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Age-Related Changes in Emotional Behavior: Evidence from a 13-Year Longitudinal Study of Long-Term Married Couples

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Abstract

We examined age-related changes in emotional behavior in a sample of middle-aged and older long-term married couples over a 13-year period. Data were collected at three waves, each occurring five to six years apart. For the present study, only couples who participated in all three waves were examined (n=87). Couples were either in the middle-aged group (40-50 years old, married at least 15 years) or older group (60-70 years old, married at least 35 years). At each wave, couples engaged in 15-minute unrehearsed conversations about an area of disagreement in their marriage. Emotional behaviors during the conversation were objectively coded using the Specific Affect Coding System. Latent growth curve analyses revealed that, for both husbands and wives, negative emotional behavior (primarily belligerence, defensiveness, fear/tension and whining) decreased and positive emotional behavior (primarily humor, enthusiasm, and validation) increased with age. Findings generalized across middle-aged and older cohorts and levels of marital satisfaction. These findings support theories that suggest that positive emotion increases and negative emotion decreases with age, expanding upon previous findings by examining objectively coded emotional behaviors longitudinally in an interpersonal context.

Keywords

Aging, Emotional Behavior; Marriage; Longitudinal

Early research on emotion and aging was conducted with the expectation (Jung, 1933; Looft, 1972) that older adults would show declines in emotion paralleling well-documented declines in health and cognition (Park & Bischof, 2013; Rowe & Kahn, 1997; Verhaeghen & Salthouse, 1997). Challenging this expectation, a number of cross-sectional studies with healthy community samples found that many aspects of emotional functioning are preserved in late life (Mather & Ponzio, 2016; Scheibe & Carstensen, 2010). However, findings have been mixed as to the patterns of age-related change in different kinds of emotions. For example, some research indicates that negative emotion increases with age and positive emotion decreases (Kurdek, 1998), while other research supports the opposite trajectory

(e.g., Carstensen et al., 2011). Notably, these prior research findings share a number of limitations: (a) examining related constructs (e.g., marital satisfaction) without directly assessing emotion, (b) relying exclusively on self-report measures of emotion, (c) not assessing interpersonal contexts where most emotions occur (Keltner & Kring, 1998; Levenson, Haase, Bloch, Holley, & Seider, 2013), and (d) using largely cross-sectional designs. Using methods developed in our own prior cross-sectional laboratory-based research (Carstensen, Gottman, & Levenson, 1995), the present study examined changes in objectively coded negative and positive emotional behaviors during marital interaction in a sample of middle-aged and older long-term married couples assessed longitudinally over 13 years.

Diverging Views of Emotion and Aging in Couples

In the following section, we review research in support of three popular models of emotional aging: (a) total emotion declines with age; (b) negative emotion increases with age; and (c) positive emotion increases while negative emotion decreases with age. It is important to note that although many have theorized how emotions change over time, the majority of studies supporting these models, particularly earlier studies, did not directly measure emotional behavior but rather assessed related constructs such as marital satisfaction or life satisfaction. Given this important limitation, whenever possible we will present studies that assessed emotional changes over time in individuals and couples using measures of emotional behaviors. When unavailable, we will present studies that used other emotion measures (e.g., self-reported emotion) and/or "proxy" measures (e.g., marital satisfaction).

The first model, that total emotion in intimate relationships declines with age, was prominent in an earlier era that viewed late life as a time of emotional flatness and disengagement (Cumming & Henry, 1961; Jung, 1933; Looft, 1972). A number of studies examining emotion using self-reported data supported this view, showing lower levels of self-reported emotional intensity (Diener, Sandvik, & Larsen, 1985; Lawton, Kleban, Rajagopal, & Dean, 1992) and lower levels self-reported emotional expressivity. Some studies utilized proxy measures to examine how total emotion changes with age, and found lower levels of general cardiovascular responding (Frolkis, 1977) in late life, which is thought to be tied to decreased emotional responding. However, no studies supporting this model, to our knowledge, examined objective emotional behaviors, hence highlighting a gap in our understanding of how emotions change with age.

The second model, that negative emotion in intimate relationships increases with age, has sometimes been deemed the "honeymoon-is-over" effect (Kurdek, 1998) or the "honeymoon-then-years-of-blandness" pattern (Aron, Norman, Aron, & Lewandowski, 2002). Most empirical support for this model came primarily from studies of marital satisfaction, which has well-established relationships with emotion (Gottman & Levenson, 1986; Karney & Bradbury, 1995). Early cross-sectional studies of marital satisfaction reported a U-shaped curve over the course of marriage, such that couples experience a dip in self-reported marital quality during the middle years of the relationship following the highs of the "honeymoon phase," then marital satisfaction increases once more in the post-parental years (for a review, see Spanier & Lewis, 1980). It is important to note that this observed

change may be related more to life stage (e.g., couples transitioning out of childrearing) than age per se, however little research has examined emotion in marriages while accounting for life stage and/or age (e.g., comparing young married couples with recently married older couples). Some longitudinal studies have indicated a linear decline in marital satisfaction over time, indicating that the decline experienced after the honeymoon stage does not reverse later on (e.g., Finkel, Slotter, Luchies, Walton, & Gross, 2013; Vaillant & Vaillant, 1993; VanLaningham, Johnson, & Amato, 2001). Cowan and Cowan (2014) concluded that "in more than 50 studies in a number of industrialized countries, marital or couple relationship satisfaction declines over time". It is important to note, however, that some recent studies that do not find declines in relationship satisfaction with age but, instead, increases (Braun, Rohr, Wagner, & Kunzmann, 2018; Gorchoff, John, & Helson, 2008). Notably, studies utilizing emotional behaviors to support this theory are rare; but in our own longitudinal research using objective coding of emotional behaviors in couples, we have found age-related increases in spouses' avoidance behaviors (Holley, Haase, & Levenson, 2013), which are often seen as "negative" emotional behaviors because they signal a conscious action by one spouse to impede effective conflict resolution.

The third model is that positive emotions increase and negative emotions decrease with age in intimate relationships. A prominent theoretical framework, socioemotional selectivity theory, proposes that, as individuals get older, they prioritize socioemotional goals and maximize positive and minimize negative emotion (Carstensen, Isaacowitz, & Charles, 1999). Empirical support for this view comes in part from cross-sectional studies utilizing proxy measures. For example, studies have found that older individuals in single-subject studies pay more attention to and remember positive stimuli better than negative stimuli (Carstensen et al., 2011; Reed, Chan, & Mikels, 2014). In addition, Stone and colleagues examined changes in self-reported well-being with age, and found that well-being increases over time (Stone, Schwartz, Broderick, & Deaton, 2010). More support comes from cross-sectional self-report studies, such that older adults report lower levels of negative affect and higher levels of positive affect in their daily life (Mroczek & Kolarz, 1998; Stone et al., 2010), as well as during marital interactions (Levenson, Carstensen, & Gottman, 1994). Empirical support also comes from longitudinal, single-subject studies, which show that the ratio of self-reported positive emotional experiences to negative emotional experiences increases with age (Carstensen et al., 2011). Additionally, Sprecher (1999) found that both men and women perceived their self-reported positive feelings (e.g., love) as increasing over a 4-year period (Sprecher, 1999). Studies supporting this view that directly examine objective emotional behaviors are more rare, but in our own cross-sectional work, we have found that compared to middle-aged couples, older couples exhibit less negative emotional behavior (e.g., anger, disgust, whining, belligerence) and higher positive emotional behavior (e.g., affection; Carstensen et al., 1995).

Emotion, Aging, and Gender

A pervasive finding in the literature is that women are more emotionally expressive than men (Brody & Hall, 2000). Specifically, women tend to be more reactive to negative stimuli than men (Germans, Gard, & Kring, 2007) and express more anger, contempt, sadness, whining, and joy than men during conflict conversations (Carstensen et al., 1995). Gutmann

(1987) has proposed that these kinds of sex differences diminish over time, with gender roles "softening" as individuals age. However, in a cross-sectional study conducted in our laboratory, older couples displayed the same gender-related patterns as younger couples, with wives expressing more positive and negative emotional behaviors than their husbands during a conversation, thereby not supporting a softening of gender roles with age (Carstensen et al., 1995). An aim of the present study is to re-examine this notion using longitudinal behavioral data.

Methodological Considerations

As discussed above, existing studies of how emotions change with age are limited in several ways.

Emotions vs. related constructs.

Many studies presented above examined constructs that are related to emotions but did not examine particular emotions (e.g., anger, fear, happiness) or families of emotion (e.g., negative emotions, positive emotions). For example, marital satisfaction data have often been used to understand how trajectories of emotion change with age. Although marital satisfaction is related to emotion (Karney & Bradbury, 1995), it is an imperfect proxy. Both satisfied and dissatisfied couples typically experience and express both positive and negative emotions, and these wax and wane over time (Haase, Seider, Shiota, & Levenson, 2012; Hoppmann, Gerstorf, Willis, & Schaie, 2011; Carstensen et al., 1995). Hence, studies are needed that directly examine emotions.

Self-report versus behavioral measures of emotion.

