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## **Daily positive experiences and health: Biobehavioral pathways and resilience to daily stress**

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### **Abstract**

Positive emotions and minor positive events are far more likely to occur in people's day-to-day lives than are negative emotions and stressors. Despite being common features of daily life, little work has been done to characterize daily positive experiences or to examine whether these experiences are related to psychological and physical well-being. This chapter first provides an overview of theoretical perspectives and previous research linking positive experiences with stress and health. Next, we propose a conceptual framework that describes constructs within the realm of "daily positive experiences," namely daily positive affect, daily positive events, and affective, cognitive, and behavioral responses to positive events. The framework posits that daily positive experiences contribute to long-term health through behavioral and biological pathways, as well as by mitigating the damaging effects of stress. Readers are introduced to research methods for evaluating positive aspects of daily life. Drawing on data from the National Studies of Daily Experiences (the daily diary project of the Midlife in the United States Study), we describe the sociodemographic patterning of daily positive experiences by age, gender, race, and socioeconomic status. We then present our multidisciplinary work linking between-person differences and within-person (day-to-day) variations in daily positive experiences to stressor reactivity, inflammation, and diurnal cortisol rhythms. Finally, we conclude with a discussion of unanswered questions and key areas for future discovery and innovation. Taken together, the study of everyday positive experiences provides important insights into health and well-being that go beyond what can be learned from focusing solely on negative experiences.

## **Introduction**

Many features of our daily lives—including interpersonal tensions, work demands, and family responsibilities—can shape physical and mental health. Mounting evidence suggests that how people respond to daily stressors is predictive of risks for long-term health outcomes (e.g., Charles, Piazza, Mogle, Sliwinski, & Almeida, 2013; Mroczek et al., 2015; Piazza, Charles, Sliwinski, Mogle, & Almeida, 2013). By contrast, positive aspects of daily life and their potential implications for health have received considerably less attention. The purpose of this chapter is to provide an overview of research on “daily positive experiences,” defined as positive affect and positive events in everyday life (for example, sharing a laugh, accomplishing a goal, or spending time in nature). First, we review theories and background literature on positive experiences and health conducted prior to the Midlife in the United States Study (MIDUS). Second, we present our conceptual framework, which posits that individual and environmental factors influence daily positive experiences that, in turn, are prospectively linked to health through biological, behavioral, and stress-buffering pathways. Third, we introduce our daily process approach for examining various constructs within the realm of daily positive experiences in MIDUS. We then present findings on daily positive experiences from two sub-studies of MIDUS, the National Study of Daily Experiences (NSDE) 2 and the NSDE Refresher Study, followed by recommendations for future research.

### **Background: Pre-MIDUS Research on Daily Experiences and Health**

#### **Early work and theoretical perspectives**

Over 30 years ago, positive experiences were theorized to co-occur with stressors (Kanner, Coyne, Schaefer, & Lazarus, 1981) and were thought to facilitate the coping process (Lazarus, Kanner, & Folkman, 1980), ameliorate depression (Lewinsohn & Libet, 1972), and reflect adaptive behavior patterns in daily life (Zautra, Guarnaccia, & Dohrenwend, 1986). Early

research on minor positive events—also called “uplifts”—suggested that positive events might have stress-buffering effects, such that positive events were thought to be protective for mental and physical health in the context of elevated stress but would be relatively unimportant in the absence of stress (S. Cohen & Hoberman, 1983; Reich & Zautra, 1981). For example, in an experimental study, college students who were instructed to engage in pleasant activities across two weeks—such as chatting with a friend or participating in a class discussion—showed increases in quality of life compared to those in a control condition (Reich & Zautra, 1981). Pleasant activities reduced psychiatric distress only among participants who had encountered more negative life events (Reich & Zautra, 1981). In another study, high-stress college students who reported more positive events over the past year showed less depressive and physical symptoms than their high-stress counterparts who experienced fewer positive events (S. Cohen & Hoberman, 1983). Among low-stress college students, however, positive events were unrelated to depressive symptoms and were linked to slightly elevated physical symptoms. Together, these studies provided preliminary support for the role of minor positive events in maintaining psychological and physical well-being among individuals experiencing chronic stress, yet the mechanisms underlying these stress-buffering effects were unclear.

Lazarus, Kanner, and Folkman (1980) proposed that the positive emotions derived from positive events might serve three functions in the coping process. First, positive emotions can serve as *breathers* that provide temporary relief from the stressful experience and engage the person in a pleasurable activity. Second, positive emotions (such as hope) are *sustainers* that might motivate the person to continue coping with the stressor. Third, positive emotions may function as *restorers* that facilitate recovery from stress by replenishing depleted resources or by building new resources. Folkman and Moskowitz (2000) further extended these ideas by

proposing several ways in which positive affect is generated and sustained in the context of chronic stress. In their qualitative work, they found that caregiving partners of men with AIDS coped with stress by using *positive reappraisal* (reframing a situation in a positive light), *problem-focused coping* (efforts to solve or manage the problem causing distress), and by *infusing ordinary events with meaning* (creating a positive event or interpreting an otherwise ordinary event as positive). Their research demonstrated that, even in the midst of profoundly stressful circumstances, people actively sought out positive experiences and employed coping strategies that enhanced or maintained positive affect (Folkman, 1997; Folkman & Moskowitz, 2000; Folkman, Moskowitz, Ozer, & Park, 1997).

Beyond their hypothesized roles in stress and coping, does the assessment of positive events in everyday life contribute to our understanding of well-being? Zautra and colleagues advanced a body of literature showing that positive events and negative events had distinct associations with affect, such that—when comparing between persons—individuals who reported more positive events (e.g., played a sport, made a new friend) had greater positive affect but did not differ in psychological distress, compared to those who experienced fewer positive events (Zautra, 2003; Zautra & Reich, 1983). Subsequently, new developments in analytic methods enabled the examination of positive events, stressors, and affect as they unfolded within-persons in daily life. Their research on within-person processes led to the development of the Dynamic Model of Affect, which contends that, under safe and predictable circumstances, people are able to separately process positively- and negatively-valenced features of a situation to obtain maximum information (Zautra, Affleck, Tennen, Reich, & Davis, 2005; Zautra, Smith, Affleck, & Tennen, 2001). Positive and negative affect are therefore hypothesized to be less correlated in the absence of stress. The model also proposes that the uncertainty of stress will

increase cognitive demands and lead to less differentiation in affect. Thus, positive and negative affect are expected to become highly inversely correlated during times of stress. It also follows that, in the context of stress, positive events and positive affect should play a greater role in reducing negative affect and attenuating the effects of stressors.

These theoretical foundations have set the stage for research on positive experiences in daily life, but the empirical work has not kept up with the theoretical advocacy. Although a growing literature has linked individual differences in trait-like measures of positive affect (generally assessed at a single time point) with better physical health and longevity (Boehm & Kubzansky, 2012; Pressman & Cohen, 2005; Sin, 2016), few studies have examined day-to-day or moment-to-moment assessments of positive experiences in relation to health. We turn now to a review of the literature on sociodemographic predictors of daily positive experiences, as well as the associations of daily positive experiences with pathways to health.

### **Age, social disadvantage, and daily positive experiences**

Age, race, and socioeconomic status are critical to understanding health and may predict exposure and responses to daily positive experiences. Emotional well-being has been observed to improve with age, such that there are gradual increases or maintenance in positive emotions and decreases in negative emotions (e.g., Carstensen et al., 2011). The socioemotional selectivity theory asserts that, with advancing age and limited time left, older adults restructure their lives to prioritize meaningful relationships and activities and to minimize potentially negative experiences (Carstensen, Isaacowitz, & Charles, 1999). However, it is also possible that by avoiding stressful activities or situations, older adults may inadvertently reduce their exposure to positive experiences. Indeed, a study of 101 healthy women ages 63-93 found that older age was associated with both fewer positive events and fewer stressors (Charles et al., 2010). The women showed no age-related differences in emotional responses to positive events or stressors,

suggesting that the older women retained the ability to benefit from positive events and were as reactive to stressors as the younger women in the sample. Further research on developmental trajectories and age differences in daily positive experiences would shed light on the contextual factors involved in emotion regulation and aging (Aldwin, Jeong, Igarashi, & Spiro, 2014).

Resource-based theories, such as the Reserve Capacity Model, posit that social disadvantage hinders the development and replenishment of psychosocial resources (e.g., positive affect, positive social relationships), which can lead to poorer health for marginalized or disadvantaged groups (Gallo & Matthews, 2003). We might therefore expect daily positive events to be patterned by race and socioeconomic status, such that whites and those with higher income or education might experience more frequent positive events than racial minorities and individuals with lower income or education. To the extent that daily positive experiences promote health and mitigate the effects of stress, racial minorities and those from disadvantaged backgrounds may have diminished reserves to draw upon when faced with challenges. In fact, two recent studies found that people with lower socioeconomic status had lower positive affect and less-positive social interactions in everyday life. One study reported that reduced daily positive experiences accounted for socioeconomic differences in inflammation among adolescents (Chiang et al., 2015). Another found that reduced positive experiences partially mediated the link between subjective social rank and self-rated health in a community sample of adults (Cundiff, Kamarck, & Manuck, 2016).

