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## Getting better with age: The relationship between age, acceptance, and negative affect

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### Abstract

Although aging involves cognitive and physical declines, it is also associated with improved emotional well-being, particularly lower negative affect. However, the relationship between age and global negative affect, versus discrete negative emotions, and the pathways that link age to lower negative affect are not well understood. We hypothesize that one important link between age and lower negative affect may be acceptance of negative emotional experiences. The present study examined this hypothesis in a community sample of 21–73 year olds ( $N = 340$ ) by measuring acceptance and multiple indices of negative affect: trait negative affect; negative experiential and physiological reactivity to a laboratory stress induction; daily experience of negative affect; and trait negative affect six months after the initial assessment. Negative affect was measured using a discrete emotions approach whereby anger, anxiety, and sadness were assessed at each time point. Age was associated with increased acceptance as well as lower anger and anxiety (but not sadness) across measurement modalities and time points. Further, acceptance statistically mediated the relationship between age and anger and anxiety. These results are consistent with the idea that acceptance may be an important pathway in the link between age and lower negative affect. Implications of these results for understanding the nature of age-related decreases in discrete negative emotions are discussed.

### Keywords

aging; acceptance; negative affect; well-being; discrete emotions

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Most people do not await aging with great anticipation. Empirical studies demonstrate that aging is associated with physical and cognitive declines (Bromley, 1990; Frenkel-Brunswik, 1968; Levy, 1994; Schönknecht, Pantel, Kruse, & Schröder, 2005), suggesting that the trepidation about aging is justified. So, are we to conclude that aging is all bad news? A growing body of research offers evidence to the contrary: namely, that aging is associated with improved emotional well-being, most notably lower negative affect (for reviews, see Charles & Piazza, 2009; Cheng, 2004; Kunzmann, Little, & Smith, 2000; Mather & Carstensen, 2005).

Despite the growing consensus that aging is associated with lower negative affect, little is known about *how* aging may lead to this outcome. These correlates of aging are especially perplexing because some cognitive-control functions are thought to underlie successful

emotion regulation in younger adults (Ochsner & Gross, 2005). The fact that older adults appear to show declines in some forms of cognitive control (Nessler, Friedman, Johnson, & Bersick, 2007; see Verhaeghen, 2011 for a detailed discussion) that are involved in emotion regulation raises the puzzling question of just how older people may arrive at greater emotional well-being. To enhance our understanding of the factors that may contribute to age-related enhanced well-being, the present study examined acceptance as a potential link between age and lower negative affect.

Acceptance is defined as the process of deliberately and non-judgmentally engaging with negative emotions (Segal, Williams, & Teasdale, 2002). It is conceptualized as an active process that leads to greater emotional awareness and understanding, and is thus not the same as resignation (Segal et al., 2002). Acceptance is the opposite of avoiding negative emotion and has been shown to lead to lower negative affect, across experimental and clinical intervention studies (Campbell-Sills, Barlow, Brown, & Hofmann, 2006a; Ma & Teasdale, 2004; Twohig et al., 2010).

Acceptance is a particularly promising candidate to consider as a link between age and negative affect for three reasons. First, theoretical considerations and emerging empirical evidence suggest that acceptance of negative emotional experiences increases with age (Blanchard-Fields, 2007; Butler & Ciarrochi, 2007). Second, accepting negative experiences appears to causally contribute to lower negative affect (Campbell-Sills et al., 2006a; Twohig et al., 2010). Finally, acceptance, unlike many other emotion-regulation strategies, appears not to rely on cognitive functions that decline with age (Schloss & Haaga, 2011). Together, these considerations suggest acceptance may be a link between age and lower negative affect. The present study tested this hypothesis using a short-term, prospective, multi-method study design. An additional contribution of the present study is that negative affect was examined using a discrete emotion approach, thereby adding to our understanding of the precise nature of age-related decreases in negative affect.

## Age and Decreased Negative Affect

Multiple lines of research have demonstrated that age is associated with greater emotional well-being, particularly lower negative affect. For example, cross-sectional studies have shown that age is inversely related to the experience of negative affect (for reviews, see Charles & Carstensen, 2007; Charles & Piazza, 2009; Consedine & Magai, 2006; Kunzmann et al., 2000; Mather & Carstensen, 2005). This relationship holds even when controlling for key confounds such as stress, personality, and physical health (Mroczek & Kolarz, 1998). Longitudinal and experience sampling studies (which control for additional confounds such as retrospective and memory biases) have also demonstrated that age is associated with lower negative affect (Blanchard-Fields & Coats, 2008; Carstensen, Pasupathi, Mayr, & Nesselrode, 2000; Carstensen et al., 2011; Diener & Suh, 1998; Riediger, Schmiedek, Wagner, & Lindenberger, 2009; Stacey & Gatz, 1991; Windsor & Anstey, 2010). Further evidence for the relationship between age and negative affect comes from laboratory studies demonstrating that age is associated with lower negative experiential and physiological reactivity to laboratory emotion inductions (Labouvie-Vief, Lumley, Jain, & Heinze, 2003; Levenson, 2000; Tsai, Levenson, & Carstensen, 2000). Thus, considerable evidence from multiple methodological and measurement approaches supports a robust inverse relationship between age and negative affect. It is important to note that this does not imply that increasing age is (or should) be associated with the complete absence of negative affect. Rather, it is associated with more moderate levels of negative affect that characterize greater well-being (Diener, Suh, Lucas, & Smith, 1999) and lower risk for psychopathology (Gotlib & Joormann, 2010; Werner & Gross, 2010).

Several frameworks have suggested mechanisms to explain the relationship between age and negative affect, including rumination (Charles & Carstensen, 2008; Erskine, Kvavilashvili, Conway, & Myers, 2007), positive appraisals (Charles & Carstensen, 2008), selective attention and memory bias towards positive material (Charles, Mather, & Carstensen, 2003; Isaacowitz, Wadlinger, Goren, & Wilson, 2006), avoidance and passive coping (Birditt & Fingerman, 2005; Birditt, Fingerman, & Almeida, 2005; Blanchard-Fields, Stein, & Watson, 2004), and cognitive reappraisal (Diehl, Coyle, & Labouvie-Vief, 1996; Folkman, Lazarus, Pimley, & Novacek, 1987; Shiota & Levenson, 2009). However, to our knowledge, only positive appraisals and passive coping have been tested using mediation models, and neither of these were found to explain the relationship between age and negative affect (Birditt et al., 2005; Charles & Carstensen, 2008). Thus, despite some attention to the pathways by which age may be related to lower negative affect, the key question remains: *How* do people arrive at lower negative affect as they age? Next, we review evidence suggesting that increased acceptance may be a key link between age and lower negative affect, because a) age may be associated with increased acceptance, and b) increased acceptance is associated with lower negative affect.

### Age and Increased Acceptance

Several theoretical and empirical considerations suggest that acceptance of negative emotional experiences may be constant or even increase with age. First, acceptance seems not to rely on cognitive functions that generally decline with age such as working memory and processing speed (Craik & McDowd, 1987; Schloss & Haaga, 2011). Acceptance may therefore be an emotion regulation strategy that aging populations can rely on in the face of some cognitive declines.

Second, older individuals frequently encounter experiences that may foster the use of acceptance because they are beyond individuals' control. For example, older individuals experience more uncontrollable life events such as death of loved ones (Lang, 2001). Because acceptance is a strategy that may be easier to employ in the context of uncontrollable vs. controllable life events (e.g., loss; Bonanno, Wortman, & Nesse, 2004), higher levels of acceptance may be expected for older individuals.

Further theoretical support for the idea that age is associated with increased acceptance comes from the literature on wisdom. Wisdom has been defined as a knowledge system that governs the conduct and understanding of life (Baltes & Smith, 2008). A key component of wisdom is acceptance of uncertainty, unpredictability, and impermanence, and the negative emotions that often accompany these experiences (Ardelt, 2000). Provided that wisdom generally increases with age (Clayton, 1982; Grossmann, Na, Varnum, Park, Kitayama, & Nisbett, 2010; Tentori, Osherson, Hasher, & May, 2001), and that acceptance is a key component of wisdom, it seems likely that acceptance increases with age.