Existing studies have often relied on self-report measures of emotion (Isaacowitz & Blanchard-Fields, 2012). Although self-report measures provide important insights into individuals' beliefs about their emotional responding, they also have limitations. Individuals are not always able to characterize their own emotional behavior accurately. For example, retrospective self-reports of emotion can show marked dissociations from behavioral measures (Reisenzein, Bördgen, Holtbernd, & Matz, 2006) and from emotional experience measured in the moment (Robinson & Clore, 2002). Further, the interpretation of self-report data may need to be adjusted with different age groups, reflecting age-related changes in how emotions are perceived and recalled (Charles, Mather, & Carstensen, 2003). In contrast, emotional behaviors serve as an overt and visible feature of emotion that is very salient in interpersonal interactions. Thus, objectively examining emotional behaviors may have important advantages over self-report measures for studies of emotion and aging.

Single-subject versus interpersonal designs.

Social relationships are hotbeds of emotion (Carstensen et al., 1999; Keltner & Kring, 1998; Levenson et al., 2013; Shiota, Campos, Keltner, & Hertenstein, 2004). Nonetheless, most laboratory studies of age-related changes in emotion have used designs in which participants respond to experimental stimuli such as films, static images, memories, or scenarios while sitting alone in a room (see Campos, Walle, Dahl, & Main, 2011). Although these stimuli

often have interpersonal content, they are not the same as being engaged with another person in a meaningful interaction.

Cross-sectional versus longitudinal designs.

Finally, most studies of age-related changes in emotion, especially those examining emotions in couples, have utilized cross-sectional designs, examining differences between age groups at a particular point in time (e.g., Carstensen et al., 1995; Levenson et al., 1994). Longitudinal studies using panel designs (e.g., with multiple age groups), which enable disentangling cohort and aging effects (Baltes, 1968), have been rare.

The Present Study

The present study examined how objective emotional behaviors change with age in intimate relationships. The research design addressed the methodological issues discussed above by: (a) directly examining emotional behavior, rather than related constructs, such as marital satisfaction; (b) using an objective measure of emotional behavior, the Specific Affect Coding System (SPAFF; Coan & Gottman, 2007), rather than self-report measures of emotion; (c) assessing emotion in an interpersonal context, specifically during unrehearsed 15-minute conversations of a marital disagreement between spouses in long-term marriages, rather than using a single-subject design; and (d) using a prospective longitudinal panel design in which emotional behaviors were assessed on three waves over 13 years in both middle-aged and older spouses, rather than using a cross-sectional design.

Based on recent research on emotion and aging (e.g., Carstensen, 1995; Mather & Ponzio, 2016), we tested the three models discussed above: (a) total emotional behavior decreases with age; (b) negative emotional behavior increases with age; and (c) positive emotional behavior increases and negative emotion decreases with age. We tested these hypotheses at the level of the couple, the individual spouses, and the dyad (i.e., accounting for interdependence between spouses). To provide a more comprehensive view of emotional changes, we also examined: (a) age-related changes in total speaker behaviors and total listener behaviors; (b) age-related changes in specific speaker emotions (e.g., negative emotions such as anger and sadness; positive emotions such as affection and validation), which reflect a discrete emotions perspective (Kunzmann, Kappes, & Wrosch, 2014) and allowed us to determine whether changes in broader positive and negative emotion categories could be accounted for by changes in particular emotions; and (c) generality of findings across middle-aged and older cohorts and across levels of marital satisfaction.

Method

Ethics Statement

The study was carried out in accordance with adherence to generally accepted practices for experimental research with human subjects. The protocol was approved by the University of California, Berkeley, Committee for Protection of Human Subjects.

Participants

Data were drawn from a study of 156 couples who participated in a longitudinal study of long-term marriages that consisted of three waves of assessment over a 13-year period. For the first wave conducted in 1989, participants comprised a middle-aged cohort (age 40-50), who had been married for at least 15 years, and an older cohort (age 60-70), who had been married for at least 35 years. The sample was recruited from the San Francisco Bay Area, California so that it matched demographic characteristics (socioeconomic status, religion, ethnicity) of long-term marriages in these age groups in this geographic area (determined via a random telephone survey conducted by a survey research company. Recruitment for the present study was conducted by way of advertisements and announcements using a variety of modalities, including newspapers, newsletters of organizations serving older populations, and public service announcements on radio stations. Then, a telephone screening was conducted with over 900 individuals to determine whether they were eligible for the study (example criteria include age and duration of marriage). Eligible and interested responders completed a questionnaire packet that included marital satisfaction questionnaires. From this, couples were recruited for four experimental groups, based on age and marital satisfaction: middle-aged dissatisfied, middle-aged satisfied, older dissatisfied, and older satisfied. The assignments to the satisfied vs. dissatisfied groups were based on cutoffs obtained from mean scores in the random telephone survey. Within each group, couples were recruited with the widest distribution of marital satisfaction scores possible. The resulting sample was primarily Caucasian (86%; 4% Black; 3% Hispanic; 3% Asian; 4% other), Protestant or Catholic (61%), relatively well-off socioeconomically (household income—Mdn = $50,000-$59,999, range = below $10,000-above $100,000; Levenson, Carstensen, & Gottman, 1993), and with children (96% of couples had at least one child). Full details of the original sampling and recruitment procedures have been published previously (Levenson et al., 1993).

For the second wave, conducted in 1995/1996, there were 125 couples (middle-aged couples=62, older couples=63). For the third wave, conducted in 2001/2002, there were 90 couples (middle-aged couples=50, older couples=40; three did not participate in the second wave of assessment). Analyses in the present study were based on the 87 couples who participated in all three waves of assessment.

Reasons for discontinuation of the study included: (a) divorce (wave two: $n = 5$; wave three: $n = 8$); (b) death of a spouse (wave two: $n = 10$; wave three: $n = 25$), or (c) declined/ unknown reasons (wave two: $n = 9$; wave three: $n = 21$). None of the primary study variables (i.e., emotional behaviors) predicted dropout over time, $ps > .05$. Among potential covariates, lower education and older age predicted greater drop-out at waves 2 and 3 respectively, $ps < .05$.

Procedures

At each wave of assessment, couples completed a battery of questionnaires and participated in a laboratory session conducted at the Berkeley Psychophysiology Laboratory. In the laboratory session, couples engaged in three 15-minute unrehearsed conversations using well-established procedures (Levenson et al., 1993; Levenson & Gottman, 1983) on the

following topics: (a) events of the day (wave one) or events since the last assessment (waves two and three); (b) conflict conversation– an issue of ongoing disagreement in their marriage; and (c) pleasant topic– something the couple enjoyed doing together. The specific issue discussed during the conflict conversation was determined by having spouses rate the severity of their disagreement on a number of common marital issues (e.g., communication, finances, children), and collaboratively selecting a topic they both rated highly. In a prior study using Wave 1 data, differences in marital satisfaction by age largely remained stable when controlling for severity of marital problems (see Levenson et al., 1993 for details about conflict topics and their relationship with age and marital satisfaction in the present sample). Both spouses' peripheral physiological responses (e.g., heart rate, pulse transmission time, skin conductance, finger temperature, somatic activity) were monitored continuously during each conversation. Participants returned to the laboratory within several days to watch the videotaped conversations and to rate their own emotions continuously using a rating dial procedure (Gottman & Levenson, 1985). Two partially hidden cameras were used to obtain images of each spouse's head and torso during the interactions. For the final recording, a video special effects generator was used to combine the images from the two cameras. In addition, both visible and computer-readable timing information was added to aid in subsequent behavioral coding (see below). Because of our interest in observable emotional behavior, the present study focused solely on the behavioral coding of the conflict conversations.

Measures

Emotional behavior.—Emotional behavior was captured by observational coding of the 15-minute conflict conversation at all three waves of assessment using the Specific Affect Coding System (SPAFF; Coan & Gottman, 2007). In SPAFF, trained raters view the video recordings of the conversations and code each spouse's emotional behaviors based on a gestalt of verbal content, voice tone, context, facial expressions, gestures, and body movements on a second-by-second basis. SPAFF has eight negative speaker codes (i.e. anger, contempt, disgust, domineering, defensiveness, fear/tension, sadness, whining), five positive speaker codes (i.e. interest, affection, humor, enthusiasm, and validation), a neutral speaker code, and four listener codes (i.e. negative, positive, neutral, and stonewalling). In a dyadic interaction, emotions can occur when an individual is speaking or not speaking, therefore listener codes are utilized to capture the emotional quality of the non-speaking spouse. For our primary analyses, we analyzed speaker and listener composites separately rather than combining them because: (a) the nature of the two types of codes is different (e.g., specific emotions for speaker codes vs. broad categories for listener codes), (b) we were interested in determining whether these two kinds of behaviors (speaker vs. listener) would change in different ways with age, and (c) we sought to follow the procedures typically used in the literature (Jacobson et al., 1994). In an exploratory analysis, however, we did combine the speaker and listener codes.[2] In Wave 1, coding was done by coders trained in Dr. John Gottman's laboratory. In Waves 2 and 3, coding was done by coders

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[2]Exploratory analyses examining combined speaker and listener codes yielded results comparable to our primary analyses, such that both husbands and wives combined negative emotion significantly decreased over time ($M_S = -.010$, $p < .001$ and $M_S = -.008$, $p < .001$, respectively) and combined positive emotion increased over time ($M_S = .004$, $p < .001$ and $M_S = .003$, $p < .01$, respectively). In addition, we conducted further exploratory analyses where we examined changes in the ratio of positive to negative emotion over time.

trained in Dr. Robert Levenson's laboratory. For all three waves, coders were trained to reliability with SPAFF training videos. Twenty percent of conflict conversations were chosen at random and coded independently by two raters to establish reliability. Coding by multiple coders was averaged for use in subsequent analyses. Raters were blind as to our hypotheses and achieved satisfactory levels of reliability (i.e., Wave 1: k=.64 Carstensen et al., 1995); Wave 2: k= .70; Wave 3: k= .82).

