept was significant for the early life

Table 2. Covariance Estimates between Marital Happiness, Marital Problems, and Health Problems

Age Groups at Time 1	18–39 (n = 1084)			40–55 (n = 597)		
Construct	Covariance	r	p	Covariance	r	p
Marital happiness (mar hap)[a]						
mar hap int↔health int	.404 (.07)	.292	***	.357 (.11)	.180	**
mar hap int↔health slope	−.012 (.01)	−.168	*	−.022 (.01)	−.200	*
health int↔mar hap slope	−.008 (.01)	−.136	.124	−.013 (.01)	−.190	.060
mar hap slope↔health slope	.001 (.00)	.318	**	.003 (.00)	.223	.069
Marital problems (prob)[b]						
mar prob int↔health int	−.161 (.04)	−.172	***	−.278 (.07)	−.241	***
mar prob int↔health slope	.000 (.00)	−.010	.892	.013 (.01)	.214	*
health int↔mar prob slope	.003 (.00)	.089	.304	.005 (.00)	.184	.163
mar prob slope↔health slope	.000 (.00)	−.128	.257	−.001 (.00)	−.383	*

Numbers in parentheses are standard errors.

a. Marital happiness fit statistics: $\chi^2(192) = 472.20$, $p < .001$, comparative fit index (CFI) = .94, Tucker-Lewis Index (TLI) = 0.91, root-mean-square error of approximation (RMSEA) = .029.

b. Marital problems fit statistics: $\chi^2 = 328.23$ (192), $p < .001$, CFI = .97, TLI = .96, RMSEA = .021.

* $p < .05$; ** $p < .01$; *** $p < .001$

($r = .29$, $p < .001$) and midlife cohorts ($r = .18$, $p < .01$), indicating that higher levels of marital happiness were associated with better physical health. Similarly, the association between the intercept of marital problems and the intercept of health was significant for the young adult ($r = -.17$, $p < .001$) and midlife cohorts ($r = -.24$, $p < .001$), indicating that a greater number of marital problems was associated with poorer physical health.

We tested the second hypothesis of the study, that baseline levels of marital quality would be related to subsequent changes in health, by examining the relationship between the intercept of marital quality and the slope of health. The results did not support the second hypothesis. As indicated in Table 2, the initial levels of marital happiness were related to the slope of health for the young adults and midlife cohorts ($r = -.17$, $p < .05$ and $r = -.20$, $p < .05$, respectively). However, the associations were in the opposite direction than were anticipated, with initial levels of marital happiness being predictive of a decline in health over the 20 years of the study. When examining marital problems, initial levels of marital problems were not significantly associated with the slope of health among the young adult cohort ($r = -.01$, $p = .89$), but it was significant among the midlife cohort ($r = .21$, $p < .05$). Similarly, although the association was significant among the midlife cohort, the direction of the association was different than expected, with more marital problems being predictive of improved health over time.

Another way to examine the longitudinal association between marital quality and physical health was to assess the correlation between the slope of marital quality and the slope of physical health. Results indicated that the slope of marital happiness was positively correlated with the slope of physical health among younger cohort ($r = .32$, $p < .05$), while the correlation approached significance among the midlife cohort ($r = .22$, $p = .069$). Thus, increased marital happiness over time was predictive of improvement in health over time for the younger cohort. The slope of marital problems was negatively associated with the slope of physical health among the midlife cohort ($r = -.38$, $p < .05$), but not for the younger cohort ($r = -.13$, $p = .257$). This finding indicates that increases in marital problems over time were predictive of poorer physical health over time among the midlife cohort.

Among the control variables, being female, non-European American, older, and less educated were generally associated with poorer health. Among the early adult cohort, gender ($\beta = -.08$, $p < .05$), race ($\beta = .12$, $p < .01$), age ($\beta = -.10$, $p < .01$), and education ($\beta = .26$, $p < .001$) were all significantly associated with initial levels of health. Age ($\beta = -.20$, $p < .001$) and education ($\beta = .24$, $p < .001$) were significantly associated with initial levels of health in the midlife cohort. None of the control variables were significantly associated with the slope of health for either cohort.