Preliminary empirical evidence is consistent with the idea that age is associated with increased acceptance. For example, older individuals demonstrate an increased willingness to experience unpleasant emotions related to physical and cognitive declines (Butler & Ciarrochi, 2007; Efklides, Kalaitzidou, & Chankin, 2003; Leung, Wu, Lue, & Tang, 2004). Additionally, older, compared to younger, adults have a tendency to use acceptance when faced with socio-emotional problems (Blanchard-Fields, 2007) and in the context of frustrating interpersonal conflicts (Charles & Carstensen, 2008). To our knowledge, however, very few studies have tested the relationship between age and acceptance. Still, theoretical considerations and the preliminary evidence reviewed above suggest that age is associated with increased acceptance.

## Acceptance and Decreased Negative Affect

Numerous studies have demonstrated an inverse relationship between acceptance and negative affect. For example, cross-sectional and prospective correlational studies indicate that the tendency to accept negative emotions is associated with lower negative affect (Kashdan et al., 2006; Shallcross et al., 2010). Moreover, randomized controlled trials that assign participants to interventions involving acceptance (e.g., Acceptance and Commitment Therapy, Dialectical Behavior Therapy, Mindfulness Based Cognitive Therapy) suggest that acceptance-based interventions causally contribute to lower negative affect (Linehan et al., 2006; Ma & Teasdale, 2004; Twohig et al., 2010). Finally, laboratory-based experimental studies that instruct participants to “experience [their] feelings fully and to not try to control or change them in any way” (e.g. Campbell-Sills et al., 2006a; Hofmann, Heering, & Asnaani, 2009) support that it is specifically acceptance that leads to lower negative affect. Several of these experimental studies have shown that acceptance lowers symptoms of panic (Eifert & Heffner, 2003; Feldner, Zvolensky, Eifert, & Spira, 2003; Levitt, Brown, Orsillo, & Barlow, 2004) and negative affect (Campbell-Sills et al., 2006a; Campbell-Sills, Barlow, Brown, & Hofmann, 2006b). Overall, the correlational, intervention, and experimental evidence suggests a robust and causal association between acceptance and lower negative affect.

The relationship between acceptance and lower negative affect may appear paradoxical at first glance: How is a strategy that involves *engaging with* negative emotions associated with the experience of *less* negative emotion? Acceptance is thought to decrease negative affect by two related processes: a) Presenting opportunities to acknowledge and understand negative emotions, which promotes self-compassion, psychological and behavioral flexibility (Hayes & Wilson, 2003; Kashdan, Barrios, Forsyth, & Steger, 2006); and b) Reducing rumination, negative cognitions, and meta-emotions (Segal et al., 2002; Simons & Gaher, 2005). Although engaging with negative emotions may initially increase one’s self-reported experience of these emotions (Campbell-Sills et al., 2006a; Hofmann, Heering, & Asnaani, 2009), approaching negative emotions in a non-evaluative way diffuses these emotions relatively quickly (Campbell-Sills et al., 2006a), via the mechanisms described above, and ultimately leads to less ‘net’ negative affect (Segal et al., 2002).

Taken together, theoretical considerations and empirical evidence converge on a model in which acceptance may be an important link between age and negative affect. This model holds promise for advancing our understanding of the inverse relationship between age and negative affect.

## Open Questions

Despite strong evidence for the association between age and negative affect, several open questions remain. First, the mechanism responsible for the relationship between age and negative affect remains unknown. Theoretical considerations and preliminary empirical evidence suggest that age may be associated with lower negative affect via increased acceptance. However, very little research to date has statistically tested whether age is related to acceptance or whether acceptance may link age and negative affect.

Second, relatively little is known about the relationship between age and discrete negative emotions such as anger, anxiety, and sadness because few studies of aging and negative affect have distinguished between these emotional states. Discrete negative emotions stem from distinct causes and are associated with distinct motivations and behavioral outcomes (e.g., Keltner & Gross, 1999). As such, discrete negative emotions, compared to negative affect more broadly, may show distinct relationships with age. For example, Charles and Carstensen (2008) examined the relationship between age and both sadness and anger. They

found that age was negatively related to anger but not sadness. Other studies have replicated that age is negatively associated with anger (Blanchard-Fields & Coats, 2008) but not sadness (Pearman, Andreoletti, & Isaacowitz, 2010). Although at least one study has found a positive relationship between age and sadness (Kunzmann & Gruhn, 2005), the pattern of results across several studies suggests that among discrete negative emotions age may be negatively associated with anger but not with sadness. This pattern is consistent with functional theories of emotion, whereby the goal of social connectedness, which becomes more important over the life-span (Carstensen, 1992), is hindered by anger, and perhaps anxiety, yet facilitated by sadness (Blanchard-Fields & Coats, 2008; Consedine, Magai, & Bonanno, 2002). As far as we know, age, anger, anxiety, and sadness have not been examined in the same study. Thus, the question remains: Is age differentially related to anger, anxiety, and sadness?

### The Present Research

The goals of the present study were to (a) examine the relationships between age, acceptance, and negative affect (specifically, anger, anxiety, and sadness); and (b) test whether the link between age and lower negative affect would be statistically mediated by acceptance. Such statistical mediation, though by itself is not indicative of a causal effect of aging or acceptance on negative affect (Lindenberger, von Oertzen, Ghisletta, & Hertzog, 2011), is an important step toward building a causal model of healthy aging. To examine these questions, we recruited a community sample and measured participants' experience of anger, anxiety, and sadness. Our sample allows our findings to generalize to a wide age range (21–73 years), across genders, and across levels of socioeconomic status.

To enhance the reliability and validity of our findings, a multi-method approach was used to assess anger, anxiety, and sadness at several time points. First, trait anger, anxiety, and sadness were assessed with two surveys six months apart (Time 1 and Time 4). Such repeated measures increase the reliability of results. Furthermore, examining negative affect at Time 4 offers understanding of the prospective relationship between age, acceptance, and negative affect. Second, anger, anxiety, and sadness reactivity to a laboratory stress induction was assessed (Time 2, one week after Time 1). This method minimizes recall bias and isolates emotional responding from the influence of daily events that may be confounded with age or acceptance. Additionally, in the same laboratory procedure, autonomic physiological reactivity was measured to provide an index of emotional responding unbiased by social desirability and limited introspection. Third, daily experience reports of anger, anxiety, and sadness were measured with 14 daily diaries (Time 3, beginning one day after Time 2). This method minimizes recall bias, enhances ecological validity, and provides a measure of anger, anxiety, and sadness that is less driven by personality, social identity, and self-concept than trait measures (Robinson & Clore, 2002).

To rule out the possibility that age is simply related to lower activation (arousal), rather than lower affective states, we also measured participants' experience of affectively neutral higharousal states (*attentive* and *alert*; "activation"). Additionally, to rule out the possibility that stress accounted for the relationships between age and acceptance or negative affect, we statistically controlled for recent life stress as a potential confound.

Based on theoretical support as well as emerging empirical evidence, we hypothesized that age would be negatively correlated with anger and anxiety but unrelated to sadness at all time points and measurement modalities. We further hypothesized that age would be positively correlated with acceptance, and that acceptance would statistically mediate the negative relationship between age and anger and anxiety.

## Methods

**Participants**—Participants ( $N = 340$ ) aged 21 to 73 years were recruited from the Denver metro area to complete this study as part of a larger research project, for which they received \$135. See Table 1 for demographic information. To enhance variance in the negative emotions under investigation, we recruited participants who had recently experienced a stressful life event. A stressful life event was defined to prospective participants as an event that had a significant impact on their lives and that had a distinct starting point within the past three months. Although all participants experienced a recent, acute, stressful life event, the relative impact of these events varied across participants such that there was a wide distribution of perceived stress across the sample.

**Procedure**—Data were collected at four time points. Informed consent was maintained throughout the study and all procedures were approved by the University of Denver Institutional Review Board.

At Time 1 (T1), participants completed measures of demographics, trait acceptance, trait negative affect, and trait activation.