Marital Satisfaction.—Marital satisfaction scores were based on two combined measures: the Locke-Wallace Marital Adjustment Test, comprised of 15 items, and the Locke-Williamson Marital Adjustment Inventory, comprised of 22 items (Burgess, Locke, & Thomes, 1971; Locke & Wallace, 1959). The average combined marital satisfaction scores for husbands was 112.18 (SD = 16.86), with a mean of 115.22 (SD = 14.41) for the older cohort and a mean of 109.70 (SD = 18.39) for the middle-aged cohort. The average combined marital satisfaction scores for wives was 112.64 (SD = 16.61), with a mean of 115.50 (SD = 15.86) for the older cohort and a mean of 110.32 (SD = 17.02) for the middle-aged cohort.

Statistical Analyses

All SPAFF data were converted to rates of each code per second. For each SPAFF speaker code for each spouse, the number of seconds in which the code was given were summed and divided by 900 (the number of seconds in the 15-minute interaction). Composite scores for the negative codes (i.e., anger, contempt, disgust, domineering, whining, fear, defensiveness, sadness) and positive SPAFF codes (i.e., affection, validation, enthusiasm, humor, interest) codes were computed to parallel how SPAFF data are typically analyzed in the literature (see Carstensen et al., 1995; Yuan, McCarthy, Holley, & Levenson, 2010).[1]

These composite scores were calculated by summing the total number of seconds across negative speaker codes and dividing this total by total codes for each spouse and following the same procedure for positive speaker codes, negative listener codes (negative and stonewalling) and positive listener codes (positive) In addition to these spousal scores, which were utilized in the individual and dyad level analyses, couple scores were computed by averaging husband and wife composite scores for use in couple-level analyses.

Skewness and kurtosis were acceptable (Kline, 2011) for the composite speaker codes for both husbands and wives and for the positive listener code for wives (skewness ranged from 0.53 to 2.36, kurtosis ranged from 0.13 to 9.15). Skewness and kurtosis were not acceptable for stonewalling/negative listener composites for both spouses, as well as for the positive listener codes for husbands (skewness ranged from 3.00 to 4.06, kurtosis ranged from 10.83 to 24.31). For these variables, results remained stable when repeating the analyses using the asymptotic distribution free function (Browne, 1984).

Results indicated that for wives, this ratio increased over time (M_S = .464, $p < .01$) while there was no significant change over time for husbands (M_S = .407, $p = .483$).

[1]We aggregated across the different emotional behaviors to create positive and negative speaker composite scores, in line with Bollen and Lennox (1991) who argue that the different emotional behaviors can be conceived of as different indicators (e.g., anger, contempt) "causing" an underlying construct (e.g., negative behavior; (Bollen & Lennox, 1991). This approach follows previous literature utilizing SPAFF (e.g., (Carstensen et al., 1995), and is reminiscent of similar approaches in stress or life events research where researchers aggregate across different life stressors (Sarason, Johnson, & Siegel, 1978).

Analytic strategy.—Hypotheses were tested using latent growth curve modeling (LGM), following standard procedures (e.g., Holley et al., 2013; Shaffer, Kim, & Carver, 2016). In LGM, two latent variables are modeled, the intercept and the slope. The intercept indicates the average latent mean of the respective construct (e.g. total speaker positive emotion) at wave one (i.e., the initial level of the behavior). The slope indicates the average age-related latent change in the respective construct (e.g. speaker positive emotion) across waves one, two, and three (i.e., the rate of change in the behavior accounting for wave one levels). To test our primary hypothesis, we examined the slope for both positive and negative emotional speaker behaviors as well as for positive and negative listener behaviors. We identified the appropriate LGM (e.g., linear or nonlinear) for both total positive and negative emotional behaviors following recommendations by Coffman and colleagues (Coffman & Millsap, 2006).

Analyses were conducted using AMOS (version 20; Arbuckle, 2011). To determine appropriate model fit, we utilized the chi-square statistic, which is a measure of absolute fit. This statistic has been recommended for samples with 75-200 cases (Kenny, 2012). LGMs for which the chi-square values were nonsignificant (ps > .05) indicate good model fit. We also utilized the comparative fit index (CFI), for which values above .90 indicate good fit, and the root mean square error of approximation (RMSEA), for which values above .06 indicate good fit and values below .08 or .10 indicate reasonable fit (Browne, Cudeck, & Bollen, 1993; Finch & West, 1997; Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004) . All models were over-identified with at least one degree of freedom (see Table 2).

Note that for most LGMs, slope variances were not significantly different from zero and sometimes negatively estimated. We therefore set them to zero (without loss in model fit) as per common practices (Chen, Bollen, Paxton, Curran, & Kirby, 2001; de Frias, Lövdén, Lindenberger, & Nilsson, 2007). Accordingly, in instances where we set slope variances to zero, we did not include slope covariates.

LGM analyses at the individual spouse, couple, and dyad level.—We tested our hypotheses in three ways to allow for comparisons with our prior research: (a) at the level of the couple, for which emotional behaviors were averaged across spouses to create a single positive emotion score per couple (e.g., Carstensen et al., 1995); (b) at the level of the dyad, for which spouses' emotional behavior variables were kept separate and both spouses' composite variables were included in the same model (Holley et al., 2013); (c) at the level of the individual, for which we conducted analyses for husbands and wives in separate models (Levenson et al., 1993). For the couple-level analyses, we used the SPAFF scores that were averaged across the husband and wife in each couple and examined changes in couples' emotional behaviors using LGM. For the dyad-level analyses, we examined changes in husbands and wives' emotional behaviors using Actor Partner Interdependence Modeling (APIM) within LGM (Olsen & Kenny, 2006) to control for interdependence between spouses. Because husbands and wives in our study represent meaningful, distinguishable groups, we modified the original LGM, which was meant for indistinguishable dyads, by removing equality constraints between spouses. For the individual-level analyses, we examined changes in husbands and wives' emotional behaviors using separate LGM. Results were largely similar across these three approaches. Because the models for the individual-

level analyses yielded the best fit, we present results from the individual-level analyses in the main text (results from the two other approaches are presented in Footnotes 4 and 5).

Analyses of individual SPAFF codes.—We chose to conduct exploratory analyses examining the individuals SPAFF codes, given previous work that has demonstrated that certain emotions (e.g., sadness) may be particularly important in late life (Haase et al., 2012), and hence may not follow the general patterns of decline in negative emotion as a whole. Analyses of specific emotional behaviors may aid in disentangling whether or not these changes in emotional valence (positive vs. negative) are largely accounted for by changes in one or two specific emotions. Because the base rates of individual SPAFF codes were low and skewed, LGM was unsuitable. Thus, for exploratory analyses of specific codes, we used paired dependent t-tests, comparing each SPAFF code at the first versus third waves of assessment.

Moderation by cohort and marital satisfaction.—In follow-up analyses, we examined whether changes in general positive and negative emotional behaviors differed across middle-aged and older cohorts. Following established procedures for multi-group modeling (e.g., Duncan & Duncan, 2004), we tested whether slope means in the LGMs differed across the middle-aged and older groups. We conducted further multi-group analyses to examine whether changes in general negative and positive emotional behaviors differed by couples who reported high marital satisfaction, μ=123.53, STD=4.99, versus low marital satisfaction, μ=100.49, STD=15.38, as delineated by a median split, $t(85)$=9.53, $p<$.001. Although median splits are not typically recommended for continuous measures, they are useful in LGM analyses for testing moderator effects (Byrne, 2010).

Results

In this section, we present preliminary analyses (e.g., correlations between emotional behaviors, baseline differences in emotional behaviors), then examine the three possible models in succession, providing evidence or lack of evidence for each. Within each model we present the three main ways in which we examined the models (speaker behavior, listener behavior, and specific behaviors).

Preliminary Analyses[3]

We examined correlations among emotional behaviors (i.e., total, composite positive and composite negative as well as specific SPAFF codes) at the first wave of assessment for

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[4]LGMs of couples' negative emotional behavior showed reasonable fit, $\chi^2(1) = .262$, $p = .609$. Couples' total negative emotional behavior increased with age, as indicated by a significant negative slope mean, $M_S = -.075$, p = < .001. We also analyzed changes in negative emotional behavior in both husbands and wives within the same model. The LGMs showed suboptimal fit, $\chi^2(11) = 24.49$, $p = .011$; CFI = .901; RMSEA = .119). Results paralleled those found when analyzing each spouse separately. Husbands' total negative emotional behavior decreased with age, as indicated by a negative slope mean, $M_S = -.085$, $p < .001$. Wives' total negative emotional behavior also decreased with age, as indicated by a negative slope mean, $M_S = -.065$, $p < .001$.