Women were found to have lower initial levels of marital happiness in both the early ($\beta = -.09$, $p < .05$) and midlife ($\beta = -10$, $p < .05$) cohorts. The women in the early adult cohort also reported higher initial levels of marital problems ($\beta = .07$, $p < .05$). European Americans had higher initial levels of marital happiness among the early ($\beta = .12$, $p < .001$) and midlife ($\beta = .14$, $p < .05$) cohorts, and the early adult cohort had lower initial levels of marital problems ($\beta = -.15$, $p < .001$). Age among the younger cohort was the only control variables that was significantly associated with the slope of marital happiness ($\beta = .14$, $p < .05$). None of the control variables were significantly predictive of the slope of marital problems.

Cohort Differences

To test for the moderating effect of age on the relationship between marital quality and physical health, we conducted a test of invariance to determine if the path coefficients and correlations of the younger cohort's and the midlife cohort's latent growth curve models were equivalent. Constraining all of the paths between the two cohorts to be equal in the marital happiness model resulted in a χ^2 of 356.419. This value was not significantly different from the unconstrained model ($\Delta\chi^2 = 27.993$ (22), $p = .18$). Constraining all of the paths between the two cohorts to be equal in the marital problems model resulted in a χ^2 of 500.358, which is not statistically different from the unconstrained model ($\Delta\chi^2 = 28.158$ (22), $p = .17$). Thus, there were no cohort, or age, differences between the two models for marital happiness and marital problems, indicating that the relationship between marital quality and physical health did not differ by age.

When we examined specific paths, we noted only one significant difference: In both the marital happiness and marital problems models, the relationship between age and the initial value of physical health was different between the two cohorts ($\Delta\chi^2 = 6.382$ (1), $p < .05$). The association between age and the initial value of physical health was −.10 among the younger cohort and −.20 among the midlife cohort.

Discussion

This study provides evidence that both positive and negative dimensions of marital quality are predictive of physical health. The results indicated that initial (baseline) levels of marital happiness and marital problems were significantly associated with initial levels of physical health. These findings are consistent with a substantial body of previous research that has documented a cross-sectional association between marital quality and health (Kiecolt-Glaser & Newton, 2001; Sandberg et al., 2009).

The test of the second hypothesis, however—that initial levels of marital quality would significantly predict the slope of physical health—produced results that were unexpected. Rather than finding that higher initial levels of marital happiness predicted an increase in physical health over time, the opposite was found for both the younger and midlife cohorts. The results of the marital problems analysis were also puzzling, with initial levels of marital problems being positively associated with the slope of physical health among the midlife cohort, indicating that more initial marital problems was predictive of improved physical health over time.

These unexpected findings can be explained from a statistical perspective by the law of initial values, which is particularly common when studying longitudinal changes in psychophysiological variables (Campbell, 1981). The law was first discussed and named by Joseph Wilder (1958) and refers to the paradoxical relationship between the initial value of a variable and it subsequent change over time. The law states that when an initial value of a variable is high, there is often a drop in the value of the variable over time; conversely, if the initial value is low, the value of the variable often increases over time (Jin, 1992). The result is a statistical artifact that creates findings that do not accurately represent the data being analyzed.

The law of initial values seems to fit our findings, with the correlations between the initial value of health and the slope of health being −.41 ($p < .001$) for the younger cohort and −.39 ($p < .001$) for the midlife cohort. Thus, consistent with the law of initial values, higher initial levels of health were predictive of significant declines in health over the 20 years of the study. According to our findings, participants who reported higher initial levels of marital happiness in general also reported better baseline physical health. Consequently, applying the law of initial values, because higher initial levels of health are predictive of better initial physical health, those who reported higher initial levels of marital happiness were more likely to be found, on the basis of the statistical analysis, as experiencing a decline in health over time. Using similar logic, those participants who reported more initial marital problems were found to experience improved of health over time. Thus, on the basis of the law of initial values, the findings that initial levels of marital happiness were predictive of decline in physical health over time for both cohorts, and that initial levels of marital problems was predictive of improvement in physical health, comprise a statistical artifact.

