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Abstract

Bad moods are considered “bad” not only because they may be aversive experiences in and of themselves, but also because they are associated with poorer psychosocial functioning and health. We propose that people differ in their negative affect valuation (NAV; the extent to which negative affective states are valued as pleasant, useful/helpful, appropriate, and meaningful experiences) and that affect-health links are moderated by NAV. These predictions were tested in a life-span sample of 365 participants ranging from 14–88 years of age using reports of momentary negative affect and physical well-being (via experience sampling) and assessments of NAV and psychosocial and physical functioning (via computer-assisted personal interviews and behavioral measures of hand grip strength). Our study demonstrated that the more individuals valued negative affect, the less pronounced (and sometimes even nonexistent) were the associations between everyday experiences of negative affect and a variety of indicators of poorer psychosocial functioning (i.e., emotional health problems, social integration) and physical health (i.e., number of health conditions, health complaints, hand grip strength, momentary physical well-being). Exploratory analyses revealed that valuing positive affect was not associated with the analogous moderating effects as NAV. These findings suggest that it may be particularly important to consider NAV in models of affect-health links.

Keywords: negative and positive emotions; physical health; subjective well-being; affect-health links; affect valuation

When Bad Moods May Not Be So Bad: Valuing Negative Affect is Associated with Weakened Affect-Health Links

Negative affect (NA) states, such as nervousness, anger, and sadness, are considered “negative” not only because they may be generally unpleasant experiences, but also because they have been linked to diminished psychosocial functioning (e.g., social integration; Kawachi & Berkman, 2001) and physical health (e.g., Watson & Pennebaker, 1989). There is emerging evidence, however, that people differ in their evaluations of NA as aversive and undesirable experiences (e.g., Harmon-Jones, Harmon-Jones, Amodio, & Gable, 2011; Izard, 1971) and that there are also individual differences in the magnitude of the couplings between experiences of NA and poorer psychosocial well-being and health (Consedine, Magai, & Horton, 2005; Curhan et al., 2014; Kitayama et al., 2015; Miyamoto et al., 2013; Pressman, Gallagher, & Lopez, 2013). In the current study, we investigate whether the links between NA and lower psychosocial and physical functioning may be moderated by individual differences in negative affect valuation (NAV; the degree to which individuals evaluate negative affective states as pleasant, useful, appropriate, and meaningful experiences).

Links Between Negative Affect and Physical and Psychosocial Functioning

According to appraisal theories of emotion, individuals appraise or evaluate events on multiple dimensions (e.g., unpleasantness of the event; potential of the event to disrupt one’s goals or concerns) and these initial situational appraisals give rise to different affective states (e.g., Frijda, 1986; Moors, 2013; Ortony, Clore, & Collins, 1988; Roseman, 1984; Scherer, 1984; Siemer, Mauss, & Gross, 2007; Smith & Ellsworth, 1985; Stein & Levine, 1989; Weiner, 1985). Individuals may appraise situations and stressors, such as finding out that one’s partner has been deceitful, as threatening and counter to their goals to maintain a harmonious relationship, which then elicits NA states such as anger. These NA states are believed to motivate action tendencies

that are useful for coping with stressful circumstances by involving psychological changes (such as heightened arousal) that increase sensory alertness and prepare the individual for the prompt execution of these behaviors (Carver, 2001; 2004). However, when individuals have difficulties coping with stressors and experience sustained and intense levels of NA, then NA can be dysfunctional. Over time, the physiological arousal and subjective distress arising from these emotional states may undermine psychosocial functioning (Meeks & Murrell, 2001) and physically wear and tear on the body (McEwen & Seeman, 1999).

A large corpus of studies indeed documents the robust associations between NA and reduced psychosocial well-being and physical health. For example, high levels of NA are related to lower psychosocial well-being, such as depressive symptoms (Denollet & De Vries, 2006; Wichers et al., 2007), weakened social support and social integration (see review by Mayne, 1999), and lower life satisfaction (e.g., Kuppens, Realo, & Diener, 2008). NA is also linked to poorer physical health, including reduced immune responses (Cacioppo et al., 1998), development of clinical colds (Cohen, Tyrrell, & Smith, 1993), health complaints (e.g., Pressman et al., 2013; Watson, 1988), disease incidence (Kubzansky & Kawachi, 2000; Nabi, Kivimaki, De Vogli, Marmot, & Singh-Manoux, 2008; Pennix et al., 1998), and even mortality risk (e.g., Pinquart & Duberstein, 2010). Recent studies have further shown that high levels of NA are prospectively linked to mental and physical health problems up to 10 years later (Charles, Piazza, Mogle, Sliwinski, & Almeida, 2013; Piazza, Charles, Sliwinski, Mogle, & Almeida, 2013). Hereafter, we refer to the associations between NA and psychosocial and physical functioning as “affect-health” links.

Notably, however, there are important individual and cultural differences in these affect-health associations. Studies have shown, for example, that people differ in the degree to which NA is related to psychosocial well-being (e.g., life satisfaction: Curhan et al.; Haase, Seider,

Shiota, & Levenson, 2012; Kuppens et al., 2008) and physical functioning (e.g., biological health risk profiles: Kitayama et al., 2015; Miyamoto et al., 2013; self-reported health problems: Consedine et al., 2005; Consedine et al., 2006; Curhan et al., 2014). Researchers have posited that individual differences in the extent to which NA is valued may play a role in explaining variation in the relative strength of the relations between NA and health, such that greater valuation of NA may attenuate these affect-health associations (e.g., Curhan et al.; Kuppens et al.; Miyamoto et al.). Few studies, however, have directly investigated whether individual differences in valuing negative affect may indeed account for some of the variability in affect-health links.

Individual Differences in Negative Affect Valuation (NAV)

Why might valuing negative emotions moderate affect-health associations? Before addressing this question, one first needs to understand that in addition to the situation-specific appraisals, another higher-ordered appraisal process may occur which targets the affective state itself. We refer to these affective appraisals as *negative affect valuation* (NAV), which is the degree to which individuals tend to appraise or evaluate NA not solely as aversive states, but occasionally also as valuable experiences with respect to their (a) hedonic pleasure states, (b) functional adaptiveness or utility in attaining one's goals, (c) appropriateness or acceptability, and (d) meaningfulness (Bartsch, Vorderer, Mangold, & Viehoff, 2008; Eid & Diener, 2001; Lazarus, 1999; Ochsner & Gross, 2014; Simons & Gaher, 2005). Next, we address each of these four facets in turn and briefly describe how the facets collectively contribute to NAV.

In terms of hedonic pleasure states, an overreliance on the valence dichotomy of positive vs. negative affect in the literature may have led to unfounded assumptions that NA is wholly undesirable, and equally so for all individuals (see discussions by Solomon & Stone, 2002; Zaborowski, 2013). Although NA is often viewed as unpleasant, unhelpful, inappropriate, and

meaningless, just how negative such emotional experiences are will vary for each person. It may therefore be important to consider the evaluation of affective states in more relative terms (i.e., on a continuum). For example, with respect to the *pleasantness* facet of NAV, individuals differ in the degree to which they enjoy experiencing the negative emotions, such as sadness and fear, induced by sappy dramas and horror films (Andrade & Cohen, 2007; Hoffner & Levine, 2005; Oliver, 1993). Similarly, certain individuals may actually like experiencing anger as they may find it empowering, whereas others may appraise experiences of anger to be unbearably aversive (Harmon-Jones et al., 2011). Although NA is typically not considered pleasant, per se, the main point is that individuals differ in the extent to which NA is considered (un)pleasant or (un)comfortable. Some people may deem NA to be extremely unpleasant, but others may evaluate such states as relatively less burdensome.

With respect to their *functional adaptiveness* or *utility*, studies have also shown that negative emotions, including anger (Knobloch-Westerwick & Alter, 2006; Morris & Keltner, 2000; Tamir & Ford, 2012; Tamir, Mitchell, & Gross, 2008), sadness (Hackenbracht & Tamir, 2010), fear (Lang, Davis, & Öhman, 2000; Tamir & Ford, 2009), and anxiety (Tamir, 2005), can be instrumental for achieving personal goals (see reviews by Keltner & Gross, 1999; Tamir, 2009). Experiencing anger as useful, in turn, can contribute to more positive and/or less negative evaluations of anger (Netzer, Igra, Anan, & Tamir, 2015).

Moreover, negative emotions may be more *appropriate* in certain contexts than in others (e.g., Västfjäll & Gärling, 2006). When delivering bad news, for example, feeling somber may be socially acceptable and even expected. Sharing and expressing NA may also make such experiences more *meaningful* (e.g., Luminet, Bouts, Delie, Manstead, & Rimé, 2000; Rimé, 2009), which adds to their value by making them more positive and less threatening (Hayes, Strosahl, & Wilson, 1999; Park, 2010). Just as there are interindividual differences in ratings of

NA on the pleasantness-unpleasantness continuum, there are also differences in the tendency to occasionally evaluate NA as useful, appropriate, and meaningful (e.g., Bastian et al., 2012; Eid & Diener, 2001; Koopmann-Holm & Tsai, 2014; Miyamoto, Ma, & Petermann, 2014; Stearns & Lewis, 1998; Tamir, 2005; Uchida & Kitayama, 2009).

