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Anger and Sadness in Response to an Emotionally-Neutral Film: Evidence for Age-Specific Associations with Well-Being

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Abstract

When the association between emotion and well-being is being considered, positive emotions usually come to mind. However, negative emotions serve important adaptive functions and particular negative emotions may be especially adaptive at different stages of adult development. We examined the associations between self-reported negative emotions in response to an emotionally-neutral, thematically-ambiguous film and subjective well-being among 76 young (age 20–29), 73 middle-aged (age 40–49), and 73 older (age 60–69) adults. Results indicated that higher self-reported anger in response to the film was associated with higher well-being for middle-aged adults, but not for young and older adults. Higher self-reported sadness in response to the film was associated with higher well-being for older adults, but not for young and middle-aged adults. These findings were stronger for cognitive well-being (i.e., satisfaction with life) than for affective well-being (i.e., ratio of positive to negative affect) and were specific to these emotions (not found for self-reported disgust or fear) and to the emotionally-neutral film (not found for sad or disgusting films). Results are discussed in terms of the functions that anger and sadness are thought to serve and the control opportunities afforded in midlife and late life that render these functions differentially adaptive.

Keywords

Emotional reactivity; anger; sadness; well-being; life-span development

In both popular lore and scholarly work (e.g., Larsen, 2000), negative emotions are typically considered undesirable. For example, when asked to rate their ideal affect, individuals in the United States and Hong Kong report low preference for negative emotions and high preference for positive emotions (Tsai, Knutson, & Fung, 2006). Consist with this, most attempts at regulating our emotions aim to minimize negative emotion (Gross & Thompson, 2007) and a central goal in many forms of psychotherapy is reducing negative emotion (Campbell-Sills & Barlow, 2007). These examples are consistent with research showing that excess amounts of negative emotion have untoward consequences for long-term well-being

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and health (e.g., Carstensen, Gottman, & Levenson, 1995; Gotlib & Hammen, 2009; Potegal, Stemmler, & Spielberger, 2010).

These observations notwithstanding, functionalist and evolutionary views of emotion hold that *all* emotions—both positive and negative—are adaptive in particular contexts (Averill et al., 1994; Darwin, 1872; Lazarus, 1991; Levenson, 1999). Extrapolating from this functionalist view, a life without negative emotion would be impoverished, unhappy, and short. Anger helps us retain that which is ours; sadness helps us adapt to irrevocable loss and recruit help from others.

In the present study we explored the hypothesis that experiencing these two negative emotions (anger and sadness) in response to an emotionally-neutral, thematically-ambiguous film stimulus would be positively associated with well-being. Moreover, because different control opportunities, challenges, and goals typify different stages of the lifespan (e.g., Erikson, 1959), we predicted that these associations with well-being would differ as a function of age.

Anger and Sadness: Age-Specific Associations with Well-Being?

Subjective well-being is central to adaptive development (Diener, 2000; Kahneman, Diener, & Schwarz, 1999) and predicts positive outcomes in many life domains (Fredrickson & Losada, 2005; Lyubomirsky, King, & Diener, 2005). The present study focuses on two aspects of well-being: (a) satisfaction with life (a cognitive aspect of well-being) and (b) the ratio of dispositional positive to negative affect (an affective aspect of well-being). Cognitive and affective aspects of well-being have been widely studied in research on aging (Gerstorf, Ram, Mayraz, Hidajat, Lindenberger, Wagner, & Schupp, 2010) and well-being (Fredrickson & Losada, 2005; Kahneman et al., 1999). Although cognitive and affective aspects of well-being are clearly related, they are distinct theoretical constructs (Kahneman et al., 1999), and there is empirical evidence for discriminant validity (Lucas, Diener, & Suh, 1996) and differences in their trajectories across the life span (Stone, Schwartz, Broderick, & Deaton, 2010).

The typically postulated association between emotions and well-being (cf. Kahneman et al., 1999) supports the hypothesis that individuals who respond with negative emotions to laboratory stimuli should also experience lower subjective well-being in their daily lives. However, in our research, we examined an alternative hypothesis, namely, that an inclination toward responding with certain negative emotions at particular stages of adult development can be positively associated with well-being.

Functionalist views of anger and sadness

Emotions can be defined as “short-lived psychological-physiological phenomena that represent efficient modes of adaptation to changing environmental demands.” (Levenson, 1999, p. 481). Functionalist and evolutionary views hold that all emotions—both positive and negative—are useful, having evolved to facilitate adaptive behavioral responses to prototypical, fitness-relevant threats and opportunities (e.g., Averill et al., 1994; Darwin, 1872; Keltner, Haidt, & Shiota, 2006; Levenson, 1999; Nesse, 2000; Tooby & Cosmides, 2008). Anger and sadness are negative emotions that serve distinct functions (Darwin, 1872)[1]; research suggests that individuals seek to experience these emotions when they deem them useful (Hackenbracht & Tamir, 2010; Tamir, Mitchell, & Gross, 2008).

[1]Darwin (1872) proposed different functions for anger and sadness. He noted that “an indignant man unconsciously throws himself into an attitude ready for attacking” (p. 216). In contrast, when “we fall into a state of low spirits (…) [we] no longer wish for action” (p. 155).

Anger is a functional response to an offense against me or mine (Lazarus, 1991). It typically arises when there is an unfair and deliberate threat by another to one's welfare, whether physical, material, or social (e.g., insults to status or reputation). Consistent with this idea, anger has been linked to a reactant ("moving against") state of action readiness (Frijda, Kuipers, & ter Schure, 1989). Anger enhances optimistic thinking, leading to higher control beliefs (Lerner & Tiedens, 2006), fosters the use of proactive regulation strategies (Blanchard-Fields & Coats, 2008), promotes persistence (Lench & Levine, 2008), and is intimately tied to the motivational approach system (Carver & Harmon-Jones, 2009). Moreover, anger promotes efforts to bring others' behavior in line with individual goals (Fischer & Roseman, 2007).

Sadness, in contrast, is a response to an irrevocable loss (Lazarus, 1991). Research shows that sadness promotes relatively unbiased information processing (Forgas, 2008), resulting in lower (i.e., more realistic) control beliefs (Alloy & Abramson, 1979). Sadness helps individuals to analyze the causes of their losses (Andrews & Thomson, 2009) and eventually promotes disengagement from goals that can no longer be attained (Nesse, 2000; Wrosch & Miller, 2009). Moreover, sadness elicits support and sympathy from close relationship partners (see Andrews & Thomson, 2009).

In sum, despite typically being thought of as "negative" and "unpleasant", anger and sadness can both confer considerable benefits. Anger appears to promote higher control beliefs, goal engagement, and exerting social influence to attain one's goals. Sadness appears to foster lower control beliefs, disengagement from unattainable goals, and elicits social support.