At Time 2 (T2) (within one week of T1), participants completed a laboratory session in which experiential negative reactivity and physiological reactivity were measured in response to a standardized stress induction known to induce various negative emotions including anger, anxiety, and sadness (Moons, Eisenberger, & Taylor, 2010) and physiological stress responses (Dickerson & Kemeny, 2004; Kirschbaum, Pirke, & Hellhammer, 1993). Participants first watched a two-minute neutral film clip to establish an emotional baseline and then rated their emotional reactions to the clip. They were then told that they had to give a speech on their qualifications for a new job while being video recorded. They were given two minutes to prepare for the speech. We examined this anticipatory period because physiological responding during this period has been shown to be equally if not more pronounced than during the actual speaking task (Hassan et al., 2009; Waugh, Panage, Mendes, & Gotlib, 2010). In addition, the anticipatory stress period offers the advantage of less confounding by somatic movement (Davis, 1997; Levenson, 1979). We therefore primarily examined the anticipatory stress period, and will henceforth refer to it as the “stress induction.” After the stress induction, participants again rated their emotional experiences. Skin conductance level, a physiological index of emotional arousal, was collected throughout the procedure. The attrition rate from T1 to T2 was 17%.

At Time 3 (T3) (starting one day after T2), participants reported daily affect over the course of 14 days using daily dairies. Participants were asked to complete the dairies each evening, before they went to bed, and to mail back the packet of dairies when the 14 days were complete. Participants aged 61–73 did not complete this portion of the study. Of the people who returned the dairies, 54 % completed all 14 daily dairies, 98% completed at least 10 daily dairies, and all but one participant completed at least 7 days. The attrition rate from T1 to T3 was 28%.

At Time 4 (T4) (six months after T1), participants completed a follow-up internet survey that measured trait negative affect (cumulative attrition rate from T1 to T4 = 29%).<sup>1</sup>

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<sup>1</sup>To verify that attrition was not systematically related to any of our study variables, we created three dummy variables denoting whether each participant had completed (= 1) or not completed (= 0) T2, T3, and T4. These variables were not correlated with any index of negative affect or affective reactivity. Therefore, we did not examine attrition further.

## Measures

**Acceptance:** Acceptance was assessed using the acceptance subscale of the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004), which measures the degree to which individuals non-judgmentally engage with emotional experiences. The subscale includes nine items such as: ‘I tell myself I shouldn’t be feeling the way that I’m feeling’ and ‘I think some of my emotions are bad or inappropriate and I shouldn’t feel them’ (reverse scored) ( $\alpha = .89$ ) rated on a scale of 1 (*very rarely true*) to 5 (*very often true*). This measure has been shown to have a clear factor structure, good internal consistency, clear convergent validity, and high test-retest reliability (Baer et al., 2004; Baum et al., 2010) and has been widely used to assess acceptance (Kingston, Chadwick, Meron, & Skinner, 2007; Luberto, McLeish, Zvolensky, & Baer, 2011; Owens, Walter, Chard, & Davis, 2012). Items within the acceptance subscale have been shown to consistently load onto a single “acceptance” factor in exploratory as well as confirmatory factor analyses (Baer et al., 2004). Further, the measurement structure of the acceptance subscale was invariant across age groups.<sup>2</sup>

**Trait negative affect:** Trait anger was assessed at two time points (T1 and T4) by asking participants to what extent they generally feel *angry* and *irritable* ( $\alpha = .77$  at T1;  $\alpha = .78$  at T4). Trait anxiety was assessed at the same two time points by asking participants to what extent they generally feel *nervous* and *jittery* ( $\alpha = .74$  at T1;  $\alpha = .77$  at T4). Trait sadness was assessed at the same two time points by asking participants to what extent they generally feel *sad* and *distressed* ( $\alpha = .75$  at T1;  $\alpha = .81$  at T4). All responses were given using a scale of 1 (*not at all*) to 5 (*extremely*).

To index prospective trait negative affect, we created variables measuring T4 trait negative affect, while controlling for T1 trait negative affect. This ensures that the relationships between age, acceptance, and T4 trait negative affect are not solely being driven by T1 trait negative affect. To do this, standardized residuals were computed in three regressions between T1 trait negative affect (anger, anxiety and sadness) as the predictor variable and T4 trait negative affect (anger, anxiety and sadness) as the criterion variable. These residuals – representing the magnitude of prospective trait negative affect separate from initial trait negative affect – were used in all prospective analyses.

**Affective reactivity:** Affective reactivity was indexed using self-reported experience of negative affect and physiological responding to a laboratory stress induction.

**Negative experiential reactivity:** Anger reactivity was assessed by asking to what extent participants felt *angry* and *contemptuous* after watching the neutral film clip ( $\alpha = .46$ ) and after completing the laboratory stress induction ( $\alpha = .76$ ). Anxiety reactivity was assessed by asking to what extent participants felt *anxious* after watching the neutral film clip and after completing the laboratory stress induction. Sadness reactivity was assessed by asking to what extent participants felt *sad* and *hopeless* after watching the neutral film clip ( $\alpha = .85$ )

<sup>2</sup>To verify that the measurement structure is invariant across age groups, we conducted multi-group confirmatory factor analysis across three age groups (21–35 years; 36–49 years; 50–73 years--the youngest, middle, and oldest aged individuals in our sample). These analyses were performed using AMOS 20.0 software. First, we established configural invariance of the scale by demonstrating that the confirmatory factor model fit well for each of the three groups (all CFI’s  $\geq .98$ , all RMSEA’s  $< .07$ , all  $\chi^2$ s  $< 24$ ,  $ps > .08$ ) (Kline, 2005; Pedhazur & Pedhazur-Schmelkin, 1991). Next, we tested the equality of factor loading across the three groups. Specifically, the factor loadings were constrained across groups, and the chi-square for this model was compared to the chi-square for the model where all factor loadings are allowed to vary across groups (Byrne, 2004). Comparison of these two models revealed that the constrained model was not significantly worse than the unconstrained model ( $\Delta\chi^2(19) = 19.6$ ,  $p = .24$ ), indicating that item loadings do not differ across the three age groups. Thus, the model demonstrated weak factorial invariance – the level of invariance that is necessary for studies of structural associations among the variables (Meredith, 1964).

and after completing the laboratory stress induction ( $\alpha = .72$ ). All responses were given using a scale of 1 (*not at all*) to 9 (*extremely*).

To index negative experiential reactivity, a difference score was computed between the ratings reported at baseline and those reported after the stress induction. A separate reactivity difference score was computed for anger, anxiety, and sadness. To further control for the potential confounding nature of the baseline affective state, standardized residuals were computed in three regressions with baseline negative affect (anger, anxiety, sadness) as the predictor variable and the difference score between negative affect (anger, anxiety, sadness) during the stress induction and negative affect during baseline as the criterion variable (Waugh et al., 2010). These residuals – isolating the effect of the stress induction on affective responses – were used in all analyses involving affective reactivity.

**Physiological reactivity:** Physiological reactivity was indexed by skin conductance level (SCL), an index of negative affective reactivity (e.g., Mauss & Robinson, 2009). SCL was measured using a constant-voltage device that passed 0.5 V between Beckman electrodes (using an electrolyte of sodium chloride in Unibase) attached to the palmar surface of the first and second fingers of the nondominant hand. During the experimental session, SCL was sampled continuously at 1000 Hz using a BIOPAC recording system. Afterward, customized analysis software (Wilhelm, Grossman, & Roth, 1999) was used for data reduction, artifact control, and computation of average SCL scores for the 2-minute neutral film clip and the 2-minute speech preparation time for each participant.

To index SCL reactivity, a difference score was computed between SCL at baseline (during the 2-minute neutral film clip) and SCL during the 2-minute stress induction, as has been done in prior studies (Troy, Wilhelm, Shallcross, & Mauss, 2010). To further control for the potential confounding nature of baseline physiological responding (e.g., Mendes, Blascovich, Lickel, & Hunter, 2002), standardized residuals were computed in a regression with baseline SCL as the predictor variable and the difference score between SCL during the stress induction and SCL during baseline as the criterion variable (Waugh et al., 2010). This residual – isolating the effect of the stress induction on SCL – was then used as the criterion variable in a final regression, with somatic movement during the stress induction as the predictor variable. This final variable – controlling for the effects of baseline SCL and somatic movement – was used in the analyses involving SCL reactivity.<sup>3</sup>

**Daily negative affect:** Daily negative affect was assessed across 14 consecutive days by asking to what extent participants felt various negative emotions *within the last 24 hours* on a scale of 1 (*not at all*) to 5 (*extremely*). Daily anger was assessed using ratings of *angry* and *irritable*; each item was averaged across the 14 days ( $\alpha_s = .74 - .79$ ) and then averaged together ( $\alpha = .85$ ) to create a composite score. Daily anxiety was assessed using ratings of *nervous* and *worried*; each item was averaged across the 14 days ( $\alpha_s = .88 - .89$ ) and then averaged together ( $\alpha = .88$ ) to create a composite score. Daily sadness was assessed using ratings of *sad* and *distressed*; each item was averaged across the 14 days ( $\alpha_s = .88 - .89$ ) and then averaged together ( $\alpha = .88$ ) to create a composite score.