[5]LGMs of couples' total positive emotion showed reasonable fit, $\chi^2(1) = .587$, $p = .443$. Couples' total positive emotional behavior increased with age as indicated by a significant positive slope mean, $M_S = .014$, $p = .003$. We also analyzed changes in positive emotional behavior in both husbands and wives within the same model. The LGMs showed suboptimal fit ($\chi^2(11) = 22.361$, $p = .022$; CFI = .93; RMSEA=.110). Results paralleled those found when analyzing each spouse separately. Husbands' total positive emotional behavior increased with age, as indicated by a positive slope mean, $M_S = .015$, $p = .009$. Wives' total positive emotional behavior also increased with age, as indicated by a positive slope mean, $M_S = .013$, $p = .009$.

wives and husbands (see Table 1). Correlations among specific SPAFF codes ranged from small to moderate, highlighting considerable specificity at the level of the individual emotional behaviors. Correlations among total emotion variables showed wide variability; notably, correlations between total emotion and total negative emotions were high (rs > 0.95), while correlations between total emotion and total positive emotions were not significant (rs < −0.14).

Although our hypotheses focused on longitudinal changes in emotional behaviors, we also examined cross-sectional differences in emotional behaviors between middle-aged and older husbands and wives at the first wave of assessment. Note that in our earlier cross-sectional work (Carstensen et al., 1995), we had analyzed differences in emotional behavior between middle-aged and older adults at the couple level. Results (see Carstensen et al., 1995) showed that middle-aged couples showed more interest, humor, anger, disgust, belligerence, and whining behavior and less affection behavior than older couples (there were no differences in listener behaviors). When we repeated these analyses separately for husbands and wives for the present study using t-tests, results generally mirrored these findings. At the first assessment, middle-aged husbands showed more interest, anger, and belligerence than older husbands, whereas middle-aged wives showed more interest, anger, disgust, and belligerence than older wives, ps < .05. In addition, both older husbands and wives showed more fear/tension than middle-aged husbands and wives, respectively, ps < .05. There were no significant differences in total speaker behavior (total, negative, positive) or total listener behavior, all ts<.58, ps>.56).

Test of Model 1: Total Emotional Behavior Decreases with age

To test this model, we examined changes in total emotional behavior (i.e., composite of all positive and negative speaker codes) for husbands and wives using LGM. As detailed below, findings supported model 1. As noted above, total emotional behavior was highly correlated with total negative emotional behavior (rs > 0.95), but not with positive emotional behavior (rs < −0.14). This suggests that analyses examining total emotional behavior are redundant with analyses examining total negative emotional behavior, and may not actually be reflective of changes in total emotion. Hence, the results for this model are presented with the caveat that total emotion and negative emotion may not reflect distinct constructs.

Findings supported an overall decrease in total emotional behavior. Specifically, for husbands, the LGM showed reasonable fit, $\chi^2(1) = .019$, $p = .89$, RMSEA = .000, CFI = 1.000, and indicated that husbands' total emotional behavior decreased with age, $M_s = −.069$, $p < .001$. Similarly, for wives, the LGM showed reasonable fit, $\chi^2(1) = 3.40$, $p = .07$, RMSEA = .170, CFI = .70, and indicated that wives' total emotional behavior decreased with age, $M_s = −.051$, $p < .001$.

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[3]Although our primary analyses focused on examining longitudinal change using dyadic LGM, we conducted a repeated-measures ANOVA (emotion type [positive; negative] × wave [1, 2, 3] × age group [middle-aged; older] × sex [men; women]) as a preliminary analysis. Results indicated a significant interaction between type of emotion and wave ($F(2, 161)=25.86$, $p<.001$), indicating that positive and negative emotion changed in different directions with age. There was no significant interaction between type of emotion and sex and wave ($F(1, 161)=1.07$, $p=.35$), or between type of emotion and age group and wave ($F(1, 161)=1.81$, $p=.17$), indicating that changes in positive and negative emotion generalized across cohort and sex. Nevertheless, we chose to conduct the LGM reported below separately for men and women to facilitate comparisons with prior studies (e.g., (Lavner & Bradbury, 2010).

Test of Model 2: Negative Emotional Behavior Increase with Age

To test this model, we examined changes in negative emotions (i.e., negative speaker behavior, negative listener behavior, specific negative speaker behaviors) for husbands and wives using LGM (*see* Table 2). As detailed below, findings did not support model 2; instead, they demonstrated an overall decrease in negative emotion.

Negative speaker behavior.—We first examined changes in total negative speaker behavior for husbands and wives. For husbands, the LGM showed reasonable fit, $\chi^2(3) = 1.31$, $p = .73$, RMSEA = .000, CFI = 1.000, and indicated that husbands' total negative speaker behavior decreased with age, as indicated by a significant negative slope mean, $M_s = -.084$, $p < .001$ (see Figure 2). LGMs of wives' total negative speaker behavior also showed reasonable fit, $\chi^2(1) = 2.171$, $p = .14$, RMSEA = .117, CFI = .890. Paralleling the findings with husbands, wives' total negative speaker behavior decreased with age, as indicated by a significant negative slope mean, $M_s = -.067$, $p < .001$ (see Figure 2). [4]

Negative listener behavior.—We next examined changes in negative listener behavior for husbands and wives. For husbands, the LGM showed reasonable fit, $\chi^2(2) = 1.4.187$, $p = .12$, RMSEA = .029, CFI = .996. Husbands' negative listener behavior decreased with age, as indicated by a significant negative slope mean, $M_s = -.012$, $p < .001$. For wives, the LGM also showed reasonable fit, $\chi^2(2) = 13.00$, $p < .01$, RMSEA = .000, CFI = 1.000. Paralleling the findings with husbands, wives' negative listener behavior decreased with age, as indicated by a significant negative slope mean, $M_s = -.009$, $p < .001$.

Specific negative speaker behaviors.—Finally, we examined changes in specific negative speaker behaviors for husbands and wives using t-tests between waves one and three. Results showed that, for husbands and wives, belligerence, defensiveness, fear/tension, and whining behavior decreased with age. In addition, husbands' anger and stonewalling behavior and wives' contempt behavior decreased with age. There was one exception to the overall pattern of decreased negative speaker behavior with age; for wives, domineering behavior increased with age. All other specific negative speaker behaviors remained stable (*see* Table 3).

Test of Model 3: Positive Emotional Behaviors Increase and Negative Emotional Behaviors Decrease with Age

To test this model, we examined changes in positive emotions (i.e., positive speaker behavior, positive listener behavior, specific positive speaker behaviors) for husbands and wives using LGM (*see* Table 2). As indicated below, findings supported model 3.

Positive speaker behavior.—We first examined changes in total positive speaker behavior for husbands and wives. For husbands, the LGM showed reasonable fit, $\chi^2(3) = 1.31$, p = .73, RMSEA = .000, CFI = 1.000, and indicated that husbands' total positive speaker behavior increased with age, as indicated by a significant positive slope mean, $M_s = .015$, $p = .006$ (see Figure 3). LGMs of wives' positive speaker behavior also showed reasonable fit, $\chi^2(1) = .342$, $p = .56$, RMSEA = .000, CFI = 1.000. Paralleling the findings

with husbands, wives' total positive emotional behavior increased with age, as indicated by a significant positive slope mean, $M_s = .012$, $p = .014$ (see Figure 3).[5]

Positive listener behavior.—We next examined changes in positive listener behavior for husbands and wives. For husbands, the LGM showed reasonable fit, $\chi^2(3) = 3.85$, $p = .28$, RMSEA = .000, CFI = 1.000. Husbands' positive listener behavior increased with age, as indicated by a significant positive slope mean, $M_s = .010$, $p < .001$. For wives, the LGM also showed reasonable fit, $\chi^2(1) = .003$, p = .96, RMSEA = .000, CFI = 1.000. Paralleling the findings with husbands, wives' positive listener behavior increased with age, as indicated by a significant positive slope mean, $M_s = .006$, $p = .014$.

Specific positive speaker behaviors.—Finally, we examined changes in specific positive speaker behaviors for husbands and wives using t-tests between waves one and three. Results showed that, for husbands and wives, humor, enthusiasm, and validation behavior increased with age. There was one exception to the overall pattern of increased positive speaker behavior with age; for wives, affection behavior decreased with age. All other specific positive speaker behaviors remained stable (see Table 4).

Negative speaker behavior.—As described above, husbands' and wives' total negative speaker behavior decreased with age, as indicated by a significant negative slope means, $M_s = -.084$, $p < .001$ and $M_s = -.067$, $p < .001$, respectively.