Age as a moderator of associations between anger, sadness, and well-being

Viewed within a lifespan developmental framework, individuals' control opportunities, challenges, and goals change with age (e.g., Carstensen, Isaacowitz, & Charles, 1999; Erikson, 1959). In the motivational theory of lifespan development (Heckhausen, Wrosch, & Schulz, 2010) and related theoretical frameworks (Brandtstädter & Rothermund, 2002), congruency between the individual's psychological functioning and the control opportunities afforded by their life context are thought to be intimately tied to well-being. Thus, to the extent that specific emotions serve to help us deal with particular constellations of control opportunities, it is reasonable to expect that certain emotions would be particularly adaptive at certain stages of adult development.

In young and middle adulthood, individuals have greater opportunities to pursue their goals, experience more gains, and benefit more from acquiring and protecting resources for the future (Brandtstädter & Rothermund, 2002; Carstensen et al., 1999; Ebner, Freund, & Baltes, 2006; Erikson, 1959; Heckhausen et al., 2010). In particular, middle-aged adults have the highest control opportunities in terms of social status and financial resources (Lachman, 2004; see also Freund & Ritter, 2009). In contrast, in older adulthood, individuals have more limited control opportunities, experience more losses, and derive greater benefits from goal disengagement (Brandtstädter & Rothermund, 2002; Carstensen et al., 1999; Ebner et al., 2006; Erikson, 1959; Heckhausen et al., 2010). Disengaging from unattainable goals is important because it protects individuals from wasting time and energy in hopeless endeavors, and aids in transferring investments to more achievable goals (Heckhausen et al., 2010). Moreover, in late life, individuals typically seek to maximize their enjoyment of current experience, including contact with close social partners, rather than building resources for future use (Carstensen et al., 1999).

Research shows that age moderates associations between psychological functioning and well-being (Brandtstädter & Rothermund, 2002; Ebner et al., 2006; Heckhausen et al., 2010; Lang & Heckhausen, 2001; Wrosch & Heckhausen, 2002). At younger ages, higher control

beliefs and higher goal engagement are associated with higher well-being. At older ages, lower control beliefs and higher goal disengagement are associated with higher well-being.

In a similar vein, we propose that age moderates associations between responding with anger or sadness and well-being. In midlife, when control opportunities abound, being optimistic and tenacious and exerting social influence to attain one's goals are more adaptive. Thus, we would expect that a bias toward responding with anger, an emotion that serves these functions, would be positively associated with well-being in midlife. In late life, when control opportunities are limited, being realistic, disengaging from goals that no longer can be attained, and activating social support are more adaptive. Thus, we would expect that a bias toward responding with sadness, an emotion that serves these functions, would be positively associated with well-being in late life.

Assessing Emotional Reactivity Using Neutral Stimuli

Emotional reactivity refers to changes in subjective experience, expressive behavior, and physiology that occur in response to changes in the internal and external environment (Levenson, 2007). In empirical studies, emotional reactivity is typically assessed using standardized stimuli (e.g., films, images, or vignettes) that are presented under well-controlled laboratory conditions (e.g., Coan & Allen, 2007). In our work, we have typically used film stimuli because their dynamic, multimodal (visual and auditory) qualities add ecological validity. Typically, films used in studies of emotional reactivity are carefully selected to elicit a particular target emotion (Gross & Levenson, 1995). This is accomplished by choosing films that have clear thematic content that matches antecedents for particular emotions (e.g., Boucher & Brandt, 1981; Scherer, Schorr, & Johnstone, 2001). Thus, films selected to elicit sadness could portray loss of a loved one and films selected to elicit anger could portray an injustice. Although films with this kind of thematic clarity tend to elicit the same emotion from all viewers, they are still useful for studying individual differences in the form of the intensity of response (e.g., our study showing age differences in the amount of sadness produced by films portraying irrevocable personal loss; Seider, Shiota, Whalen, & Levenson, 2011).

In the present study, we were more interested in studying individual differences or biases toward experiencing different emotions. To achieve this requires a very different kind of film stimulus, one that does not have the kind of thematic clarity that pulls for a particular emotion (or emotions), but rather has sufficient ambiguity to allow for a range of emotional responses. Emotionally-neutral stimuli that have this kind of thematic ambiguity are particularly well-suited for revealing qualities of the observer. For an observer to have a particular emotional reaction, she or he must select and amplify certain thematic cues while deamplifying others and may even need to construct themes de novo where objectively there is only ambiguity.

For the present study, we chose an excerpt from the film "Stranger than Paradise" (Driver & Jarmusch, 1984) in which two men engage in a very halting conversation in a way that on the surface is devoid of purpose, intent, and theme. Overall, the film elicits fairly neutral affect. However, its ambiguity allows different individuals to appraise the content in different ways and hence to react with different emotions. For example, one individual's appraisals may emphasize the emptiness and loneliness of the interaction, leading to an emotional reaction characterized by subtle levels of sadness. Another may focus on the inability of the two men to say what's on their mind and make an interpersonal and communicative link, with this frustration leading to subtle levels of anger. As Frijda (1988, p. 350) noted "[e]motions are changed when events are viewed differently".

The use of these kinds of thematically-ambiguous stimuli builds on a long tradition of individual differences research, beginning with early projective tests as famously indicated in Rorschach's (1921) ink-blots and continuing into the present (e.g., Schultheiss & Brunstein, 2010). Such stimuli have been used in a wide range of studies of individual differences spanning amygdala reactivity (Blasi et al., 2009; Whalen, 1998), emotional reactivity (Carthy, Horesh, Apter, & Gross, 2010), anger and aggression (Dodge, 1980), anxiety (Carthy et al., 2010), stress interpretations (Chen, Langer, Raphaelson, & Matthews, 2004), and person perception (Pauker, Weisbuch, Ambady, Sommers, Adams, & Ivcevic, 2009). Ambiguity is also a core feature of the "weak situation" as conceptualized by Mischel (1977).

The Present Study

We examined whether self-reported anger and sadness in response to an emotionally-neutral, thematically-ambiguous film are associated with subjective well-being among young, middle-aged, and older adults. We hypothesized that self-reported anger in response to the film would be positively associated with well-being among middle-aged adults, but not among young or older adults. In contrast, we predicted that self-reported sadness in response to the film would be positively associated with well-being among older adults, but not among young or middle-aged adults. Well-being was measured both in terms of satisfaction with life and the ratio of dispositional positive to negative affect.

In most of our work with emotional reactivity, we also measure expressive emotional behavior and physiological reactivity in addition to self-reported emotional experience. We could not study individual differences in emotional facial behavior in the present study because facial expressions of emotion were extremely rare in response to this film. We did measure physiological reactivity, using it as a covariate to control for age differences in physiological reactivity to emotional stimuli (e.g., Labouvie-Vief, Lumley, Jain, & Heinze, 2003; Levenson, 2000; Tsai, Levenson, & Carstensen, 2000). Finally, all analyses were controlled for gender and for pre-film emotion reports.