Taken together, the burgeoning literature suggests that the four facets introduced above (pleasantness, utility, appropriateness, and meaningfulness) contribute to the valuation of NA. Indeed, one can imagine that some individuals may sometimes enjoy feeling angry because it makes them feel empowered (i.e., pleasantness facet), which may also be helpful for preparing oneself for confrontations (i.e., utility facet; Tamir & Ford, 2012) and may be appropriate and meaningful in such situations. Previous studies, however, often had a more restricted focus and examined specific valuation facets separately, such as how much people like various emotions (as a measure of pleasantness; e.g., Harmon-Jones et al., 2011). Other studies have used similar but less encompassing constructs, such as meta-emotions (i.e., emotions about emotions; see review by Bartsch et al., 2008; Mayer & Gaschke, 1988), attitudes toward emotions (e.g., understanding, dreading, or preferring emotions; Izard, 1971), and acceptance of emotions (Shallcross, Troy, Boland, & Mauss, 2010). These constructs are related but do not comprehensively capture the underlying components of NAV, as we have outlined.¹

Negative Affect Valuation (NAV) as a Potential Moderator of Affect-Health Links

Affective appraisals, such as NAV, can change the course, meaning, and possibly even correlates and outcomes of the emotional experience itself (e.g., Bartsch et al., 2008; Gross, 2015; Ochsner & Gross, 2014), including affect-health links. Returning to our example above, although an unfavorable initial situational appraisal of a partner's deceit may elicit anger, an individual may appraise the experience of anger itself as relatively pleasant (e.g., empowering), useful/helpful, appropriate, and meaningful in standing one's ground in confronting the partner.

To the degree that NA is appreciated and valued, then, its meaning may be transformed from a solely aversive response to a more nuanced experience whereby the negative emotions themselves may have some redeeming qualities for the individual. In particular, greater valuation of NA may be protective because it may serve as a personal resource to help individuals deal with the detrimental impacts of NA on health, consistent with biopsychosocial models (see review by Blascovich & Mendes, 2010). For example, it is possible that NAV acts as a higher-ordered emotion regulation strategy to reappraise NA states, allowing individuals to view such emotions in a more positive light. A growing literature demonstrates, for example, that situational reappraisal (in which individuals think about events in a more positive way) is generally quite effective for reducing distress (e.g., Garnefski & Kraaij, 2006; John & Gross, 2004; see review by Gross, 2015). Perhaps in an analogous manner, NAV may help individuals reappraise the distressing aspects of NA experiences and view such emotions in a less threatening manner (e.g., Simons & Gaher, 2005). Indeed, related work suggests that reappraising stress arousal may weaken links between NA and maladaptive physiological responses (e.g., Jamieson, Mendes, & Nock, 2013; Jamieson, Nock, & Mendes, 2013). Greater valuation of NA may thereby alter the subsequent cascade of physiological arousal and psychological distress that accompany NA states and which have been theorized to ravage long-term health and well-being (e.g., Myin-Germeys & van Os, 2007; Piazza et al., 2013). We therefore predict that relatively greater NAV would be associated with attenuated affect-health links.

The Current Study

Negative affect has been robustly linked to poorer psychosocial functioning (Kuppens et al., 2008) and physical health (e.g., Cohen et al., 1995; Mayne, 1999; Watson & Pennebaker, 1989). Individuals, however, vary in the extent to which they value NA, which in turn, is hypothesized to moderate the links between experiences of NA and poorer psychosocial and

physical functioning. In particular, we predict that with greater NAV, the affect-health associations will be less pronounced. We focus on NA more generally, rather than discrete emotions (e.g., sadness, nervousness), given that the robust associations in the literature have been primarily based on the affective valence (i.e., negative affect). This approach is consistent with previous studies that have examined moderators of affect-health links (e.g., Curhan et al., 2014; Miyamoto et al., 2013). In addition, our study examines these affect-health inter-relations in a life-span community sample ranging from adolescence to old age, which extends the generalizability of the findings to a larger segment of the population compared to college student samples. We use mobile phone-based experience sampling methodology (ESM) to investigate how NAV may moderate affect-health links, both at the person-level and occasion-level. Our study also tests whether these findings are unique to NAV or whether valuing positive affect also shows similar moderating effects.

Method

Participants

Data for the current study were based on the 2013 wave of a larger ongoing longitudinal project on affective experiences in daily life, the Multi-Method Ambulatory Assessment (MMAA) project. We introduced key measures of interest for the current investigation in the 2013 wave. The 365 participants in this wave were originally recruited from three metropolitan regions in Germany (Berlin, Dusseldorf, and Munich) by a survey research company (TNS Infratest Sozialforschung) which has conducted the recruitment and fieldwork since the beginning of the MMAA project in 2007. Participants were invited to participate in the 2013 wave of data collection if they had previously participated in a prior wave of the MMAA project. As with other waves of the MMAA project, new participants were recruited to the study to account for attrition across waves. The study was approved by the Max Planck Institute ethics

committee. The sample under consideration ranged from 14 to 88 years of age and was approximately stratified by gender (see Table 1 for descriptive statistics). Of the 336 participants who had completed their schooling, 30.7% had obtained a college degree.

Procedure

Computer-assisted personal interview (CAPI). Two computer-assisted personal interviews (CAPI) were conducted – one before and one after the experience sampling methodology (ESM) phase (described further below). Participants (and parents of participants younger than 18 years of age) provided informed consent. Next, the interviewers administered the first CAPI, whereby the interviewers read the questions to the participants and entered their responses using a laptop computer. During the initial CAPI, participants reported their psychosocial (emotional health, social integration) and physical functioning (number and severity of health conditions, health complaints, self-rated health), and also completed a hand grip strength assessment as a behavioral indicator of functional health. After the ESM phase, participants reported their life satisfaction among other tasks in a follow-up CAPI and were compensated 100€ for their participation.

Experience Sampling Methodology (ESM) Phase. At the start of the study, professional interviewers instructed participants on how to operate the mobile phones and respond to the ESM surveys. During the ESM portion of the study, participants carried smartphones (Huawei Ascend G330) during their daily routines. The phone signaled participants to answer questions at random intervals during each participant's waking hours throughout the day, six times a day for nine days, spread over a three-week period. Whenever participants were signaled, they answered questions regarding their current experiences and affective states using the telephone touchscreen. If two or more assessments were missed within a given day, participants were assigned an additional day of ESM assessments in order to ensure that they provided sufficient

data (see Riediger, Schmiedek, Wagner, & Lindenberger, 2009 for more details on the study procedure). Participants could be assigned a maximum of nine additional assessment days during the ESM phase. On average, participants responded to 55.84 ESM surveys ($SD = 4.78$).

Measures

Person-level measures from the CAPI.

Demographics. Participants reported demographic information, including their birthdate and gender. Age was calculated by subtracting the date of birth from the date of the initial CAPI assessment.

Negative and positive affect valuation. Negative affect valuation (NAV) was assessed by how frequently participants appraised each of three negative emotions (anger, nervousness, and downcast) with respect to four facets: pleasantness (2 items), utility (2 items), appropriateness (2 items), and meaningfulness (2 items; see Appendix). Response options ranged from 1 (*almost never or never*) to 7 (*almost always or always*). The NAV score was based on the average of all 24 items (Cronbach's $\alpha = .85$; Cronbach's α for pleasantness facet = .62; Cronbach's α for utility facet = .64; Cronbach's α for appropriateness facet = .62; Cronbach's α for meaningfulness facet = .60). Similarly, positive affect valuation (PAV) was measured by the frequency with which participants evaluated each of three positive emotions (joy, contentment, and interest) on the same 7-point scale with the corresponding facets and items. The PAV composite score was the average of all 24 items (Cronbach's $\alpha = .86$; Cronbach's α for pleasantness facet = .62; Cronbach's α for utility facet = .61; Cronbach's α for appropriateness facet = .57; Cronbach's α for meaningfulness facet = .59).

Emotional health problems. Emotional health problems were assessed with three items from validated symptoms rating scales (Heinemann et al., 1999; Heinemann et al., 2004) by measuring how strongly participants experienced (1) irritability, (2) anxiety, and (3) depressive

mood on a 5-point scale from 0 (*no complaint*) to 4 (*very strong complaint*). The score was based on the sum of the complaints of the three items (Cronbach's $\alpha = .72$).

