Full-Length Research Report

Age Differences in the Effects of Self-Esteem

The Link Between Physical Symptoms and Daily Affect

Helena Chui[1] and Manfred Diehl[2]

[1]School of Psychology, Australian Catholic University, Strathfield, NSW, Australia
[2]Department of Human Development and Family Studies, Colorado State University, Fort Collins, CO, USA

Abstract. This study examined the link between physical symptoms, affect, and self-esteem in everyday life across adulthood. The sample consisted of young, middle-aged, and older adults. Results indicated a significant Self-Esteem × Physical Symptoms interaction on positive affect (PA). The effect of self-esteem on PA was lower with increasing physical symptoms. For negative affect (NA), the Self-Esteem × Physical Symptoms × Age interaction was significant. In older adults, the effect of self-esteem on NA was lower with increasing physical symptoms. Thus, the effect of self-esteem ran opposite to the expected buffering effect. In addition, the age difference in the effect of self-esteem on NA presents potential challenges to the adaptive capacity of older adults in emotional well-being.

Keywords: affect, physical symptoms, self-esteem, buffering effect, age differences

The study of intraindividual variability in everyday affect has generated much interest in the literature of aging and resilience (Eid & Diener, 1999; Röcke, Li, & Smith, 2009; Sliwinski, Almeida, Smyth, & Stawski, 2009). In the context of the quality of life and health in older adults, studies of the bivariate associations between affect and indices of physical health are critical in identifying the link between quality of life and the processes to maintain emotional well-being (Ong, Zautra, & Reid, 2010; Webb, Blane, McMunn, & Netuveli, 2011; Zakoscielna & Parmelee, 2013). However, the process of how individuals orchestrate their psychological resources to optimize their emotional experience in everyday life is still not well understood (Nesselroade & McCollam, 2000; Wilt, Noftle, Fleeson, & Spain, 2012). The current study advances the literature by presenting findings from a 7-day daily-diary study on the underlying process of the link between daily affect and physical symptoms in a sample of community-residing adults. Specifically, adding to the literature of self-esteem variability and self-esteem as a psychological resource of resilience (Leary, 1999; Murrell, Meeks, & Walker, 1991; Sowislo, Orth, & Meier, 2014), we examined the buffering effect (Cohen & Wills, 1985) of self-esteem on the link between physical symptoms and daily affect. Furthermore, this study adds to the literature of the lifespan development of self-esteem (Harter, 2006; Orth & Robins, 2014), by examining age differences in the buffering effect of self-esteem on the link between physical symptoms and daily affect.

Trait-State Distinction and Self-Esteem

The trait-state distinction is the subject of an ongoing debate in psychology (Allen & Potkay, 1981; Zuckerman, 1983). Recent studies on the trait-state distinction in self-esteem point to evidence of both trait self-esteem, a more stable and relatively permanent disposition, and state self-esteem, a more ephemeral, time-varying condition (Anusic & Schimmack, 2016; Coleman, Ivani-Chalian, & Robinson, 1993; Hank, 2015). In particular, results of a meta-analysis quantified the extent to which self-esteem remained stable or changed over time (Anusic & Schimmack, 2016). Stability accounted for 56% of the total variance in self-esteem and change accounted for 44%. Furthermore, trait-state variances may be differentiated into three components (Wagner, Lüdtke, & Trautwein, 2015). In a sample of adolescents, self-esteem showed substantial amounts of (1) stable trait variance, (2) autoregressive trait variance, and (3) state variance across 10 years (Wagner et al., 2015). Thus, evidence suggests that self-esteem has both trait and state characteristics (Anusic & Schimmack, 2016; Donnellan, Kenny, Trzesniewski, Lucas, & Conger, 2012; Wagner et al., 2015). However, the implication of the stability and change in self-esteem on well-being remains to be examined (Kernis, 2005; Paradise & Kernis, 2002). For instance, it is not clear whether instability in self-esteem indicates vulnerability or resilience in adult development and aging (Kernis, 2005; Sowislo et al., 2014).

Self-Esteem as a Psychological Resource of Resilience

A myriad of research has shown the imminent role of self-esteem as a resilience factor; that is, a psychological resource of adaptation (Baumeister, Campbell, Krueger, & Vohs, 2003; Schimel, Landau, & Hayes, 2008; Sowislo & Orth, 2013). For instance, trait self-esteem (as opposed to state self-esteem, see Donnellan et al., 2012; Hank, 2015) serves to buffer the effect of negative daily social interactions on daily affect (Brown, 2010). Specifically, after receiving negative social feedback, individuals with higher self-esteem felt better about themselves, compared to individuals with lower self-esteem (Brown, 2010). Buffering effects are widely studied in mental and physical health research (Cohen & Wills, 1985; Dixon & Overall, 2016), in which a resilience factor, such as self-esteem, mitigates the threat of the risk factor, such as physical symptoms (Cohen, Cohen, West, & Aiken, 2003).