The design of the study enabled us to evaluate the specificity of our findings in terms of stimuli and specific negative emotions. To determine whether our findings were specific to the emotionally-neutral, thematically-ambiguous film, we also included films that reliably elicit sadness and disgust (Gross & Levenson, 1995). We expected that the moderation by age of the association between anger (or sadness) and well-being would emerge in response to the neutral film but not to the others films. To determine whether our findings were specific to the emotions of anger and sadness, we also assessed two other negative emotions —disgust and fear. Both of these latter emotions are thought to be highly functional: Disgust protects us from decayed and rotting food and other forms of contamination (Rozin & Fallon, 1987); fear protects us against physical and material risk (Lerner & Keltner, 2001; Öhman, 2009). These kinds of protective functions are adaptive at all stages of the lifespan, thus we did not expect to find age differences in their association with well-being.

Method

Participants[2]

There were 222 participants, 76 young adults (20–29 years), 73 middle-aged (40–49 years), and 73 older adults (60–69 years) with about 50% females in each age group. The sample was recruited by a survey research company to be representative of the Bay area in terms of ethnicity (50.9% European-American, 17.1% African-American, 15.8% Asian-American, 13.5% Latino/-a American, 2.7% other or mixed ethnicity) and socioeconomic status (years of education: $M = 15.51$; $SD = 1.80$). Telephone screening excluded individuals who (a) had

participated in another research study during the last six months; (b) did not speak English as the primary language; (c) had Michigan Alcoholism Screening Test (Selzer, 1971) scores greater than 6; (d) were wheelchair-bound; (e) had diagnosed diabetes or any other medical condition that would prevent their sitting comfortably in a laboratory chair for two hours; (f) were currently using psychoactive medication to treat an affective or anxiety disorder; or (g) were allergic to the adhesive used to attach the physiological sensors. Data from four additional participants were excluded due to computer or physiological signal quality problems. Participants received $50 for participating in the approximately 2.5 hour study.

Procedure

The study consisted of two parts, (1) questionnaires completed at home a few days prior to the laboratory session, including the measures of subjective well-being, and (2) a laboratory session that assessed emotional reactivityto films. Upon arrival at the laboratory, participants reviewed and signed a consent form. The devices used to measure physiological activation were attached. There were six trials in which participants viewed films. Within each trial, participants viewed: (1) a large “X” on a television monitor for 60 seconds, during which they were instructed to clear their minds of thoughts, feelings, and memories (pre-film period); (2) on screen instructions for the trial displayed for 5 seconds; (3) a film, which lasted approximately three minutes, and (4) a blank screen that appeared for 60 seconds. After each trial, the experimenter entered the room to obtain questionnaire ratings of subjective emotional experience. Following the final trial, the experimenter removed the physiological measurement devices, administered a brief interview, and debriefed the participant.

The present study examined the first three trials, during which participants were instructed to “just watch the film clip as though you were watching television at home, or a movie in a movie theater.” The remaining three trials were emotion regulation trials (Shiota & Levenson, 2009). Of primary interest for the present study was the emotionally-neutral, thematically-ambiguous film clip, which was always presented in the first trial. This clip was an excerpt from the film “Stranger than Paradise” (Driver & Jarmusch, 1984) in which two men engage in a very halting conversation in a way that on the surface is devoid of purpose, intent, and theme. As noted earlier, the thematic ambiguity of the film is such that it does not draw for any emotion in particular but rather allows individuals to appraise the film in different ways, thus revealing individual differences or biases in emotional reactivity.

In the second and third trials, participants saw one of two films selected to elicit sadness and one of two films selected to elicit disgust with film type and trial order counterbalanced across the sample. The first sad clip, an excerpt from the film “21 Grams”, depicted a mother learning of the death of her two young daughters in a car accident. The other sad clip, an excerpt from the film “The Champ”, depicted a boy watching his father’s death after a boxing match. The disgusting clips, both excerpts from the television show “Fear Factor,” portrayed people engaging in unpleasant eating activities (in one a woman was eating horse rectum, in the other a man was sucking fluid from cow intestine). These films each depicted a prototypical elicitor of the target emotion (Lazarus, 1991; Rozin & Fallon, 1987). Previous research has demonstrated their effectiveness for young, middle-aged, and older adults (for

[2]The present study draws from a large laboratory-based study of young, middle-aged, and older adults involving multiple experimental trials that assessed different aspects of emotional functioning. Some results from this study have previously been reported. Shiota and Levenson (2009) examined age differences in three different kinds of emotion regulation. Seider et al. (2011) examined age differences in sadness reactivity to films that portrayed irrevocable loss. The present article focused on age-specific associations between anger and sadness in response to the emotionally-neutral film and well-being. Thus, the present study had no overlap with the prior studies in terms of the research question that was addressed or the experimental trial of primary interest, but did overlap in participants. In addition, the present study used data from the sad and disgusting films reported in Seider et al. (2011) to determine whether the association between emotional reactivity and well-being was specific to the emotionally-neutral film.

details see Seider, Shiota, Whalen, & Levenson, 2010; Shiota & Levenson, 2009). The sad clips portrayed irrevocable loss and primarily elicited sadness across age groups. The disgusting clips presented a strong threat of disease contamination but also produced moral indignation regarding the show contestants' behavior. In earlier work, we had found that films portraying surgical procedures, which are typically used to elicit disgust with younger adults (Gross & Levenson, 1993), were not as effective with older adults (Kunzmann, Kupperbusch, & Levenson, 2005). The disgusting clips used in the present study produced both physical revulsion and moral indignation across age groups.

Measures

Subjective Emotional Experience—Participants reported how strongly they felt each of nine emotions (amusement/humor, anger, contentment, compassion, disgust, enthusiasm/excitement, fear, sadness, and surprise), once at the beginning of the laboratory session (i.e., pre-film) and again in response to each film (i.e., reactivity). The rating scale for each emotion ranged from 0 (did not experience that emotion at all) to 8 (strongest experience of that emotion ever felt). Because of our interest in negative emotional reactivity, the present study focused on the four negative emotions: anger, sadness, disgust and fear.

Physiological Activation—The physiological measures were selected to sample broadly from major organ systems involved in emotional responding (cardiac, vascular, respiratory, and electrodermal), to allow for continuous measurement, to be as unobtrusive as possible, and to include measures used in our previous studies of emotion and aging (e.g., Kunzmann et al., 2005; Levenson, Carstensen, Friesen, & Ekman, 1991). Continuous physiological recordings were obtained using standard procedures (for details see Seider et al., 2010; Shiota & Levenson, 2009). Building on Shiota and Levenson (2009), we examined eight physiological measures (i.e., cardiac inter-beat interval; skin conductance level; finger pulse amplitude; pulse transmission time to the finger; pulse transmission time to the ear; finger temperature; mean arterial blood pressure; respiration depth).