Although the law of initial values provides a statistical explanation for these findings, the family resilience perspective provides a possible theoretical explanation. Family resilience refers to the ability of individuals and families to positively adapt to stressful and challenging circumstances (Patterson, 2002). This perspective is based on the observation that, although crises and stressful circumstances place individuals and families at risk for poor outcomes, not everyone experiences negative consequences. It recognizes ''the potential for personal and relational transformation and growth that can be forged out of adversity'' (Walsh, 2002, p. 130). Indeed, stressful circumstances can be awake-up call that motivates healthier and more adaptive pathways of behavior over time. Thus, the finding that participants with lower initial levels of marital happiness and higher levels of marital problems generally experienced improved health over the 20 years of the study could reflect an adaptive response over time to the stressful and adverse circumstances of low marital quality and poorer health at the beginning of the study.

Some findings from the growth curve analyses indicated that changes in marital quality

over time were predictive of changes in physical health. The slope of marital happiness was significantly associated with the slope of physical health among the younger cohort, and it trended towards significance among the midlife cohort, indicating that increases in marital happiness over time were predictive of improvement in physical health over time. Similarly, the slope of marital problems was significantly associated with the slope of physical health among the midlife cohort, indicating that decreases in marital problems over time were predictive of improved health over time.

Moreover, the correlations between marital quality and physical health at each wave of data collection were significant among the younger cohort, and they were significant at many of the waves among the midlife cohort. These findings suggest that, throughout the course of the study, marital happiness was predictive of better concurrent physical health, especially among the younger cohort. Similarly, marital problems were generally predictive of poorer concurrent physical health, especially among the younger cohort. Thus, consistently high levels of marital happiness at each wave of data collection were associated with better health, and consistently high levels of marital problems at each wave were associated with poorer health over the 20 years of the study.

Marital Happiness and Health

An important finding in this study was the significant association between marital happiness and health, both in the cross-sectional and longitudinal results. Previous research has most commonly used global measures of marital quality that have combined positive and negative dimensions of the marital relationship (Levenson et al., 1993; Prigerson et al., 1999; Wickrama et al., 1997). Research has demonstrated that the positive and negative dimensions of marital quality are distinct and should be measured separately (Johnson et al., 1986; Kiecolt-Glaser & Newton, 2001). Cross-sectional studies that have separately measured positive dimensions of marital quality have generally found that positive marital quality is significantly associated with good physical health (Ren, 1997; Whisman & Uebelacker, 2006). Umberson et al. (2006), in their longitudinal study, measured positive and negative dimensions of marital quality separately and found that, although positive marital quality significantly predicted health cross-sectionally, it was not associated with the trajectory of health over the 8 years of the study. Another longitudinal study that examined only two waves of data, though, found that positive aspects of marital quality were significantly associated with health 12 years later (Hawkins & Booth, 2005).

The findings from this study highlight the importance to health of high levels of marital satisfaction. In their seminal review article on marriage and health, Burman and Margolin (1992) proposed the stress/social support hypothesis to explain the relationship between marital quality and health. They proposed that distressed marital relationships are a major source of stress, but satisfying marital relationships are characterized by high levels of social support, which is predictive of better health.

Research has found substantial evidence for the social support hypothesis. An emotionally close relationship, in which the spouses serve as each other's confidants, helps protect women and men against the harmful effects of stressful life events (Pearlin, Lieberman, Menaghan, & Mullan, 1981). There is substantial evidence that social and emotional support plays an important role in enhancing adults' psychological and physical well-being of adults. For example, a large, national study found that spousal social support was predictive of lower levels of depressive symptoms (Choi & Ha, 2011). In addition, a national community health study found a significant association between emotional and social support and mental and physical health status (Strine, Chapman, Balluz, & Mokdad, 2008). These authors found that those participants who reported low levels of emotional and social support were 2.1 times more likely to report poor or fair levels of health.