**Individual differences:** To evaluate the discriminant validity of our measure of acceptance, we measured two individual difference variables at T1 that may be correlated with acceptance.

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<sup>3</sup>When somatic movement is not controlled for, the relationships between physiological reactivity, age and acceptance all remain significant. We continued to control for somatic movement in our analyses because it is an important potential confounding variable that varies with age (correlation between age and movement during the speech preparation time,  $r = -.16$ ,  $p = .009$ ).



**Neuroticism:** Neuroticism was measured using the 10-item neuroticism subscale of the International Personality Item Pool (IPIP; Goldberg, 2005) ( $\alpha = .91$ ).

**Optimism:** Optimism was measured using the 10-item (including 4 filler items) Life Orientation Scale (LOT; Scheier & Carver, 1985) ( $\alpha$  of 6 “true” items = .86).

### Control variables

**Stress:** Stress was measured using the Life Experiences Survey (LES; Sarason, Johnson, & Siegel, 1978), a widely used measure of stress (e.g., Herrington, Matheny, Curlette, McCarthy, & Penick, 2005). The LES consists of 45 items assessing a wide range of life events such as marriage and death of a partner. For each item, participants indicated if a particular event had occurred within the previous 18 months, and the impact of each event that they experienced by rating it on a 7-point scale ( $-3 = \textit{extremely negative}$ ,  $0 = \textit{no impact}$ ,  $+3 = \textit{extremely positive}$ .) The negative impact of stressful life events was used as the measure of interest because negative events are better predictors of emotional well-being than positive events (e.g., Sarason, Sarason, Potter, & Antoni, 1985). A cumulative negative impact score was calculated by summing all impact ratings of negatively rated stressful life events. Summed scores were then reverse coded, so that a higher score denoted greater stress.

Participants in the study reported experiencing a wide range of events prior to enrolling in the study, including (but not limited to) job loss or severe financial hardship (4%), death or serious illness of a loved one (19%), and divorce or separation (6%). The cumulative stress impact ratings ( $M = 3.90$ ,  $SD = 1.28$ ) was correlated with acceptance,  $r = -.31$ ,  $p < .001$ , and all indices of trait (T1, T4), daily (T3) and prospective (T4, controlling for T1) negative affect,  $r_s > .21$ ,  $p_s < .001$ . Because stress was therefore a potential confound, overall cumulative stress impact was controlled for in our analyses.

To control for this potential confound, standardized residuals were computed in a series of regressions with stress as the predictor variable and each of the outcomes as criterion variables: age, acceptance, and trait, daily, and prospective negative affect. These residuals – isolating the magnitude of negative affect separate from the effect of stress – were used in all analyses involving trait, daily, and prospective affect. Results remain comparable when not controlling for stress; however, given the rationale for controlling for this confounding variable, all analyses reported hereafter will partial out the effect of stress.<sup>4</sup>

**Social anxiety:** Because reactivity to stress was assessed with a public speaking task, it was important to measure and control for intense social anxiety, as people who experience extreme social anxiety may be qualitatively different from than the normative sample we recruited. Social anxiety was assessed using the social subscale of the Anxiety Screening Questionnaire (ASQ; Wittchen & Boyer, 1998). The subscale includes 16 items such as “In the past six months, did you worry a lot about embarrassing yourself in front of others?” ( $\alpha = .93$ ) rated with a “yes” or a “no.” The number affirmative responses were summed.

Given the potentially confounding nature of extreme levels of social anxiety in the context of a speech stressor (Beidel, Turner, & Dancu, 1985), participants who scored 2.5 standard deviations above the mean on social anxiety symptoms ( $n = 5$ ) were excluded from the analyses related to the stress induction (i.e., affective reactivity).<sup>5</sup>

<sup>4</sup>To reduce the effect of outliers on our analyses, scores for all variables that were outside the range defined by the whiskers in Tukey’s (1977) box plot (i.e., scores that were 1.5 times the interquartile range below the 25th percentile or above the 75th percentile) were adjusted to fall within that range.

## Trait activation

Trait activation was assessed at T1 by asking participants to what extent they typically feel *alert* and *attentive* on a scale of 1 (*not at all*) to 5 (*extremely*). These two items were averaged for each person ( $\alpha = .85$ ).

## Results

### Descriptive Statistics

See Table 2 for all descriptive statistics for negative affect and affective reactivity. See Table 3 for correlations among the measures of negative affect.

### Age, Acceptance, and Negative Affect

As summarized in Table 2 and as predicted, age was positively correlated with acceptance. With regard to cross-sectional trait affect (T1), age was negatively correlated with trait anger and anxiety but not trait sadness. With regard to affective reactivity to the laboratory stress induction (T2), age was negatively correlated with anger, anxiety, and physiological reactivity but not sadness reactivity. With regard to daily reports of affect (T3), age was negatively correlated with daily anger and anxiety but not daily sadness. With regard to prospective trait affect (T4 trait affect controlling for T1 trait affect), age was negatively correlated with prospective trait anxiety but not with prospective anger or sadness. Thus, as predicted, age was associated with lower anger and anxiety but not sadness across time points and measurement modalities. Furthermore, acceptance was significantly associated with all measures of negative affect and affective reactivity except for sadness reactivity.

### Acceptance Statistically Mediates Age-Related Decreases in Negative Affect

We predicted that acceptance would account for age-related decreases in negative affect. To test this prediction, we used statistical mediation models following the procedures outlined by Baron and Kenny (1986).<sup>6</sup> As summarized in Figure 1 and Table 2, results were generally consistent with the prediction. Acceptance statistically mediated links between age on the one hand and cross-sectional trait anger (T1; Panel A), cross-sectional trait anxiety (T1; Panel B), anger reactivity (T2; Panel C), anxiety reactivity (T2; Panel D), physiological reactivity (T2; Panel E), daily anger (T3; Panel F), and daily anxiety (T3; Panel G)<sup>7</sup> on the other hand. Acceptance marginally mediated the link between age and prospective trait anxiety (T4 controlling for T1; Panel H),  $p$  of Sobel's  $z = .054$ . Full mediation was found for all measures except physiological reactivity and prospective trait anxiety, where acceptance was a partial mediator. The correlation between age and prospective trait anger was not significant; therefore, statistical mediation was not feasible. Similarly, age and sadness (at all time points and measurement modalities) were not associated with one another; therefore, statistical mediation was not feasible for sadness.

<sup>5</sup>When the five people who are highly socially anxious are screened out of all analyses (other than those involving reactivity to the speech), the pattern of results remains the same.

<sup>6</sup>To adjust for multiple comparisons, a Bonferroni correction was employed for the regression analyses in each statistical mediation model.

<sup>7</sup>Given this paper's focus on average levels of negative affect (and not necessarily change in negative affect over the two weeks of diaries), multilevel modeling was not necessary to test our hypotheses. Nonetheless, we also examined our model within the multilevel framework, where daily negative affect was predicted by daily stress, age, and acceptance (Raudenbush, Byrk, & Congdon, 2011). Results for this model were identical to those found using across-time average values of negative affect: (a) age predicted lower anger and anxiety, but not sadness, even when controlling for stress, (b) acceptance predicted lower anger, anxiety and sadness (c) when age and anxiety were entered as simultaneous predictors of anger and anxiety, only acceptance remained a significant predictor.