Most research, however, has focused on trait self-esteem, that is, the mean level of self-esteem using cross-sectional or longitudinal investigations that span across relatively long assessment periods (Harter, 2006; Orth, Robins, & Widaman, 2012; Wagner, Gerstorf, Hoppmann, & Luszcz, 2013). In contrast, recent studies have examined state self-esteem, i.e., the intraindividual variability of self-esteem and its relevance to health-related outcomes using the intensive repeated-measures approach (Kernis, 2005; Paradise & Kernis, 2002; Sowislo et al., 2014). Evidence has shown that greater intraindividual variability in self-esteem was associated with a higher risk of depressive symptoms (Sowislo et al., 2014) and lower levels of psychological well-being (Paradise & Kernis, 2002). Furthermore, in a college student sample, the mean level of daily self-esteem was positively associated with indicators of competence and social connectedness, including daily authenticity, daily autonomy, daily competence, and daily relatedness (Heppner et al., 2008). However, little is known about the processes associated with state self-esteem across other domains such as emotion and health (Noftle & Fleeson, 2015; Stawski, Smith, & MacDonald, 2015). The present study addressed one aspect of the link between quality of life and the maintenance processes, namely, the buffering effect of state self-esteem on the link between physical symptoms and daily affect.

Self-Esteem in Lifespan Development

Regardless of the ongoing state-trait debate, recent evidence suggests that self-esteem changes across adulthood (Orth & Robins, 2014; Trzesniewski, Donnellan, & Robins, 2003). However, findings regarding the age-related changes in self-esteem remain inconclusive. Using an 18-year longitudinal sample of older adults (N = 1,215; M age = 78.8 years; SD = 5.9 years; age range: 65–103 years at baseline), self-esteem showed considerable stability with minor declines only emerging in advanced ages (Wagner et al., 2013). In contrast, using a lifespan sample (N = 3,617; M age = 54.0 years; SD = 17.6 years at baseline) with an age range of 25–104 years across a 16-year period, self-esteem showed more substantial changes across adulthood (Orth, Trzesniewski, & Robins, 2010). Specifically, self-esteem followed a reverse U-shaped trajectory with an increase from young adulthood, reaching the peak at about the age of 60 years, then declined afterward. Few studies have, however, examined the implication of the age-related changes of self-esteem as a resilience factor in facing the risks and challenges associated with old age (for an exception, see Orth et al., 2012). The role of self-esteem as a resilience factor, defined as a buffer against negative events, may change across the adult lifespan due to the age-related changes in challenges and resources (Wagner, Lang, Neyer, & Wagner, 2014).

Covariates: Sex, Physical Health, Neuroticism

Although self-esteem serves an imminent role as a resilience factor, past research has shown the effect of other important interindividual differences on emotional experiences (Chui, Hoppmann, Gerstorf, Walker, & Luszcz, 2014; Moen & Spencer, 2006). For example, compared to men, women tend to report more negative emotional experiences (Barefoot, Mortensen, Helms, Avlund, & Schroll, 2001). In addition, poorer physical health and higher neuroticism were associated with indicators of negative emotional experiences (Koster et al., 2006; Lahey, 2009). For these reasons, the present study controlled for the effects of gender, subjective health, and neuroticism in the examination of the associations between daily affect, daily self-esteem, and daily physical symptoms.

Current Study

The current study addressed two major issues. First, we used data from a 7-day daily-diary study with an adult sample to examine the interrelationship across three domains: affect, health, and self-esteem. Specifically, we examined the buffering effect of self-esteem on the link between daily affect and daily physical symptoms. Second, we examined possible age differences in the role of self-esteem as a buffer in the link between daily affect and daily physical symptoms. Based on past findings that self-esteem serves as a buffer between negative experiences and affect (Brown, 2010), and the age-related decline in the

Table 1. Descriptive statistics at baseline by age group

	Young adults (n = 33)	Middle-aged adults (n = 34)	Older adults (n = 61)	Correlations						
Mean				1	2	3	4	5	6	7
1. Age	29.90 (3.95)	54.65 (5.15)	72.37 (8. 46)	–						
2. Life satisfaction	4.73 (.63)	4.41 (.82)	4.80 (.79)	.03	–					
3. Neuroticism	18.30 (8.83)	17.03 (9.11)	12.16 (8.66)	−.30***	−.34***	–				
4. Subjective health	4.82 (1.13)	5.00 (1.02)	5.23 (.84)	.12	.30***	−.17	–			
5. Self-esteem	22.85 (4.62)	22.85 (4.32)	24.62 (4.14)	.16	.28***	−.71***	.12	–		
6. Positive affect	33.39 (7.08)	34.47 (6.50)	35.62 (5.70)	.11	.35***	−.25***	.11	.34***	–	
7. Negative affect	19.70 (6.62)	18.68 (6.65)	15.54 (4.77)	−.29***	−.16	.58***	−.11	−.50***	−.27***	–
8. Physical symptoms	18.39 (4.51)	16.29 (3.35)	16.08 (3.46)	−.18	−.07	.23	−.31***	−.09	−.08	.21

Note. Standard deviations are in parentheses.***$p < .001$.

level but increase in the intraindividual variability of self-esteem (Orth et al., 2010; Trzesniewski et al., 2003), we tested two hypotheses. First, self-esteem would be a significant moderator between daily affect, both positive (PA) and negative affect (NA), and daily physical symptoms. We expected a significant Self-Esteem × Physical Symptoms interaction effect on PA and NA. Second, the buffering effect of self-esteem would decrease with age. We expected a significant Self-Esteem × Physical Symptoms × Age interaction effect on PA and NA.