### **Preliminary evidence linking daily positive experiences and health**

**Biological health outcomes.** Positive experiences might influence health through a number of biological mechanisms, including immune, neuroendocrine, and autonomic pathways (Boehm & Kubzansky, 2012; Ong, 2010; Pressman & Cohen, 2005; Sin, 2016). Several studies using repeated assessments of momentary or daily positive affect found that people with higher

aggregated positive affect were less susceptible to developing an illness following experimental exposure to a cold or flu virus (S. Cohen, Alper, Doyle, Treanor, & Turner, 2006; S. Cohen, Doyle, Turner, Alper, & Skoner, 2003) and showed reduced inflammatory responses and lower systolic blood pressure during acute stress tasks (Steptoe, Gibson, Hamer, & Wardle, 2007; Steptoe & Wardle, 2005; Steptoe, Wardle, & Marmot, 2005), compared to those with lower aggregated positive affect. Furthermore, in two samples of middle-aged and older adults, people who spent more of their daily lives engaged in positive social interactions with close others (assessed in real-time via ecological momentary assessments) had relatively lower levels of the inflammatory marker interleukin-6 (Bajaj et al., 2016). Interestingly, these studies found that single-administration retrospective measures of trait positive affect (S. Cohen et al., 2006, 2003; Steptoe, Gibson, et al., 2007) or global social support and integration (Bajaj et al., 2016) showed weaker effects or no associations with biomarkers.

At the within-person level, daily or momentary positive experiences have been shown to covary with better physical functioning. In one of the first studies on this topic, on days when individuals experienced more desirable events or had higher positive affect than usual, they showed enhanced immunity as indicated by greater secretory immunoglobulin A antibody response to an oral antigen (Stone et al., 1994). Even more striking were the lagged effects: desirable events were predictive of more antibody 1 and 2 days later, whereas undesirable events (particularly work stressors) were linked to reduced antibody on the same day (Stone et al., 1994). In another study, total cortisol output was reduced on days when couples had more positive interactions with one another, compared to days when they had little or no exchange of physical affection; positive couple interactions also reduced cortisol output levels associated with chronic work stressors (Ditzen, Hoppmann, & Klumb, 2008).



However, daily positive experiences may have health costs in the short-term by increasing physiological reactivity or disrupting daily routines such as sleep. For example, among women with fibromyalgia or rheumatoid arthritis, increases in daily positive events were associated with less same-day fatigue but greater next-day fatigue (Parrish, Zautra, & Davis, 2008). State positive affect has been shown to provoke physiological reactivity, such as increased blood pressure and reduced heart rate variability, in the short-term (Pressman & Cohen, 2005; Schwerdtfeger & Gerteis, 2014). Thus, although between-person differences in positive affect and positive events may be health-promoting, such experiences might transiently disrupt health when they occur at a greater frequency or intensity than one's usual level.

**Health behaviors.** An accumulating literature has linked trait measures of positive well-being to better health behaviors, including physical activity, sleep, diet, and medication adherence (Boehm, Vie, & Kubzansky, 2012; Grant, Wardle, & Steptoe, 2009; Ong, Kim, Young, & Steptoe, 2016; Sin, Moskowitz, & Whooley, 2015). In fact, multiple studies indicate that favorable health behaviors mediated the associations of trait positive affect with subsequent lower risk of incident cardiovascular disease (Kubzansky & Thurston, 2007) and all-cause mortality (Hoen, Denollet, de Jonge, & Whooley, 2013; Hoogwegt et al., 2013; Koopmans, Geleijnse, Zitman, & Giltay, 2010). Why is positive affect associated with better health behaviors? People with higher positive affect may have relatively greater motivation, higher self-efficacy, and are perhaps better able to adjust health goals and to cope with setbacks (Sin, Moskowitz, et al., 2015).

In contrast to the literature on trait positive affect, less work has examined the relationships between positive experiences and health behaviors in the context of daily life. Recently, we examined the within-person, bidirectional associations of daily psychosocial

experiences (positive and negative affect, positive events, and stressors) with self-reported sleep quality and duration across eight days in two samples of middle-aged employees from the Work, Family, and Health Network Study (Sin, Almeida, et al., 2017). When testing daily experiences as predictors of same-night sleep, negative affect and stressors were found to be unrelated to sleep. Daily positive experiences, on the other hand, were associated with improved as well as disrupted subsequent sleep. Specifically, positive events at home were associated with better subsequent sleep quality, whereas positive events at work predicted poorer sleep quality and elevated positive affect predicted shorter sleep duration by 15 minutes. These sleep disturbances may have been due to activated emotions such as excitement, recurrent thoughts about the positive events, and amplified physiological reactivity. Just as positive experiences are associated with transient health costs at the physiological level, there also appears to be costs at the behavioral level.

The results of the Work, Family, and Health Network Study showed more support for the reversed direction of association, i.e., nightly sleep as a predictor of next-day psychosocial experiences. Better sleep quality predicted better mood, greater odds of experiencing positive events, and lower odds of encountering stressors on the following day. Taken together, these findings supported the reciprocal links between sleep and psychosocial experiences in everyday life. Furthermore, the associations of positive affect and events—but not negative affect or stressors—with subsequent sleep demonstrated that positive experiences revealed information about a person's daily life that could not be captured by relying solely on assessments of negative experiences.

**Stress-buffering effects.** Results from several daily diary studies indicate that, at the within-person level, positive affect buffers against the effects of daily stress on same-day

emotional and physical well-being (Ong & Allaire, 2005; Ong, Bergeman, & Bisconti, 2004; Ong, Bergeman, Bisconti, & Wallace, 2006). Specifically, daily positive affect mitigated the within-person association between daily negative affect and systolic blood pressure (Ong & Allaire, 2005) and buffered against the effects of daily stress on depressive symptoms in recently bereaved widows (Ong et al., 2004). Daily positive emotions also attenuated negative affective reactivity to stressors and predicted accelerated emotional recovery from prior-day stressors (Ong et al., 2006). Less research has explored the potential stress-buffering effects of daily positive events. An exception is a 3-week field study of 61 women employed in outpatient clinics, which found that workplace positive events—such as receiving positive feedback, accomplishing a task, or having fun and socializing—reduced the influences of negative work events on subsequent stress and physical symptoms in the evening (Bono, Glomb, Shen, Kim, & Koch, 2013). These studies collectively suggest that positive experiences can have buffering effects when they occur close in time to stressful events or increased negative affect. However, the precise stress-buffering functions of daily positive experiences (such as minimizing stressor exposure, reducing stressor reactivity, accelerating recovery from stressors, or enabling more effective coping strategies) remain largely untested.

**Prospective associations of daily positive experiences with health outcomes.** Several longitudinal studies have provided initial evidence that positive aspects of daily life may be predictive of subsequent mental and physical health. Among nearly 3,900 older adults in the English Longitudinal Study of Aging, momentary positive affect (aggregated across a single day) predicted lower risk of mortality across five years, such that participants in the highest tertile of positive affect had a 50% reduction in mortality risk compared to those in the lowest tertile. In contrast, momentary negative affect did not predict mortality (Steptoe & Wardle, 2011).

Dynamic aspects of daily positive affect are also important for future health: positive affective reactivity (i.e., greater loss of positive affect in response to daily stressors) predicted subsequent risk of depressive symptoms (L. H. Cohen, Gunthert, Butler, O'Neill, & Tolpin, 2005; O'Neill, Cohen, Tolpin, & Gunthert, 2004) and 10-year risk of mortality (Mroczek et al., 2015). Again, stress-related increases in negative affect were not prospectively associated with risk of depressive symptoms or mortality in these studies. However, in a sample of 1,315 men from the VA Normative Aging Study, a checklist measure of uplifts was administered once every three years and was found to be unrelated to mortality risk (Jeong, Aldwin, Igarashi, & Spiro, 2016). To our knowledge, no research has examined daily positive events (assessed with repeated measures during the course of daily life) in relation to long-term health outcomes.

### **Integrative Pathways Linking Daily Positive Experiences and Health**

In summary, the research reviewed above support multiple linkages of daily positive experiences with biological health markers, health behaviors, and distal health outcomes. The findings generally suggest that positive experiences are health-protective and may attenuate the influences of stress on health, although the possible costs of positive experiences warrant further study (Gruber, Mauss, & Tamir, 2011; Ong et al., 2013; Sin, Almeida, et al., 2017). The associations between daily positive experiences and health often persisted after controlling for measures of negative affect or stress, demonstrating that these effects were not merely attributable to low levels of negative psychological states. Moreover, a growing number of studies indicate that assessments of affect and social interactions in daily life are more closely tied to biomarkers of health (e.g., immune response, inflammation, cortisol awakening response, blood pressure) than are global retrospective measures (Bajaj et al., 2016; S. Cohen et al., 2006, 2003; Conner & Barrett, 2012; Daly, 2012; Steptoe, Gibson, et al., 2007). This may be because

repeated assessments in daily life are better suited for capturing emotions, stress, and other psychosocial phenomena that transpire across the same time scales (i.e., moments, hours, or days) as physiological changes and health behaviors. In addition, retrospective or trait measures of well-being—in which participants rate how they generally feel—differ from actual experiences because they can be susceptible to memory biases and global evaluations of one's life (Kahneman & Riis, 2005).

Despite these promising findings, key limitations and gaps must be addressed to better understand the types of positive experiences that arise in everyday life, why these experiences occur, and the psychosocial and biobehavioral pathways by which positive experiences relate to short- and long-term health. First, nearly all of the studies reviewed were focused on positive affect (rather than positive events) and had linked between-person differences in aggregated daily or momentary positive affect with health measures that were assessed at a single time point. Positive affect exists within a context, and thus it is necessary to examine discrete events and circumstances in daily life that contribute to mean levels, fluctuations, and changes in positive affect. Second, the extant findings were based on studies conducted outside of the United States or with smaller samples (such as college students and clinical samples with specific mental or physical health conditions) whose daily experiences and health may not reflect those of the general adult population in the United States. Third, the evidence on daily positive experiences is sparse and scattered across different literatures. A unifying framework is needed to tie together these separate lines of inquiry and to guide progress towards a cohesive literature on positive aspects of day-to-day life.