In addition, spouses monitor each other's health-related behaviors, such as driving safely and not drinking excessively, and they promote good health by detecting health problems and encouraging regular visits to the doctor (Kiecolt-Glaser & Newton, 2001). The benefits of high marital quality on health-related behaviors were demonstrated in Wickrama et al.'s (1997) longitudinal study. These authors included a scale of health-risk behaviors that measured hours of sleeping, eating a balanced diet, getting regular exercise, having a sedentary lifestyle, maintain-

ing a healthy body weight, using tobacco, and using illicit drugs. They found that high marital quality was negatively related to health-risk behaviors, which was a mediating variable between marital quality and health problems.

The concept of allostatic load suggests another pathway between high marital quality and good physical health. Allostasis is the physiological adaptive processes and coping mechanisms that enable the body to adapt to chronic stresses and maintain biological homeostasis, such as proper metabolism and body temperature (Ryff & Singer, 2005). Allostatic load refers to the wear and tear on physiological systems that comes from having to adapt to chronic stress and repeated challenges, which eventually compromises the functioning of physiological systems (Karlamangla, Singer, & Seeman, 2006). Research has shown that high allostatic load is predictive of decreased cognitive and physical functioning (Karlamangla, Singer, McEwen, Rowe, & Seeman, 2002), as well as higher mortality rates (Karlamangla et al., 2006). Thus, satisfying marital relationships are predictive of low allostatic load, which is instrumental in maintaining good health.

The results from our study indicated that there were no differences in the relationship between marital quality and physical health between the two cohorts, suggesting that the relationship was the same, regardless of the age of the participants. At first glance, these findings seem to contradict the findings of Umberson et al. (2006), who found that the relationship between negative marital interaction and physical health was present primarily among their oldest cohort of participants. They concluded that ''the adverse effects of negative experiences may become apparent only at older ages either because they take a cumulative toll on health or because health status becomes more vulnerable to stress at older ages,'' (p. 8). The differences in findings between the two studies are likely due to the different ages of the cohorts. Umberson el al.'s oldest cohort consisted of adults who were age 70 or older at the beginning of their study. In contrast, our older cohort, which we called the midlife cohort, had an average age at the *end* of the study of 66. Our study included nonelderly cohorts who did not reach the age of the oldest cohort in Umberson et al.'s study, and our findings indicated no cohort differences between the younger and midlife cohorts, which is consistent with the findings of Umberson and colleagues, who also found no differences between their 30 year old and 50 year old cohorts.

Study Limitations and Directions for Future Research

Future research should address possible moderators of the relationship between marital quality and physical health. The analyses in this study included gender, race, age, and education as control variables, which allowed for an examination of their association with the initial level and slope of marital quality and health. The next analytic step should be to include these variables as possible moderators to assess their effect on the relationship between marital quality and health over time.

The findings of this study expand our understanding of the effect of marital quality on physical health. The analysis of six waves of data over a 20-year period revealed longitudinal effects of both negative and positive dimensions of marital quality on physical health over time. These results not only reinforce the effect of negative marital quality on declining health but also call attention to the important influence of positive marital quality on maintaining good health.

References

Aldwin, C. M. & Gilmer, D. F. (2003). *Health, illness, and optimal aging: Biological and psychosocial perspectives*. Thousand Oaks, CA: Sage.

Amato, P. R., Booth, A., Johnson, D. R., & Rogers, S. J. (2007). *Alone together: How marriage in America is changing*. Cambridge, MA: Harvard University Press.

Anderson, J. R., Van Ryzin, M. J., & Doherty, W. J. (2010). Developmental trajectories of marital happiness in continuously married individuals: A group-based modeling approach. *Journal of Family Psychology*, *24*, 587–596; doi: 10.1037/a0020928

Arbuckle, J. L. (2007). *Amos (version 18.0)* [Computer Program]. Chicago, IL: SPSS.