A computer program written by one of the authors (Robert W. Levenson) was used to calculate second-by-second averages for each physiological measure. Members of the research team who were blind to participant age, sex, and experimental condition examined all physiological measures to eliminate artifacts and outliers. Reactivity scores were computed for each physiological measure for each trial by subtracting the mean activation during the 60 seconds prior to the film (i.e., pre-film) from the mean activation during the film. Select physiological variables (e.g., cardiac inter-beat interval where lower values originally indicated higher activation) were multiplied by −1 so that higher values consistently reflected higher physiological activation. To reduce the risk of Type 1 error we computed a composite measure of physiological activation for each trial by normalizing the individual reactivity scores using the means and standard deviations for the entire sample and averaging the eight physiological measures. The internal consistencies of the composite variables were: α = .45 (emotionally-neutral film); α = .54 (sad films); α = .47 (disgusting films).

Subjective Well-Being

Satisfaction with life: Satisfaction with life was measured by the 5-item Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985), which assesses global cognitive evaluations of one's own life (e.g., "I am satisfied with my life"; 1 = strongly disagree, 7 = strongly agree; α = .89).

Ratio of positive to negative affect: Positive and negative affect were measured by the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988).

Participants rated the extent to which each of 20 affect terms described their "mood in general" using a scale from 1 (slightly or not at all) to 5 (very much). Positive affect was assessed by 10 items (e.g., "enthusiastic"; $\alpha = .87$). Negative affect was assessed by 10 items (e.g., "distressed"; $\alpha = .90$). The ratio of positive (P) to negative (N) affect was calculated based on Fredrickson and Losada (2005) as P/N.

Statistical Analyses

First, we conducted a variety of preliminary analyses including analyses of age group differences in means and variances of the self-reported negative emotions and intercorrelations between the key study variables.

To examine the hypotheses, hierarchical multiple linear regression analyses were performed to analyze associations between self-reported anger (or sadness) in response to the emotionally-neutral, thematically ambiguous film and the two dependent variables, satisfaction with life and the ratio of positive to negative affect, among young, middle-aged, and older adults. We tested the moderation effects of age following procedures proposed by West, Aiken, and Krull (1996) analyzing age group as a categorical variable (see also, for example, Stone et al., 2010). We chose this approach in order to best capture the hypothesized nonlinear interaction effect between anger × age group when predicting well-being and to preserve consistency across analyses. When we repeated the analyses treating age as a continuous variable, all results remained essentially stable.[3]

In the analyses examining anger as a predictor of well-being in the three age groups, age group was coded using two dummy variables, with middle-aged adults as the common reference group. The first age dummy variable was coded as (1) for young adults and (0) for the other age groups. The second age dummy variable was coded as (1) for older adults and (0) for the other age groups. In the analyses examining sadness as a predictor of well-being in the three age groups, the coding scheme was changed, with older adults serving as the common reference group. The first age dummy variable was coded as (1) for young adults and (0) for the other age groups. The second age dummy variable was coded as (1) for middle-aged adults and (0) for the other age groups. All continuous variables were z-standardized.

In the regression analyses, self-reported anger (or sadness), age (dummy variables), and self-reported anger (or sadness) × age (dummy variables) were included as predictors in the first step. In the second step, physiological activation, pre-film anger (or sadness)[4], and gender were added as predictors. We decomposed interaction effects between anger (or sadness) and age group, analyzing the simple slopes for each age group controlling for physiological activation, pre-film anger, and gender. Note that with our analytic structure, the simple slopes for the relationship between an emotion and well-being were equivalent to the main effect of this emotion in the common reference group (i.e., the age group that was coded with values 0 on both age dummy variables, see West et al., 1996). Thus, for anger, this was the middle-aged group (see Table 3, step 2) and for sadness this was the older age group (see Table 4, step 2). To obtain simple slopes for the other age groups, we repeated these

[3]Analyzing anger in response to the emotionally-neutral film and treating age as a continuous variable, significant interaction effects between anger × age^2 were found when predicting satisfaction with life ($p = .009$) and the ratio of positive to negative affect ($p = .026$). Analyzing sadness in response to the emotionally-neutral film and treating age as a continuous variable, interaction effects between sadness × age were significant when predicting satisfaction with life ($p = .022$) and marginally significant when predicting the ratio of positive to negative affect ($p = .082$). When we decomposed these interaction effects, the results were essentially similar to the results obtained analyzing age group as a categorical variable.

[4]Multiple linear regression analyses showed that age did not moderate any of the associations between pre-film reports of anger (or sadness) and subjective well-being controlling for physiological activation, anger (or sadness) in response to the emotionally-neutral film, and gender (all interaction effects, $p > .05$).

analyses with coding schemes that treated the other two age groups as the common reference group (i.e., coded 0 on both age dummy variables). The simple slopes for the three age groups derived from these analyses are reported in the text and Figures. To conserve space, we only report the full analytic results for the two hypothesized relationships with the reference group in focus (anger and well-being in middle age; sadness and well-being in old age) in the Tables.

Preliminary analyses showed that the variable assessing anger in response to the emotionally-neutral film was skewed (3.17) whereas sadness was not (.87). To preserve the original metric and enhance consistency across analyses, we report the analyses using the original anger variable. When we repeated the analyses using a log transformed anger variable to reduce skewness, all results remained essentially stable. Moreover, because the reliabilities of the physiological composites were not high, we repeated all analyses using the individual physiological measures as covariates instead of the composites. With one exception noted below, this did not change the findings in any significant way; thus, the results will be reported using the physiological composites. Furthermore, we explored interaction effects between anger (or sadness) × gender as predictors of well-being. None of the interaction effects was significant (*p*s > .05); thus, they were not included in the analyses.

Finally, to examine the specificity of the findings, we examined self-reported disgust and fear in response to the emotionally-neutral film as well as self-reported anger, sadness, disgust, and fear in response to the sad and disgusting films. Remember that participants saw one of two sad and one of two disgusting film clips with film type and trial order counterbalanced across the sample. MANOVAs revealed that there were no age group differences in emotion reactivity (i.e., self-reported anger, sadness, fear, disgust, physiological activation) in response to the different film clips indicated by nonsignicificant interaction effects between age group × film clip in the sad trial and the disgust trial (*p*s > .05).

Results

Preliminary Analyses

Table 1 presents means and standard deviations for self-reported anger, sadness, disgust, and fear in response to the emotionally-neutral, sad, and disgusting films among young, middle-aged, and older adults. Analyses of variance revealed no differences between age groups for mean levels of the four negative emotions in response to the neutral film. Significant age differences were found for mean levels of self-reported sadness in response to the sad and disgusting films with older adults reporting higher sadness.[5] Applying Levene's tests, the variances of anger, sadness, and disgust in response to the neutral, sad, and disgusting films were similar across age groups. The variances of fear in response to the sad films and sadness in response to the disgusting films differed across age groups with higher variances among older adults.