To address these gaps in the literature, we have developed a conceptual model of daily positive experiences and their putative roles in stress and health processes. As shown in Figure 1,

the model describes resilience and vulnerability factors that predict daily positive experiences, in addition to proposing that daily positive experiences contribute to health through biological, behavioral, and stress-buffering mechanisms. The model first suggests that individual, group-level, and environmental factors (for example, personality, race, and socioeconomic status) influence exposure and responses to daily positive experiences and stressors. Next, the model proposes that daily positive experiences have proximal direct effects on physiological functioning and daily health behaviors, as well as buffer against the influences of daily stressors, negative affect, and psychological distress (e.g., depressive symptoms) on physiology and behavior. These biobehavioral pathways, in turn, contribute to health over the long term. The paths in the model are conceptualized as bidirectional, reciprocal associations with feedback loops. For example, poor physical health may reduce daily positive experiences and increase vulnerability to daily stress. Previous research has provided empirical support for separate paths within the model, but no studies thus far have tested integrated pathways (e.g., mediation) nor examined these processes over time.

### **MIDUS Methods and Concepts in the Study of Daily Positive Experiences**

MIDUS is a national longitudinal study of health and well-being that is uniquely suited for tracking the impact of day-to-day experiences on social, psychological, and physical well-being across adulthood. Among the many strengths of MIDUS is its groundbreaking assessments of psychosocial constructs in a large sample of midlife adults across the United States (Brim, Ryff, & Kessler, 2004). MIDUS takes a multidisciplinary approach and spans multiple domains and levels of analysis, from the individual level to family, neighborhoods, social networks, and broader period effects on health. Another innovative feature of MIDUS is the use of substudies to obtain in-depth assessments of daily life, cognitive function, biomarkers, and neural activity and brain morphology. Our research combines daily diary interviews from the National Studies

of Daily Experiences (NSDE) with data from the other substudies, thereby permitting the examination of daily well-being and health across varying time scales that range from days to decades.

As the largest and longest running daily diary study in the United States, NSDE has made significant advances in understanding the contexts in daily life that shape (and are affected by) health, well-being, and adult development. NSDE uses a daily process approach in which daily diary interviews of emotions, stressors, and positive events are repeated across consecutive days (Almeida, 2005). This approach captures rapidly-fluctuating phenomena close in time to their actual occurrence, thus providing greater ecological validity and minimizing recall biases compared to traditional survey and experimental methods. More importantly, intensive repeated measures enable the disaggregation of between-person and within-person effects (Bolger, Davis, & Rafaeli, 2003). The between-person level of analysis is concerned with differences between people (e.g., *Do people who experience more positive events have less physical symptoms, compared to people with fewer positive events?*). At the within-person level of analysis, we can examine variation within an individual from one occasion to the next, in addition to establishing the temporal ordering of events. For example, we can ask: *On days when a positive event occurs, are physical symptoms lower than usual? Does the occurrence of a positive event precede decreases in physical symptoms, or vice versa?* By using participants as their own controls, the within-person approach rules out factors that are stable over time (e.g., gender, race, personality). Between- and within-person approaches both provide important complementary information: the former on why some people are happier and healthier than others, and the latter on the contexts and situations that underlie positive psychological functioning and health.

We take an events-based approach to investigate different aspects of daily positive events: exposure, reactivity, lingering, and appraisals. Adapted from the daily stress process model, we define exposure as the likelihood that a person will experience daily positive events, whereas reactivity refers to a person's affective or physical reactions to the positive event (Almeida, 2005; Bolger & Zuckerman, 1995; Suls & Martin, 2005; Zautra, 2003; Zautra, Affleck, Davis, Tennen, & Fasman, 2006; Zautra et al., 2005). We further extend the daily stress process model by examining lingering (i.e., the residual affective or physical effects following a positive event) and appraisals (i.e., subjective perceptions of the positive event). Lingering—also called spillover, inertia, or lagged effect (Suls, Green, & Hillis, 1998; Suls & Martin, 2005)—can be understood as slower recovery or having elevated positive affect for a longer duration of time after a positive event has occurred. Evidence regarding the savoring of positive events (Smith, Harrison, Kurtz, & Bryant, 2014) and the lingering effects of workday positive events on reduced blood pressure in the evening (Bono et al., 2013) suggests that positive affective lingering may be beneficial for health. Appraisals may include evaluations of the event's intensity, surprise, desirability, self-relevance, and controllability or self-agency (Folkman et al., 1997; Reich & Zautra, 1981), in addition to perceived benefits of the event for a one's goals and well-being. We focus here on exposure and affective responses to positive events, although other work has described potential behavioral responses, such as capitalizing on (i.e., sharing news of) the positive event (Gable, Gonzaga, & Strachman, 2006; Gable, Reis, Impett, & Asher, 2004; Langston, 1994).

### **Findings from the MIDUS National Studies of Daily Experiences**

In this next section, we provide descriptive findings on exposure, reactivity, and appraisals for daily positive events. Our data came from NSDE 2 and NSDE Refresher Study, as the first wave of NSDE did not include assessments of daily positive events. Data for NSDE 2



were collected between 2004 and 2007 from 2,022 participants randomly selected from MIDUS (Almeida, McGonagle, & King, 2009). The NSDE 2 sample ranged in age from 35 to 86 years old; 57% were women, 38% had a 4-year college degree, and the racial composition was 84% white, 11% black/African American, and 5% other races. The NSDE Refresher Study, conducted 2012-2014, was composed of 782 participants between 26 and 77 years old (Ryff et al., 2016). The Refresher sample was 55% women, 50% college graduates, 84% white, 7% black/African American, and 9% other races.

### **Daily Diary Protocol**

In both studies, the daily diary protocol consisted of short telephone interviews for eight consecutive evenings. During the interviews, participants answered questions regarding their daily affect and events. Positive events were assessed by asking whether the participant had experiences in the past 24 hours that most people would consider particularly positive (see Appendix for items). Five items inquired about events in each of the following life domains: *positive interaction*, *positive experience at work/school/volunteer position*, *positive experience at home*, *network positive event* (i.e., positive event experienced by a close friend or relative), and *any other positive event*. The Refresher Study also included an item that asked whether the person had spent time *enjoying or viewing nature*, as well as additional questions regarding subjective responses to the events.

Daily stressors were assessed using the Daily Inventory of Stressful Events (Almeida, Wethington, & Kessler, 2002). Participants were asked whether each of 7 types of stressors had occurred in the past 24 hours: *argument*, *avoided an argument*, *stressor at work or school*, *stressor at home*, *discrimination*, *network stressor* (i.e., stressful event that happened to a close friend or family member), and *any other stressor*.

Daily affect was assessed using scales developed for the MIDUS Study (Kessler et al., 2002; Mroczek & Kolarz, 1998). On a 5-point scale ranging from “none of the time” to “all of the time,” participants rated the extent that they had experienced 14 negative emotions (e.g., *nervous, worthless, so sad nothing could cheer you up, afraid, irritable*) and 13 positive emotions (e.g., *in good spirits, calm and peaceful, satisfied, attentive, proud*). Daily negative and positive affect were calculated by averaging the items within each subscale.

### **What types of daily positive events did people encounter?**

A total of 14,912 daily interviews were obtained from the 2,022 participants in NSDE 2, and 5,760 interviews were obtained from the 782 participants in NSDE Refresher. Open-ended responses revealed that many of the daily positive events were indeed experiences that most people would consider to be particularly positive. Examples of positive events included attending a barbeque or potluck, receiving a compliment, or spending time with grandchildren. Some positive events involved helping others (e.g., volunteering, involvement in church) as well as accomplishments, such as taking care of tasks or learning to play the guitar. People also reported experiences that were relatively common and ordinary in daily life (e.g., getting a hug from one’s spouse or child, playing with pets), suggesting that these individuals tended to interpret everyday experiences in a more positive light. Another theme was looking on the bright side of an unfavorable situation, such as getting home in the nick of time before a storm or having the financial resources to pay a medical bill. Lastly, respondents were not active participants in some of the reported positive events (e.g., favorite sports team won a game).

### **How frequently did positive events occur, and how did they make people feel?**

As shown in Table 1, participants experienced a mean of approximately one positive event per day. We defined the frequency of positive events (i.e., exposure) as the percentage of days during which any positive event occurred. On average, participants reported at least one

positive event on 71% of interview days in NSDE 2 and on 75% of interview days in NSDE Refresher. This figure in NSDE Refresher was driven in large part by the new item on positive events in nature. When nature events were excluded, the frequency of positive events in NSDE Refresher was reduced to 62% of days ( $SD = 28\%$ ). Positive social interactions were the most common type of positive event, occurring on 62% of days in NSDE 2 and 53% of days in NSDE Refresher. In NSDE Refresher, enjoying or viewing nature was the second most frequent positive event, followed by events at home and at work. Figure 2 shows the average subjective responses to positive events in the Refresher Study. People generally felt low-activation positive emotions (*pleasant, calm*) during these experiences and somewhat *close to others* and *proud*. Overall, participants were not *surprised* and only *thought about* the event a little after it happened.