Social integration. Participants rated their agreement on a 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*) with 7 items assessing social integration using a modified version of the Social Support Questionnaire (Fydrich, Sommer, & Brähler, 2003). Sample items included “I have enough strong relationships in my life” and “I often feel like an outsider” (reverse coded). Social integration scores were obtained by averaging the items, with higher scores indicating greater social integration (Cronbach's $\alpha = .76$).

Life satisfaction. Current life satisfaction was based on participants' average ratings of 6 statements from 1 (*does not apply to me at all*) to 7 (*completely applies to me*) on the Life Evaluation Scale (Ferring, Filipp, & Schmidt, 1996). Sample items included “In my life, I have a lot of things that bring me joy” and “My life is filled with interesting things” (Cronbach's $\alpha = .81$).

Measures of physical health and functioning. Participants completed a battery of physical health measures. The *total number of health conditions* that participants were experiencing or diagnosed with was based on a health conditions checklist adapted from the Midlife Development in the United States study (MIDUS; see Marmot & Fuhrer, 2004). Participants reported whether they had any of 12 different health conditions, including diabetes, cardiovascular disease, and allergies. The health conditions were summed to create a total score. *Severity of health conditions* was assessed with a single item measuring the degree to which the participants' present health status hinders their day-to-day activities from 1 (*not at all*) to 5 (*extremely*). We also assessed the total sum score of *health complaints* of 6 relatively more common (non-specific) health issues, including regular pains (e.g., headaches), physical exhaustion/loss of energy, and joint/muscle problems on a 5-point scale from 0 (*no complaints*) to

4 (*very strong complaints*) (Heinemann et al., 2004; Heinemann, Zimmermann, Vermeulen, Thiel, & Hummel, 1999); Cronbach's $\alpha = .73$. *Self-rated health* was assessed with a single item, "How would you describe your overall present state of health?", using a scale from 1 (*very good*) to 5 (*poor*), which has been validated in national panel studies (e.g., Sacker, Worts, & McDonough, 2011). The scale was reverse scored so that higher scores indicated better health.

Hand grip strength. Hand grip strength is an index of muscle strength, with weaker grip strength associated with frailty, prospective disability, and even mortality risk (Gale, Martyn, Cooper, & Sayer, 2007; Rantanen, 2003; Syddall, Cooper, Martin, Briggs, & Sayer, 2003). While participants were standing, each hand was assessed with two trials after a practice trial per hand using a dynamometer (Smedley, S Dynamometer, TTM, Tokyo, 100kg). Participants alternated hands to allow for a rest period between trials. Holding the dynamometer in the test hand with their elbows at their sides and their arms positioned at a 90 degree right angle, participants were instructed to squeeze the hand grip as forcefully as they could. Grip strength was calculated as the average score of the two assessment trials across both hands in kilograms of force (for more information on grip strength assessments see Hank, Juerges, Schupp, and Wagner, 2009; Roberts et al., 2011)². Given that health indices, including hand grip strength, vary with gender and age (e.g., Bohannon, Peolsson, Massy-Westropp, Desrosiers, & Bear-Lehman, 2006; Evans & Hurley, 1995), all subsequent analyses include gender and age as covariates in the models.

Occasion-level measures from the ESM phase.

Negative and positive affect. On each of the ESM assessment occasions, participants reported how much they were currently experiencing various emotions on a 7-point Likert scale from 0 (*not at all*) to 6 (*very strongly*). Momentary negative affect (NA) was the average intensity of 6 emotional states (angry, tired, downcast, disappointed, tense, and nervous) per assessment occasion, whereas momentary positive affect (PA) was the average of 7 items (joyful, content,

enthusiastic, relaxed, well, energetic, and interested) per assessment occasion. In addition, we used the average of NA and PA across the entire ESM phase as indicators of trait negative and positive affect, respectively, for each person because these scores represent individual differences in mean affect (i.e., trait affect).

Momentary physical well-being. At each ESM assessment occasion, participants rated their overall momentary physical well-being with a single item, “How do you currently feel physically?”, on a 7-point scale from -3 (*very bad*) to +3 (*very good*).

Stressor occurrence. Participants reported whether stressors or hassles had occurred since the last ESM assessment occasion (-1 = *no*, 1 = *yes*).

Main activity and social context (covariates). Current activities reported during the ESM phase were subsequently effect-coded into 4 categories: *work and school* (work/school/studying), *errands* (errands/chores, doctor’s visit/office run), *leisure* (leisure activity, conversation/visit, doing nothing/sleeping/watching TV), and *unspecified activity* (“other” activity category or multiple categories selected). Participants also reported their social context, which was effect-coded into 5 categories: *alone* (nobody else present with the participant), *close social partners* (romantic partner, family, friends), *work colleagues* (colleagues/fellow students), *strangers*, and *unspecified social partner* (“other” social partner or multiple categories selected). The “unspecified” category served as the reference group for both the current activity and social context control variables.

Results

Data Analysis Plan

We first present descriptive statistics and psychometric properties for our measure of negative affect valuation (NAV), which was based on four facets identified in the literature as important aspects of valuing emotional experiences (i.e., pleasantness, utility/helpfulness,

appropriateness, and meaningfulness). Next, we test the hypotheses that individuals with greater NAV will exhibit attenuated associations between experiences of NA and indices of poorer (a) psychosocial well-being and (b) physical health and functioning. We first test these moderating effects at the person-level and then at the occasion-level to determine whether the pattern of results replicates in daily life. In the person-level analyses, we investigate whether NAV moderates the associations between Trait NA and health measures that were not assessed at the momentary level (e.g., number and severity of health conditions, health complaints, hand grip strength, social integration, life satisfaction). In contrast, at the occasion-level, we examine how NAV may moderate the relations between momentary NA and physical well-being at particular occasions in daily life as reported in the ESM. To determine whether these effects are unique to NAV or may be a general effect related to valuing emotions more broadly, we conduct exploratory analyses examining whether positive affect valuation (PAV) moderates affect-health links in an analogous manner as NAV.

Descriptive Results and Psychometric Properties of NAV

One participant had missing data for all of the NAV and PAV items and was therefore excluded from all subsequent analyses, reducing the effective sample size to 364 participants. Table 1 shows the correlation matrix and descriptive statistics of the key study variables, including NAV, trait (i.e., person-level mean) NA, and the physical and psychosocial functioning measures. As expected, the NAV scores were relatively low, suggesting that most individuals do not frequently value negative affect. The distribution of NAV scores in Figure 1, however, shows that there was quite some variability and that individuals did not simply cluster at the extreme low end of the response distribution (skewness = .08, kurtosis = -0.58, Kolmogorv-Smirnov $D = .04$, $p = .16$). In addition, NAV showed comparable variability between individuals as did trait NA and PA (Table 1).

Based on existing theoretical models, we predicted that the NAV construct is a higher-order factor based on 4 valuation factors (i.e., pleasantness, utility/helpfulness, appropriateness, and meaningfulness). Confirmatory factor analyses (CFA) were conducted in MPlus 7.0 to test whether the proposed factor structure for NAV is supported. To facilitate modeling the large number of indicators (24 indicators), we used item parceling for each facet within each discrete negative emotion and allowed for correlated residuals between facets. Results from the CFA revealed that this model was a good fit to the data, $\chi^2 = 70.16$, $df = 32$, $p < .001$; root mean-square error of approximation (RMSEA) = .057; 90% confidence interval RMSEA [.039, .075]; comparative fit index (CFI) = .975; standardized root mean square residual (SRMR) = .036³. The factor loadings of each facet on NAV were high (pleasantness: .85; utility: .93; appropriateness: .62; meaningfulness: .82) and the lower-ordered valuation facets were strongly correlated with one another, as shown in Table 2.⁴

Testing Moderating Effects of Negative Affect Valuation on the Links Between Trait Negative Affect and Psychosocial Functioning

Our first hypothesis asserted that the more individuals value negative affect, the less strongly their experiences of NA would be related to poorer psychosocial functioning (i.e., emotional health problems, less social integration, lower life satisfaction). We conducted hierarchical regression analyses with each psychosocial functioning measure regressed in separate models on mean NA reported during the ESM assessments (Trait NA, mean-centered), NAV (mean-centered), and the cross-product interaction term (Trait NA \times NAV). All analyses adjusted for effect-coded gender (i.e., males = -1, females = +1), age (mean-centered), and positive affect valuation (PAV; mean-centered). By controlling for PAV, we could ensure that any statistically significant interaction effects with NAV were above and beyond the effects of PAV, which would rule out the possibility that NAV simply denotes a measure of valuing all

emotions. Covariates and main effects were entered in the first step and the interaction term was included in the second step.