Table 2 presents the intercorrelations of the key study variables. Self-reported anger and sadness in response to the neutral film were not correlated with each other or with age. Moreover, anger and sadness were not correlated with gender.

[5]Seider et al. (2011) had hypothesized that older adults would have greater sadness reactivity in response to sad films, but not in response to the emotionally-neutral film. The rationale was that increased exposure to loss in life would sensitize older adults to respond with greater sadness to loss-themed stimuli. Using an analysis of variance approach with these data, we found support for this pattern. Using a slightly different statistical approach, Seider et al. (2011) had found support for this pattern for physiological responding, but not for self-reported emotions.

Finally, no correlations were found between any of the negative emotions in response to any of the films and satisfaction with life or the ratio of positive to negative affect ($ps > .05$). Pre-film reports of sadness, disgust, and fear were negatively correlated with satisfaction with life and/or the ratio of positive to negative affect ($ps < .05$). Note that all subsequent analyses were controlled for pre-film emotion reports.

Anger and Subjective Well-Being Among Young, Middle-Aged, and Older Adults

As shown in Table 3, age moderated the association between self-reported anger in response to the emotionally-neutral, thematically-ambiguous film and *satisfaction with life*. Specifically, two interaction effects were found for anger × age (young vs. middle-aged adults) and anger × age (older vs. middle-aged adults) in the second step. We decomposed these interaction effects, analyzing the simple slopes for each age group controlling for physiological activation, pre-film anger, and gender. As shown in Figure 1, anger did not predict satisfaction with life for young adults ($B = -.23$, SE(B) = .26, $p = .369$) or older adults ($B = -.03$, SE(B) = .21, $p = .883$); however, higher anger predicted higher satisfaction with life for middle-aged adults ($B = .49$, SE(B) = .15, $p = .001$).

As further shown in Table 3, age moderated the association between self-reported anger in response to the emotionally-neutral, thematically-ambiguous film and the *ratio of positive to negative affect*. Specifically, in the second step, an interaction effect was found for anger × age (older vs. middle-aged adults). We decomposed this interaction effect, analyzing the simple slopes for each age group controlling for physiological activation, pre-film anger, and gender. As shown in Figure 1, anger did not predict the ratio of positive to negative affect for young adults ($B = -.11$, SE(B) = .15, $p = .472$) or older adults ($B = -.14$, SE(B) = .12, $p = .243$); however, higher anger predicted a higher ratio of positive to negative affect for middle-aged adults ($B = .18$, SE(B) = .09, $p = .038$).

Finally, follow-up analyses were conducted to examine the specificity of the findings. Analyses were controlled for physiological activation, pre-film reports of the respective emotion, and gender. First, self-reported disgust and fear in response to the emotionally-neutral film were examined. No interaction effects were found between disgust × age and fear × age in response to the neutral film when predicting satisfaction with life and the ratio of positive to negative affect ($ps > .05$). Likewise, no main effects of disgust and fear were found ($ps > .05$). Second, self-reported anger in response to the sad and disgusting films was examined. No interaction effects were found between anger × age in response to the sad or disgusting films when predicting satisfaction with life or the ratio of positive to negative affect ($ps > .05$). Likewise, no main effects of anger were found ($ps > .05$).

To summarize, anger in response to the emotionally-neutral, thematically-ambiguous film was positively associated with subjective well-being (in both cognitive and affective measures) for middle-aged adults, but not for young and older adults. This finding was specific to anger (not found for disgust or fear) and to the emotionally-neutral film (not found for sad or disgusting films).

Sadness and Subjective Well-Being Among Young, Middle-Aged, and Older Adults

As shown in Table 4, age moderated the association between self-reported sadness in response to the emotionally-neutral, thematically-ambiguous film and *satisfaction with life.* Specifically, an interaction effect was found for sadness × age (young vs. older adults) in the second step. We decomposed this interaction effect, analyzing the simple slopes for each age group controlling for physiological activation, pre-film sadness, and gender. As shown in Figure 2, sadness did not predict satisfaction with life for young adults ($B = -.26$, SE(B) = .21, $p = .212$) or middle-aged adults ($B = -.08$, SE(B) = .20, $p = .698$); however, higher

sadness predicted higher satisfaction with life for older adults (B = .34, SE(B) = .17, p = .047).

As further shown in Table 4, age moderated the association between self-reported sadness in response to the emotionally-neutral, thematically-ambiguous film and the *ratio of positive to negative affect*. Specifically, an interaction effect was found for sadness × age (young vs. older adults) in the second step. We decomposed this interaction effect, analyzing the simple slopes for each age group controlling for physiological activation, pre-film sadness, and gender. As shown in Figure 2, sadness did not predict the ratio of positive to negative affect for young adults (B = −.17, SE(B) = .12, p = .145), middle-aged adults (B = .07, SE(B) = .11, p = .544), or older adults (B = .14, SE(B) = .10, p = .150). However, when repeating this analysis using the individual physiological measures as covariates instead of the composite, the positive association between sadness and the ratio of positive to negative affect approached significance for older adults (B = .20, SE(B) = .11, p = .081).

Finally, follow-up analyses were conducted to examine the specificity of the findings. Remember that no interaction effects were found between self-reported disgust and fear in response to the emotionally-neutral film and subjective well-being (see above). Moreover, self-reported sadness in response to the sad and disgusting films were studied. Analyses were controlled for physiological activation, pre-film sadness, and gender. No interaction effects were found between sadness × age in response to the sad or disgusting films when predicting satisfaction with life or the ratio of positive to negative affect (ps > .05). Moreover, no main effects of sadness were found (ps > .05).

To summarize, sadness in response to the emotionally-neutral, thematically-ambiguous film was positively associated with subjective well-being for older adults, but not for young and middle-aged adults. This association was found for life satisfaction and was in a similar direction (albeit not significant) for the ratio of positive to negative affect. This finding was specific to sadness (not found for disgust or fear) and to the emotionally-neutral film (not found for sad or disgusting films).