### **Are daily positive events patterned by demographics and socioeconomic status?**

In line with the propositions of socioemotional selectivity theory (Carstensen et al., 1999), older age was associated with more frequent positive events in both NSDE 2 and NSDE Refresher (Table 2). However, these are cross-sectional comparisons between people of different ages that might reflect cohort effects rather than developmental change. Longitudinal data from NSDE 3 (for which data collection is currently underway) will allow us to examine age-related changes in daily positive experiences across approximately 10 years. In addition to age differences, women reported more frequent positive events than men in NSDE 2, although there was no significant gender difference in NSDE Refresher.

Daily positive events were racially patterned, such that whites experienced more frequent positive events than did blacks and other racial minorities (Table 2). Similarly, people with higher educational attainment encountered more positive events than did those with lower educational attainment. These findings complement other results from NSDE showing that

individuals with less education were more emotionally reactive to daily stressors (Grzywacz, Almeida, Neupert, & Ettner, 2004; Mroczek et al., 2015), and African Americans had prolonged physical reactivity to family arguments compared to whites (Cichy, Stawski, & Almeida, 2012; see Chapter 12 by Cichy & Lee for a discussion of racial differences in daily stressor reactivity). Because social disadvantage might influence health, in part, through differential exposure and reactivity to daily stressors, greater attention should be directed towards replenishing positive psychosocial resources that can counteract the effects of stress.

### **How do daily positive events relate to daily stressors and affect?**

The Dynamic Model of Affect predicts that, in the absence of stress, positive events will be linked to increases in positive affect but will be unrelated to negative affect (Zautra et al., 2005). Within-person correlations in Table 1 indeed indicate that on days when a person encountered more positive events than usual, positive affect was higher than usual. Positive events were not correlated with same-day negative affect.

In both NSDE 2 and NSDE Refresher, stressors and positive events were likely to co-occur on the same days within-persons (Table 1), perhaps signaling busy days that involved more activities or responsibilities than usual. The occurrence of positive events on stressful days may make it possible for these events to offset stressors. At the between-person level, people who experienced more positive events also encountered more stressors, which may reflect engagement in more social roles and thus greater exposure to both positive and stressful experiences. Across both studies, people who reported more frequent daily positive events had higher average daily positive affect. The patterns for negative affect differed by study: People who reported more positive events had lower average daily negative affect in NSDE 2, whereas they had higher daily negative affect in NSDE Refresher. However, this correlation in NSDE Refresher became nonsignificant after partialing out the effects of stressor exposure.

**Are daily positive experiences associated with health in MIDUS?**

**Individual differences in positive events and inflammation.** We were interested in inflammatory health due to its critical mechanistic role in aging-related conditions, such as cardiovascular disease and cognitive and functional decline (Harris et al., 1999; Reuben et al., 2002; Volpato et al., 2001). The inflammatory markers interleukin-6, C-reactive protein, and fibrinogen were especially important based on prior research linking these biomarkers to emotions and psychological stress (Stephens, Hamer, & Chida, 2007). Our data came from 969 adults ages 35-86 who participated in both NSDE 2 and the biomarker project in the second wave of MIDUS. Participants completed the 8-day telephone interview protocol and provided blood samples at a separate clinic visit, which were assayed for inflammatory markers.

Controlling for age and gender, greater frequency of daily positive events—particularly interpersonal events—were associated with lower levels of interleukin-6 and C-reactive protein in the overall sample, and lower fibrinogen in women but not men (Sin, Graham-Engeland, & Almeida, 2015). The results for interleukin-6 persisted after further adjustment for a range of confounding variables, including daily positive and negative affect, socioeconomic status, physical health indicators, personality, and health behaviors. Interestingly, positive events mitigated the association between low household income and interleukin-6, such that low-income participants who experienced more frequent positive events had reduced interleukin-6 compared to their low-income peers with fewer positive events. The results for C-reactive protein and fibrinogen were explained by race and income, such that low-income and non-white (primarily African American or black) participants had both less frequent positive events and elevated levels of inflammation. As one of the first investigations to link daily positive events with biomarkers of health, this study was important for demonstrating main effects of positive

event frequency with inflammation, as well as buffering effects whereby positive events protected against elevated interleukin-6 among low-income participants.

**Between- and within-person associations of positive events and cortisol.** Our next step was to test whether day-to-day variations in daily positive events were accompanied by corresponding changes in stress physiology, namely salivary cortisol. Cortisol—a glucocorticoid hormone produced by the hypothalamic-pituitary-adrenal axis—typically increases in the first 30-45 minutes post-waking (i.e., cortisol awakening response) and gradually declines throughout the day. Acute stressors can result in a greater cortisol awakening response (Chida & Steptoe, 2009), as well as higher total cortisol output on days when stressors occur (Stawski, Cichy, Piazza, & Almeida, 2013). Among people who have experienced prolonged stress or trauma, however, an attenuated pattern has been observed such that the cortisol awakening response and slope across the day are flattened (Chida & Steptoe, 2009; Miller, Chen, & Zhou, 2007). Blunted cortisol awakening responses and flatter diurnal slopes, in turn, may increase risk for physical disorders and premature mortality (DeSantis et al., 2012; Heim, Ehlert, & Hellhammer, 2000; Kumari, Shipley, Stafford, & Kivimaki, 2011).

In NSDE 2, a sample of 1,657 participants collected saliva four times per day across 4 days, which enabled us to determine the cortisol awakening response, diurnal cortisol slope, and total cortisol output. At the between-person level, people who experienced more frequent positive events exhibited a steeper diurnal cortisol slope, controlling for daily stressors, daily affect, and other covariates (Sin, Ong, Stawski, & Almeida, 2017). Daily positive events also attenuated the between-person association of daily stressors with blunted cortisol awakening response. That is, people who encountered more positive events alongside stressors had a more

robust cortisol awakening response, compared to people who experienced frequent stressors but few positive events.

The timing of events mattered at the within-person level. Positive events in the morning predicted a steeper decline in cortisol that day, whereas positive events in the afternoon were not associated with any same-day cortisol parameters. Daily positive events were also marginally associated with lower same-day total cortisol output. None of the between- or within-person associations were mediated by daily positive affect, suggesting that positive events were linked to cortisol through other mechanisms that have yet to be identified. Overall, these findings indicate that daily positive events are associated with more adaptive patterns of diurnal cortisol between- and within-persons. Among people who experience frequent stressors, those who also have more frequent daily positive events may be protected from stress-related blunting of the cortisol awakening response.

**Positive affective reactivity to daily stressors.** The NSDE has demonstrated that daily stressors exert immediate effects on emotions and physiological arousal (Almeida, 2005; Almeida, Piazza, Stawski, & Klein, 2011). *Affective reactivity* to daily stressors refers to a person's pattern of responding to stressors in everyday life. Affective reactivity is generally operationalized as the change in negative affect on days when stressors occur (or days when stressor occur at greater frequency or severity), relative to stressor-free or lower-stress days. Remarkably, negative affective reactivity to stressors across eight days in NSDE 1 predicted 56% greater odds of developing an affective disorder and 10-34% increased relative risk of developing chronic health conditions a decade later (Charles et al., 2013; Piazza et al., 2013). Whether positive affective reactivity—that is, the loss of positive affect in response to daily stressors—provides additional useful information on stress and health processes is largely

unknown (for exceptions, see L. H. Cohen et al., 2005; Mroczek et al., 2015; O'Neill et al., 2004). We hypothesized that repeated positive and negative affective reactions to daily stressors could lead to biological wear-and-tear (such as chronic inflammation or autonomic dysregulation), which over time, could pose greater risks for long-term mental and physical health outcomes (Sin, Sloan, McKinley, & Almeida, 2016).

In NSDE 2, we examined individual differences in affective reactivity to daily stressors as predictors of inflammatory markers interleukin-6 and C-reactive protein among 872 participants (Sin, Graham-Engeland, Ong, & Almeida, 2015). Results revealed that people who experienced a greater loss in positive affect on days when they encountered stressors had elevated interleukin-6, compared to those who were better able to maintain positive affect when stressors occurred. Heightened negative affective reactivity was associated with higher C-reactive protein among women only, and this association was explained by smoking and lack of regular physical activity among the high-reactivity women. These findings highlight the important contributions of positive affect in naturalistic stress processes, and also support inflammation as a potential pathway whereby the emotional wear and tear of daily life may accumulate to influence downstream health outcomes.

### **Future Directions**

In this chapter, we have reviewed theoretical perspectives and empirical studies on daily positive experiences and health. Our conceptual model proposes that positive affect and positive events in everyday life can promote physical health through favorable physiological functioning, better health behaviors, and by mitigating the effects of stress on health. Each of these pathways is supported by promising initial evidence, but further investigations are needed using representative samples, longitudinal assessments, in-depth measures of daily life, and a



multidisciplinary approach that will allow for the integration of cultural, environmental, psychosocial, and health factors. MIDUS affords unparalleled opportunities to expand the study of daily positive experiences and health in each of these ways.