As displayed in Table 3, we found support for our predictions, such that individuals with greater NAV exhibited attenuated associations between Trait NA and indices of poorer psychosocial functioning, including emotional health problems (see Figure 2A) and social integration (see Figure 2B). The Trait NA \times NAV interaction, however, was not statistically significant in predicting life satisfaction (see Table 3). Regions of significance analyses were conducted to facilitate interpretation of the significant interactions. These analyses revealed that Trait NA was only statistically significantly related to emotional health problems for individuals with NAV scores less than 3.77. The inverse relation between Trait NA and social integration was statistically significant only for individuals with NAV scores less than 3.31. Thus, in line with our hypotheses, individuals with relatively high NAV showed weakened and even non-existent associations between Trait NA and emotional health problems and social integration.

Testing Moderating Effects of Negative Affect Valuation on the Links Between Trait Negative Affect and Physical Health

In a similar vein, we predicted that individuals with greater NAV would exhibit less pronounced associations between experiences of NA and poorer physical health and functioning. To test these moderating hypotheses, we conducted hierarchical regression analyses in the manner described previously, controlling for effect-coded gender (i.e., males = -1, females = +1), age (mean-centered), and PAV (mean-centered). We first conducted these analyses at the person-level for health measures that were not assessed at the momentary level: number and severity of health conditions, health complaints, self-rated health, and hand grip strength. In support of our hypothesis, we found that individuals with greater NAV evinced weaker relations between Trait NA and measures of physical health and functioning (see Table 4), including the number of

health conditions (see Figure 3A), health complaints (see Figure 3B), and grip strength (see Figure 3C). Table 4 shows that the key Trait NA \times NAV interactions were in the hypothesized directions, but failed to reach statistical significance for two measures: severity of health conditions ($p = .12$) and self-rated health ($p = .09$).

We conducted regions of significance analyses to assist with interpreting the statistically significant interactions. The analyses showed that the positive association between Trait NA and number of health conditions was only statistically significant for individuals with NAV scores below 3.09. Similarly, Trait NA was only statistically significantly related to greater health complaints for people with NAV scores lower than 3.33. The inverse association between Trait NA and hand grip strength was also only statistically significant for individuals with NAV scores under 2.22⁵. Thus, consistent with our predictions, individuals who placed relatively high value on NA exhibited dampened (and in some cases, no statistically significant) associations between mean levels of negative affect reported during the ESM period (i.e., Trait NA) and the number of health conditions, health complaints, and hand grip strength, respectively.

Testing Moderating Effects of Negative Affect Valuation on the Links Between Momentary Negative Affect and Physical Well-Being

The previous analyses were conducted at the person-level, which tested whether associations between trait NA and health may depend on NAV. It is important to investigate whether these effects also apply to more proximal (concurrent) couplings between momentary NA and physical well-being as they unfold in daily life. We therefore extended the previous analyses by using reports from the ESM to test whether momentary NA was more dissociated from momentary physical well-being for individuals with greater NAV.

Multi-level models were used to account for the hierarchical data structure (i.e., ESM assessment occasions nested within persons). Full information maximum likelihood estimation

procedures were implemented using SAS PROC MIXED (v. 9.2) with the spatial power residual covariance structure, given the unequal spacing intervals between the ESM assessments (Littell, Milliken, Stroup, Wolfinger, & Schabenberger, 2007). In these models, we regressed momentary physical well-being on momentary NA, NAV, and the interaction between momentary NA \times NAV. All analyses adjusted for the occasion-level (Level 1) variables, momentary main activity and social partners present (coded such that multiple/unspecified activity and social partners were the reference groups, respectively), and stressor occurrence (effect coded as -1 = *no stressor*, +1 = *stressor occurred*), as well as the person-level (Level 2) variables, gender (effect coded as -1 = *male*, +1 = *female*), age, trait NA, and PAV (all grand-mean centered). Momentary NA (grand-mean centered) was specified as both a fixed and random effect to allow for individual differences in slopes.

Consistent with previous studies, there was a significant main effect such that greater momentary NA was associated with lower momentary physical well-being (see Table 5). This effect, however, was qualified by the statistically significant Momentary NA \times NAV interaction which supported our hypothesis that with increasingly greater NAV, the associations between momentary NA and physical well-being at the assessment occasion-level (Level 1) would be less pronounced (see Figure 4). Stated differently, for every one point increase in momentary NA, physical well-being decreased by 0.54 for individuals relatively lower on NAV (one SD below the mean), whereas individuals relatively higher on NAV (one SD above the mean) only exhibited a decrease of 0.45 in physical well-being. Regions of significance analyses showed that the relations between momentary NA and physical well-being were nonetheless statistically significant for all values of NAV.

Exploratory Analyses: Testing Additional Moderating Effects

We tested whether these moderating effects are unique to NAV or if the effect may be more general and related to valuing all types of emotions, both negative and positive. Exploratory analyses were conducted by re-running all of the previous models which tested the moderating effects of NAV on the NA-health links, including the same covariates. We replaced the NA \times NAV interactions with PA \times PAV interactions and all corresponding lower-ordered terms to test whether PAV moderates PA-health links. These analyses also controlled for mean-centered NAV. None of these key PA \times PAV interactions reached statistical significance (p 's $> .05$; see supplementary Table S1).

Given the wide age range of our sample from adolescence through later adulthood (14-88 years of age), we also tested exploratory age-moderated effects of NAV on each of the affect-health models (i.e., 3-way interactions between age, NAV, and NA). We also examined 3-way interactions between gender, NAV, and NA. None of these interactions reached statistical significance, p 's $> .05$ (see Supplementary Table S2 and Table S3 for the 3-way interaction coefficients with age and gender, respectively).

Discussion

Although a growing body of literature documents that negative affect (NA) is strongly related to poorer psychosocial and physical functioning, studies have shown that there are sizeable individual and cultural differences in these affect-health links (e.g., Curhan et al., 2014; Kuppens et al., 2008; Miyamoto et al., 2013). Theorists have suggested that individual and cultural differences in the values placed on emotional experiences may underlie some of these effects (e.g., Curhan et al.). For example, in Japanese contexts, the expression and experience of negative affect is more weakly related to health indicators than in American contexts (e.g., Curhan et al., Kitayama et al., 2015; Miyamoto et al., 2013), possibly because negative affect is more valued in East Asian contexts compared to Western contexts (e.g., Miyamoto et al., 2014;

Uchida & Kitayama, 2009). Indeed, in line with theoretical models of affect dynamics, affect valuation may play an important role in changing the meaning, experience, and even outcomes of affective states (e.g., Gross, 2015; Ochsner & Gross, 2014).

Few studies, however, have directly investigated whether individual differences in negative affect valuation (NAV; the degree to which individuals appraise negative affect as pleasant, useful, appropriate, and meaningful experiences) moderate the strength of these affect-health associations. In the current study, we tested and found general support for the hypotheses that individuals with greater NAV show attenuated links between experiences of NA and poorer psychosocial well-being (i.e., emotional health problems, social integration) and physical health and functioning (i.e., number of health conditions, health complaints, hand grip strength, momentary physical well-being). In fact, many of the typically-observed associations in the literature between health measures (specifically, emotional health, social integration, number of health conditions, health complaints, hand grip strength) and experiences of NA were non-existent for individuals who exhibited relatively higher valuation of NA. For these individuals, NA was simply not related to psychosocial well-being and health. Experiences of NA were only predictive of poorer functioning for people with relatively lower NAV.

Why might NAV moderate affect-health links? One possibility is that in line with biopsychosocial models, NAV may provide psychological resources to help individuals cope with the caustic components of negative emotional experiences (see review by Blascovich & Mendes, 2010). The ability to see the value in NA may also buffer individuals from the harmful effects of NA. For example, we previously outlined related research whereby more positive reappraisals of stress arousal were associated with weakened links between NA and subsequent maladaptive physiological responses (Jamieson, Mendes, & Nock, 2013; Jamieson, Nock, & Mendes, 2013). It is possible that greater NAV may attenuate the threatening nature of NA

experiences in a similar manner, given that such individuals may be better able to recognize that NA has some redeeming qualities and reappraise NA as a less caustic experience. More positive evaluations of NA may, in turn, help to dampen the magnitude and/or duration of the concomitant physiological arousal and psychological distress associated with NA, which are posited to be the primary mechanisms by which affective states influence long-term health (e.g., allostatic load models: McEwen & Seeman, 1999). Another (complementary) possibility is that appraising NA in a more favorable light may be associated with NA experiences that frequently mirror a more adaptive profile of psychological and physiological challenge states (which include perceptions of better coping resources and greater cardiac efficiency), as opposed to less functional threat states (which involve avoidant behavioral tendencies and less cardiac efficiency; Blascovich & Mendes, 2000; 2010). Future work should directly test these and other potential mechanisms, as we were unable to do so in the current study.