Negative listener behavior.—As described above in Model 2, husbands' and wives' negative listener behavior decreased with age, as indicated by significant negative slope means, $M_s = -.012$, $p < .001$ and $M_s = -.009$, $p < .001$, respectively.

Specific negative speaker behaviors.—As described above, for husbands and wives, belligerence, defensiveness, fear/tension, and whining behavior decreased with age. For husbands, anger and stonewalling behaviors decreased, and for wives, contempt behavior decreased with age.

Follow-up Analyses

To determine whether mean changes in emotional behavior generalized across age and marital satisfaction, we conducted multi-group analyses. Specifically, we examined whether slope means for emotional behaviors differed across middle-aged vs. older adults and across high vs. low levels of marital satisfaction (using a median split). All multi-group analyses revealed that mean changes in emotional behaviors generalized across cohorts and marital satisfaction levels, all $\chi^2(2) < 1.707$, $ps > .191$.

Discussion

Using data from a 13-year longitudinal study of middle-aged and older long-term married couples, we tested three competing models of emotional aging: (a) total emotion decreases with age; (b) negative emotion increases with age; and (c) positive emotion increases and negative emotion decreases with age. Emotional behavior was assessed during a discussion

of marital conflict and objectively coded on a second-by-second basis using the Specific Affect Coding System.

At first glance, our results provided support for Model 1, with an overall decrease of total emotional behavior with age. It is important to note, however, that these results come with a caveat: total emotional behavior and total negative emotional behavior were highly correlated, thus may represent indistinct constructs. In fact, when we analyzed negative and positive emotional behaviors separately, a different picture emerged. Specifically, we found that negative emotional behaviors decreased and positive emotional behaviors increased with age, which supported Model 3 and provided no support for Model 2. This pattern of decreasing negative and increasing positive emotional behaviors was quite robust, generalizing across husbands and wives, speaker and listener behaviors, middle-aged and older couples, and low and high levels of marital satisfaction. Follow-up analyses of specific emotional behaviors revealed that husbands' and wives' belligerence, defensiveness, and whining behavior (as well as husbands' anger and stonewalling behavior) decreased, whereas husbands' and wives' humor, enthusiasm, and validation behavior increased with age. There were two exceptions to the overall trends of positive emotional behaviors increasing and negative emotional behaviors decreasing: wives' domineering increased and wives' affection decreased with age. These findings provide some of the first longitudinal, behavioral evidence for the pattern of changes in emotion that occur in married couples with age. Moreover, they add important insights regarding the specificity of emotional changes with age.

Support for Theories of Emotional Aging in Intimate Relationships

There are good reasons to assume that couples' emotional functioning might deteriorate with age. Numerous aspects of functioning, such as health and cognition, clearly decline with age (Park & Bischof, 2013; Rowe & Kahn, 1997; Verhaeghen & Salthouse, 1997). In the present study, we did indeed find a decrease in total emotional behavior with age – seemingly supporting earlier views of increasing emotional flatness over time (Cumming & Henry, 1961; Jung, 1933; Looft, 1972).

However, in contrast to theories that predict increases in negative emotion such as the "honeymoon-is-over" effect (Kurdek, 1998), we found that negative emotional behaviors actually decreased with age, regardless of gender, cohort, and marital satisfaction. Although this decline in negative emotional behaviors seemed to support the view that emotion declines in late life, this was offset by increases in positive emotional behaviors with age (although our findings suggest that negative emotions decline more sharply than positive emotions increase, hence the finding that total levels of emotional behaviors declined with age).

We found evidence for an age-related increase in spouses' positive emotional behaviors. This finding, in conjunction with results demonstrating decreases in negative emotion with age, is consistent with Socioemotional Selectivity Theory (SST; Carstensen et al., 1999), which posits that aging individuals prioritize intimate relationships and emotional well-being. This in turn leads older individuals to maximize positive emotions and minimize negative emotions with their spouses. Although previous research supporting this theory has

often focused on aging adults' attentional and memory processes (e.g., Reed et al., 2014) in single-subject designs, our findings lend support in the emotional domain, extending Carstensen and colleagues (2011) findings within an interpersonal context. Furthermore, this study extends previous cross-sectional research examining differences in positive and negative emotion by age (Carstensen et al., 1995; Levenson et al., 1994), by utilizing a longitudinal design.

Our findings that positive emotional behaviors increase and negative emotional behaviors decrease over time support prior research demonstrating changes in emotion regulation. For example, Shiota and Levenson (2009)'s finding that emotion regulation by positive reappraisal improves with age provides a potential clue as to why positive emotion increases with age (Shiota & Levenson, 2009). Relatedly, research on conflict strategies and disagreements suggests that older couples tend to focus more on coping strategies indicative of positively appraising conflicts (Blanchard-Fields, Stein, & Watson, 2004; Diehl, Coyle, & Labouvie-Vief, 1996). This is also consistent with the age-related increases in positive emotional behaviors that were identified in the present study.

Our findings are important in the context of a wealth of research demonstrating links between emotion expressed in marriage and various outcomes, such as marital satisfaction and dissolution. Our findings of decreases in negative and increases in positive emotional behavior with age may seem in contrast with studies that have found decreases in relationship satisfaction over time (Cowan & Cowan, 2014; Finkel et al., 2013). It is possible that these opposing trends are due to a weakening in the link between emotional behavior and relationship satisfaction with age, but we also note that the question of how relationship satisfaction changes with age is far from settled with a number of longitudinal studies (Braun et al., 2018; Gorchoff et al., 2008) reporting increases in relationship satisfaction with age. How relationship satisfaction changes with age (and what might explain the different trajectories found) is an important question for further research.[6]

These findings also shed light on one of the great paradoxes of late life, where, despite experiencing inevitable losses (e.g., death of friends and family), older individuals are relatively happy and experience low rates of depression and anxiety (e.g., Henderson et al., 1998). Some of this may result from individuals who age within the context of stable marriages, which have been shown to be beneficial for mental health (Schone & Weinick, 1998; Wood, Avellar, & Goesling, 2007) , and which, as suggested by the present findings,

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[6]While the present study focused on documenting mean-level changes in emotional behaviors across time, we were curious about factors that could affect changes in individual couples' emotional behaviors over time (rather than mean-level trends). From the perspective of Socioemotional Selectivity Theory (Carstensen, 1995), one would expect age-related increases in the prioritization of close relationships (e.g., relationships with children, length of marriage) and emotional well-being to drive the changes in emotional behaviors we observed. From the perspective of Social Investment Theory (Bleidorn et al., 2013; Roberts, Wood, & Smith, 2005), one might expect having children or prolonged investment in one's marriage to drive these changes. To examine whether the number of children and length of marriage accounted for individual differences in age-related changes in emotional behaviors, we included these covariate as predictors of the emotional behavior slopes in our LGMs. Nonsignificant slopes indicate that controlling for number of children and length of marriage accounted for the significant change in slope for negative and positive emotional behavior. Number of children predicted age-related decreases in negative emotional behaviors for wives ($b = -0.03$; $p = .19$) but not husbands ($b = -0.07$; $p < .001$) and predicted increases in positive emotional behaviors for husbands ($b = 0.01$; $p = .18$) and wives ($b = 0.01$; $p = .26$). Length of marriage predicted age-related decreases in negative emotional behaviors for wives ($b = -0.03$; $p = .31$) but not husbands ($b = -0.09$; $p < .001$) and predicted changes in positive emotional behaviors for neither husbands ($b = 0.01$; $p = .22$) nor wives ($b = 0.01$; $p = .48$). These findings suggest that there are important factors to consider when examining individual-level changes in emotional behavior over time, and provides interesting avenues for future studies.

become more emotionally positive and less emotionally negative with age. Hence, despite difficulties, challenges, and losses that occur in late life, the positive emotion changes that come with age within committed relationships may be a protective factor or counterbalance for negative experiences.

Specific Emotional Behaviors

The present study found that, overall, negative emotional behaviors decreased over time. At the level of specific emotions we found decreases in belligerence (in husbands and wives), anger (in husbands), and contempt (in wives), replicating previous work showing that anger and related hostile behaviors decrease with age (Kunzmann et al., 2014; Mather & Ponzio, 2016). Moreover, we observed decreases in defensiveness and whining (in husbands and wives) and stonewalling (in husbands). These changes are interesting as contempt, defensiveness, and stonewalling appear to be particularly toxic for marital adjustment (Gottman & Gottman, 2017). Moreover, anger and stonewalling have been shown to be detrimental for physical health (Haase, Holley, Bloch, Verstaen, & Levenson, 2016). Taken together, these findings suggest that, with age, couples may decrease specifically those negative behaviors that are particularly maladaptive. Another notable decrease was found for fear/tension behavior (in husbands and wives), contradicting the idea that proximity to death increases anxiety (Becker, 1997) and converging with other findings of lower anxiety in older adults (Teachman & Gordon, 2009). Although lack of statistical power may be a factor in these analyses, we also note that some negative emotional behaviors were spared from age-related decline, with sadness as a notable example. Others have alluded to the possibility that there may be exceptions to the general patterns of increasing positivity and decreasing negativity (Scheibe & Carstensen, 2010), citing sadness as a prime example. In fact, previous work including our own (Haase et al., 2012; Seider, Shiota, Whalen, & Levenson, 2011) has shown that sadness remains stable or even increases with age, serving adaptive functions as a response to loss in late life (Haase et al., 2012).