Positive experiences, and daily life more generally, are embedded within a broader historical and societal context. Much of the research on daily stress and aging has been conducted in the last few decades, during a time of relative economic prosperity and growth. The daily lives of midlife adults were set against the backdrop of a prosperous economy, but the economic recession may have posed greater challenges for adults currently in middle or older adulthood and perhaps increased their vulnerability to the health consequences of stress. MIDUS is uniquely suited for investigating period effects in daily stress and well-being: data for the MIDUS Refresher Study were collected in the post Great Recession era from a new cohort of adults, which can be compared to the daily lives of adults of the same ages in MIDUS 1 (1994-1997) and MIDUS 2 (2004-2007). Already, we have found that midlife and older adults in the pre-recession period had more frequent daily positive events than those in the post-recession period (excluding nature events). An important next step is to test whether daily stress and financial strain related to the Great Recession might change the impact of positive events on well-being and stress processes. In addition, data collection is currently underway for the third wave of MIDUS. With MIDUS 3, it will be possible to link 10-year changes in exposure and reactivity to daily positive events to data from other projects within MIDUS, including sociodemographics and psychological well-being, cognitive functioning, biomarkers of health, gene expression, and neuroimaging and psychophysiology.

Previous research on positive events has focused on exposure and the general life domains in which the events occur (e.g., work versus home). The subjective experience of

positive events warrants further study. The NSDE Refresher includes new items assessing appraisals and emotional responses to daily positive events, offering the opportunity to examine people's perceptions of and affective, physiological, and behavioral reactivity to positive events. We can ask, for example, whether particular types of positive events have lingering effects on emotions that carry over to the following day. We can also examine individual differences that predict greater spikes in positive affect in reaction to positive events. Given past research suggesting that some positive experiences (Sin, Almeida, et al., 2017) and greater affective reactivity to positive events (Ong et al., 2013) can be disruptive for sleep, future research should seek to illuminate the conditions in which positive experiences are harmful for health.

Finally, the mechanisms whereby daily positive events influence health are still unclear. We found that daily positive affect did not mediate either the between- or within-person associations of daily positive events with diurnal cortisol in NSDE 2. However, it is possible that our end-of-day assessments of positive affect were not sensitive enough to capture minor or fleeting fluctuations, or perhaps different kinds of positive emotions (e.g., high versus low arousal) have differential health effects. Because NSDE Refresher and NSDE 3 includes emotion ratings of the events, we will be able to more precisely test whether the positive emotions derived from the events might serve as mechanisms. Besides positive affect, other potential psychosocial mechanisms include social relationships, self-efficacy, and feelings of control (Reich & Zautra, 1981).

To conclude, research on *daily* positive experiences—especially positive events—has lagged far behind that of daily stressors. Using data from NSDE 2 and NSDE Refresher, we showed that positive events happened frequently in the daily lives of midlife and older adults. Exposure and emotional responses to positive events were patterned by sociodemographic

factors, such that the daily lives of older adults, women, whites, and individuals with higher educational attainment were relatively more positive. Positive events produced upticks in positive affect (but had no significant effect on negative affect) and tended to occur on the same day as stressors. We described several of our studies on daily positive experiences and biological health, demonstrating that individuals who encountered more positive events tended to have lower inflammation and healthier profiles of diurnal cortisol (between-persons) and that the occurrence of a positive event was linked to alterations in cortisol on the same day (within-persons). By incorporating positive experiences in the study of daily stress, we can gain a more comprehensive understanding of how the ups and downs of daily life contribute to long-term health.

## References

- Aldwin, C. M., Jeong, Y.-J., Igarashi, H., & Spiro, A. (2014). Do hassles and uplifts change with age? Longitudinal findings from the VA normative aging study. *Psychology and Aging, 29*(1), 57–71.
- Almeida, D. M. (2005). Resilience and Vulnerability to Daily Stressors Assessed via Diary Methods. *Current Directions in Psychological Science, 14*(2), 64–68.  
<https://doi.org/10.1111/j.0963-7214.2005.00336.x>
- Almeida, D. M., McGonagle, K., & King, H. (2009). Assessing daily stress processes in social surveys by combining stressor exposure and salivary cortisol. *Biodemography and Social Biology, 55*(2), 219–237.
- Almeida, D. M., Piazza, J. R., Stawski, R. S., & Klein, L. C. (2011). The Speedometer of Life: Stress, Health and Aging. In K. W. Schaie & S. L. Willis (Eds.), *Handbook of the Psychology of Aging* (7th ed., pp. 191–206). New York, NY: Elsevier.
- Almeida, D. M., Wethington, E., & Kessler, R. C. (2002). The daily inventory of stressful events: an interview-based approach for measuring daily stressors. *Assessment, 9*(1), 41–55.
- Bajaj, A., John-Henderson, N. A., Cundiff, J. M., Marsland, A. L., Manuck, S. B., & Kamarck, T. W. (2016). Daily social interactions, close relationships, and systemic inflammation in two samples: Healthy middle-aged and older adults. *Brain, Behavior, and Immunity, 58*, 152–164.
- Boehm, J. K., & Kubzansky, L. D. (2012). The heart's content: The association between positive psychological well-being and cardiovascular health. *Psychological Bulletin, 138*(4), 655–691. <https://doi.org/10.1037/a0027448>

- Boehm, J. K., Vie, L. L., & Kubzansky, L. D. (2012). The Promise of Well-Being Interventions for Improving Health Risk Behaviors. *Current Cardiovascular Risk Reports*, 6(6), 511–519. <https://doi.org/10.1007/s12170-012-0273-x>
- Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual Review of Psychology*, 54(1), 579–616.
- Bolger, N., & Zuckerman, A. (1995). A framework for studying personality in the stress process. *Journal of Personality and Social Psychology*, 69(5), 890–902. <https://doi.org/10.1037/0022-3514.69.5.890>
- Bono, J. E., Glomb, T. M., Shen, W., Kim, E., & Koch, A. J. (2013). Building positive resources: Effects of positive events and positive reflection on work stress and health. *Academy of Management Journal*, 56(6), 1601–1627.
- Brim, O. G., Ryff, C. D., & Kessler, R. C. (2004). The MIDUS National Survey: An Overview. In O. G. Brim, C. D. Ryff, & R. C. Kessler (Eds.), *How healthy are we?: A national study of well-being at midlife* (pp. 1–34). Chicago: University of Chicago Press.
- Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*, 54(3), 165–181.
- Carstensen, L. L., Turan, B., Scheibe, S., Ram, N., Ersner-Hershfield, H., Samanez-Larkin, G. R., ... Nesselroade, J. R. (2011). Emotional experience improves with age: evidence based on over 10 years of experience sampling. *Psychology and Aging*, 26(1), 21.
- Charles, S. T., Luong, G., Almeida, D. M., Ryff, C., Sturm, M., & Love, G. (2010). Fewer ups and downs: Daily stressors mediate age differences in negative affect. *The Journals of Gerontology: Series B: Psychological Sciences and Social Sciences*, 65B(3), 279–286. <https://doi.org/10.1093/geronb/gbq002>

- Charles, S. T., Piazza, J. R., Mogle, J., Sliwinski, M. J., & Almeida, D. M. (2013). The Wear and Tear of Daily Stressors on Mental Health. *Psychological Science, 24*(5), 733–741.  
<https://doi.org/10.1177/0956797612462222>
- Chiang, J. J., Bower, J. E., Almeida, D. M., Irwin, M. R., Seeman, T. E., & Fuligni, A. J. (2015). Socioeconomic Status, Daily Affective and Social Experiences, and Inflammation During Adolescence. *Psychosomatic Medicine, 77*(3), 256–266.
- Chida, Y., & Steptoe, A. (2009). Cortisol awakening response and psychosocial factors: a systematic review and meta-analysis. *Biological Psychology, 80*(3), 265–278.  
<https://doi.org/10.1016/j.biopsycho.2008.10.004>
- Cichy, K. E., Stawski, R. S., & Almeida, D. M. (2012). Racial Differences in Exposure and Reactivity to Daily Family Stressors. *Journal of Marriage and the Family, 74*(3), 572–586. <https://doi.org/10.1111/j.1741-3737.2012.00971.x>
- Cohen, L. H., Gunthert, K. C., Butler, A. C., O’Neill, S. C., & Tolpin, L. H. (2005). Daily Affective Reactivity as a Prospective Predictor of Depressive Symptoms. *Journal of Personality, 73*(6), 1687–1714. <https://doi.org/10.1111/j.0022-3506.2005.00363.x>
- Cohen, S., Alper, C. M., Doyle, W. J., Treanor, J. J., & Turner, R. B. (2006). Positive emotional style predicts resistance to illness after experimental exposure to rhinovirus or influenza a virus. *Psychosomatic Medicine, 68*(6), 809–815.  
<https://doi.org/10.1097/01.psy.0000245867.92364.3c>
- Cohen, S., Doyle, W. J., Turner, R. B., Alper, C. M., & Skoner, D. P. (2003). Emotional Style and Susceptibility to the Common Cold: *Psychosomatic Medicine, 65*(4), 652–657.  
<https://doi.org/10.1097/01.PSY.0000077508.57784.DA>