Discussion

Folk notions hold that only positive emotions are associated with good outcomes, and negative emotions are always associated with bad outcomes. However, the present study offers evidence that negative emotions can sometimes be associated with good outcomes. This finding is consistent with functionalist and evolutionary views that regard all emotions —positive and negative—as adaptive in particular contexts. Models of lifespan development view different stages of adult development as affording particular control opportunities, challenges, and goals. Consistent with these theoretical frameworks and building on previous empirical findings, we found evidence for the hypothesized associations: Responding to an emotionally-neutral, thematically-ambiguous film with anger was positively associated with subjective well-being in midlife. In contrast, responding to this film with sadness was positively associated with subjective well-being in late life. Findings were more pronounced for satisfaction with life than for the ratio of positive to negative affect. These differences in the relationships between negative emotions and well-being within age groups emerged despite there being no differences between age groups in reported levels of these emotions. Findings were specific to anger and sadness (not found for disgust and fear) and to the emotionally-neutral film (not found for sad or disgusting films), and withstood statistical controls for physiological activation, pre-film reports of the respective emotions, and gender. These findings also underscore the value of using emotionally-neutral, thematically-ambivalent stimuli for studying individual differences in emotion reactivity.

Responding with Anger and Sadness: Age-Specific Associations with Well-Being

Understanding these findings requires considering the functions that anger and sadness serve and the control opportunities afforded in midlife and late life. Anger promotes higher control beliefs, goal engagement, and exerting social influence to protect one's hard-earned resources and status (Blanchard-Fields & Coats, 2008; Carver & Harmon-Jones, 2009; Fischer & Roseman, 2007; Lazarus, 1991; Lerner & Tiedens, 2006). These functions may be particularly adaptive in midlife when individuals are at the peak of their control opportunities in terms of social status and wealth (Lachman, 2004; see also Freund & Ritter, 2009). In contrast, sadness fosters lower control beliefs, goal disengagement after irrevocable loss, and elicits support from others (Alloy & Abramson, 1979; Andrews & Thomson, 2009; Lazarus, 1991; Wrosch & Miller, 2009). These functions may be particularly adaptive in late life when control opportunities are more limited and losses are common (e.g., Carstensen et al., 1999).

A rich body of empirical research has shown that congruency between individuals' psychological functioning and the control opportunities that their life context affords predicts well-being (for reviews see Brandtstädter & Rothermund, 2002; Heckhausen et al., 2010). For example, whereas holding on to goals is positively associated with well-being especially in midlife, letting go of unattainable goals is positively associated with well-being in late life (e.g., Haase, Heckhausen, & Wrosch, 2011). The present study built on this previous research, which has concentrated on psychological processes in the realm of cognition and motivation, by examining processes in the realm of emotion. Our findings show that responding to an emotionally-neutral, thematically-ambiguous film with anger, an emotion that helps us retain that which is ours, is positively associated with well-being in midlife, whereas responding to the film with sadness, an emotion that helps us let go after irrevocable loss, is positively associated with well-being in late life.

In terms of ecological validity, we often have emotional responses to ambiguous situations that we encounter in real life. For example, we may see two people interacting at a party and, even though the speech content eludes us, there may be something about their interaction that makes us feel angry or sad. Our findings suggest that, for a middle-aged adult, responding with anger may be adaptive as this emotion may help him/her to approach the situation and tackle a potential problem. In contrast, for an older adult, responding with sadness may be adaptive as this emotion may help him/her to not care so much about the situation and let it pass.

Noteworthy in our findings was the lack of an association between any particular emotion and well-being for younger adults. In terms of anger and sadness, the two emotions associated with greater well-being in later life periods, we speculate that anger, an emotion that is geared toward exerting social influence, may not be as adaptive for young adults because they do not yet have the social status and financial resources to render anger effective. Similarly, sadness, an emotion that fosters goal disengagement, may not be as adaptive in young adulthood because all goals are still potentially attainable and thus there is no pressing need for goal disengagement. Viewed more broadly, as younger adults pass through a period of life often geared toward mate selection and reproduction, it is likely that all basic emotions are adaptive. In youth, additional fine-tuning or biasing of reactivity for particular emotions may not be necessary to achieve greater well-being.

Finally, several cautionary notes need to be raised regarding the emotions we found to be related to well-being and the film context. First, the effects we found are reliable but small. They suggest that subtle biases toward responding with particular negative emotions to an emotionally-neutral, thematically-ambiguous film were associated with greater well-being at different life stages. To be very clear, we are not implying that negative emotions are always

positively associated with well-being, nor are we implying that large or chronic negative emotional responses to stimuli with ambiguous content would be adaptive. There are sizeable literatures demonstrating that high levels and/or chronic activation of negative emotions are related to low levels of well-being and health (e.g., Gotlib & Hammen, 2009; Potegal et al., 2010).

Second, although we found considerable specificity in terms of which emotions are associated with well-being, this does not imply that other emotions such as disgust and fear are not adaptive. As we noted earlier, we consider all negative emotions to be highly functional. Disgust protects us from decayed and rotting food (Rozin & Fallon, 1987); fear protects us from predators and sensitizes us to risk (Lerner & Keltner, 2001; Öhman, 2009). These functions are highly important in all three life stages we studied; thus, disgust or fear reactivity may not need to be fine-tuned at these ages to produce greater well-being. Of course, it is also possible that such fine-tuning might be associated with greater well-being at certain ages or life stages not examined in the present study. For example, during pregnancy, a bias toward responding with disgust (and thus minimizing contamination) may be particularly adaptive; in very old age, a bias toward responding with fear (and thus minimizing risk) may be particularly adaptive.

Limitations

The present study has several limitations. First, our use of a cross-sectional design makes it impossible for us to tell whether differences between age groups reflect the effects of age or the effects of cohort. Our middle-aged group (Baby Boomers) may have had greater control opportunities than our older age group (children of the Great Depression or born during World War II), due to economic and child-rearing differences rather than or in addition to differences in developmental stage. These differences in historical context would also account for differential functionality of anger and sadness in the middle-aged and older cohorts. Second, our sample was relatively well-educated, reflecting demographics of the San Francisco Bay Area. Whether these findings would generalize to groups with different demographics remains unknown. Third, the correlational nature of our study design makes it impossible for us to know the direction(s) of causality between particular kinds of enhanced emotional reactivity and well-being. Fourth, we studied only one emotionally-neutral, thematically-ambiguous film. We cannot know whether our findings would generalize to other similar kinds of stimuli. Moreover, our rationale for using this kind of film was that it allowed individuals to appraise it in different ways and hence to react with subtle levels of different emotions. We did not include a direct assessment of how individuals appraised the film and this would have been desirable. Fifth, our findings are based on a single study. We had strong a priori hypotheses grounded in the prior theoretical and empirical literatures. However, as with any new finding, only time will tell whether the findings will replicate with other samples and stimuli and in other laboratories.