Baron, K. G., Smith, T. W., Czajkowski, L. A., Gunn, H. E., Jones, C. R. (2009). Relationship quality and CPAP adherence in patients with obstructive sleep apnea. *Behavioral Sleep Medicine*, *7*, 22–36; doi: 10.1080/15402000802577751

Black, P. H. (2006). The inflammatory consequences of psychological stress: Relationship to insulin resistance, obesity, atherosclerosis and diabetes mellitus, type II. *Medical Hypotheses*, *67*, 879–891.

Blackwell, D. L., & Tonhat, L. (2002). *Summary health statistics for the U.S. population: National Health Interview Survey, 1999*. Vital Health Statistics, Series 10, No. 208. Accessed at http://www.cdc.gov/nchs/data/series/sr_10/sr10_208.pdf

Bookwala, J. (2005). The role of marital quality in physical health during the mature years. *Journal of Aging and Health*, *17*, 85–104; doi: 10.1177/089826430427279

Booth, A., & Johnson, D. R. (1985). Tracking respondents in a telephone interview panel selected by random digit dialing. *Sociological Methods and Research*, *14*, 53–64; doi: 10.1177/0049124185014001003

Bradbury, T. N., Cohan, C. L., & Karney, B. R. (1998). Optimizing longitudinal research for understanding and preventing marital dysfunction. In T. N. Bradbury, ed., *The developmental course of marital dysfunction*. (pp. 279–311). New York: Cambridge University Press.

Brock, R. L., & Lawrence, E. (2011). Marriage as a risk factor for internalizing disorders: Clarifying scope and specificity. *Journal of Consulting and Clinical Psychology*, *79*(5), 577–589; doi: 10.1037/a0024941

Burman, B., & Margolin, G. (1992). Analysis of the association between marital relationships and health problems: An interactional perspective. *Psychological Bulletin*, *112*, 39–63; doi: 10.1037/0033-2909.112.1.39

Campbell, M. E. (1981). Statistical procedures with the law of initial values. *Journal of Psychology*, *108*, 85–101.

Cano, A., Gillis, M., Heinz, W. Geisser, M., & Foran, H. (2004). Marital function, chronic pain, and psychological distress. *Pain*, *107*, 99–106; doi: 10.1016/j.pain.2003.10.003

Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*, *54*, 165–181; doi: 10.1037/0003-066X.54.3.165

Choi, N. G., & Ha, J. H. (2011). Relationship between spouse/partner support and depressive symptoms in older adults: Gender differences. *Aging & Mental Health*, *15*, 17–37; doi: 10.1080/13607863.2010.513042

Dannefer, D. (2003). Cumulative advantage/ disadvantage and the life course: Cross-fertilizing age and social science theory. *Journal of Gerontology: Social Sciences*, *58B*, S327-S337; doi: 10.1093/geronb/58.6.S327

Duncan, T. E., Duncan, S. C., Strycker, L. A. (2006). *An introduction to latent variable growth curve modeling* (2nd). Mahwah, NJ: Erlbaum.

Ferraro, K. F., & Farmer, M. M. (1999). Utility of health data from social surveys: Is there a gold standard for measuring morbidity? *American Sociological Review*, *64*, 303–315.

Fleming, C. B., White, H. R., & Catalano, R. F. (2010). Romantic relationships and substance use in early adulthood: An examination of the influences of relationship type, partner substance use, and relationship quality. *Journal of Health and Social Behavior*, *51*, 153–167; doi: 10.1177/0022146510368930

Gouin, J., Glaser, R., Loving, T. J., Malarkey, W. B., Stowell, J., Houts, C., et al. (2009). Attachment avoidance predicts inflammatory responses to marital conflict. *Brain, Behavior, and Immunity*, *23*(7), 898–904; doi: 10.1016/j.bbi.2008.09.016.