- Cohen, S., & Hoberman, H. M. (1983). Positive Events and Social Supports as Buffers of Life Change Stress. *Journal of Applied Social Psychology, 13*(2), 99–125.  
<https://doi.org/10.1111/j.1559-1816.1983.tb02325.x>
- Conner, T. S., & Barrett, L. F. (2012). Trends in Ambulatory Self-Report: The Role of Momentary Experience in Psychosomatic Medicine. *Psychosomatic Medicine, 74*(4), 327–337. <https://doi.org/10.1097/PSY.0b013e3182546f18>
- Cundiff, J. M., Kamarck, T. W., & Manuck, S. B. (2016). Daily Interpersonal Experience Partially Explains the Association Between Social Rank and Physical Health. *Annals of Behavioral Medicine, 1*–8. <https://doi.org/10.1007/s12160-016-9811-y>
- Daly, M. (2012). Are momentary measures of positive affect better predictors of mortality than recalled feelings? *Proceedings of the National Academy of Sciences, 109*(18), E1049–E1049. <https://doi.org/10.1073/pnas.1201630109>
- DeSantis, A. S., DiezRoux, A. V., Hajat, A., Aiello, A. E., Golden, S. H., Jenny, N. S., ... Shea, S. (2012). Associations of salivary cortisol levels with inflammatory markers: The Multi-Ethnic Study of Atherosclerosis. *Psychoneuroendocrinology, 37*(7), 1009–1018.  
<https://doi.org/10.1016/j.psyneuen.2011.11.009>
- Ditzen, B., Hoppmann, C., & Klumb, P. (2008). Positive couple interactions and daily cortisol: on the stress-protecting role of intimacy. *Psychosomatic Medicine, 70*(8), 883–889.  
<https://doi.org/10.1097/PSY.0b013e318185c4fc>
- Folkman, S. (1997). Positive psychological states and coping with severe stress. *Social Science & Medicine, 45*(8), 1207–1221. [https://doi.org/10.1016/S0277-9536\(97\)00040-3](https://doi.org/10.1016/S0277-9536(97)00040-3)
- Folkman, S., & Moskowitz, J. T. (2000). Positive affect and the other side of coping. *American Psychologist, 55*(6), 647–654. <https://doi.org/10.1037/0003-066X.55.6.647>

Folkman, S., Moskowitz, J. T., Ozer, E. M., & Park, C. L. (1997). Positive meaningful events and coping in the context of HIV/AIDS. In *Coping with chronic stress* (pp. 293–314).

Springer.

Gable, S. L., Gonzaga, G. C., & Strachman, A. (2006). Will you be there for me when things go right? Supportive responses to positive event disclosures. *Journal of Personality and Social Psychology, 91*(5), 904–917. <https://doi.org/10.1037/0022-3514.91.5.904>

Gable, S. L., Reis, H. T., Impett, E. A., & Asher, E. R. (2004). What do you do when things go right? The intrapersonal and interpersonal benefits of sharing positive events. *Journal of Personality and Social Psychology, 87*(2), 228.

Gallo, L. C., & Matthews, K. A. (2003). Understanding the association between socioeconomic status and physical health: do negative emotions play a role? *Psychological Bulletin, 129*(1), 10–51.

Grant, N., Wardle, J., & Steptoe, A. (2009). The relationship between life satisfaction and health behavior: a cross-cultural analysis of young adults. *International Journal of Behavioral Medicine, 16*(3), 259–268. <https://doi.org/10.1007/s12529-009-9032-x>

Gruber, J., Mauss, I. B., & Tamir, M. (2011). A Dark Side of Happiness? How, When, and Why Happiness Is Not Always Good. *Perspectives on Psychological Science, 6*(3), 222–233. <https://doi.org/10.1177/1745691611406927>

Grzywacz, J. G., Almeida, D. M., Neupert, S. D., & Ettner, S. L. (2004). Socioeconomic status and health: a micro-level analysis of exposure and vulnerability to daily stressors. *Journal of Health and Social Behavior, 45*(1), 1–16.

Harris, T. B., Ferrucci, L., Tracy, R. P., Corti, M. C., Wacholder, S., Ettinger Jr, W. H., ...

Wallace, R. (1999). Associations of elevated Interleukin-6 and C-Reactive protein levels



- with mortality in the elderly. *The American Journal of Medicine*, 106(5), 506–512.  
[https://doi.org/10.1016/S0002-9343\(99\)00066-2](https://doi.org/10.1016/S0002-9343(99)00066-2)
- Heim, C., Ehlert, U., & Hellhammer, D. H. (2000). The potential role of hypocortisolism in the pathophysiology of stress-related bodily disorders. *Psychoneuroendocrinology*, 25(1), 1–35. [https://doi.org/10.1016/S0306-4530\(99\)00035-9](https://doi.org/10.1016/S0306-4530(99)00035-9)
- Hoen, P. W., Denollet, J., de Jonge, P., & Whooley, M. A. (2013). Positive affect and survival in patients with stable coronary heart disease: Findings from the Heart and Soul Study. *Journal of Clinical Psychiatry*, 74(7), 716–722. <https://doi.org/10.4088/JCP.12m08022>
- Hoogwegt, M. T., Versteeg, H., Hansen, T. B., Thygesen, L. C., Pedersen, S. S., & Zwisler, A.-D. (2013). Exercise mediates the association between positive affect and 5-year mortality in patients with ischemic heart disease. *Circulation: Cardiovascular Quality and Outcomes*, 6(5), 559–566.
- Jeong, Y.-J., Aldwin, C. M., Igarashi, H., & Spiro, A. (2016). Do hassles and uplifts trajectories predict mortality? Longitudinal findings from the VA Normative Aging Study. *Journal of Behavioral Medicine*, 39(3), 408–419. <https://doi.org/10.1007/s10865-015-9703-9>
- Kahneman, D., & Riis, J. (2005). Living, and thinking about it: Two perspectives on life. *The Science of Well-Being*, 285–304.
- Kanner, A. D., Coyne, J. C., Schaefer, C., & Lazarus, R. S. (1981). Comparison of two modes of stress measurement: Daily hassles and uplifts versus major life events. *Journal of Behavioral Medicine*, 4(1), 1–39.
- Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L. T., ... Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, 32(6), 959–976.

- Koopmans, T. A., Geleijnse, J. M., Zitman, F. G., & Giltay, E. J. (2010). Effects of happiness on all-cause mortality during 15 years of follow-up: The Arnhem Elderly Study. *Journal of Happiness Studies*, *11*(1), 113–124.
- Kubzansky, L. D., & Thurston, R. C. (2007). Emotional vitality and incident coronary heart disease: benefits of healthy psychological functioning. *Archives of General Psychiatry*, *64*(12), 1393–1401.
- Kumari, M., Shipley, M., Stafford, M., & Kivimaki, M. (2011). Association of Diurnal Patterns in Salivary Cortisol with All-Cause and Cardiovascular Mortality: Findings from the Whitehall II Study. *The Journal of Clinical Endocrinology & Metabolism*, *96*(5), 1478–1485. <https://doi.org/10.1210/jc.2010-2137>
- Langston, C. A. (1994). Capitalizing on and coping with daily-life events: Expressive responses to positive events. *Journal of Personality and Social Psychology*, *67*(6), 1112–1125. <https://doi.org/10.1037/0022-3514.67.6.1112>
- Lazarus, R. S., Kanner, A. D., & Folkman, S. (1980). Emotions: A cognitive-phenomenological analysis. In R. Plutchik & H. Kellerman (Eds.), *Theories of Emotion* (pp. 189–217). New York: Academic Press.
- Lewinsohn, P. M., & Libet, J. (1972). Pleasant events, activity schedules, and depressions. *Journal of Abnormal Psychology*, *79*(3), 291–295.
- Miller, G. E., Chen, E., & Zhou, E. S. (2007). If it goes up, must it come down? Chronic stress and the hypothalamic-pituitary-adrenocortical axis in humans. *Psychological Bulletin*, *133*(1), 25–45. <https://doi.org/10.1037/0033-2909.133.1.25>

- Mroczek, D. K., & Kolarz, C. M. (1998). The effect of age on positive and negative affect: A developmental perspective on happiness. *Journal of Personality and Social Psychology*, 75(5), 1333–1349. <https://doi.org/10.1037/0022-3514.75.5.1333>
- Mroczek, D. K., Stawski, R. S., Turiano, N. A., Chan, W., Almeida, D. M., Neupert, S. D., & Spiro, A. (2015). Emotional reactivity and mortality: Longitudinal findings from the VA Normative Aging Study. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 70(3), 398–406.
- O’Neill, S. C., Cohen, L. H., Tolpin, L. H., & Gunthert, K. C. (2004). Affective Reactivity to Daily Interpersonal Stressors as a Prospective Predictor of Depressive Symptoms. *Journal of Social and Clinical Psychology*, 23(2), 172–194. <https://doi.org/10.1521/jscp.23.2.172.31015>
- Ong, A. D. (2010). Pathways Linking Positive Emotion and Health in Later Life. *Current Directions in Psychological Science*, 19(6), 358–362. <https://doi.org/10.1177/0963721410388805>
- Ong, A. D., & Allaire, J. C. (2005). Cardiovascular Intraindividual Variability in Later Life: The Influence of Social Connectedness and Positive Emotions. *Psychology and Aging*, 20(3), 476–485. <https://doi.org/10.1037/0882-7974.20.3.476>
- Ong, A. D., Bergeman, C. S., & Bisconti, T. L. (2004). The role of daily positive emotions during conjugal bereavement. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 59(4), P168–P176.
- Ong, A. D., Bergeman, C. S., Bisconti, T. L., & Wallace, K. A. (2006). Psychological resilience, positive emotions, and successful adaptation to stress in later life. *Journal of Personality and Social Psychology*, 91(4), 730–749. <https://doi.org/10.1037/0022-3514.91.4.730>