Methods

Participants

A convenience sample of community-residing adults (N = 128; M age = 56.7 years; SD = 18.7; range = 24.2–90.2; 46% women) participated in a 7-day daily-diary study. Participants were recruited for a follow-up of a previous larger study (Diehl & Hay, 2007). Because the study focused on the effects of daily stress in healthy community-residing adults, participants were screened out for any major sensory impairments, concurrent depression, or history of severe mental illness. These eligibility criteria were established during a screening interview conducted by phone. Of the original sample of 239 participants, 132 (55%) were successfully recruited for the current study. Four participants were excluded from analyses because they failed to return the baseline although they completed the daily diaries. The overall compliance rate was 98%, with 91% participants completing all 7 days' diary, 7% missing one diary, and 2% missing two to four diaries.

Most participants identified themselves as Caucasian (91%; n = 116), 9% (n = 11) as Black, and 1% (n = 1) as American Indian or Alaska Native. The majority of participants were married (58.6%), 21.1% were single, 12.5% were divorced, 7.0% were widowed, and 0.8% were separated. Participants' annual household income ranged from less than $5,000 to over $150,000, with a mean of $59,100. Most participants (85%) had a bachelor's degree or higher. Participants described themselves as having good vision, M = 4.70; SD = 1.05, and hearing, M = 4.73; SD = 1.02, (1 = *very poor* . . . 6 = *very good*), and being satisfied with their lives, M = 4.68, SD = .77 (1 = *extremely unhappy* . . . 6 = *extremely happy*).

Table 1 presents additional baseline information of the three age groups: young adults (n = 33; 24–39 years), middle-aged adults (n = 34; 40–59 years), and older adults (n = 61; 60 and older). At baseline, the three age groups differed significantly from each other in neuroticism, $F(2, 125) = 6.36$, $p < .01$, negative affect (NA), $F(2, 125) = 6.51$, $p < .01$, and physical symptoms, $F(2, 125) = 4.44$, $p < .05$. In contrast, the three age groups did not differ from each other in life satisfaction, subjective health, self-esteem, and positive affect (PA), ps > .05. Results of Spearman's rank correlation test showed that income, ρ = –.01, and education, ρ = .08, were not significantly associated with self-esteem ps > .05.

Procedure

Participants were recruited for a 6-year follow-up study. Participants were sent a baseline questionnaire and paper diaries in the mail. Trained research assistants gave instructions to the participants over the phone on how to complete the baseline questionnaire and paper diaries. Participants were instructed to first complete the baseline questionnaire. They then started the daily diaries the next day. Participants received daily reminders to complete the diaries before they went to bed, via phone calls, emails, or texts. To ensure compliance with the protocol, participants used prepaid envelopes to return the completed baseline questionnaire and each completed diary the next day. Overall compliance was 98%. Participants provided an average of 6.9 diaries (SD = .51; range = 3–7). The final sample consisted of 128 individuals who returned at least six completed diaries. Given our analytic strategy (see the section below: Statistical Analysis: Multivariate Marginal Modeling) only days with complete data on all measures of interest were

included in the analyses. Thus, the present analyses were based on 878 days of data (an average of 6.86 days of data per person).

Measures

Measures administered in the baseline assessed a variety of sociodemographic and personal information, including positive affect (PA) and negative affect (NA), self-esteem, physical symptoms, and selected individual difference variables, such as neuroticism (McCrae & Costa, 2003) and psychological well-being (Ryff, 1995). Measures in the daily diaries assessed PA and NA, self-esteem, and physical symptoms on a day-to-day basis. Additional measures in the daily diaries included perceived control (Eizenman, Nesselroade, Featherman, & Rowe, 1997) and a checklist of self-attributes. Below we described the measures pertaining to the research questions of the current study.

Daily Positive and Negative Affect

Participants completed the 20-item Positive Affect and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) on a daily basis. The PA and NA scale each consists of 10 items. Respondents indicated how often they had felt this way during the past 24 hours on a 5-point scale (1 = *very slightly or not at all* . . . 5 = *extremely*). The sum of the item scores were used for further analyses. Higher scores were indicative of a higher level of affect. The PANAS has high internal consistency and test-retest reliability in previous studies (Watson et al., 1988). In the present study, the range of Cronbach's α across 7 days was .85 to .94 for PA, M = .91 (SD = .03), and .78 to .86 for NA, M = .84 (SD = .03).