Hawkins, D. A., & Booth, A. (2005). Unhappily ever after: Effects of long-term, low-quality marriages on well-being. *Social Forces*, *84*, 445–464; doi: 10.1353/sof.2005.0103

Holt-Lunstad, J., Birmingham, W., & Jones, B. Q. (2008). Is there something unique about marriage? The relative impact of marital status, relationship quality, and network social support on ambulatory blood pressure and mental health. *Annuals of Behavioral Medicine*, *35*, 239–244; doi: 10.1007/s12160-008-9018-y

Homish, G. G., Leonard, K. E., & Cornelius, J. R. (2010). Individual, partner and relationship factors associated with non-medical use of prescription drugs. *Addiction*, *105*, 1457–1465; doi: 10.1111/j.1360-0443.2010.02986.x

Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behavior*, *38*, 21–37; doi: 10.1007/s10433-011- 0198-0

Jin, P. (1992). Toward a reconceptualization of the Law of Initial Value. *Psychological Bulletin*, *111*, 176–184.

Johnson, D. R., White, L. K., Edwards, J. N., & Booth, A. (1986). Dimensions of marital quality: Towards methodological and conceptual refinement. *Journal of Family Issues*, *7*, 31–49; doi: 10.1177/019251386007001003

Kahn, J. R., & Pearlin, L. I. (2006). Financial strain over the life course and health among older adults. *Journal of Health and Social Behavior*, *47*, 17–31; doi: 10.1177/002214650604700102

Karlamangla, A. S., Singer, B. H., McEwen, B., Rowe, J., & Seeman, T. E. (2002). Allostatic load as a predictor of functional decline. *Journal of Clinical Epidemiology*, *55*, 699–710; doi: 10.1016/S08954356(02)00399-2

Karlamangla, A., Singer, B., & Seeman, T. E. (2006). Reduction in allostatic load in older adults is associated with lower all-cause mortality risk: MacArthur studies of successful aging. *Psychosomatic Medicine*, *68*, 500–507; doi: 10.1097/01.psy.0000221270.93985.82

Karney, B. R. (2001). Depressive symptoms and marital satisfaction in the early years of marriage: Narrowing the gap between theory and research. In S. R. H. Beach, ed., *Marital and family processes in depression* (pp. 45–70). Washington, D.C.: American Psychological Association; doi: 10.1037/10350-003

Karney, B. R., & Bradbury, T. N. (1995). The longitudinal course of marital quality and stability: A review of theory, method, and research. *Psychological Bulletin*, *118*, 3–34; doi: 10.1037/00332909.118.1.3

Kiecolt-Glaser, J. K., & Newton, T. L. (2001). Marriage and health: His and hers. *Psychological Bulletin*, *127*, 472–503; doi: 10.1037/0033- 2909.127.4.472

Kiecolt-Glaser, J. K., Glaser, R., Gravenstein, S., Malarkey, W. B., & Sheridan, J. (1996). Chronic stress alters the immune response to influenza virus vaccine in older adults. *Proceedings of the National Academy of Sciences of the United States of America*, *93*, 3043–3047.

Kiecolt-Glaser, J. K., Gouin, J. P., Hantsoo, L. (2010). Close relationships, inflammation, and health. *Neuroscience and Biobehavioral Reviews*, *35*, 33–38; doi: 10.1016/j.neubiorev.2009.09.003

Kiecolt-Glaser, J. K., Malarkey, W. B., Chee, M., Newton, T., Cacioppo, J. T., Mao, H. & Glaser, R. (1993). Marital discord and immunity in males. *Psychosomatic Medicine*, *55*, 395–409.

Kitson, G. C., & Langley, J. K. (1984). Couples who file for divorce but change their minds. *The American Journal of Orthopsychiatry*, *54*, 469–489.

Kurdek, L. A. (1999). The nature and predictors of the trajectory of change in marital quality for husbands and wives over the first 10 years of marriage. *Developmental Psychology*, *35*, 1283–1296; doi: 10.1037/00121649.35.5.1283

Lachman, M. E., & Bertrand, R. M. (2001) Personality and the self in midlife. In M. E. Lachman, ed., *Handbook of midlife development*. (pp. 279–309). New York: John Wiley and Sons.