Caveats and Further Considerations

We have interpreted our findings as showing that NAV may help to moderate (i.e., attenuate) affect-health links, which is consistent with a large number of related theoretical predictions in the literature that suggest that individual and cultural differences in the valuation of emotional experiences may alter the outcomes of emotional experiences (e.g., Curhan et al., 2014; Gross, 2015; Kitayama et al., 2015; Ochsner & Gross, 2014; Park et al., 2013). We therefore view NAV as a highly plausible and theoretically-grounded explanation for such moderating effects. It should be noted, however, that reverse causation is possible given our correlational data—that is, for certain types of people, affective and health experiences may be more de-coupled, which may then allow them to better appreciate and see the value in NA. Yet another possibility is that the healthiest individuals are more likely to value negative affect. Although such explanations are possible, they still leave a number of questions unanswered. For

example, if these latter explanations are true, why do such individuals experience NA and health experiences in a more dissociated manner in the first place? In other words, what would be the mechanism underlying such effects? Moreover, how would these alternate explanations fit in with existing theories about the causal pathways between NA and health? Disentangling the causal pathways underlying these effects will be an important agenda for future research.

Negative affect valuation moderated the associations between a variety of diverse health and well-being indices—both generally at the person-level (as assessed in various life domains) and momentarily at the occasion-level (as assessed in daily life)—but failed to do so for a few measures: severity of health conditions, self-rated health, and life satisfaction. These null results are actually consistent with previous related investigations. For example, one study showed that the social valuation of negative affect did not moderate the association between experiences of negative affect and life satisfaction ratings (Bastian, Kuppens, De Roover, & Diener, 2014). Similarly, another study found no statistically significant moderated effects for associations between NA and self-rated health, nor with life satisfaction (Curhan et al., 2014).

The affect-as-information model (see review by Schwarz & Clore, 2003) may provide an explanation for why we and other researchers obtained null results when examining indices of affect valuation as potential moderators of affect-health links. According to the model, individuals may use information about their affective states to evaluate their circumstances, such as global quality of life and health ratings. It is possible that because these holistic health and life satisfaction ratings are somewhat abstract and require the synthesis of many diverse pieces of information, individuals may heavily rely on more easily accessible and salient information—their affective experiences (e.g., Kahneman, 2011)—in order to form their ratings, regardless of how much they value such emotional experiences. In contrast, specific domains of functioning, which only require participants to report whether they have experienced certain health conditions

or social situations, may be cases in which affect is less likely to be used to inform such reports, allowing NAV to potentially play a stronger role in dissociating the links between experiences of NA and physical and psychosocial functioning. Future studies should delineate the possible boundary conditions and directions of these effects. In addition, it will be fruitful to extend these findings to other measures of poorer functioning (e.g., ineffective emotion regulation, biomarkers associated with health risks). Such investigations would allow us to assess whether enhancing NAV may be a viable target for interventions aimed at improving long-term health.

Finally, much of the work to date on the valuation of affective experiences has been conducted in the context of cultural differences (e.g., Kitayama et al., 2015; Kitayama, Markus, & Kurokawa, 2000; Koopmann-Holm & Tsai, 2014; Mesquita & Walker, 2003; Park et al., 2013; Tsai et al., 2006; Tsai, 2007; Uchida & Kitayama, 2009). Previous work has shown that avoidance of negative affect may be less frequent in German contexts relative to American contexts (Koopmann-Holm & Tsai), possibly because the former may be more likely to value such experiences compared to the latter. In the current investigation, we were primarily interested in understanding how individual differences in the valuation of negative affect may buffer affect-health links. It should be noted, however, that our study was conducted with participants in Germany. Thus, it is possible that our results may be specific to German cultural contexts. Although such cultural specificity may temper the generalizability of our results, it is also important to consider that much of the previous work examining cultural differences focused on mean levels of affect valuation. We found inter-individual differences (i.e., between-person variability) within our German sample that predicted the strength of affect-health links. More research is needed to better understand cultural differences in inter-individual variability in NAV and its potential moderating effects.

Conclusions

The current study adds to the literature in a number of ways. Our multi-method study employed experience sampling and interview protocols, which allowed us to test hypotheses at both the momentary- and person-levels. We showed that valuing negative affect moderated the associations between daily experiences of NA and psychosocial and physical functioning in a heterogeneous life-span sample ranging from adolescence to old age. Given that these effects were robust for both self-reported (e.g., health complaints) and behavioral indices (i.e., hand grip strength), it is untenable that response biases (which suggest that NAV may be correlated with responding to psychological assessments in a particular manner) account for all of the results. Notably, these analogous effects were not found for the valuation of positive affect, which suggests that these findings are unique to NAV, and are unlikely due to a general effect of valuing all affective states.

In sum, negative affect is often considered “negative” because it is related to poorer health and well-being. There is a large body of literature that supports this interpretation: Negative affect is indeed strongly correlated with diminished psychosocial and physical functioning. The results of the current study, however, have important implications and suggest that assumptions that NA states are uniformly evaluated as unpleasant, useless, inappropriate, and meaningless experiences must be re-examined. Additionally, our findings suggest that current theoretical and practical perspectives must reconsider the validity of assumptions that NA has equally detrimental health effects for all individuals. Our study shows that NAV may have far-reaching implications given that the links between NA and important indicators of psychosocial and physical functioning depend on NAV. In other words, under certain conditions and for some people, being in a bad mood may not be so bad.

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Footnotes

¹ Our use of the term *negative affect valuation* is distinct from the use in affect valuation theory (AVT; Tsai, Knutson, & Fung, 2006; Tsai, 2007). We conceptualize negative affect valuation as the extent to which people value negative affective states as relatively more pleasant, useful/helpful, appropriate, and meaningful experiences. Our use of the term *valuation* thereby refers to appraisals or evaluations of the value of affective states themselves (e.g., Gross, 2015; Ochsner & Gross, 2014; Pressman, Gallagher, Lopez, & Campos, 2014). In contrast, AVT focuses, among other aspects, on differentiating between actual affect (what people actually feel) and ideal affect, which pertains to motivational goal strivings: the emotions that people ideally want to feel (e.g., Tsai, Knutson, & Fung, 2006; Tsai, 2007). It is believed that ideal affect (i.e., a type of motivation for affect) is shaped by how much people value the respective affective states. Similarly, avoided affect refers to states that people do not want to feel (Koopmann-Holm & Tsai, 2014), that is, affective states that people are motivated to avoid.

² The final measure used in the current analyses which averaged the last two trials for each hand (i.e., excluding the practice trials from the final score) was correlated with the measure using all three hand grip strength trials (i.e., including the practice trials) at $r = .996, p < .001$. All analyses using the average hand grip strength of all three trials produced the same pattern of results as presented in the paper. Consistent with the protocol of previous studies (e.g., Hank et al., 2009), we chose to use the measure which omitted the practice trials from the final hand grip strength score. This procedure has shown comparable reliability with other grip strength measures (Roberts et al., 2011).

³ A correlated factors model without a higher-ordered NAV factor also showed good fit to the data, $\chi^2 = 37.98, df = 30, p = .15$; RMSEA = .027; 90% confidence interval RMSEA [.00, .05]; CFI = .995, SRMR = .024. For the purposes of the current study, we chose to examine NAV as a

higher-order construct because not only is this approach consistent with theoretical models in the literature, but it is a more parsimonious model with fewer assumptions about the data structure and more degrees of freedom.

⁴ To test whether the positive affect valuation (PAV) construct fit the same proposed higher-ordered factor structure with 4 lower ordered valuation factors (pleasantness, utility, appropriateness, and meaningfulness), we conducted an analogous CFA as the NAV factor model. Consistent with the previous results, we found that the proposed model fit the data well, $\chi^2 = 64.86$, $df = 32$, $p < .001$; RMSEA = .053, 90% confidence interval RMSEA [.034, .072]; CFI = .980; SRMR = .034. Together, these findings suggest that our approach to examining affect valuation as a higher-ordered construct is well-supported and further, that there are sufficient inter-individual differences in NAV to warrant testing of moderating effects on affect-health links.

⁵ For individuals with high NAV (greater than 4.76), Trait NA was actually related to greater average grip strength. Although this value is within the theoretical range of the NA valuation scale (with possible scores between 1 and 7), this score was the maximum observed value in the current study. Caution should be taken when interpreting the positive association between trait NA and greater hand grip strength for individuals with relatively high NA valuation scores, as this effect may be based on extrapolations of the current observed data.