Daily Self-Esteem

Participants completed the modified 10-item Self-Esteem Scale (SES; Rosenberg, 1989) on a daily basis, using a 4-point scale (1 = *strongly agree* . . . 4 = *strongly disagree*). The original Rosenberg's scale was modified for the purpose of this diary measure. Participants were instructed to report how they felt about themselves during the past 24 hours. A sample modified item was "During the past 24 hours, I felt that I am a person of worth, at least on an equal basis with others." The responses were later recoded (0 = *strongly disagree* . . . 3 = *strongly agree*). The sum of the item scores were used for further analyses, higher scores indicating a higher level of self-esteem. The SES has high internal consistency and test-retest reliability (Rosenberg, 1989; Trzesniewski et al., 2003). Cronbach's α ranged from .87 to .93 in the present study, M = .91, SD = .03.

Daily Physical Symptoms

Participants rated each day the intensity of 11 physical symptoms, such as headache (1 = *none*; 4 = *most*). The sum of the item scores were used for further analyses. Higher scores were indicative of a higher level of physical symptoms.

Neuroticism

In the baseline questionnaire, neuroticism was assessed using the Neuroticism subscale of the NEO Five-Factor Inventory (McCrae & Costa, 2003). The Neuroticism subscale consists of 12 items rated on a 5-point scale (0 = *strongly disagree* . . . 4 = *strongly agree*). The sum of the item scores were used for further analyses. Higher scores indicated higher neuroticism. The reliability and validity of this scale have been established in various studies (Costa & McCrae, 1992; McCrae & Costa, 2003). The internal consistency of the scale was high in the present study (Cronbach's α = .90).

Subjective Health

Subjective health was assessed during the baseline. Participants responded to a single health item using a 6-point scale (1 = *very poor* . . . 6 = *very good*). Higher scores indicated better subjective health.

Statistical Analysis: Multivariate Marginal Modeling

To examine the associations between affect, physical symptoms, and self-esteem, the typical multilevel modeling analysis would entail a univariate approach. However, the univariate multilevel modeling approach ignores the multivariate response association and does not yield valid statistical inferences (Asar & İlk, 2013). The current study moved the typical univariate analyses one step further and used a multivariate marginal modeling approach.

Models for longitudinal data may be grouped into (1) single-level and (2) multilevel models (Asar & İlk, 2013). In contrast to the multivariate multilevel approach (Raudenbush & Bryk, 2002), which is multilevel, the multivariate marginal approach is single level. For multilevel models, both the regression parameters, random effects, and dependencies are estimated simultaneously. The computation of this group of models leads to statistical difficulties such as convergence problems and computational burden (Asar & İlk, 2013). For marginal models, however, the dependencies are modeled separately and treated as nuisance parameters. Thus, multivariate marginal models allow the interpretation of the regression parameters on the

mean response, but not the random effects and dependencies. We applied the multivariate marginal approach in this study because we are primarily interested in the regression parameters, rather than the random effects and dependencies (Asar & İlk, 2013).

Analyses were performed using the R package "mmm" (Asar, 2014; Asar & İlk, 2013). The basic multivariate marginal model can be presented in the following equations.

$$Y_{itj} = \beta_{0j} + \beta_{1j}\, Self\text{-}Esteem_{it} + \beta_{2j}\, Physical\ Symptoms$$

This model indicates two different models for Y_{itj} = PA (j = 1) and Y_{itj} = NA (j = 2) for participant i at time t. Thus, for each assessment at time t, there are two affect variables, namely, PA and NA within participants. In the single-level model, the independent variables entered may be time-invariant or time-varying. In subsequent models, covariates including age, sex, neuroticism, subjective health, and interaction terms were added.

The multivariate marginal modeling approach used generalized estimating equations (GEEs) for parameter estimation (Asar & İlk, 2013; Liang & Zeger, 1986). GEEs use the robust sandwich estimator to estimate the variance-covariance matrix. The robust sandwich variance estimates are insensitive to incorrect choices of the association structures. In contrast, the naive variance estimates are sensitive to the misspecification of the association structures (Asar & İlk, 2013). Interested readers may consult Asar's work (Asar, 2014; Asar & İlk, 2013) and the corresponding web resources (https://cran.r-project.org/web/packages/mmm/index.html) for details of the theory and application of multivariate marginal modeling.

Results

The results section is organized in three parts: (1) descriptive statistics, (2) interaction effect of self-esteem and physical symptoms on PA and NA, and (3) age differences in the interaction effect of self-esteem and physical symptoms on PA and NA.

Descriptive Statistics

Table 1 presents selected baseline information of the three age groups. For the measures administered in the diaries, the intraclass correlation (ICC) for PA was .69 and .43 for NA. The ICCs for self-esteem was .60 and .61 for physical symptoms. The ICCs indicated that PA, NA, self-esteem, and physical symptoms showed substantial within-person variability in the study period. Across individuals and days, mean PA was 31.92 (*SD* = 8.14; range = 10–50). Mean NA was 13.70 (*SD* = 4.73; range = 10–37). Mean self-esteem was 24.51 (*SD* = 5.05; range = 0–30). Mean physical symptoms was 14.21, *SD* = 3.48, range = 11–38.