Lee, Y. (2000). The predictive value of self assessed general, physical, and mental health on functional decline and mortality in older adults. *Journal of Epidemiology and Community Health*, *54*, 123–129; doi: 10.1136/jech.54.2.123

Levenson, R. W., Carstensen, L. L., & Gottman, J. M. (1993). Long-term marriages: Age, gender, and satisfaction. *Psychology and Aging*, *8*, 301–313; doi: 10.1037/0882-7974.8.2.301

Levenstein, S., Ackerman, S., Kiecolt-Glaser, J. K.,& Dubois, A. (1999). Stress and peptic ulcer disease. *Journal of the American Medical Association*, *281*, 10–11; doi: 10.1001/jama.281.1.10

Lorenz, F. O., Wickrama, K. A. S., Conger, R. D., & Elder, Jr., G. H. (2006). The short-term and decade-long effects of divorce on women's midlife health. *Journal of Health and Social Behavior*, *47*, 111–125; doi: 10.1177/002214650604700202

Martin, M., & Zimprich, D. (2005). Cognitive development in midlife. In S. L. Willis & M. Martin, eds., *Middle adulthood: A lifespan perspective*. (pp. 179–206). Thousand Oaks, CA: Sage Publications.

Miilunpalo, S., Vuori, I., Oja, P., Pasanen, M., & Urponen, H. (1997). Self-rated health status as a health measure: The predictive value of self-reported health status on the use of physician services and on mortality in the working-age population. *Journal of Clinical Epidemiology*, *50*, 517–528; doi: 10.1016/S0895-4356(97)00045-0

National Center for Health Statistics. (2012). *Health, United States, 2011: With special feature on socioeconomic status and health*. Hyattsville, MD.

Patterson, J. M. (2002). Integrating family resilience and family stress theory. *Journal of Marriage and Family*, *64*, 349–360.

Pearlin, L. I., Lieberman, M. A., Menaghan, E. G., & Mullan, J. T. (1981). The stress process. *Journal of Health and Social Behavior*, *22*, 33–356.

Prigerson, H. G., Maciejewski, P. K., & Rosenheck, R. A. (1999). The effects of marital dissolution and marital quality on health and health services use among women. *Medical Care*, *37*, 858–873.

Ren, X. S. (1997). Marital status and quality of relationships: The impact on health perception. *Social Science and Medicine*, *44*, 241–249; doi: 10.1016/S0277-9536(96)00158-X

Robles, T. F., & Kiecolt-Glaser, J. K. (2003). The physiology of marriage: Pathways to health. *Physiology and Behavior*, *79*, 409–416; doi: 10.1016/S0031-9384(03)00160-4

Rogosa, D., Brant, D., & Zimowski, M. (1982). A growth curve approach to the measurement of change. *Psychological Bulletin*, *92*, 726–748; doi: 10.1037/0033-2909.92.3.726

Ryff, C. D., & Singer, B. H. (2005). Social environments and the genetics of aging: Advancing knowledge of protective health mechanisms. *Journal of Gerontology: Series B*, *60B*, 12–23; doi: 10.1093/geronb/60.Special_Issue_1.12

Ryff, C. D., Singer, B. H., Wing, E., & Love, G. D. (2001). Elective affinities and uninvited agonies: Mapping emotion with significant other onto

health. In C. D. Ryff & B. H. Singer, eds., *Emotion, social relationships, and health* (pp. 133–175). New York: Oxford University Press.

Sandberg, J. G., Miller, R. B., Harper, J. H., Robila, M., & Davey, A. (2009). The relationship among marital quality, health, and health care utilization in older couples. *Journal of Health Psychology*, *14*, 9–17; doi: 10.1177/1359105308097938

Sbarra, D. A., Law, R. W., & Portley, R. M. (2011). Divorce and death: A meta-analysis and research agenda for clinical, social, and health psychology. *Perspectives on Psychological Science*, *6*, 454–474; doi: 10.1177/1745691611414724

Spiro, A., III. (2001). Health in midlife: Toward a lifespan view. In M. E. Lachman, ed., *Handbook of midlife development*. (pp. 156–187). New York: John Wiley and Sons.