Implications for Future Research

The present study has several implications for research on emotion and aging. First, although it is often asserted that positive emotions are good and negative emotions are bad, it may be not that simple. Our findings indicate that negative emotions can be associated with positive outcomes at certain life stages. The work of others supports such a link (as well as the converse, that positive emotions can sometimes be associated with negative outcomes, e.g., Griskevicius, Shiota, & Neufeld, 2010; Gruber, Mauss, & Tamir, 2011; Haase & Silbereisen, 2011). Specifically, anger has been found to predict increases in marital satisfaction in a longitudinal study of middle-aged couples (Gottman & Krokoff, 1989); and experimentally induced anger can lead to higher positive affect (Harmon-Jones, Harmon-Jones, Abramson, & Peterson, 2009). Sadness, to our knowledge, has not been

positively linked to well-being, but a related emotional state–crying–appears to promote well-being in certain contexts (Hendriks, Nelson, Cornelius, & Vingerhoets, 2008).

Second, our findings suggest that associations between negative emotions and well-being may be moderated by age, a factor overlooked in many previous studies of emotional functioning and well-being. In line with previous studies (Brandtstädter & Rothermund, 2002; Heckhausen et al., 2010), we view age in part as a proxy for control opportunities. By carefully assessing factors that shape control opportunities (e.g., physical health, socioeconomic status, critical life events) in addition to using samples that differ in age, we can begin to determine the extent to which age-related differences in the association between emotional reactivity and well-being are driven by age, by control opportunities, or by both.

Third, the positive association between sadness reactivity and well-being among older adults sheds additional light on the "positivity effect" postulated by socioemotional selectivity theory (Mather & Carstensen, 2003). This notion suggests that older adults direct their attention away from negative stimuli. Yet, Scheibe and Carstensen (2010) noted that "there should be conditions under which the [positivity] effect is not observed." (p. 137). In fact, sadness helps individuals disengage from offending situations and thus serves the overall goal of reducing distress for older adults (Charles & Carstensen, 2008). Studies show that older adults experience and express less anger in comparison to younger age groups (e.g., Blanchard-Fields & Coats, 2008; Charles & Carstensen, 2008). However, older adults appear to experience and express levels of sadness that are similar to or even higher than those of younger age groups (e.g., Charles & Carstensen, 2008; Kunzmann & Grühn, 2005; Seider et al., 2011), supporting the postulated boundary condition of the positivity effect. These studies indicate that older adults are more prone to sadness than younger adults in certain contexts. The present study extends this finding to show that, among older adults, higher sadness in response to an emotionally-neutral, thematically-ambiguous film can be associated with greater well-being.

Fourth, the present study was designed to study emotion reactivity; however, emotion reactivity and emotion regulation may be intrinsically linked (e.g., Campos, Frankel, & Camras, 2004). Thus, the present study may also have implications for research on emotion regulation showing that it may not always be adaptive to minimize negative emotions (cf. Larsen, 2000). Recent findings demonstrate that individuals do not always seek to minimize negative emotions (Riediger, Schmiedek, Wagner, & Lindenberger, 2009), but rather seek to experience them when they deem them useful (Hackenbracht & Tamir, 2010; Tamir et al., 2008). Dynamic integration theory (e.g., Labouvie-Vief, 2003) states that well-being requires the coordination of two affect regulation strategies, affect optimization and affect complexity. Whereas affect optimization refers to maximizing positive and minimizing negative affect, affect complexity refers to the ability to tolerate negative affect. Our findings are consistent with the latter, insofar as they show that experiencing negative affect may be positively associated with well-being in certain contexts.

Conclusion

The "good life" is often equated with an absence of negative emotions. From this perspective, a positive association between negative emotions and subjective well-being may seem unexpected. However, functionalist perspectives suggest that all emotions, both positive and negative, are adaptive in particular situations. The present study demonstrates that age may be an important factor in determining which negative emotions are particularly adaptive. We found evidence that responding to an emotionally-neutral, thematically-ambiguous film with subtle levels of negative emotions can be positively associated with well-being—anger in midlife, sadness in late life. These findings may help refine our understanding of how emotions are linked to adaptive development across the life span.

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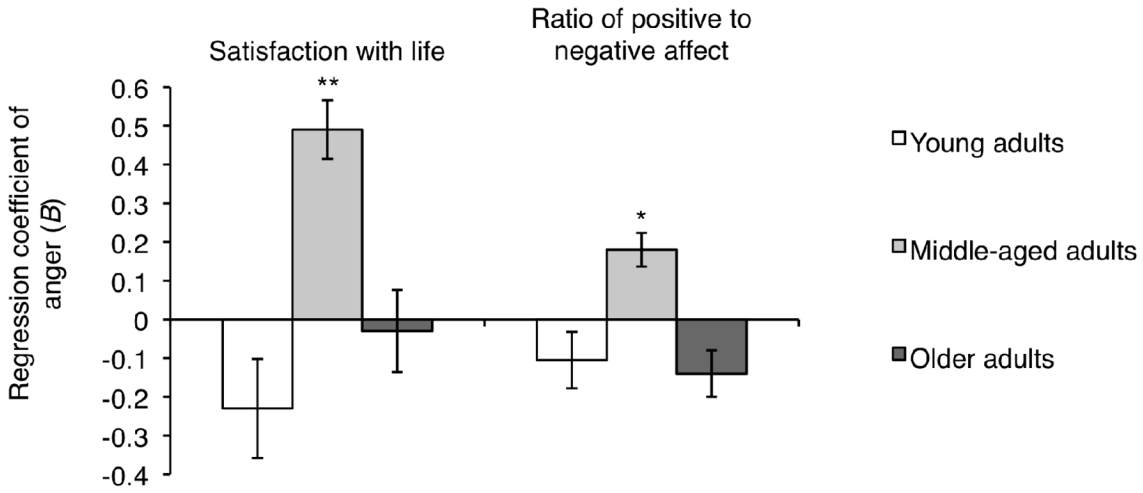

Figure 1.

Angerin response to the emotionally-neutral, thematically-ambiguous film as a predictor of subjective well-being among young, middle-aged, and older adults.

Note. Unstandardized regression coefficients (*B*) shown. Error bars represent standard errors (SE(*B*)). Analyses were controlled for physiological activation, pre-film anger, and gender. **p* < .05. ***p* < .01.

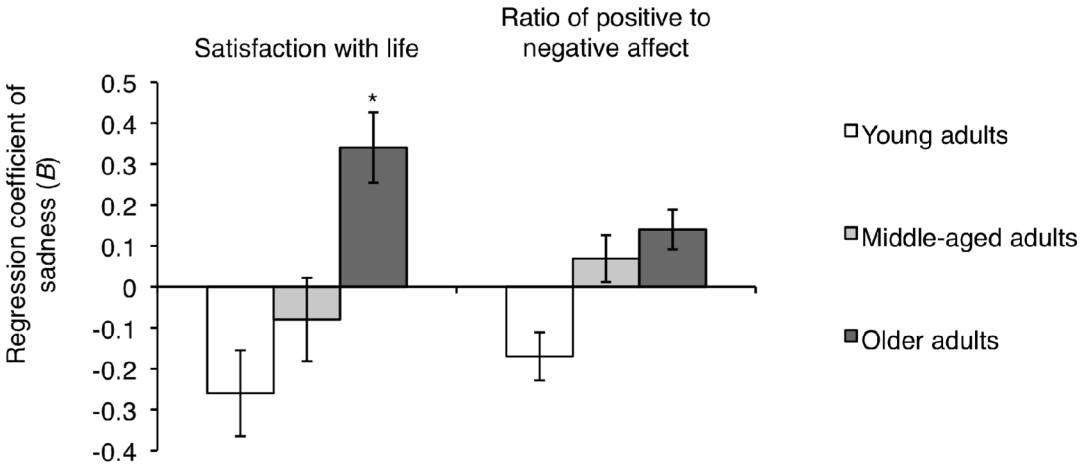

Figure 2.