Interaction Effect of Self-Esteem and Physical Symptoms

Table 2 presents the results of three nested models. Model 1 tested the effects of self-esteem (within-person) and physical symptoms on PA and NA simultaneously. For PA, self-esteem was associated with a higher level of PA, β_{11} = .54, robust z = 3.99. The association between PA and physical symptoms was not significant, β_{21} = –.20, robust z = –1.34. For NA, self-esteem was associated with a lower level of NA, β_{12} = –.38, robust z = –3.57. Physical symptoms were associated with a higher level of NA, β_{22} = .15, robust z = 2.03. To address the first hypothesis, Model 2 tested the Self-Esteem × Physical Symptoms two-way interaction on PA and NA. For both PA and NA, the Self-Esteem × Physical Symptoms effect was not significant, β_{31} = –.03, robust z = –.78, and β_{32} = .003, robust z = .15.

Age Differences in Interaction Effect of Self-Esteem and Physical Symptoms

Finally, to address the second hypothesis, Model 3 tested the age difference in the interaction effect of self-esteem (within-person) on PA and NA, by including the Self-Esteem × Physical Symptoms × Age three-way interaction. Although no goodness-of-fit indices were available from the mmm package, Model 3 was used for further interpretation for three reasons: (1) our theoretical interest to address the buffering effect of self-esteem, (2) statistically significant Self-Esteem × Physical Symptoms × Age interaction on NA, and (3) interaction terms should not be dropped simply because the interaction effects do not reach statistical significance. For point (3) in particular, an interaction term is included in the model to test the relevant hypothesis. Dropping nonsignificant interaction terms may potentially lead to missing important conditional relationship between variables (Brambor, Clark, & Golder, 2006). We noted that the Self-Esteem × Physical Symptoms effect on PA was significant in Model 3 but not in Model 2. However, effects of lower order terms are almost certain to change with the inclusion of a higher order interaction term (Brambor et al., 2006). According to Brambor et al. (2006) and Friedrich (1982), the change in the effects of lower order terms with the inclusion of a higher-order interaction should not be interpreted as a sign of multicollinearity. In addition, results from multivariate marginal modeling reported here were essentially identical to results using univariate multilevel modeling (Chui & Diehl, 2014, November). The selection of Model 3 for interpretation was further supported based on the goodness-of-fit indices available in results from univariate multilevel modeling.

In Model 3, the Self-Esteem × Physical Symptoms effect was significant for PA, β_{31} = –.07, robust z = –2.22, but not significant for NA, β_{32} = .03, robust z = 1.23. In contrast, the Self-Esteem × Physical Symptoms × Age effect was not significant for

Table 2. Results of multivariate multilevel modeling

Parameter	Model 1 Unstandardized Estimate (Robust *SE*)	Model 2 Unstandardized Estimate (Robust *SE*)	Model 3 Unstandardized Estimate (Robust *SE*)
		Fixed effects	
PA			
Time-varying variables			
Intercept	32.30 (.67)*	32.25 (.66)*	32.26 (.66)*
Self-esteem	.54 (.14)*	.55 (.13)*	.56 (.11)*
Physical symptoms	−.20 (.15)	−.22 (.15)	−.08 (.13)
Self-Esteem × Physical Symptoms		−.03 (.04)	−.07 (.03)*
Self-Esteem × Age			−.01 (.01)
Physical Symptoms × Age			.01 (.01)
Self-Esteem × Physical Symptoms × Age			−.003 (.002)
Time invariant variables			
Age	.06 (.03)*	.06 (.03)*	.06 (.03)*
Health	1.49 (.46)*	1.49 (.46)*	1.50 (.45)*
Neuroticism	.12 (.07)	.12 (.07)	.13 (.07)
Sex	−.74 (.90)	−.70 (.90)	−.71 (.90)
Self-esteem (between-person)	.74 (.15)*	.76 (.15)*	.76 (.15)*
Physical symptoms (between-person)	−.04 (.17)	−.06 (.17)	−.06 (.17)
NA			
Time-varying variables			
Intercept	13.32 (.32)*	13.32 (.33)*	13.28 (.32)*
Self-esteem	−.38 (.11)*	−.38 (.10)*	−.39 (.08)*
Physical symptoms	.15 (.07)*	.15 (.07)*	.13 (.10)
Self-Esteem × Physical Symptoms		.003 (.02)	.03 (.03)
Self-Esteem × Age			.11 (.004)*
Physical Symptoms × Age			.01 (.004)
Self-Esteem × Physical Symptoms × Age			.004 (.002)*
Time invariant variables			
Age	−.02 (.01)	−.02 (.01)	−.02 (.01)
Health	−.12 (.32)	−.12 (.31)	−.15 (.31)
Neuroticism	.12 (.04)*	.12 (.04)*	.12 (.04)*
Sex	.57 (.56)	.57 (.56)	.62 (.56)
Self-esteem (between-person)	−.15 (.08)	−.15 (.08)	−.15 (.08)*
Physical symptoms (between-person)	.28 (.11)*	.28 (.10)*	.26 (.10)*

Note. All time-varying covariates are within-person centered. All time invariant covariates are grand-mean centered. *Robust $z > 1.98$.