Strine, T. W., Chapman, D. P., Balluz, L., & Mokdad, A. H. (2008). Health-related quality of life and health behaviors by social and emotional support. *Social Psychiatry and Psychiatric Epidemiology*, *43*, 151–159; doi: 10.1007/s00127-007-0277-x

Umberson, D., Williams, K., Powers, D. A., Chen, M. D., & Campbell, A. M. (2005). As good as it gets? A life course perspective on marital quality. *Social Forces*, *84*, 493–511; doi: 10.1353/sof.2005. 0131

Umberson, D., Williams, K., Powers, D. A., Liu, H., & Needham, B. (2006). You make me sick: Marital quality and health over the life course. *Journal of Health and Social Behavior*, *47*, 1–16; doi: 10.1177/002214650604700101

VanLaningham, J., Johnson, D. R., & Amato, P. (2001). Marital happiness, marital duration, and the U-shaped curve: Evidence from a five-wave panel study. *Social Forces*, *78*, 1313–1341; doi: 10.1353/sof.2001.0055

Walsh, F. (2002). A family resilience framework: Innovative practice applications. *Family Relations*, *51*, 130–137.

Webster-Marketon, J., & Glaser, R. (2008). Stress hormones and immune function. *Cellular Immunology*, *252*, 16–26; doi: 10.1016/j.cellimm.2007.09.006

Whisman, M. A. (2007). Marital distress and *DSM-IV* psychiatric disorders in a population-based national survey. *Journal of Abnormal Psychology*, *116*, 638–643; doi: 10.1037/0021- 843X.116.3.638

Whisman, M. A., & Baucom, D. H. (2012). Intimate relationships and psychopathology. *Clinical Child and Family Review*, *15*, 4–13; doi: 10.1007/s10567-011-0107-2

Whisman, M. A. & Uebelacker, L. A. (2006). Impairment and distress associated with relationship discord in a national sample of married and cohabiting adults. *Journal of Family Psychology*, *20*, 369–377; doi: 10.1037/0893-3200.20.3.369

Whisman, M. A., Uebelacker, L. A. Bruce, M. L. (2006). Longitudinal association between marital dissatisfaction and alcohol use disorders in a community sample. *Journal of Family Psychology*, *20*, 164–167; doi: 10.1037/0893-3200. 20.1.164

Whitbourne, S. K. (2001). The physical aging process in midlife: Interactions with psychosocial and sociocultural factors. In M. E. Lachman, ed., *Handbook of midlife development*. (pp. 109–155). New York: John Wiley and Sons.

Whiteman, S. D., McHale, S. M., & Crouter, A. C. (2007). Longitudinal changes in marital relationships: The role of offspring's pubertal development. *Journal of Marriage and Family*, *69*, 1005–1020; doi: 10.1111/j.1741-3737.2007. 00427.x

Wickrama, K. A. S., Lorenz, F. O., Conger, R. D., & Elder, G. H. (1997). Marital quality and physical illness: A latent growth curve analysis. *Journal of Marriage and the Family*, *59*, 143–155; doi: 10.2307/353668

Wickrama, K. A. S., Lorenz, F. O., Fang, S. A., Abraham, W. T., & Elder, G. H. (2005). Gendered trajectories of work control and health outcomes in the middle years: A perspective from the rural Midwest. *Journal of Aging and Health*, *17*, 779–806; doi: 10.1177/0898264305279868

Wilder, J. (1958). Modern psychophysiology and the law of initial value. *American Journal of Psychotherapy*, *12*, 199–211.

Williams, K., & Umberson, D. (2004). Marital status, marital transitions, and health: A gendered life course perspective. *Journal of Health and Social Behavior*, *45*, 81–98; doi: 10.1177/002214650404500106