Sadnessin response to the emotionally-neutral, thematically-ambiguous film as a predictor of subjective well-being among young, middle-aged, and older adults.

Note. Unstandardized regression coefficients (*B*) shown. Error bars represent standard errors (SE(*B*)). Analyses were controlled for physiological activation, pre-film sadness, and gender. When using the individual physiological measures as covariates instead of the composite, the positive association between sadness and the ratio of positive to negative affect approached significance for older adults ($B = .20$, SE(B) = .11, $p = .081$).

*$p < .05$.

Table 1

Negative Emotions in Response to Emotionally-Neutral, Sad, and Disgusting Films Among Young, Middle-Aged, and Older Adults

	Young adults	Middle-aged adults	Older adults	F^a (F for Levene's test^b)
Emotionally-neutral film (df = 2, 218)				
Anger	.41 (.82)	.44 (1.13)	.29 (.77)	.56 (1.65)
Sadness	1.61 (2.05)	1.74 (2.10)	2.32 (2.30)	2.23 (1.41)
Disgust	.71 (1.22)	.73 (1.41)	.81 (1.48)	.11 (.36)
Fear	.63 (1.36)	.64 (1.24)	.93 (1.84)	.96 (4.25*)
Sad films (df = 2, 217)				
Anger	1.37 (2.04)	1.63 (2.18)	1.73 (2.28)	.45 (.71)
Sadness	4.25 (2.53)	4.92 (2.49)	5.79 (2.41)	7.52** (1.36)
Disgust	1.31 (1.90)	1.84 (2.33)	1.67 (2.42)	1.08 (2.23)
Fear	1.91 (2.17)	1.99 (2.28)	2.46 (2.75)	1.12 (8.35***)
Disgusting films (df = 2, 218)				
Anger	1.23 (1.94)	1.11 (1.88)	1.48 (2.38)	.61 (3.03)
Sadness	1.03 (1.65)	1.27 (2.06)	1.88 (2.51)	3.20* (10.20***)
Disgust	5.17 (2.32)	5.85 (2.19)	5.52 (2.60)	1.50 (2.30)
Fear	1.11 (1.60)	1.25 (1.91)	1.25 (2.20)	.13 (2.33)

Note. M (SD) shown.

^{a}Results from analyses of variance for tests of mean differences across age groups.

^{b}Results from Levene's tests of equality of variances across age groups.

$^*p < .05$.

$^{**}p < .01$.

$^{***}p < .001$.

Table 2

Intercorrelations of Key Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Anger[a]	-								
2. Sadness[a]	.12	-							
3. Age	−.05	.13	-						
4. Physiological activation[a]	−.13	.03	.20**	-					
5. Pre-film anger	.26***	.10	−.11	−.11	-				
6. Pre-film sadness	.18**	.31***	−.06	−.01	.58***	-			
7. Female gender	−.13	−.04	.02	.04	−.02	−.01	-		
8. Satisfaction with life	.08	−.02	.02	.05	−.04	−.14*	.15*	-	
9. Ratio of positive to negative affect	.01	−.04	.06	−.03	−.10	−.22**	.14	.44***	-

Note.

[a]Self-reported anger, self-reported sadness, and physiological activation in response to the emotionally-neutral, thematically-ambiguous film.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3

Anger, Age, Anger × Age, and Covariates as Predictors of Subjective Well-Being

	Satisfaction with life				Ratio of positive to negative affect			
	Step 1		Step 2		Step 1		Step 2	
	B	**SE(*B*)**	***B***	**SE(*B*)**	***B***	**SE(*B*)**	***B***	**SE(*B*)**
Anger[a]	.41**	.15	.49**	.15	.13	.08	.18*	.09
Age (YA vs. MA)	.84**	.26	.83**	.26	−.04	.15	−.06	.15
Age (OA vs. MA)	.81**	.26	.72**	.26	.06	.15	.02	.15
Anger[a] × age (YA vs. MA)	−.66*	.30	−.72*	.30	−.27	.17	−.29†	.17
Anger[a] × age (OA vs. MA)	−.49†	.26	−.52*	.26	−.29†	.15	−.32*	.15
Physiological activation[a]	-	-	.18	.24	-	-	−.07	.14
Pre-film anger	-	-	−.10	.11	-	-	−.11†	.06
Female gender	-	-	.52*	.21	-	-	.24†	.12
ΔR^2	.10**		.03†		.03		.03†	

Note. YA = Young adults. MA = Middle-aged adults (reference group). OA = Older adults.

[a]Self-reported anger and physiological activation in response to the emotionally-neutral, thematically-ambiguous film.

† $p < .10$.

* $p < .05$.

** $p < .01$.

Table 4

Sadness, Age, Sadness × Age, and Covariates as Predictors of Subjective Well-Being

	Satisfaction with life				Ratio of positive to negative affect			
	Step 1		Step 2		Step 1		Step 2	
	B	**SE(*B*)**	***B***	**SE(*B*)**	***B***	**SE(*B*)**	***B***	**SE(*B*)**
Sadness[a]	.26	.17	.34*	.17	.07	.10	.14	.10
Age (YA vs. OA)	.02	.26	.14	.27	−.14	.15	−.09	.15
Age (MA vs. OA)	−.74**	.27	−.63*	.26	−.05	.15	.00	.15
Sadness[a] × age (YA vs. OA)	−.57*	.27	−.61*	.27	−.30†	.15	−.31*	.15
Sadness[a] × age (MA vs. OA)	−.45†	.26	−.42	.26	−.10	.15	−.07	.15
Physiological activation[a]	-	-	.16	.24	-	-	−.07	.14
Pre-film sadness	-	-	−.22*	.11	-	-	−.20**	.06
Female gender	-	-	.47*	.21	-	-	.24*	.12
ΔR^2	.08**		.04*		.02		.07**	

Note. YA = Young adults. MA = Middle-aged adults. OA = Older adults (reference group).

[a]Self-reported sadness and physiological activation in response to the emotionally-neutral, thematically-ambiguous film.

†$p < .10$.

*$p < .05$.

**$p < .01$.