For positive emotional behaviors, results indicated an overall increase with age. Specifically, we found increases in husbands and wives' humor, enthusiasm, and validation behavior, whereas affection behavior remained stable (for husbands) or decreased (for wives). These emotional behaviors and their different trajectories offer support for the idea of love evolving as adults age. Hatfield and Walster (1985) propose that the beginning stages of a relationship are marked by passionate love, whereas adults who have been married for longer periods of time experience a shift toward companionate love. Humor, characterized by good-natured teasing, jokes, and silliness, and validation, characterized by the expression of understanding and active listening behavior, could be argued to be an expression of companionate love, whereas affection, characterized by caring statements and compliments, could represent a form of passionate love. When interpreting the age-related increase in enthusiasm behavior, it is important to consider that this behavior (formerly labeled "joy") is coded during "joyful moments" and "will often be accompanied by broad, warm smiles" (Coan & Gottman, 2007). This suggests that this behavior may also represent a more companionate than passionate form of love.

Generalizability across Gender, Cohort, and Marital Satisfaction

We took care to evaluate the generalizability of our findings across gender, cohort, and marital satisfaction. As a caveat, it is important to note that the present study did not examine the cross-spouse effects of emotional behaviors over time, hence we cannot determine whether these changes are due to actor-partner effects. However, even within these limitations, we found that most of our findings generalized across husbands and wives, but with some interesting exceptions. Some of the changes in negative behaviors were specific to husbands (e.g., decreases in anger and stonewalling) or wives (e.g., decreases in contempt), but overall displayed similar trends. However, in contrast to the overall trend of decreases in negative behaviors, wives' domineering behavior increased with age. It is tempting to speculate this increase may reflect some of the broader social changes towards rising feminism and greater gender equality (Bolzendahl & Myers, 2004; Brewster & Padavic, 2000; Thornton & Young-DeMarco, 2001) but it may also reflect changes in roles and responsibilities between men and women that come with age and age-related events such as retirement.

In terms of cohort differences, a key finding was that all age-related changes in emotional behaviors generalized across middle-aged and older adults, emphasizing that these are generalizable developmental trajectories across the second half of the adult life span. Moreover, several findings from the cohort comparisons at the first wave of assessment converged with the longitudinal findings (i.e., lower levels/decreases in anger, belligerence, and whining [(Carstensen et al., 1995)] with age), again emphasizing the generalizability of these developmental trajectories. However, not all cohort differences converged with the longitudinal findings, emphasizing the power of our two-cohort longitudinal panel design to (at least partly) disentangle age and cohort effects. Specifically, the middle-aged cohort showed more interest, humor, and affection and less fear/tension than the older cohort at the first assessment wave (in contrast to the longitudinal results, which demonstrated that some of these did change with age)– reflecting perhaps an overall more positive and less anxious emotional outlook in the middle-aged cohort (who were born during or after WWII and thus were for the most part "Baby Boomers") compared to the older cohort (who were "Children of the Great Depression"; Elder, 1974). Finally, and again highlighting the generalizability of the longitudinal changes, all findings generalized across levels of low vs. high marital satisfaction.

Strengths and Limitations

The present study had several strengths and limitations. Strengths included (a) examining emotional behavior rather than related constructs, such as marital satisfaction; (b) using an objective behavioral measure rather than self-report measures of emotion; (c) assessing emotion in an interpersonal context, rather than a single-subject design; (d) using a prospective longitudinal panel design, rather than a cross-sectional design; and (e) using a sample that was carefully recruited to be representative of Bay Area long-term married couples in terms of socioeconomic status, religion, and ethnicity, which may not generalize to all parts of the country.

The study also had several limitations. We focused on mean-level changes in emotional behaviors (i.e., slope means across all couples), hence our findings do not provide evidence for deviations from these general trajectories that may be found in individual couples. It is important to note, therefore, that the absence of evidence (i.e., of significant slope variances), does not necessarily denote the lack of an effect. Similarly, a larger sample size would have provided greater statistical power for our analyses of changes in individual emotional behaviors and multi-group analyses; hence, null findings for these analyses should be interpreted with some caution. Having said this, we should note that our findings remained stable when we repeated our analyses using the entire original sample of 156 couples and using full information maximum likelihood estimation to account for missing data (see Footnote 7).

Another important limitation of the present study was that, although the sample was recruited to be representative of Bay Area long-term married couples and is not intended to be representative of couples in all age groups nationwide, it is unknown whether the findings are generalizable to other kinds of couples, such as same-sex couples, non-married couples, couples outside of the Bay Area, and help-seeking couples. Further, the Bay Area sample may not be generalizable due to diversity, education, and SES characteristics (e.g., the mean salary across all couples was $50-60,000 per year; average education was 4 years of college). In addition to possible limitations generalizing to a wider population outside of the Bay Area, there may be important limitations in terms of selection effects of the sample. Notably, the middle-aged couples had a higher dropout rate due to divorce than the older couples; in contrast, the older couples had a higher rate of dropout due to the death of one or both spouses. Despite these age differences in dropout for divorce vs. widowhood, our findings held regardless of whether we included couples who participated in all waves of data collection (as in the main analyses) or also included couples who dropped out (accounting for missing data using appropriate statistical techniques). This suggests that the observed changes were indeed due to aging and not a result of selective attrition.

We should note that our findings are based on a sample of couples who are relatively older (i.e., no younger couples were included), married for a significantly greater number of years, and more satisfied than the general population. Relatedly, our focus on couples who married early in life and were in long-term marriages meant that age and duration of marriage were confounded. Disentangling these factors would benefit from samples that included couples who married later in life (both first marriages and remarriages) as well.

Finally, it is important to note that our study relies exclusively on objectively-coded data. This parallels our argument that utilizing a single measure (i.e., focusing solely on self-report) has been a limitation of previous studies. Nonetheless, we consider behavioral data to be particularly important in the context of a social situation (i.e., conflict conversation) due to its highly communicative nature. We therefore would argue that emotional behavior provides a particularly important starting point for examining changes over time in couple

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[7]When we conducted analyses using the full sample of 156 couples, using the full information maximum likelihood estimation to account for missing data, results were comparable to the smaller, more conservative sample (negative emotional behaviors for husbands and wives: b > −.094, $p < .001$; positive emotional behaviors for husbands and wives, b > .017, $p < .001$).

interactions. Examining data longitudinally using multiple streams of data (i.e., self-report, physiology) would provide an even broader perspective of emotional changes over time, which suggests an important direction for future research.

Future Directions

As mentioned above, we focused on objective emotional behavior. However, it is also important to determine how other aspects of emotion change with age. Previous research has found cross-sectional differences in the experience of positive emotion during mutual reminiscing (Pasupathi & Carstensen, 2003) and during a conflict conversation (Levenson et al., 1994), where older adults report higher levels of positive emotion. Research examining the changes in the experience of negative emotion demonstrates that older adults report less frequent negative affect in their daily lives, as captured by experience sampling methodologies (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000). Future studies that examine changes in the subjective experience of both positive and negative emotion using a longitudinal design (rather than cross-sectional) and within interpersonal contexts (rather than within the individual) would be extremely valuable. Longitudinal studies examining changes in physiological responding during significant social interactions would similarly be highly informative, especially as they provide links to changing trajectories of health (Haase et al., 2016).

In addition, future studies should seek to determine how partner effects in behavior exchanges within dyads change over time, or perhaps may even predict change over time. The present study focused on examining changes in emotional behavior during a marital interaction over time within the individual. Research that seeks to examine how one partner's possible emotional behavior, for example, is related to the other partner's positive emotional behavior both within the same wave and at future waves would contribute to a richer understanding of the reciprocal emotional changes that occur in dyads over time.

Finally, it would be interesting to conduct studies designed to help disentangle age from length of relationship from life stage. For example, future studies should examine how changes in emotion over time may differ for couples at various life stages, for example by comparing young married couples with older recently married couples.

Conclusion

This study expands on previous research examining changes in emotional behavior with age, utilizing objectively coded emotional behavior, a longitudinal panel design, a sample recruited to be demographically representative of the region, and an interpersonal context. The aging literature has posited three main models of aging: (a) emotions decline with age as a whole, (b) negative emotions increase with age, and (c) positive emotions increase and negative emotions decrease with age. The present study provided some support for the first model, but the strongest support was provided for the third model, such that that in the context of long-term marriages, positive emotional behaviors increase and negative emotional behaviors decrease with age. Finally, these findings underscore the importance of intimate relationships as individuals age. These relationships can provide a context for

increases in positive emotion and decreases in negative emotion, which may help explain the many health benefits associated with marriage.