PA, $\beta_{61} = -.003$, robust $z = -1.54$, but significant for NA, $\beta_{62} = .004$, robust $z = 2.34$. Results of Model 3 are graphically presented in Figures 1 and 2 for PA and NA, respectively.

We followed the procedures and recommendations to interpret interaction effects (Aiken & West, 1991; Friedrich, 1982). Figure 1 graphically represents the two-way interaction of self-esteem and physical symptoms on PA. When self-esteem was higher (solid black line), PA was higher compared to when self-esteem was lower (dotted gray line), across all levels of physical symptoms. In addition, the effect of self-esteem on PA depended on the level of physical symptoms. Specifically, the effect of self-esteem on PA was higher when the level of physical symptoms was lower. Thus, the Self-Esteem × Age interaction effect was in the opposite direction as hypothesized, such that, if the buffering effect of self-esteem was present, the effect of self-esteem on PA would be higher at the higher end of physical symptoms (Cohen & Wills, 1985). Figure 2 illustrates the three-way interaction of self-esteem, physical symptoms, and age on NA. Across all three age groups, when self-esteem was higher (solid black line), NA was lower compared to when self-esteem was lower (dotted gray line). In addition, the association between physical symptoms and NA depended jointly on self-esteem and age. The effect of self-esteem on NA was lower when both the levels of physical symptoms and age were higher. In particular,

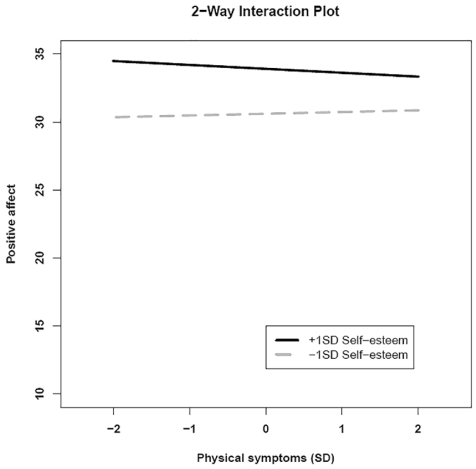

Figure 1. Two-way interaction of self-esteem and physical symptoms on positive affect.

in older adults (Panel c), the effect of self-esteem on NA was lower at the higher end of physical symptoms, such that when the level of physical symptoms was at +2SD, the level of NA was the same regardless of the level of self-esteem. As shown from Figures 2(a) to 2(c), the effect of self-esteem was reduced from young to old age when the level of physical symptoms was higher.

Discussion

In the context of quality of life and health in aging, studies have identified the links between indices of quality of life and the processes to maintain emotional well-being (Kernis, 2005; Zakoscielna & Parmelee, 2013). The present study focused on the role of self-esteem as a resilience factor in the link between physical symptoms and affect in the everyday life of adults. Findings showed an overall effect of within-person self-esteem on the association between physical symptoms and PA. However, the effect of self-esteem on PA was reduced when the level of physical symptoms was higher. In addition, results showed a significant age difference in the effect of within-person self-esteem on the association between physical symptoms and NA. Specifically, when the level of physical symptoms was higher, the effect of self-esteem on NA was smaller in older adults compared to young and middle-aged adults.

Affect and Health in Everyday Life

Consistent with findings of past cross-sectional, longitudinal, and intensive repeated-measures studies, the daily physical symptoms of adults were associated with negative emotional experiences, including depression and negative affect (Murrell et al., 1991; Zautra, 2003). For example, in an earlier