## Age and Activation

Some theories and empirical evidence suggest that old age is associated with diminished experience of high-activation states (Cacioppo, Berntson, Bechara, Tranel, Hawley, in press; Levenson, Carstensen, Friesen, & Ekman, 1991). In light of our results showing age to be related to lower anger and anxiety (both high-activation emotions) but not sadness (a low-activation emotion), it was important to rule out the alternative hypothesis that our results were due to general blunting of high-activation emotions in older age. To do so, we measured trait activation using a composite of “alert” and “attentive” (two high-activation states) from the Positive and Negative Affect Schedule (PANAS: Watson, Clark, & Tellegen, 1988). In secondary analyses, we examined whether this measure of trait activation was correlated with age. Our results indicate that age was associated with increased activation ( $r = .12, p = .024$ ). Thus, although older adults were less likely to experience anger and anxiety, they were not simply less likely to experience all high-activation states. This is in line with the idea that it is specifically the negative emotions of anger and anxiety that are diminished with increasing age.<sup>8</sup>

## Discussion

Although aging is frequently accompanied by physical and cognitive declines, getting older is not all bad news. Perhaps most notably, increased age is associated with lower negative affect (Charles, Reynolds, & Gatz, 2001; Gross et al., 1997). Few studies, however, have taken a discrete-emotions approach to understanding the precise nature of the relationship between age and negative affect, and even fewer studies have examined *how* age might be linked to lower negative affect. The present research assessed the hypothesis that age is negatively associated with anger and anxiety but not sadness. In addition, we tested the hypothesis that acceptance may be an important link between age on the one hand and anger and anxiety on the other hand. These hypotheses were assessed in a community sample of 21–73 year-olds. Anger, anxiety, and sadness were measured using a multi-method approach that included assessments of cross-sectional trait affect, negative experiential and physiological reactivity to a laboratory stress induction, daily experience reports, and prospective trait affect measured six months after the initial assessment.

### Age and Discrete Negative Emotions

The present study examined whether age is associated with decreases in specific negative emotions. Results largely confirmed our hypotheses. Age was related to anger and anxiety, but not to sadness. Three features of our results enhance the reliability and validity of these findings. First, the present results converge with other studies demonstrating that age is associated with less anger but is not associated with sadness (Charles & Carstensen, 2008; Pearman et al., 2010).

Second, the same pattern of results between age and each negative emotion (decreases in anger and anxiety and no relationship between age and sadness) emerged across almost all measurement modalities and time points: cross-sectional, negative experiential, daily experience assessments, and prospective. The finding that age was inversely associated with

<sup>8</sup>The overall pattern of results remained the same when controlling for initial levels of trait activation in the correlations between age, acceptance and negative affect. While controlling for trait activation, all correlations between acceptance and negative affect that were originally significant remain significant ( $r_s > -.14, p_s < .031$ ) and all correlations between age and negative affect that were originally significant either remain significant or are marginally significant. Specifically, when controlling for trait activation, age is correlated with T1 trait anger,  $r = -.11, p = .045$ , T1 trait anxiety,  $r = -.12, p = .024$ , T2 experiential anger reactivity,  $r = -.12, p = .049$ , T2 experiential anxiety reactivity,  $r = -.09, p = .117$ , T2 physiological reactivity,  $r = -.18, p = .006$ , T3 daily anger,  $r = -.12, p = .06$ , T3 daily anxiety,  $r = -.11, p = .076$ , T4 trait anxiety,  $r = -.17, p = .008$ , and T4 (controlling for T1) prospective trait anxiety,  $r = -.16, p = .012$ . The marginally significant results may be explained by the fact that the measure of activation (alert and attentive) is correlated with our measure of acceptance ( $r = .25, p < .001$ ).

physiological reactivity, in particular, further substantiates the present results because skin conductance level (SCL) has been found to correlate with anger and anxiety but not sadness (Bradley, Silakowski, & Lang, 2008; Cacioppo, Berntson, Larsen, Poehlmann, & Ito, 2000; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). Thus, age-related decreases in SCL provide some objective support for age-related decreases in self-reported anger and anxiety.

Finally, because age was positively related to high-activation states (*alert* and *attentive*), the differential effects of age on anger and anxiety (both high-activation emotions) versus sadness (a low activation emotion) are not simply driven by decreases in high activation states. Although older adults are less likely to experience anger and anxiety, they are not less likely to experience *all* activated states.

The convergence of our results with other studies, the consistency of our results across measurement modalities and time points, and the fact that important alternative hypotheses were ruled out, suggest that anger and anxiety decrease with increasing age but sadness does not. Why might this be the case? One possibility is that with increasing age, people experience less anger and anxiety because these emotions are physiologically and psychologically more costly than sadness (Clark & Watson, 1994; Consedine et al., 2002). This explanation, however, is rendered somewhat less likely because activation (presumably a 'costly' state) was controlled for in our analyses.

A second, and perhaps more plausible, explanation is that discrete emotions are functional to different degrees across the lifespan (Consedine & Magai, 2006; Keltner & Gross, 1999). For example, with increasing age, anger and anxiety may not be useful and may even be counter-productive in facilitating goals that become increasingly salient over the lifespan, such as cultivating close relationships and maintaining social connectedness (Brandstädter & Rothermund, 2002; Carstensen, Isaacowitz, & Charles, 1999; Heckhausen, Wrosch, & Schulz, 2010). Sadness, on the other hand, may be a more functional emotion as individuals age because it enhances the prospects of emotional intimacy by evoking sympathy from others and by communicating a need for support (Izard, 1993; Lazarus, 1991). This raises the question, however: Why wouldn't older adults then experience *more* sadness than younger individuals? After all, in addition to sadness facilitating meaningful goals for them, older individuals tend to experience more uncontrollable life events, such as death, more frequently than younger adults (Lang, 2001). As discussed in the next section, older adults are more likely to use acceptance. This skill may decrease levels of sadness to remain on par with those of younger individuals. Thereby, net levels of sadness remain constant across age groups.

While the present study cannot offer definitive explanations for the differential correlations between age on the one hand and anger, anxiety, and sadness on the other hand, the functionalist explanation is consistent with the present pattern of results. Regardless, further research on the relationship between age and reactivity to discrete emotions is needed.

### **Age, Acceptance, and Negative Affect**

Although several studies have demonstrated that age is associated with decreased negative affect, little is known about how getting older may lead to lower negative affect. The present study provides insight into how emotional well-being might be enhanced with age. Based on theoretical considerations, we argued that acceptance is a plausible link in the relationship between age and negative affect. Overall, results were consistent with our predictions. Across measurement modalities (i.e., trait assessments, experiential and physiological responding to a laboratory stress induction, and daily diaries), acceptance statistically mediated the relationship between age on the one hand and anger and anxiety on the other hand.

Additional support comes from the prospective analyses whereby acceptance partially mediated the relationship between age and anxiety measured six months after acceptance, while controlling for initial levels in trait anxiety. These results point to a directional model whereby age-related increases in acceptance contribute to decreased anxiety. Thus, acceptance may play a protective role in helping older individuals decrease anxiety. However, the indirect effect of age on prospective trait anxiety (T4 controlling for T1) was marginal,  $p$  of Sobel's  $z = .054$ , and thus should be interpreted with caution.<sup>9</sup> It should also be noted that the relationship between age and prospective trait anger (controlling for T1 anger) was not significant. It is possible that prospective anger is less influenced by acceptance than prospective anxiety. However, given that the direction of the effect is similar, comparable effects (between age and prospective anger and anxiety) might emerge under conditions more conducive to evoking anger. Ultimately, prospective links between age, acceptance, and well-being need to be further explored in future research.

The finding that acceptance statistically mediates the relationship between age and negative affect makes an important contribution to theories about healthy aging. Several theories argue that age-related increases in emotional well-being are due to improved emotion regulation (Charles & Carstensen, 2008). However, little empirical evidence to date has been garnered in support of these arguments (Isaacowitz & Blanchard-Fields, 2012), and the present findings fill this gap. The fact that cognitive-control functions (some of which decrease with age) underlie some of the most adaptive forms of emotion regulation (Kensinger & Leclerc, 2009; Urry, van Reekum, Johnstone, & Davidson, 2009) raises a question about which types of emotion regulation may be enhanced with age (Shiota & Levenson, 2009; Urry & Gross, 2010). Importantly, acceptance appears not to rely on cognitive functions (Schloss & Haaga, 2011). Therefore, it may be a particularly viable emotion-regulation strategy for older individuals while also promoting emotional well-being. Overall, although results from the present study do not offer causal evidence, they are an important first step toward helping to clarify how age is associated with lower negative affect. Acceptance of negative emotional experiences appears to be a strategy that increases with age and that adults across the life span can rely on to enhance emotional well-being.