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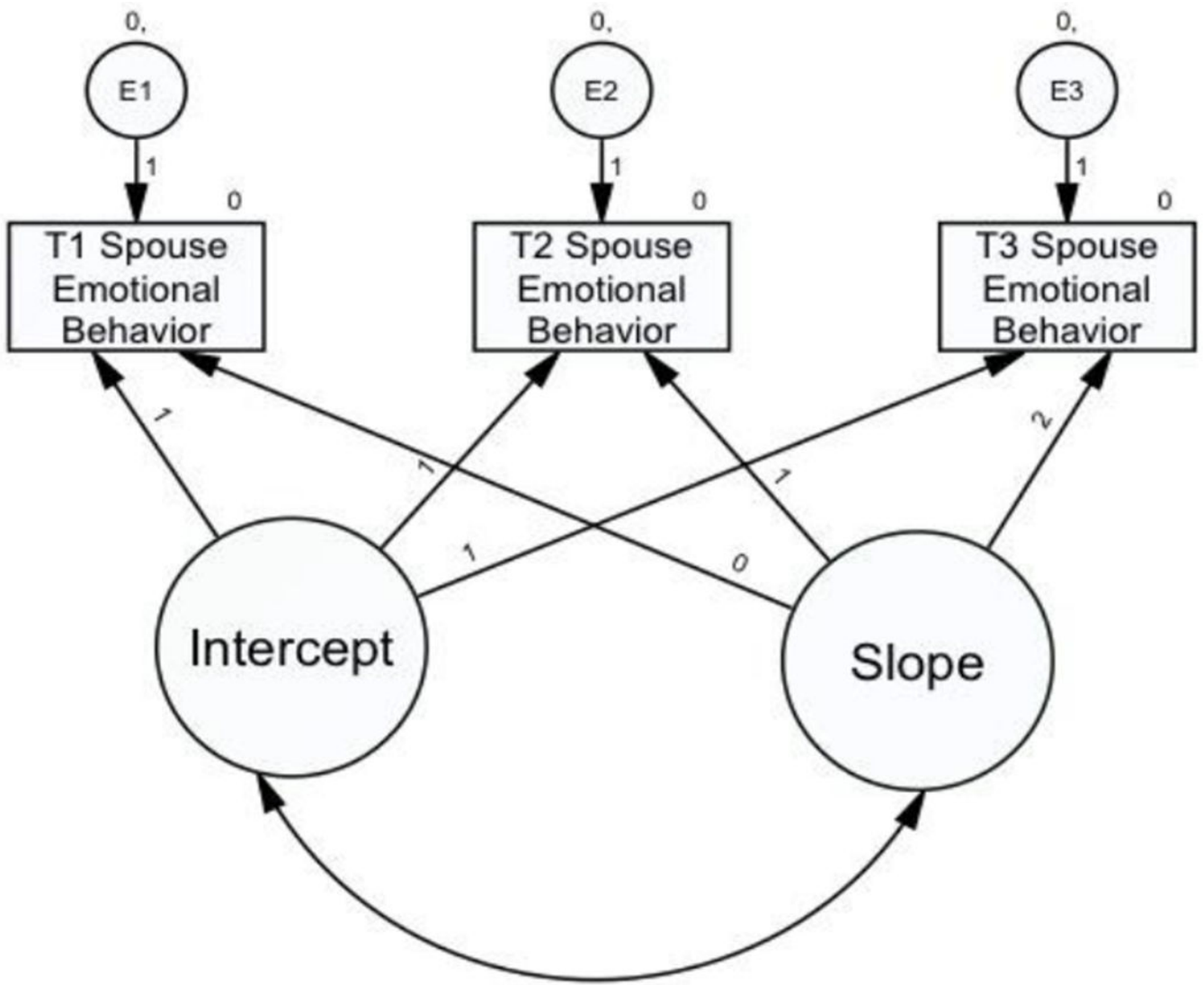**Figure 1.**
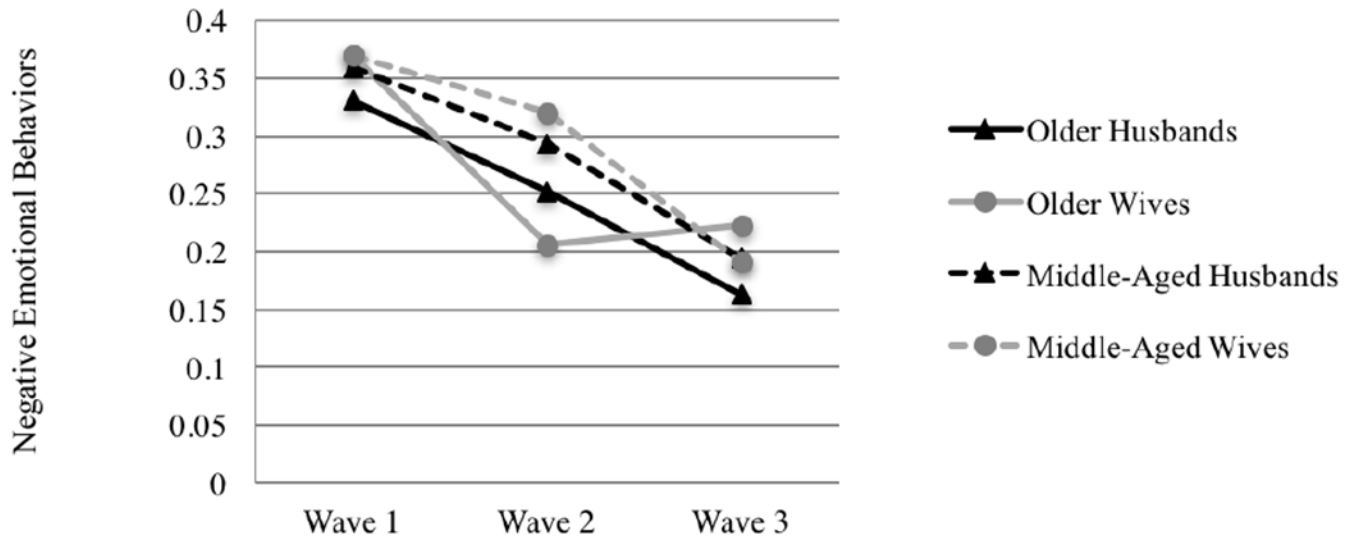Example of an Individual LGM: Spouse's Emotional Behavior

Figure 2.
Middle-Aged and Older Husbands and Wives' Total Negative Emotional Behavior
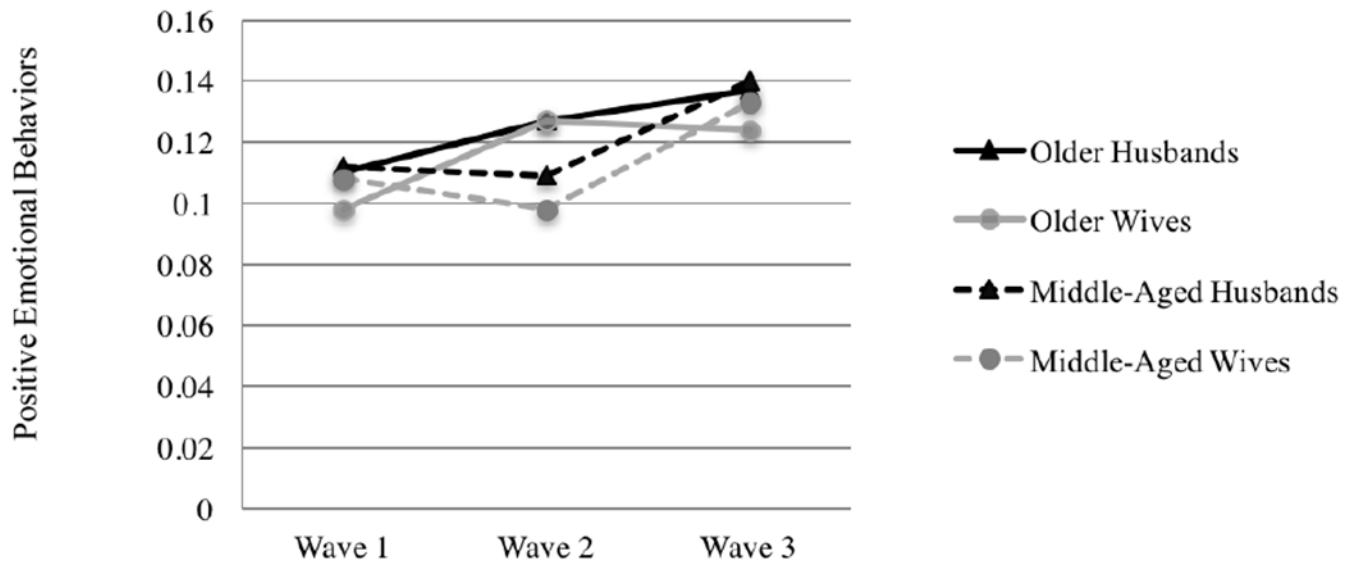
Figure 3.
Middle-Aged and Older Husbands and Wives' Total Positive Emotional Behavior