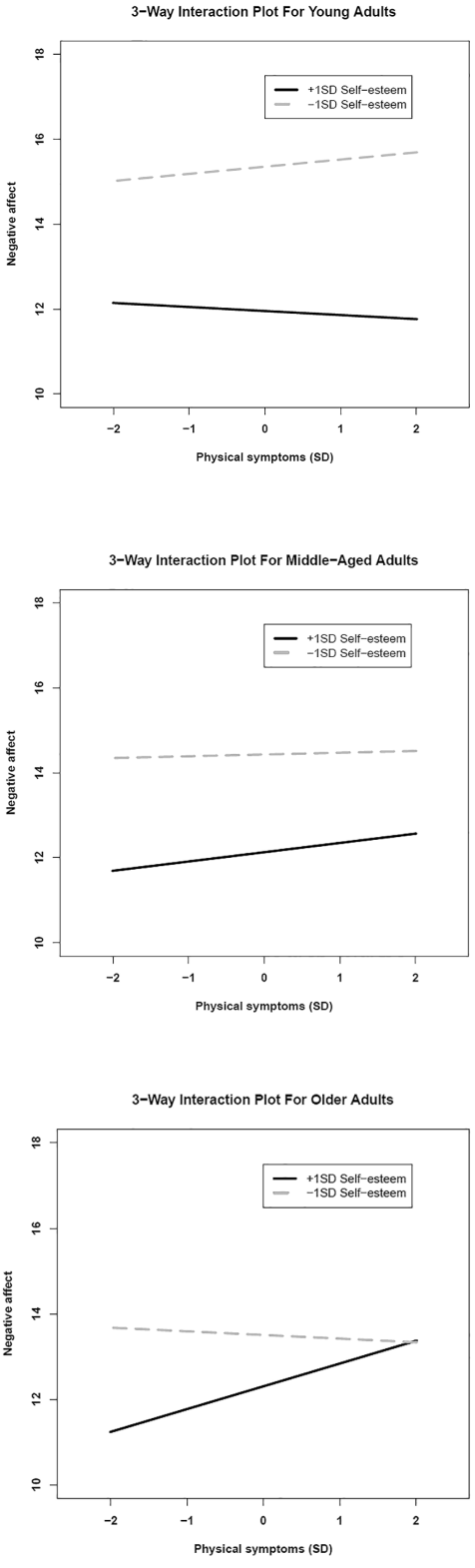

Figure 2. Three-way interaction of self-esteem, physical symptoms, and age on negative affect. Age was grand-mean centered. For illustration, we used young adults = −1 *SD*, middle-aged adults = 0, and older adults = +1 *SD*. The *M* age was 56.7 years, and *SD* was 18.66. Thus, the specific ages used from panels (1) to (3) were 38.04, 56.7, and 75.36 years, respectively.

study by Conner et al. (2006), physical pain was associated with negative emotional experiences in individuals with rheumatoid arthritis. Our results advance those reported in intensive repeated-measures studies, such that the application of the multivariate marginal approach (Asar & İlk, 2013) enabled the simultaneous examination of PA and NA in their associations with physical symptoms. Although PA and NA are conceptualized as relatively independent dimensions (Watson et al., 1988), ignoring the multivariate responses within person may not yield valid statistical inferences because of the inaccurate estimates of standard errors (Asar & İlk, 2013; Zeger, Irizarry, & Peng, 2006). In addition, the univariate examination of either PA or NA fails to provide a more complete picture of the complexity of emotional experience in everyday life (Hay & Diehl, 2011). Thus, the findings reported here contribute to the existing literature by examining the associations between PA, NA, physical symptoms, and self-esteem simultaneously.

Self-Esteem as a Resilience Factor across the Adult Lifespan

In accord with past research, our findings provided partial support for the role of self-esteem as a resilience factor in the face of daily physical symptoms (Baumeister et al., 2003; Greenberg et al., 1992). Self-esteem has been associated with various indicators of life success, including better academic and occupational achievement, higher income, better physical health, and more happiness (Leary & Baumeister, 2000; Orth et al., 2012; Trautwein, Ludtke, Koller, & Baumert, 2006). Self-esteem was also shown to buffer the negative effect of death-related existential threats in young adults (Routledge et al., 2010). Most studies, however, focused on self-esteem as a trait-like individual difference variable (Kernis, 2005) and its associations with indicators of life success. Although between-person associations do not necessarily translate into within-person associations (Hamaker, 2012), recent findings supported that the time-varying aspect of self-esteem may have implications for emotional well-being (Paradise & Kernis, 2002; Sowislo et al., 2014). Instead of the degree of stability, the present study moved one step further and examined the buffering effect of within-person self-esteem in the everyday context. Our findings suggest that within-person self-esteem does not buffer the effect of physical symptoms on daily PA or NA. Although within-person self-esteem showed an overall effect on daily PA and NA, its effect on PA was reduced when the level of physical symptoms was higher. In addition, the effect of within-person self-esteem on daily NA became negligible when the level of physical symptoms was high in older adults. Our findings suggest that the effect of within-person self-esteem diminishes in old age when age-related limitations in resources and challenges to well-being become more personally relevant (Orth et al., 2010; Wagner et al., 2013). Similarly, results from longitudinal studies have shown that the level of depressive symptoms increased and the use of coping strategies decreased in old age (Chui, Gerstorf, Hoppmann, & Luszcz, 2015; Diehl et al., 2014). Thus, self-esteem may serve as a psychological resource to cope with minor stress earlier in life. In contrast, age-related vulnerabilities such as chronic health conditions may render the implementation of coping and self-regulation strategies more difficult if not impossible (Charles, 2010).