- Ong, A. D., Exner-Cortens, D., Riffin, C., Steptoe, A., Zautra, A., & Almeida, D. M. (2013). Linking stable and dynamic features of positive affect to sleep. *Annals of Behavioral Medicine*, *46*(1), 52–61. <https://doi.org/10.1007/s12160-013-9484-8>
- Ong, A. D., Kim, S., Young, S., & Steptoe, A. (2016). Positive affect and sleep: A systematic review. *Sleep Medicine Reviews*. <https://doi.org/10.1016/j.smrv.2016.07.006>
- Parrish, B. P., Zautra, A. J., & Davis, M. C. (2008). The role of positive and negative interpersonal events on daily fatigue in women with fibromyalgia, rheumatoid arthritis, and osteoarthritis. *Health Psychology*, *27*(6), 694–702. <https://doi.org/10.1037/0278-6133.27.6.694>
- Piazza, J. R., Charles, S. T., Sliwinski, M. J., Mogle, J., & Almeida, D. M. (2013). Affective reactivity to daily stressors and long-term risk of reporting a chronic physical health condition. *Annals of Behavioral Medicine*, *45*(1), 110–120.
- Pressman, S. D., & Cohen, S. (2005). Does Positive Affect Influence Health? *Psychological Bulletin*, *131*(6), 925–971. <https://doi.org/10.1037/0033-2909.131.6.925>
- Reich, J. W., & Zautra, A. (1981). Life events and personal causation: some relationships with satisfaction and distress. *Journal of Personality and Social Psychology*, *41*(5), 1002–1012.
- Reuben, D. B., Cheh, A. I., Harris, T. B., Ferrucci, L., Rowe, J. W., Tracy, R. P., & Seeman, T. E. (2002). Peripheral Blood Markers of Inflammation Predict Mortality and Functional Decline in High-Functioning Community-Dwelling Older Persons. *Journal of the American Geriatrics Society*, *50*(4), 638–644. <https://doi.org/10.1046/j.1532-5415.2002.50157.x>

- Ryff, C., Almeida, D., Ayanian, J., Binkley, N., Carr, D., Coe, C., ... Williams, D. (2016). National Survey of Midlife Development in the United States (MIDUS Refresher), 2011-2014. Inter-university Consortium for Political and Social Research (ICPSR) [distributor]. Retrieved from <http://doi.org/10.3886/ICPSR36532.v2>
- Schwerdtfeger, A. R., & Gerteis, A. K. S. (2014). The manifold effects of positive affect on heart rate variability in everyday life: Distinguishing within-person and between-person associations. *Health Psychology, 33*(9), 1065–1073. <https://doi.org/10.1037/hea0000079>
- Sin, N. L. (2016). The Protective Role of Positive Well-Being in Cardiovascular Disease: Review of Current Evidence, Mechanisms, and Clinical Implications. *Current Cardiology Reports, 18*(11), 1–10. <https://doi.org/10.1007/s11886-016-0792-z>
- Sin, N. L., Almeida, D. M., Crain, T. L., Kossek, E. E., Berkman, L. F., & Buxton, O. M. (2017). Bidirectional, Temporal Associations of Sleep with Positive Events, Affect, and Stressors in Daily Life Across a Week. *Annals of Behavioral Medicine, 1–14*.
- Sin, N. L., Graham-Engeland, J. E., & Almeida, D. M. (2015). Daily positive events and inflammation: Findings from the National Study of Daily Experiences. *Brain, Behavior, and Immunity, 43*, 130–138. <https://doi.org/10.1016/j.bbi.2014.07.015>
- Sin, N. L., Graham-Engeland, J. E., Ong, A. D., & Almeida, D. M. (2015). Affective reactivity to daily stressors is associated with elevated inflammation. *Health Psychology, 34*(12), 1154–1165. <https://doi.org/10.1037/hea0000240>
- Sin, N. L., Moskowitz, J. T., & Whooley, M. A. (2015). Positive Affect and Health Behaviors Across 5 Years in Patients With Coronary Heart Disease: The Heart and Soul Study. *Psychosomatic Medicine, 77*(9), 1058–1066. <https://doi.org/10.1097/PSY.0000000000000238>

- Sin, N. L., Ong, A. D., Stawski, R. S., & Almeida, D. M. (2017). Daily positive events and diurnal cortisol rhythms: Examination of between-person differences and within-person variation. *Manuscript under Review*.
- Sin, N. L., Sloan, R. P., McKinley, P. S., & Almeida, D. M. (2016). Linking Daily Stress Processes and Laboratory-Based Heart Rate Variability in a National Sample of Midlife and Older Adults. *Psychosomatic Medicine*, 78(5), 573–582.  
<https://doi.org/10.1097/PSY.0000000000000306>
- Smith, J. L., Harrison, P. R., Kurtz, J. L., & Bryant, F. B. (2014). Nurturing the Capacity to Savor: Interventions to Enhance the Enjoyment of Positive Experiences. In A. C. Parks & S. M. Schueller (Eds.), *The Wiley Blackwell Handbook of Positive Psychological Interventions* (pp. 42–65). Wiley.
- Stawski, R. S., Cichy, K. E., Piazza, J. R., & Almeida, D. M. (2013). Associations among daily stressors and salivary cortisol: Findings from the National Study of Daily Experiences. *Psychoneuroendocrinology*, 38(11), 2654–2665.  
<https://doi.org/10.1016/j.psyneuen.2013.06.023>
- Step toe, A., Gibson, E. L., Hamer, M., & Wardle, J. (2007). Neuroendocrine and cardiovascular correlates of positive affect measured by ecological momentary assessment and by questionnaire. *Psychoneuroendocrinology*, 32(1), 56–64.  
<https://doi.org/10.1016/j.psyneuen.2006.10.001>
- Step toe, A., Hamer, M., & Chida, Y. (2007). The effects of acute psychological stress on circulating inflammatory factors in humans: A review and meta-analysis. *Brain, Behavior, and Immunity*, 21(7), 901–912. <https://doi.org/10.1016/j.bbi.2007.03.011>

- Step toe, A., & Wardle, J. (2005). Positive affect and biological function in everyday life. *Neurobiology of Aging*, *26*(1, Supplement), 108–112.  
<https://doi.org/10.1016/j.neurobiolaging.2005.08.016>
- Step toe, A., & Wardle, J. (2011). Positive affect measured using ecological momentary assessment and survival in older men and women. *Proceedings of the National Academy of Sciences*, *108*(45), 18244–18248. <https://doi.org/10.1073/pnas.1110892108>
- Step toe, A., Wardle, J., & Marmot, M. (2005). Positive affect and health-related neuroendocrine, cardiovascular, and inflammatory processes. *Proceedings of the National Academy of Sciences of the United States of America*, *102*(18), 6508–6512.  
<https://doi.org/10.1073/pnas.0409174102>
- Stone, A. A., Neale, J. M., Cox, D. S., Napoli, A., Valdimarsdottir, H., & Kennedy-Moore, E. (1994). Daily events are associated with a secretory immune response to an oral antigen in men. *Health Psychology*, *13*(5), 440–446. <https://doi.org/10.1037/0278-6133.13.5.440>
- Suls, J., Green, P., & Hillis, S. (1998). Emotional Reactivity to Everyday Problems, Affective Inertia, and Neuroticism. *Personality and Social Psychology Bulletin*, *24*(2), 127–136.  
<https://doi.org/10.1177/0146167298242002>
- Suls, J., & Martin, R. (2005). The Daily Life of the Garden-Variety Neurotic: Reactivity, Stressor Exposure, Mood Spillover, and Maladaptive Coping. *Journal of Personality*, *73*(6), 1485–1510. <https://doi.org/10.1111/j.1467-6494.2005.00356.x>
- Volpato, S., Guralnik, J. M., Ferrucci, L., Balfour, J., Chaves, P., Fried, L. P., & Harris, T. B. (2001). Cardiovascular Disease, Interleukin-6, and Risk of Mortality in Older Women The Women's Health and Aging Study. *Circulation*, *103*(7), 947–953.  
<https://doi.org/10.1161/01.CIR.103.7.947>

Zautra, A. J. (2003). *Emotions, stress, and health*. Oxford University Press.

Zautra, A. J., Affleck, G. G., Davis, M. C., Tennen, H., & Fasman, R. (2006). Assessing the ebb and flow of daily life with an accent on the positive. In A. D. Ong & M. H. M. van Dulmen (Eds.), *Oxford handbook of methods in positive psychology*. New York, NY: Oxford University Press.

Zautra, A. J., Affleck, G. G., Tennen, H., Reich, J. W., & Davis, M. C. (2005). Dynamic approaches to emotions and stress in everyday life: Bolger and Zuckerman reloaded with positive as well as negative affects. *Journal of Personality, 73*(6), 1511–1538.  
<https://doi.org/10.1111/j.0022-3506.2005.00357.x>

Zautra, A. J., Guarnaccia, C. A., & Dohrenwend, B. P. (1986). Measuring small life events. *American Journal of Community Psychology, 14*(6), 629–655.

Zautra, A. J., & Reich, J. W. (1983). Life events and perceptions of life quality: Developments in a two-factor approach. *Journal of Community Psychology, 11*(2), 121–132.