Table 1

Correlation Matrix and Descriptive Statistics of Key Study Variables

Variable Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. NA Valuation	---													
2. PA Valuation	-.45***	---												
3. Trait NA	.18**	-.27***	---											
4. Trait PA	.04	.09†	-.20***	---										
5. Age	-.15**	.13*	-.24***	.07	---									
6. Gender (1 = female)	-.10†	.18**	-.02	.00	.03	---								
7. Emotional Health Problems	-.08	-.01	.22***	-.26***	.12*	.13*	---							
8. Social Integration	-.01	.17**	-.15**	.20***	-.21***	.04	-.43***	---						
9. Life Satisfaction	-.03	.28***	-.25***	.30***	-.09†	.00	-.39***	.45***	---					
10. Number of Health Conditions	-.13*	.06	.01	-.16**	.41***	.02	.37***	-.24***	-.20***	---				
11. Severity of Health Conditions	-.11*	.07	.06	-.25***	.33***	.09	.40***	-.28***	-.21***	.51***	---			
12. Health Complaints	-.17**	-.01	.06	-.27***	.37***	.11*	.55***	-.32***	-.28***	.57***	.64***	---		
13. Hand Grip Strength	.16**	-.09†	.03	.04	-.17**	-.69***	-.17**	.14**	.10†	-.13*	-.16**	-.19***	---	
14. Self-rated Health	.14**	.02	-.03	.32***	-.38***	-.06	-.38***	.26***	.35***	-.48***	-.63***	-.65***	.13*	---
<i>Mean</i>	2.76	6.06	1.20	3.18	44.14	.55	1.82	5.61	5.89	1.29	1.74	4.58	33.65	3.68
<i>(SD)</i>	(0.78)	(0.61)	(0.76)	(0.76)	(20.27)		(2.01)	(1.00)	(1.02)	(1.60)	(1.03)	(3.73)	(11.44)	(0.92)

Note. NA = negative affect; PA = positive affect. For descriptive statistics, gender was coded 0 = male, 1 = female.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 2

Correlation Matrix of the Negative Affect Valuation Facets: Pleasantness, Utility, Appropriateness, and Meaningfulness

	1	2	3	4
1. NAV – Pleasantness Facet	---			
2. NAV – Utility Facet	.67***	---		
3. NAV – Appropriateness Facet	.33***	.49***	---	
4. NAV – Meaningfulness Facet	.52***	.59***	.54***	---

Note. NAV = negative affect valuation. Each NAV facet is based on composite scores.

*** $p < .001$.

Table 3

Psychosocial Functioning Measures Regressed on Mean Negative Affect, Negative Affect Valuation, and Mean Negative Affect \times Negative Affect Valuation

Variable	Model 1	Model 2	Model 3
	DV = Emotional Health Problems	DV = Social Integration	DV = Life Satisfaction
	β [95% CI]	β [95% CI]	β [95% CI]
Age	0.17[.07, .27]**	-0.28[-.38, -.18]***	-0.17[-.27, -.07]**
Gender	0.12[.02, .22]*	0.01[-.09, .11]	-0.5[-.14, .05]
Trait NA	0.30[.20, .41]***	-0.21[-.31, -.10]***	-0.24[-.34, -.13]***
PAV	-0.03[-.15, .09]	0.20[.09, .32]***	0.30[.19, .41]***
NAV	-0.10[-.21, .01]†	0.07[-.04, .18]	0.12[.01, .23]*
Trait NA \times NAV	-0.12[-.23, -.02]*	0.13[.03, .23]**	0.04[-.06, .14]
R ² Change (interaction)	.014	.017	.002
Adjusted R ²	.104	.120	.138

Note. Standardized beta regression coefficients and 95% confidence intervals are reported. Gender effect coded: -1 = male, 1 = female. PAV = positive affect valuation; NAV = negative affect valuation. R² change refers to the additional variance explained by the interaction term. Adjusted R² refers to the total variance explained by the full model.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Table 4

Physical Health and Functioning Measures Regressed on Trait Negative Affect, Negative Affect Valuation, and Trait Negative Affect × Negative Affect Valuation

	Model 1 DV = Number of Health Conditions	Model 2 DV = Severity of Health Conditions	Model 3 DV = Health Complaints	Model 4 DV = Hand Grip Strength	Model 5 DV = Self-Rated Health
Variable	β [95% CI]	β [95% CI]	β [95% CI]	β [95% CI]	B [95% CI]
Age	.43[.34, .53]***	.36[.26, .46]***	.40[.30, .50]***	-.16[-.23, -.08]***	-.40[-.50, -.31]***
Gender	.01[-.09, .10]	.07[-.03, .17]	.12[.02, .021]*	-.69[-.76, -.61]***	-.06[-.15, .04]
Trait NA	.16[.06, .26]**	.18[.08, .29]**	.18[.08, .28]**	-.04[-.12, .04]	-.13[-.24, -.03]*
PAV	-.02[-.13, .09]	.02[-.10, .13]	-.14[-.25, -.03]*	.11[.02, .20]*	.13[.02, .24]*
NAV	-.09[-.20, .01]†	-.07[-.18, .04]	-.18[-.29, -.08]**	.12[.04, .21]**	.15[.04, .26]**
Trait NA × NAV	-.14[-.24, -.05]**	-.08[-.18, .02]	-.10[-.20, -.01]*	.09[.02, .17]*	.08[-.01, .18]†
R ² Change (interaction)	.019	.006	.010	.008	.006
Adjusted R ²	.193	.133	.199	.505	.174

Note. Standardized beta regression coefficients and 95% confidence intervals are reported. Gender effect coded: -1 = male, +1 = female. PAV = positive affect valuation; NAV = negative affect valuation. R² change refers to the additional variance explained by the interaction term. Adjusted R² refers to the total variance explained by the full model.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Table 5*Momentary Physical Well-Being Regressed on Negative Affect and Negative Affect Valuation*

Fixed Effects	<i>Estimate</i>	<i>SE</i>
Intercept	0.86	0.04***
Momentary NA	-0.50	0.02***
NA Valuation	0.06	0.06
Momentary NA × NA Valuation	0.06	0.02*
Explained between-person variation ^a		
Pseudo- R^2 - interaction term ^a	2.64%	
Pseudo- R^2 intercept - overall model ^b	20.94%	

Note. NA = negative affect. The multi-level model coefficients are interpreted in the same manner as parameter estimates obtained from ordinary least squares regression. The model adjusted for covariates at Level 1 (main activity, social partners, and stressor occurrence) and Level 2 (effect-coded gender and grand-mean centered age, positive affect valuation, and trait NA). The model also included random effects for the intercept, residual, and negative affect (covariates and random effects are not displayed in the table).

^a The Pseudo- R^2 for the interaction term represents the proportion of explainable between-person variation in the negative affect slope that is explained by including the interaction term in the model, compared to a model with only the main effects and covariates (Singer, 1998).

^b The Pseudo- R^2 intercept for the model refers to the proportion of explainable between-person variation in momentary physical well-being that is explained by all of the predictors and interaction term in the model, compared to an unconditional means model with no predictors (Singer, 1998).