Although acceptance is one type of emotion regulation that appears to account for the relationship between age and lower negative affect, other emotion regulation strategies may additionally be involved. Future studies that formally test other possible strategies such as positive appraisals will complement our findings and are necessary to fully understand how older adults experience decreased negative affect.

Our results converge with the theory that age is associated with increased wisdom (Baltes & Smith, 2008; Clayton & Birren, 1980). Specifically, they provide support about particular aspects of wisdom that are enhanced with age and why this might be the case. For instance, our findings are in line with the idea that acceptance is a product of uncertainty, unpredictability, and impermanence, which are encountered over the life-span. Acceptance, therefore, may be a crucial component of wisdom that leads to better emotional well-being.

Findings from the present research also have important clinical implications. For example, results offer further support for the notion that acceptance is associated with psychological benefits and may be a useful therapeutic component of interventions aimed at treating psychological disorders (e.g., Segal et al., 2010; Twohig et al., 2010). Moreover, the positive relationship between age and acceptance suggests that interventions aimed at increasing

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<sup>9</sup>Acceptance partially and significantly mediated the link between age and T4 anxiety when not controlling for T1 anxiety (see Table 2). The diminished indirect effect of age via acceptance on prospective trait anxiety (T4 when controlling for T1) may thus be due to loss of power.

acceptance may be particularly viable for older individuals with cognitive decline or for individuals with impaired executive functioning.

The conclusion that age and acceptance are associated with lower negative affect – and that this is adaptive – might at first glance seem at odds with functionalist accounts, which hold that negative affect has important functions, including to signal when action is needed to address problems (Carver & Scheier, 1990; Clore, Gasper, Garvin, 2001; Ford & Tamir, 2012; Mauss & Tamir, in press). It would thus not be desirable to completely rid human life of negative affect. The present research is consistent with this notion. First, conceptually, the goal of acceptance is *not* to reduce negative affect but rather to change one's relationship with negative affect by engaging with all emotional experiences (including negative ones) in a non-judgmental way. A key principle of acceptance is that affect (positive or negative) should not be avoided because affective states are functional (e.g., they promote emotional intelligence, wisdom, and adaptive responding; Hayes et al., 2006; Williams, Teasdale, Segal, & Kabat-Zinn, 2007). Consistent with this idea, acceptance is associated with initial increases in one's experience of negative emotion (Campbell-Sills et al., 2006a; Hofmann, Heering, & Asnaani, 2009). However, approaching negative emotions in a non-judgmental way diffuses these emotions relatively quickly (Campbell-Sills et al., 2006a) and ultimately leads to less 'net' negative affect (Segal et al., 2002). Thus, decreased 'net' levels of negative affect are a somewhat paradoxical consequence of acceptance. Second, in our data, age and acceptance are not associated with complete absence of negative affect, but rather with more moderate levels of negative affect that characterize greater well-being (Diener et al., 1999), lower risk for psychopathology (Gotlib & Joormann, 2010; Werner & Gross, 2010). In addition, age was not associated with lower sadness, which may, as discussed above, point to a specific function of sadness versus anger or anxiety in older age. In sum, the present conclusions are consistent with functionalist accounts of negative affect.

### Distinguishing Acceptance from Other, Related Constructs

As a relatively new measure, it is important to distinguish acceptance from established constructs in the personality and life-span development literature. Below, we address how acceptance is distinct from several key personality and life-span development constructs.

**Personality constructs**—Acceptance appears to be distinct from neuroticism and optimism for several reasons. First, neuroticism, which is defined as the tendency to experience negative emotional states, self-doubt, and worry (Scheier, Carver, & Bridges, 1994), is conceptually distinct from acceptance, the process of deliberately and non-judgmentally engaging with negative emotions. Empirically, acceptance is related to neuroticism ( $r = -.46$  in our sample). Given the anticipated negative relationship between acceptance and negative affect (a large component of neuroticism), this is not surprising. However, neuroticism appears to be distinct from acceptance. For example, subtracting the amount of variance accounted for by the relationship between acceptance and neuroticism ( $.46^2$ ) from the acceptance measure's alpha coefficient (.89) shows that 68% of the variance in acceptance is independent of neuroticism. Comparable arguments and findings have been provided in other research on the relationship between acceptance and neuroticism (e.g., Baer et al., 2004). Thus, acceptance appears to be related to but distinct from neuroticism.

Second, acceptance is conceptually different from optimism. Optimism is the tendency to hold positive expectancies for the future and to experience low levels of negative affect (Scheier, Carver, & Bridges, 1994), while acceptance does not involve expectation. Empirically, acceptance is related to optimism ( $r = .39$  in our sample). Provided the overlap between optimism and lower negative affect and the relationship between acceptance and lower negative affect, this correlation is not surprising. However, using the same procedure

described above, 74% of the systematic variance in acceptance is independent of its relationship with optimism.

Thus, although personality measures such as neuroticism and optimism are empirically related to acceptance, acceptance is unique and conceptually distinguishable from these constructs.

**Life-span development constructs**—Acceptance may appear to be closely aligned with constructs such as habituation, passive acceptance (as discussed by Blanchard-Fields (2007)), appraisals (as discussed by Lazarus (1991)) and positivity bias (as discussed in Carstensen's socio-emotional selectivity theory (Carstensen, 1992)). However, while acceptance may be related to each of these constructs, it has unique features that warrant considering it as a distinct construct.

First, habituation is conceptually distinct from acceptance. For example, habituation is a relatively automatic and effortless process (Irwin, Huber, & Winkelman, 2010), whereas acceptance is understood to be an active and deliberate process of engaging with emotions (Hayes, Luoma, Bond, Masuda, & Lillis, 2006).

Second, Blanchard-Fields uses the term “passive acceptance” in juxtaposition with active coping strategies that focus on changing a situation. Thus, Blanchard-Fields' use of “passive acceptance” refers to acceptance of a situation whereas acceptance as it is conceptualized here and by others (Hayes et al., 2006; Williams et al., 2007) refers to emotion. While Blanchard-Fields' passive acceptance or “letting a situation be” (which is associated with adaptive functioning and increases with age) converges with the way we and others conceptualize acceptance of negative emotional experiences (“letting emotions be”), accepting one's situation and accepting one's emotions differ in crucial ways, including in their presumed effects on emotional experiences. As well, accepting one's emotions does not imply accepting the situation that caused the emotions. Further research is necessary to determine the relationship between acceptance of situations and acceptance of emotions.

Third, acceptance appears to be conceptually and empirically distinct from initial appraisals of a stimulus. Conceptually, acceptance is considered an adaptive strategy that is deployed once an emotion is experienced and after the “initial appraisal” of a stimulus. Thus, acceptance, as it is conceptualized in the literature, does not appear to operate at the level of initial appraisal. Rather, acceptance operates on the emotion after it has begun. Empirical support for the distinction between acceptance and initial appraisals is substantiated by our measure of acceptance. The KIMS measure of acceptance indexes the degree to which individuals non-judgmentally engage with emotions, as opposed to their initial appraisals of a stimulus. For example, the item “I tell myself that I shouldn't be feeling the way that I am feeling” references the evaluation of an emotion that has already unfolded and thus does not appear to measure initial appraisals of stimuli.

Finally, acceptance appears to be distinct from positivity bias as described in Carstensen's socioemotional selectivity theory (SST). Although acceptance is associated with positive emotional outcomes, it is not conceptualized as a positivity bias because the goal of acceptance is not to enhance positivity. This, however, does not preclude the notion that older adults who are high in acceptance may exhibit a positivity bias in a laboratory setting. Nor does it preclude that older adults are motivated to use acceptance, a strategy that (especially after years of practice) could be recognized to be associated with lower negative affect. For these reasons, we do not see our findings as contradictory to SST. However, further research is necessary to determine whether acceptance is associated with a positivity

bias and whether individuals indeed exhibit increased motivation to use acceptance as they age, as might be expected under SST.

Overall, despite some overlap between acceptance and each of the constructs above, on theoretical and empirical grounds it appears that acceptance is a unique process that, although underrepresented in the aging literature, may help explain the inverse relationship between age and negative affect.