Zautra, A. J., Smith, B., Affleck, G. G., & Tennen, H. (2001). Examinations of chronic pain and affect relationships: Applications of a dynamic model of affect. *Journal of Consulting and Clinical Psychology, 69*(5), 786–795. <https://doi.org/10.1037/0022-006X.69.5.786>

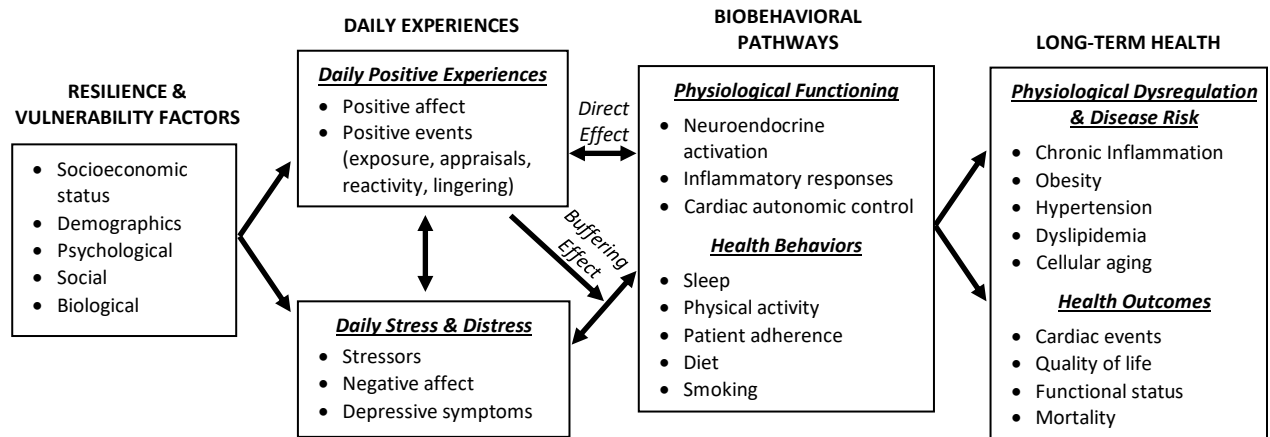


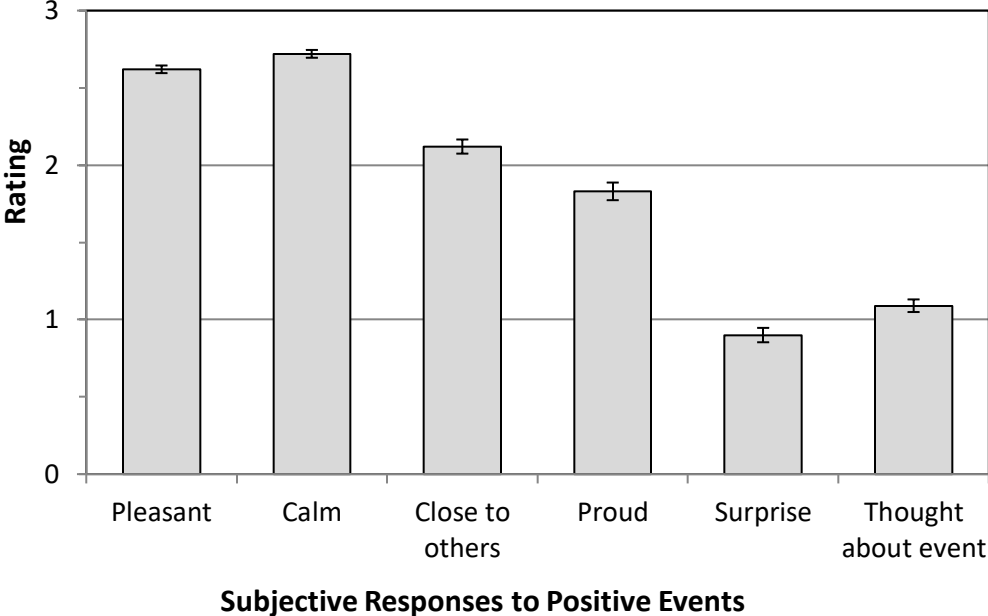
### Figure Captions

**Figure 1.** *Conceptual model of pathways linking daily positive experiences and health.*

Individual, group-level, and environmental factors (e.g., personality, socioeconomic status) influence exposure and responses to daily positive experiences as well as stressors. Daily positive experiences are proposed to have proximal direct and stress-buffering effects on physiological functioning and daily health behaviors. These biobehavioral pathways, in turn, influence health over the long term. The paths in the model are conceptualized as bidirectional, reciprocal associations with feedback loops (e.g., poor physical health may reduce daily positive experiences and increase daily stress).

**Figure 2.** *Subjective responses to positive events in the NSDE Refresher Study.* The figure depicts mean ratings from 775 participants; error bars are 95% confidence intervals. Responses were rated on a 4-point scale ranging from “not at all” to “very much.”





**Table 1. Daily positive events in the National Studies of Daily Experiences (NSDE)**

	NSDE 2 (N <sub>people</sub> = 2,022, N <sub>days</sub> = 14,912)	NSDE Refresher (N <sub>people</sub> = 782, N <sub>days</sub> = 5,760)
<b><i>Overall positive event exposure</i></b>		
Mean (SD) positive events per day	1.12 (0.68)	1.31 (0.74)
% of days with any positive event (SD)	71% (27%)	75% (25%) <sup>a</sup>
<b><i>Percent of days with type of event (SD)</i></b>		
Social interactions	62% (29%)	53% (28%)
Work, school, or volunteer position	12% (17%)	8% (14%)
Home	19% (22%)	15% (20%)
Network <sup>b</sup>	9% (14%)	6% (12%)
Nature	-----	42% (32%)
Other/Miscellaneous	10% (15%)	6% (12%)
<b><i>Within-person correlations with daily positive events</i></b>		
Same-day positive affect	$r = 0.08^{***}$	$r = 0.13^{***}$
Same-day negative affect	$r = 0.03$	$r = 0.02$
Same-day stressors	$r = 0.05^*$	$r = 0.08^*$
<b><i>Between-person correlations with daily positive events</i></b>		
Average daily positive affect	$r = 0.17^{***}$	$r = 0.17^{***}$
Average daily negative affect	$r = -0.15^{***}$	$r = 0.07^*$
% of days with any stressor	$r = 0.33^{***}$	$r = 0.28^{***}$

*Note.* The NSDE Refresher Study included an additional positive event item that asked, “Did you spend time enjoying or viewing nature?”

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

<sup>a</sup>When positive events in nature are excluded, then the mean (SD) for positive event exposure is 62% (28%).

<sup>b</sup>Positive events that happened to a friend or family member

**Table 2. Demographic and socioeconomic differences in positive event exposure (i.e., % of days with any positive event)**

	NSDE 2 (N <sub>people</sub> = 2,022)		NSDE Refresher (N <sub>people</sub> = 782)	
	Mean (SD)	Group Differences	Mean (SD)	Group Differences
<b>Age group</b>				
Younger (up to 40 years old)	65% (30%)	$F(2, 2019) = 6.83^{***}$	67% (27%)	$F(2, 779) = 16.13^{***}$
Middle-aged (40-59 years old)	70% (27%)		76% (25%)	
Older (60 years and older)	73% (27%)		81% (24%)	
<b>Gender</b>				
Men	69% (28%)	$t(2020) = 2.15^*$	73% (25%)	$t(780) = 1.17$
Women	72% (27%)		76% (26%)	
<b>Race</b>				
White race	72% (27%)	$F(2, 2019) = 10.34^{***}$	76% (25%)	$F(2, 775) = 4.03^*$
African American/Black	64% (29%)		70% (27%)	
Other races	66% (31%)		68% (29%)	
<b>Educational attainment</b>				
High school graduate or below	62% (29%)	$F(2, 2019) = 59.51^{***}$	68% (29%)	$F(2, 779) = 9.02^{***}$
Some college	71% (27%)		74% (25%)	
College graduate or above	77% (25%)		78% (24%)	

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

NSDE = National Study of Daily Experiences

## APPENDIX

In the National Studies of Daily Experiences (NSDE), daily positive events were assessed using a semi-structured instrument adapted from the Daily Inventory of Stressful Events (Almeida et al., 2002). The instrument consisted of stem questions that inquired about the occurrence of positive events in various life domains. In the NSDE Refresher Study, when participants gave an affirmative answer to a stem question, they were asked a series of follow-up questions regarding their emotional responses to the positive event and how much they have thought about the event.

### Stem Questions

1. Did you have an *interaction* with someone that most people would consider particularly positive (for example, sharing a good laugh with someone, or having a good conversation) since this time yesterday?  
No    Yes
2. Since (this time/we spoke) yesterday, did you have an experience at *work, school, or at a volunteer position* that most people would consider particularly positive?  
No    Yes
3. Since (this time/we spoke) yesterday, did you have an experience at *home* (other than what you've already mentioned) that most people would consider particularly positive?  
No    Yes
4. Since (this time/we spoke) yesterday, did anything happen to a *close friend or relative* (other than what you've already mentioned) that turned out to be particularly positive for you?  
No    Yes
5. Since (this time/we spoke) yesterday, did you spend any time enjoying or viewing *nature*? Please do not include any events you have previously mentioned.<sup>a</sup>  
No    Yes
6. Other than what you've already mentioned, did *anything else* happen to you since (this time/we spoke) yesterday that most people would consider particularly positive?  
No    Yes

<sup>a</sup>This item was asked only in the NSDE Refresher Study.

### Subjective Responses (NSDE Refresher Study only)

1. How *pleasant or enjoyable* was this experience?  
Very much                      Somewhat                      Not very                      Not at all

2. To what extent was this event a *surprise*?  
Very much                  Somewhat                  A little                  Not at all
3. How much have you *thought about* this experience since it happened?  
A lot                          Some                          A little                  Not at all
4. During this experience, how *calm* were you feeling?  
Very much                  Somewhat                  Not very                  Not at all
5. During this experience, how *proud* were you feeling?  
Very much                  Somewhat                  Not very                  Not at all
6. During this experience, how *close did you feel to others*?  
Very much                  Somewhat                  Not very                  Not at all