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

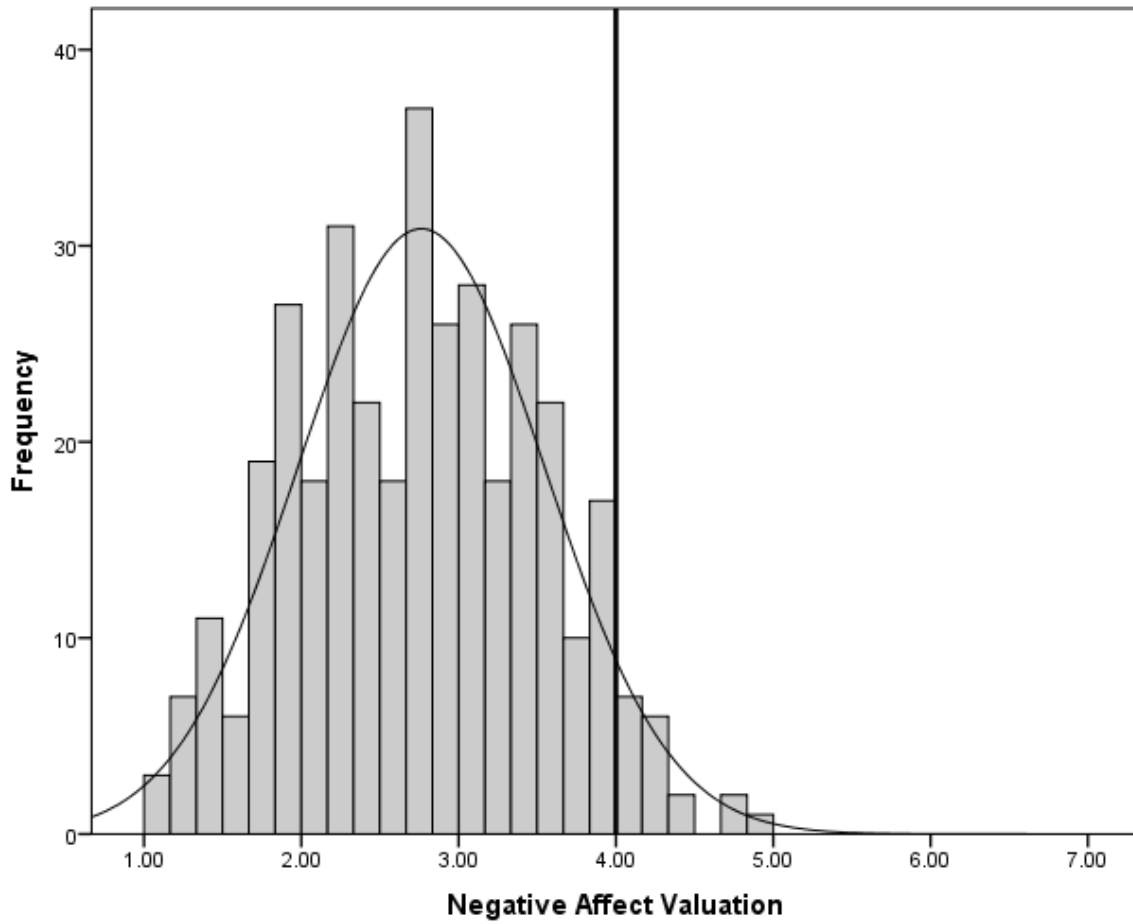


Figure 1. Frequency distribution of negative affect valuation scores, with higher values indicating greater valuation of negative affect as pleasant, useful/helpful, appropriate, and meaningful. The vertical line denotes the midpoint on the scale (possible values range from 1.00 to 7.00).

Figure 2A

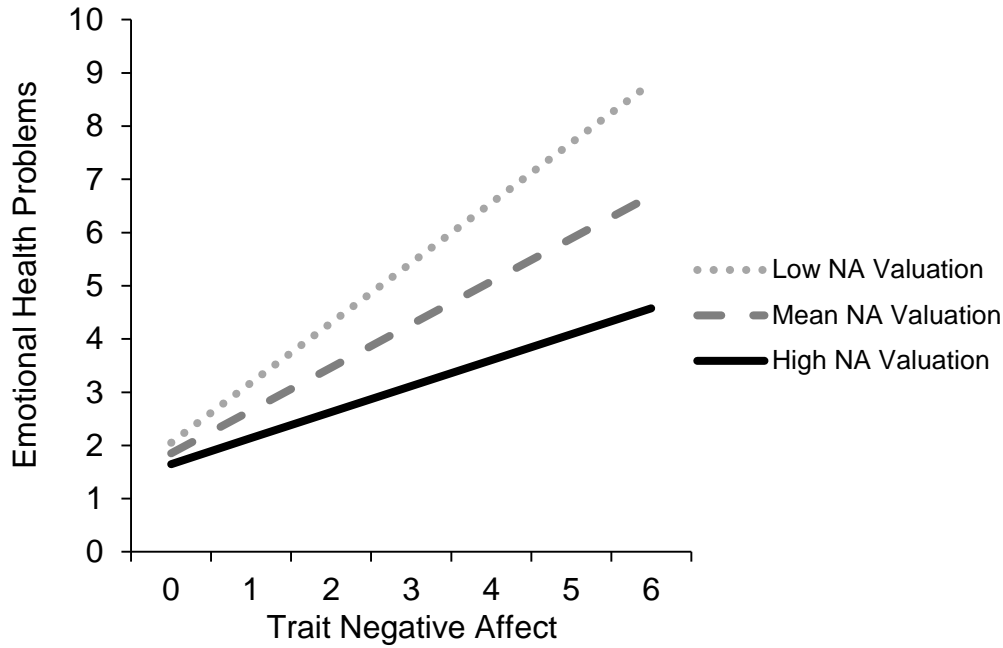


Figure 2B

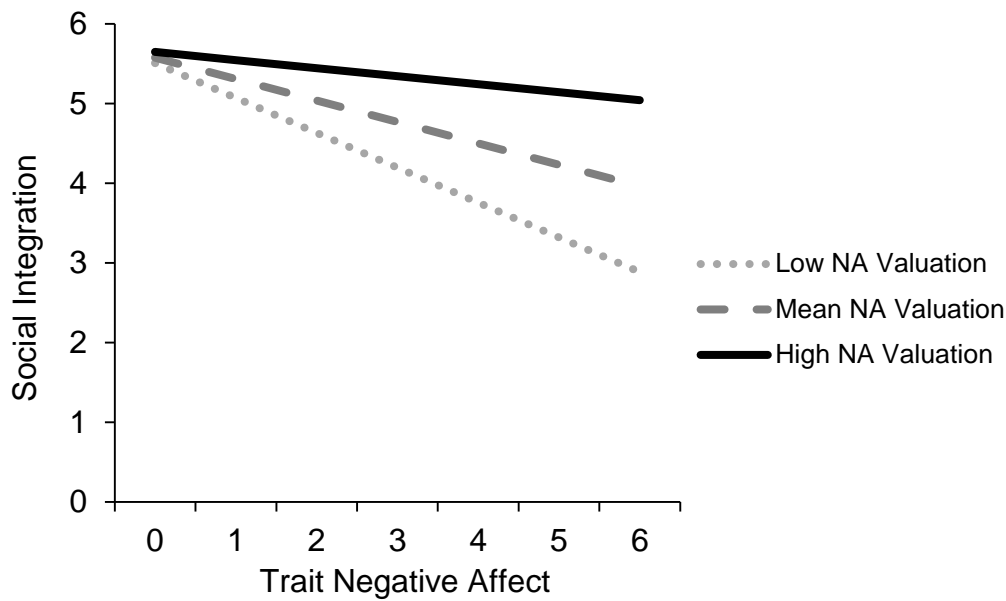


Figure 2A-2B. The association between trait negative affect and psychosocial functioning (2A: emotional health problems (1 = *no complaint* to 5 = *very strong complaint*); 2B: social integration (possible score range: 1 to 7)) is moderated by negative affect valuation (NA Valuation) in separate hierarchical regression models adjusting for the specified covariates. The simple slopes for the mean and ± 1 SD from the mean NA Valuation scores are displayed.