Table 1

Intercorrelations between key variables for spouses

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
1. Total Emotion	**.52****	−.09	−.03	−.13	−.03	−.07	−.02	.95**	.66**	.33**	.48**	.50**	−.05	.27	.46**	.44**	.09	.24*
2. Total Positive	−.14	**.53****	.63**	.61**	.32**	.29**	.66**	−.41**	−.34**	−.15	−.26*	−.22*	.07	−.12	−.06	−.21	−.15	−.19
3. Affection	−.02	.66**	**.32****	.22*	−.01	.25*	.16	−.23*	−.27*	−.21	−.09	−.17	.08	.08	.01	−.04	−.16	−.13
4. Humor	−.22*	.47**	.12	**.92****	−.02	.15	.03	−.32**	−.20	−.04	−.17	−.21	.01	−.11	−.16	−.17	−.13	.11
5. Interest	−.05	.39**	.07	.26*	**.17**	.08	.23*	−.13	−.12	.14	−.14	.07	.03	−.12	−.12	−.09	.02	.02
6. Enthusiasm[a]	na	.na	.na	na	na	**na**	.11	−.16	−.04	−.10	−.06	−.16	.23*	−.09	−.13	.07	−.06	.01
7. Validation	−.05	.66**	.11	−.09	.21	na	**.31****	−.22*	−.18	−.12	−.20	−.20	−.09	−.13	.06	−.18	−.04	−.17
8. Total Negative	.92**	−.52**	−.28*	−.38**	.20	na	−.30**	**.51****	−.71**	.35**	.53**	.53**	−.05	.29**	.45**	.47**	.13	.25*
9. Anger	.49**	−.27*	−.16	−.21	−.09	na	−.14	−.53**	**.43****	.24*	.25*	.22*	−.10	.09	.04	.26*	.04	.20
10. Belligerence	.38**	−.23*	−.20	−.04	−.09	na	−.20	.42**	.26*	**.52****	.17	.27**	.20	.03	−.17	.02	.12	.03
11. Contempt	.50**	−.24*	−.16	−.01	−.16	na	−.15	.52**	.35*	.55**	**.03**	.27*	−.07	.25**	−.13	.12	.28**	.21*
12. Defensiveness	.48**	−.37**	−.19	−.28**	−.18	na	−.22*	.57**	.14	.27*	.24*	**.27***	.05	−.08	.08	.20	.06	.02
13. Disgust	.05	−.17	−.11	−.08	−.04	na	−.13	.12	−.03	.24*	.12	−.04	**.49****	−.03	−.18	.08	.17	.04
14. Domineering	.36**	−.16	−.06	−.12	−.09	na	−.11	.38**	−.06	−.07	.10	−.02	.1	**.00**	−.06	−.04	.00	.10
15. Fear	.50**	−.23*	−.13	−.25*	−.05	na	−.09	.53**	.10	−.14	.07	.23*	−.16	−.08	**.34****	.20	−.12	−.08
16. Sadness	.36**	−.16	−.05	−.14	−.05	na	−.10	.37**	.22*	.18	.29**	.11	.03	−.04	.14	**.03**	.11	−.08
17. Stonewalling	.24*	−.21	−.10	−.16	−.07	na	−.14	.30**	.18	.08	.23*	−.07	.41**	.19	−.17	.06	**.26***	−.07
18. Whining	.17	−.02	−.04	.17	−.01	na	−.11	.15	−.02	.08	.08	.08	.01	.07	.23*	.13	−.07	**.33****

Note. Husbands' correlations are below the diagonal; wives' correlations are above the diagonal; correlations between husbands and wives are on the diagonal in bold. N=87

[a]No correlations available because of low base rate.

*
 $p < .05$.

**
 $p < .01$

Table 2.

Husbands and Wives Total, Positive, and Negative Behaviors Over Time: Dyadic Latent Growth Curve Models (N=87)

	Model Fit	Intercept		Slope		Slope Loadings (*M*)		
	χ^2 (*df*), *p*	*M*	σ^2	*M*	σ^2	T1	T2	T3
Husbands								
Total Emotion [a,b]	.019 (1), *p*=.89	.457***	.013	−.069***	.001	.000	.156	.397
Positive Speaker [a,b,c]	1.31 (3), *p*=.73	.107***	.004***	.015**				
Positive Listener [a,b,c]	3.85 (3), *p*=.28	.036***	.001***	.010***				
Negative Speaker [a,b]	.211 (2), *p*=.65	.349***	.029*	−.084***	.002	.000	.187	.529
Negative Listener [a,b]	4.187 (2), *p*=.12	.049***	.003***	−.012***	.001***	.000	.387	1.462
Wives								
Total Emotion [a,b]	3.40 (1), *p*=.07	.459***	.021*	−.051***	.008	.000	.447	1.018
Positive Speaker [a,b]	.342 (1), *p*=.56	.103***	.005**	.012*	.001	.000	.357	.857
Positive Listener [a,b]	.003 (1), *p*=.96	.041***	.002***	.006*	.000*	.000	.385	.876
Negative Speaker [a,b]	2.17 (1), *p*=.14	.361***	.034**	−.067***	.010	.000	.433	1.054
Negative Listener [a,b]	13.00 (2), *p*<.01	.042***	.002***	−.009***	.001***	.000	.471	1.602

Note. Results for total emotion, positive emotion, and negative emotion are based on a series of dyadic latent growth curve models conducted for husbands and wives separately. Error variances ranged from nonsignificant to significant.

[a] Linear LGM with slope loadings set to [0;1;2].

[b] Residual variances set equal across time.

[c] Slope Variances set to [0].

* $p < .05$.

** $p < .01$.

*** $p < .001$

Table 3

Husbands' and Wives' Negative Emotional Behavior at Wave 1, Wave 2, Wave 3

	$M(SD)$			Waves 1-3
	Wave 1	Wave 2	Wave 3	$t\,(\mathrm{df}=85)$
Husbands				
Total	.346 (.245)	.275 (.234)	.180 (.166)	−6.63[***]
Anger	.046 (.078)	.070 (.096)	.029 (.050)	−2.21[*]
Belligerence	.025 (.035)	.007 (.021)	.010 (.015)	−4.52[***]
Contempt	.022 (.031)	.013 (.034)	.013 (.044)	−1.92
Defensiveness	.084 (.085)	.078 (.078)	.039 (.046)	−4.70[***]
Disgust	.002 (.006)	.001 (.003)	.001 (.004)	−0.60
Domineering	.029 (.096)	.020 (.051)	.038 (.071)	.093
Fear/tension	.107 (.113)	.058 (.090)	.033 (.055)	−5.38[***]
Sadness	.016 (.035)	.014 (.042)	.011 (.023)	−1.32
Stonewalling	.012 (.047)	.014 (.054)	.005 (.025)	−2.01[*]
Whining	.004 (.007)	.000 (.001)	.001 (.005)	−3.23[**]
Wives				
Total	.370 (.245)	.268 (.229)	.234 (.189)	−4.38[***]
Anger	.079 (.112)	.117 (.153)	.071 (.100)	−0.65
Belligerence	.030 (.040)	.004 (.009)	.012 (.027)	−3.85[***]
Contempt	.030 (.047)	.011 (.025)	.015 (.027)	−2.76[**]
Defensiveness	.074 (.076)	.047 (.055)	.033 (.039)	−5.13[***]
Disgust	.002 (.005)	.001 (.004)	.001 (.003)	−1.72
Domineering	.024 (.059)	.010 (.027)	.047 (.064)	2.50[*]
Fear/tension	.094 (.099)	.041 (.052)	.025 (.044)	−6.07[***]
Sadness	.022 (.041)	.032 (.076)	.024 (.037)	.036
Stonewalling	.003 (.013)	.002 (.012)	.002 (.012)	−0.76
Whining	.013 (.021)	.002 (.004)	.004 (.011)	−3.80[***]

Notes. Means and standard deviations based on couples that participated in all three waves.

[*]
$p < .05$.

[**]
$p < .01$.

[***]
p .001

Table 4

Husbands' and Wives' Positive Emotional Behavior at Wave 1, Wave 2, Wave 3

	M(SD)			Waves 1-3
	Wave 1	Wave 2	Wave 3	t (df = 85)
Husbands				
Total	.110 (.098)	.117 (.102)	.139 (.100)	2.78 **
Affection	.024 (.052)	.012 (.023)	.014 (.027)	−1.75
Humor	.037 (.041)	.034 (.053)	.048 (.051)	2.41 *
Interest	.004 (.010)	.003 (.009)	.005 (.012)	0.89
Enthusiasm	.000 (.000)	.002 (.005)	.006 (.012)	4.98 ***
Validation	.045 (.060)	.067 (.060)	.066 (.053)	3.41 **
Wives				
Total	.104 (.078)	.111 (.089)	.129 (.074)	2.57 *
Affection	.026 (.034)	.013 (.024)	.014 (.023)	−2.60 *
Humor	.037 (.039)	.033 (.039)	.048 (.050)	2.03 *
Interest	.005 (.016)	.003 (.009)	.006 (.012)	0.27
Enthusiasm	.001 (.003)	.003 (.011)	.008 (.013)	4.81 ***
Validation	.035 (.041)	.059 (.059)	.053 (.041)	3.28 **

Notes. Means and standard deviations based on couples that participated in all three waves.

*
$p < .05$.

**
$p < .01$.

***
p .001