### Limitations and Future Directions

This study was designed to examine an important link in the inverse relationship between age and discrete negative emotions. Several limitations of the current study merit further investigation.

First, because our study was short-term longitudinal (across six months), cohort effects cannot be ruled out. For example, some research points to potential generational changes in acceptance such that today's younger adults may not show increases in acceptance as they age (Twenge & Campbell, 2010). Long-term longitudinal studies are of course time- and cost-intensive and cannot rule out period effects (i.e., environmental influences such as social change; Rentz & Reynolds, 1981). Thus, the present design is an important first step in examining possible mechanisms underlying age-related improvements in emotional well-being. Still, future longitudinal studies that control for cohort and period effects are needed to more fully examine the links between aging, acceptance, and emotional well-being.

A second limitation concerns our mediational analyses. As noted by Lindenberger and colleagues (Lindenberger et al., 2011) and by Maxwell and Cole (2007), cross-sectional data offer limited answers to questions about mechanisms underlying age-related changes. Our study design does not allow for advanced modeling that accounts for change over time in each of our variables. Therefore, by themselves our results cannot support acceptance as a developmental mechanism (i.e., one caused by increasing age) or allow for conclusions about the causal relationships between age, acceptance, and negative affect. Our results support patterns of relationships between age, acceptance, and negative affect and imply statistical mediation only. However, three considerations temper this limitation. First, although most of our results are based on cross-sectional data, our study design is not entirely cross-sectional. For example, we report prospective outcomes (negative affect measured six months after age and acceptance). Second, our results replicate across a wide range of methods, including daily diaries and physiological measures, which control for important confounds such as recall bias and social desirability. Third, our data converge with evidence from longitudinal and experimental designs that support causal inferences. For example, reputable longitudinal and experimental studies have provided strong support for causal relationships between aging and negative affect (Carstensen et al., 2011; Charles et al., 2001; Mroczek & Kolarz, 1998) and between acceptance and negative affect (Campbell-Sills et al., 2006a; Eifert & Heffner, 2003; Feldner et al., 2003). Thus, while our mediational results must be interpreted with caution, the pattern of correlations presented here, together with converging evidence from longitudinal and experimental studies, offers novel, meaningful, and theoretically supported evidence for the relationships between age, acceptance, and negative affect. Thus, the present research lays the groundwork for future investigators to safely invest in longitudinal cohort studies that can address causal relationships between age, acceptance, and negative affect.

A third limitation is that the age range in this study was restricted to 21–73 years. It is unclear whether findings from the present study extend to individuals older than 73 years. This is an especially interesting question as some studies have found non-linear associations between age and negative affect whereby negative affect steadily decreases until age 60 and



then levels off (Carstensen et al., 2000; Stacey & Gatz, 1991; Windsor & Anstey, 2010). Although our data suggest that the relationship between age and acceptance on anger, anxiety, and sadness is consistent across the life span (interactions between age and acceptance for all indices of anger, anxiety, and sadness were not significant), examining whether acceptance continues to increase in individuals older than 73 will be a worthwhile endeavor for future studies.

A fourth limitation of this study concerns the fact that we did not examine positive affect as an outcome. Because the literature on the relationship between age and positive affect is inconsistent (Consedine, Magai, & King, 2004; Scheibe & Carstensen, 2010; Windsor & Anstey, 2010) and because negative affect is a key predictor of overall well-being (e.g., Keyes, Shmotkin, & Ryff, 2002), we focused solely on negative affect in this study. Based on previous studies demonstrating that acceptance-based interventions increase positive emotions (e.g., Barnhofer, Chittka, Nightingale, Visser, & Crane, 2010; Gayner et al., 2010), we predict acceptance to additionally mediate the relationship between age and positive affect. However, future studies are needed to investigate this relationship.

Fifth, some of the effect sizes in the present research were modest (e.g., the correlation between acceptance and age,  $r = .17$ , represents a medium effect size). However, because of the relatively stable and general nature of these effects, they likely affect people cumulatively. Therefore, even moderate effect sizes can generate important outcomes.

Finally, state acceptance was not measured in the daily assessment or in the laboratory portion of the study, because measuring acceptance multiple times throughout the study may have primed participants to use this strategy, thus functioning as an unintended “intervention.” Therefore, we were not able to examine effects involving state acceptance in the present study. Although prior experience sampling studies suggest that trait and state acceptance are positively related (Kashdan et al., 2006), future studies should employ state and trait measures as well as daily diary assessments of acceptance to enhance understanding of the links between age and acceptance.

## Concluding Comment

Although aging is associated with some deterioration and hardship, ironically, people tend to feel better as they age. The present study took a discrete emotions approach to understanding the nature of older adults’ improved well-being and additionally explored how, with advancing age, individuals may be able to experience improved emotional well-being. Results demonstrated that feelings of anger and anxiety decrease with increasing age but sadness does not. Further, increasing age was associated with increased acceptance of negative emotional experiences, and this process statistically accounted for the inverse relationship between age and anger and anxiety. These findings offer unique insight into the nature of age-related enhanced emotional well-being and how acceptance, as a skill that increases over the life-span, may play a key role in this phenomenon.

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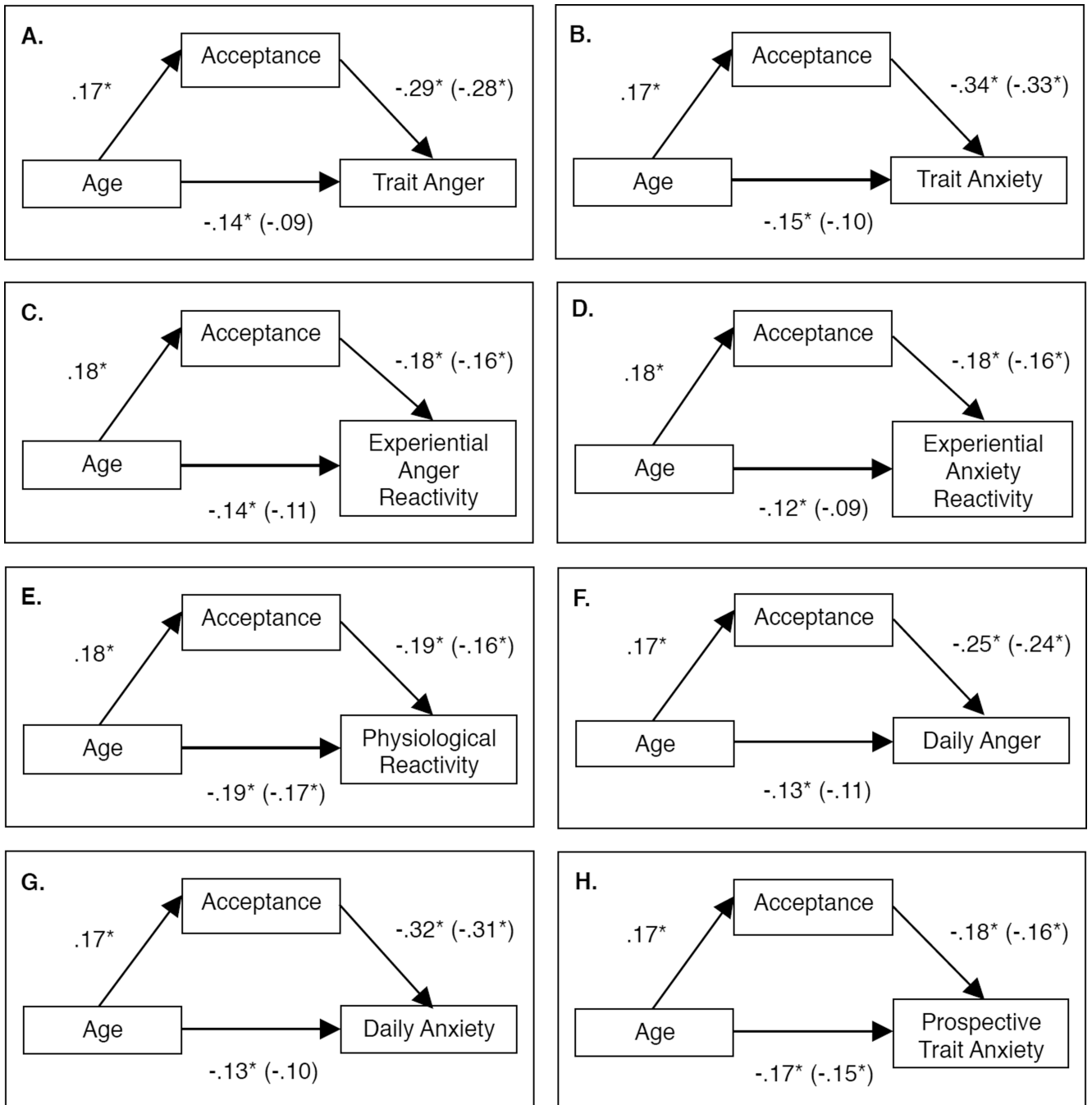
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**Figure 1.** (A-H). Statistical mediation by acceptance of the relationships between age and cross-sectional trait negative affect (T1; Panels A & B), experiential negative affective reactivity and physiological reactivity (T2; Panels C-E), daily negative affect (T3; Panels F & G) and prospective trait negative affect (T4 controlling for T1; Panel H). Numbers represent standardized betas; parenthesized numbers represent betas when predictors were entered into regression model simultaneously. Note: \* $p < .05$ .