Figure 3A

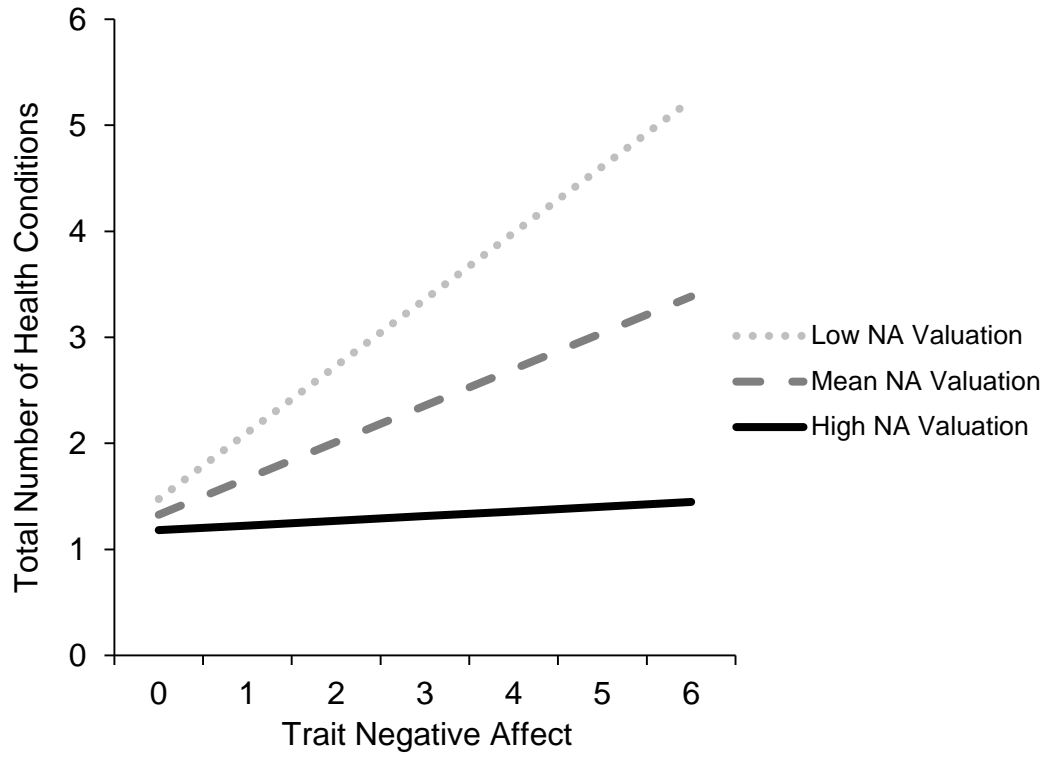


Figure 3B

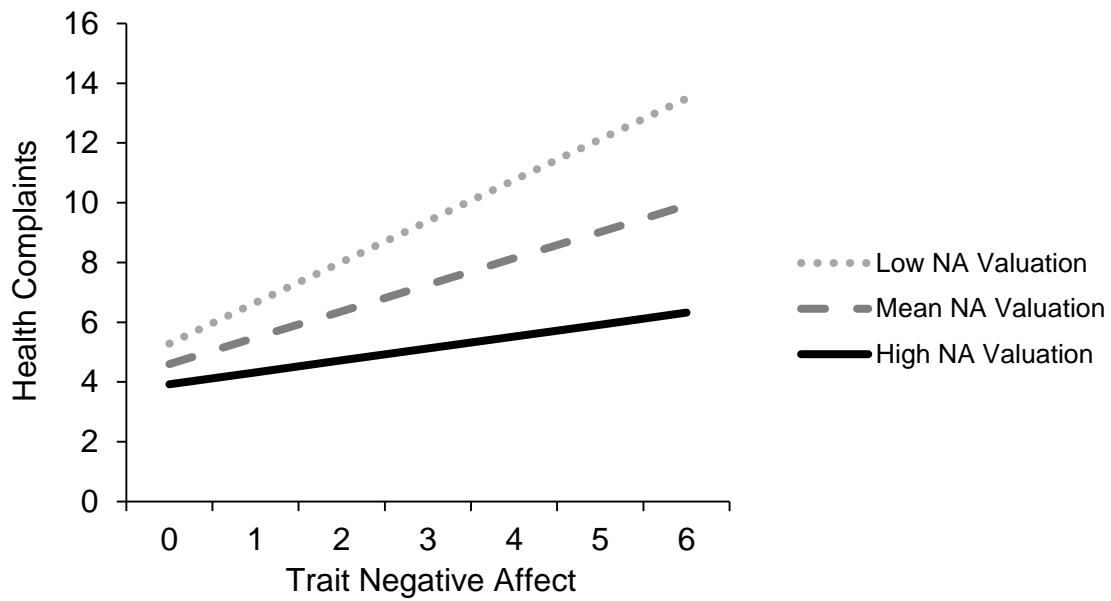


Figure 3C

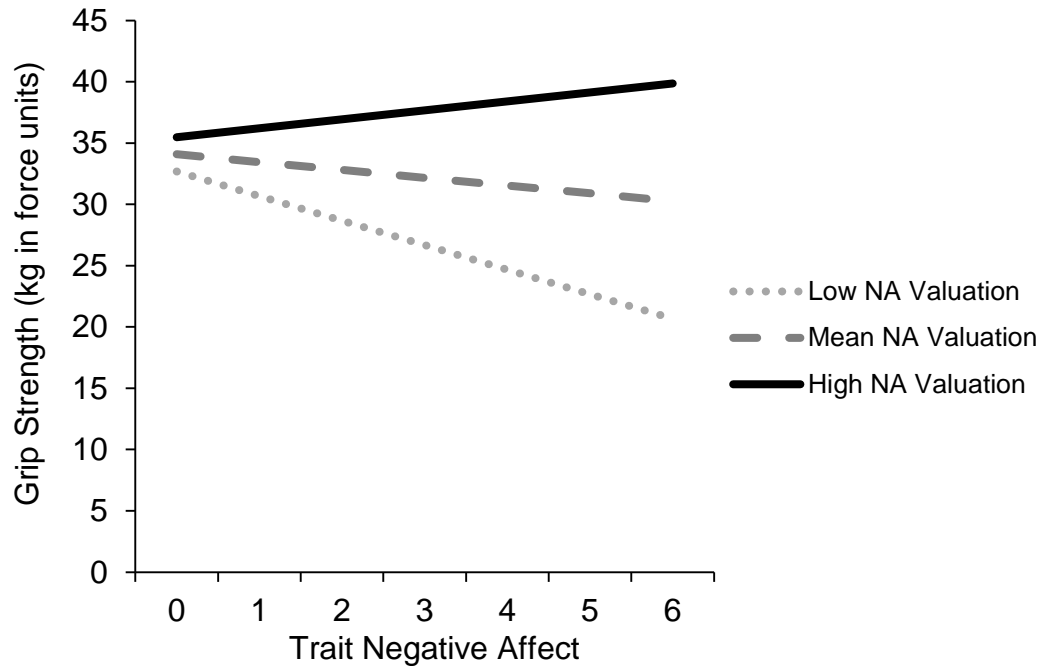


Figure 3A-3C. The association between trait negative affect and physical functioning (3A: number of health conditions; 3B: health complaints; 3C: hand grip strength) is moderated by negative affect valuation (NA Valuation) in separate hierarchical regression models adjusting for the specified covariates. The simple slopes for the mean and ± 1 SD from the mean NA Valuation scores are displayed.

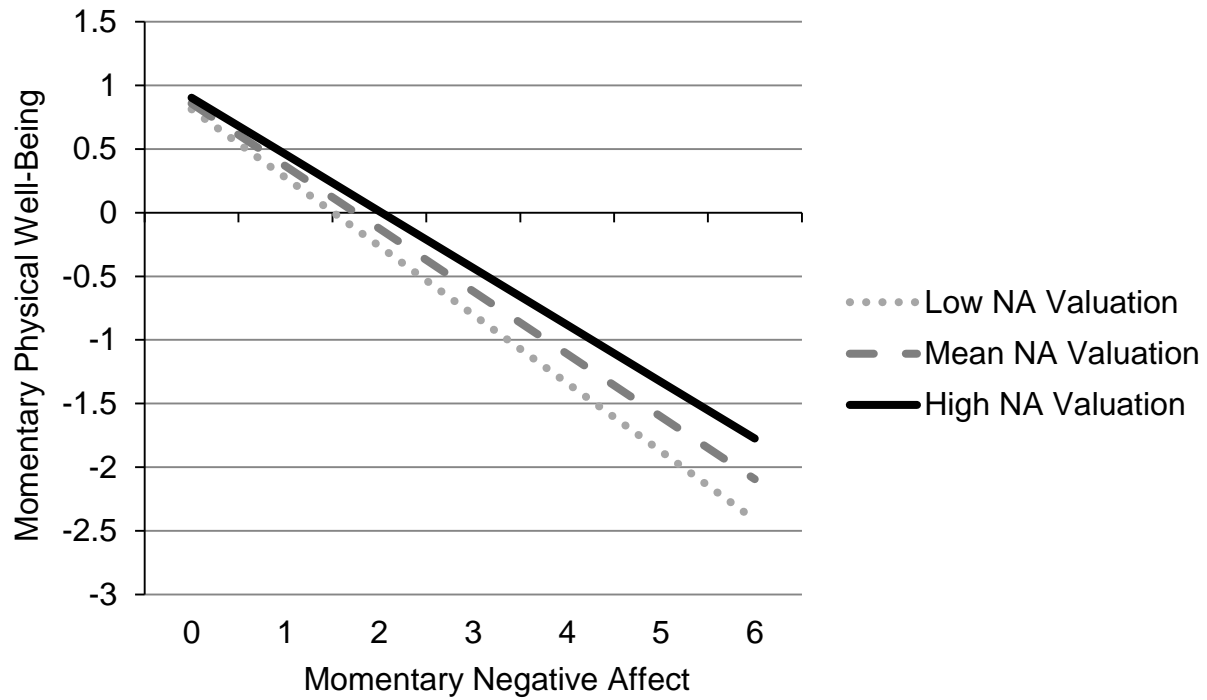


Figure 4. The association between momentary negative affect and physical well-being (-3 = *very bad* to +3 = *very good*) is moderated by negative affect valuation (NA Valuation) in a multi-level model adjusting for the specified covariates. The simple slopes for the mean and ± 1 SD the mean NA Valuation scores are displayed.

Appendix

Negative and Positive Affect Valuation Measure

The Negative and Positive Affect Valuation measure was assessed during a computer-assisted personal interview. The following items were read to participants and responses were recorded on a laptop computer. Letters in parentheses indicate the corresponding affect valuation facet for each item (P - pleasantness, U – utility/helpfulness, A - appropriateness, M - meaningfulness).

Next, we would like to ask you to consider JOY. How often do you experience the feeling of JOY as...

1. ... pleasant? (P)
2. ... disruptive? (U, reverse scored)
3. ... inappropriate? (A, reverse scored)
4. ... helpful? (U)
5. ... meaningful? (M)
6. ... unpleasant? (P, reverse scored)
7. ... pointless? (M, reverse scored)
8. ... appropriate?(A)

Response Options:

1 (almost) never ... to ... 7 (almost) always

Afterwards (and in this order), items 1 to 8 are to be repeated for: ANGER, INTEREST, NERVOUSNESS, DOWNCAST, and CONTENTMENT

P = pleasantness facet

U = utility/helpfulness facet

A = appropriateness facet

M = meaningfulness facet