**Table 1**

## Sample demographic information

Mean age in years ( <i>SD</i> )	41.32 (12.51)
Gender	
Male	48%
Female	48%
Did not report	4%
Race	
European-American	83.8%
African-American	3.9%
Asian-American	1.8%
American Indian/Alaskan native	1.8%
Mixed-race or other	8.7%
Family income per year	
< \$10,000	5.2%
\$10,000 – \$30,000	17.4%
\$30,000 – \$50,000	21.7%
\$50,000 – \$100,000	33.3%
> \$100,000	11.9%
Did not report	10.7%
Educational attainment	
Partial high school	3.3%
Completed high school	5.6%
Partial college	35.2%
Completed college	39.6%
Professional or graduate school	16.3%

**Table 2**

Descriptive statistics and correlations between age, acceptance and negative affect; regression statistics testing age and acceptance as simultaneous predictors of negative affect.

	Descriptive statistics		Simple correlations		Regression entering age and acceptance as simultaneous predictors		Sobel's z
	N	Mean (SD)	Age (r)	Acceptance (r)	Age (β)	Acceptance (β)	
Age	339	41.32 (12.51)	—	—	—	—	—
Acceptance	337	3.18 (.93)	.17*	—	—	—	—
<b>Trait negative affect (T1)</b>							
Trait anger	340	2.39 (1.02)	-.14*	-.29*	-.09	-.28*	2.66*
Trait anxiety	340	2.21 (1.05)	-.15*	-.34*	-.10	-.33*	2.78*
Trait sadness	340	2.56 (1.10)	-.08	-.35*	—	—	—
<b>Negative affective reactivity (T2)</b>							
Experiential anger reactivity	280	.70 (1.48) <sup>‡</sup>	-.14*	-.18*	-.11	-.16*	2.08*
Experiential anxiety reactivity	280	4.59 (2.59) <sup>‡</sup>	-.12*	-.18*	-.09	-.16*	2.12*
Experiential sadness reactivity	280	1.14 (1.73) <sup>‡</sup>	-.05	-.08	—	—	—
Physiological reactivity	229	4.72 (4.31) <sup>‡</sup>	-.19*	-.19*	-.17*	-.16*	1.99*
<b>Daily negative affect (T3)</b>							
Daily anger	244	1.72 (.47)	-.13*	-.25*	-.11	-.24*	2.40*
Daily anxiety	244	2.03 (.62)	-.13*	-.32*	-.10	-.31*	2.63*
Daily sadness	244	1.85 (.62)	-.06	-.29*	—	—	—
<b>Trait negative affect (T4)</b>							
Trait anger	239	2.32 (.96)	-.13 <sup>‡</sup>	-.29*	—	—	—
Trait anxiety	239	2.16 (.91)	-.20*	-.35*	-.16*	-.33*	2.69*
Trait sadness	239	2.52 (1.06)	-.01	-.29*	—	—	—

Prospective negative affect (T4 controlling for T1)

	Descriptive statistics		Simple correlations		Regression entering age and acceptance as simultaneous predictors		
	N	Mean (SD)	Age (r)	Acceptance (r)	Age (β)	Acceptance (β)	Sobel's z
Prospective trait anger	239	2.32 (.96) <sup>§</sup>	-.08	-.15*	-	-	-
Prospective trait anxiety	239	2.16 (.91) <sup>§</sup>	-.17*	-.18*	-.15*	-.16*	1.92 <sup>†</sup>
Prospective trait sadness	239	2.52 (1.06) <sup>§</sup>	.02	-.14*	-	-	-

Notes.

\*  $p < .05$ ;

<sup>†</sup>  $p < .055$ ;

<sup>‡</sup> Reactivity variables represent the difference score between reactivity during the stress period and reactivity during the baseline period but do not reflect the additional residualization that partialled out reactivity during the baseline period (which would result in a  $Mean = 0, SD = 1$ );

<sup>§</sup> Prospective variables were residualized to partial out the effect of T1 trait negative affect from T4 trait negative affect, which resulted in a  $M = 0, SD = 1$ . The given  $M$ s and  $SD$ s are from the raw T4 scores.

Table 3

Correlations among measures of affect.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Trait negative affect (T1)	Trait negative affect (T1)	Negative affective reactivity (T2)	Daily negative affect (T3)	Trait negative affect (T4)	Prospective negative affect (T4 controlling for T1)	Trait negative affect (T4)	Daily negative affect (T3)	Trait negative affect (T4)	Prospective negative affect (T4 controlling for T1)	Trait negative affect (T4)	Daily negative affect (T3)	Trait negative affect (T4)	Prospective negative affect (T4 controlling for T1)	Trait negative affect (T4)	Prospective negative affect (T4 controlling for T1)
Trait negative affect (T1)																
1. Trait anger	–															
2. Trait anxiety	.47*	–														
3. Trait sadness	.49*	.50*	–													
Negative affective reactivity (T2)																
4. Experiential anger reactivity	.16*	.13*	.10	–												
5. Experiential anxiety reactivity	.15*	.15*	.14*	.41*	–											
6. Experiential sadness reactivity	-.02	.07	.14*	.45*	.44*	–										
7. Physiological reactivity	-.01	.03	.03	.13	.08	-.02	–									
Daily negative affect (T3)																
8. Daily anger	.44*	.34	.28*	.18*	.11	.06	.02	–								
9. Daily anxiety	.30*	.43*	.39*	.23*	.16*	.15*	-.03	.55*	–							
10. Daily sadness	.35*	.37*	.36*	.12	.07	.15*	-.09	.66*	.70*	–						
Trait negative affect (T4)																
11. Trait anger	.54*	.30*	.33*	.16*	.10	-.04	-.02	.48*	.30*	.35*	–					
12. Trait anxiety	.39*	.62*	.44*	.19*	.21*	.03	-.04	.46*	.49*	.45*	.49*	–				
13. Trait sadness	.39*	.35*	.44*	.16*	.12	.03	.11	.42*	.42*	.47*	.70*	.54*	–			
Prospective negative affect (T4 controlling for T1)																
14. Prospective trait anger	.01	.04	.06	.10	.05	-.02	.01	.29*	.15*	.16*	.85*	.34*	.59*	–		
15. Prospective trait anxiety	.10	.01	.12	.10	.11	-.02	-.03	.30*	.28*	.25*	.39*	.79*	.41*	.40*	–	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Trait negative affect (T1)	Trait negative affect (T1)	Negative affective reactivity (T2)	Daily negative affect (T3)	Trait negative affect (T4)	Prospective negative affect controlling for T1	Trait negative affect (T4)	Daily negative affect (T3)	Trait negative affect (T4)	Prospective negative affect controlling for T1	Trait negative affect (T4)	Daily negative affect (T3)	Trait negative affect (T4)	Prospective negative affect controlling for T1	Trait negative affect (T4)	Prospective negative affect controlling for T1
16. Prospective trait sadness	.17*	.12	.00	.13	.04	-.04	.13	.33*	.27*	.35*	.61*	.39*	.90*	.62*	.40	

Note:

\* p < .05.