Self-Esteem in Old Age

Our results suggest that there is no universal generalization of the benefits of self-esteem, in relation to chronological age, that can be made regarding whether self-esteem confers greater resilience on adults (Diehl, Hay, & Chui, 2012). Despite the plethora of research on the benefits of high self-esteem, recent studies examined the vulnerabilities associated with high self-esteem (Crocker & Park, 2004). In particular, the different routes in the pursuit of high self-esteem were examined. When motivated by self-validation goals, individuals react to threats to the self in ways that undermine learning, relatedness, autonomy and self-regulation. Consistent with Crocker and Park (2004), we suggest that the costs associated with the pursuit of self-esteem may differ in different individuals and under different circumstances. In particular, the threat to the self due to a high level of chronic physical symptoms may not be easily dealt with by a boost of temporary self-esteem (Schimel et al., 2008).

Limitations and Outlook

Our findings should be considered in light of several limitations. First, our sample was relatively healthy, high functioning, and community-dwelling. The sample was also predominantly of European-American descent. Research suggests that individuals of more disadvantaged socioeconomic backgrounds, i.e., lower income and educational background, tend to experience more stress and poorer physical health (Gallo, Bogart, Vranceanu, & Matthews, 2005; Gruenewald et al., 2012). Thus, our findings may underestimate the association between affect and physical symptoms in a more diverse and less healthy population.

Second, the present study cannot tease apart the cause-and-effect associations between affect, physical symptoms, and self-esteem in everyday life. Instead of viewing self-esteem as a psychological resource of resilience (Leary & Baumeister, 2000), some studies view self-esteem as the outcome of good health, better education, and more positive personality profiles (Wagner, Lang, Neyer, & Wagner, 2014). We cannot ascertain whether PA and NA reported were reac-

tions to physical symptoms or other intervening events. However, in an evaluation of the prospective reciprocal relation between self-esteem and depression, results from a meta-analysis of longitudinal studies suggested that self-esteem predicts depression (Sowislo & Orth, 2013). In particular, the effect of self-esteem on depression (β = –.16) was significantly stronger than the effect of depression on self-esteem (β = –.08). Future research might include a lead/lag effect of self-esteem to examine the reciprocal relation between multiple domains in everyday life using the intense repeated-measure design (Stawski et al., 2015).

Third, recent studies applied statistical models such as the latent trait-state model to quantify the extent to which self-esteem is a trait or a state (Anusic & Schimmack, 2016; Hank, 2015; Wagner et al., 2015). Using repeated measures of different time-scales spanning from days to years, these studies examined the between-person and within-person variances in self-esteem. In general, trait self-esteem pertains to the between-person variance. In contrast, state self-esteem pertains to within-person variance. It is not clear, however, whether trait self-esteem measured using the original self-esteem scale (Rosenberg, 1989) may or may not be comparable to the measure of trait self-esteem derived from the between-person variances in repeated measures of self-esteem. Although self-esteem was measured using the original Rosenberg's self-esteem scale at baseline, the conceptualization and estimation of trait and state self-esteem were not the focus of the present study. Future studies should examine the similarities and differences in trait self-esteem measured at baseline, compared to trait self-esteem derived from the between-person variance in repeated measures.

Fourth, in this study age was a between-person variable. Thus, the effects of cohort and age differences are confounded (Li & Schmiedek, 2002). We cannot ascertain whether the age difference in the effect of self-esteem stems from age-related changes or cohort differences. Past studies found evidence both for and against cohort differences in self-esteem (Gentile, Twenge, & Campbell, 2010; Trzesniewski et al., 2003; Twenge & Campbell, 2001). However, less is known about the cohort differences in the buffering effect of self-esteem (Orth, Robins, & Meier, 2009). Future studies should adopt multiple time-scales as different metrics of time to disentangle the effects of cohort and age in the buffering effect of self-esteem (Gerstorf, Hoppmann, & Ram, 2014; Li & Schmiedek, 2002).

Fifth, although statistical methods, such as the region of significance test, are available to evaluate interaction effects in univariate multilevel modeling (Preacher, Curran, & Bauer, 2006), no equivalent computational tools are available for multivariate marginal modeling. The interaction effects reported in the present study cannot be evaluated using the Johnson-Neyman technique or confidence bands. Future developments of statistical methods and implementations in software are needed to enable better interpretation of two-way and three-way interaction effects in multivariate marginal modeling.

The last limitation affects all intensive repeated-measures designs in real life: The strength of an intensive repeated-measure design is that the phenomenon of interest is examined as it unfolds in the natural environment; thus, ecological validity is enhanced. However, unlike laboratory-based studies, our study cannot control for all other factors that may impact the affective experience in everyday life. Despite these limitations, this study offers insights for future research. Our findings support the assertions that interrelationships across multiple domains should be considered in the research of affective experiences in everyday life (Ong & Zautra, 2015). In addition to physical symptoms, research should also examine multiple types of stressors, as they may be associated with different outcomes. For instance, among stressors of different domains, social stressors were particularly relevant for physical symptoms (Hay & Diehl, 2010).

Conclusion

This study showed that the effect of self-esteem on the association between physical symptoms and affect differed between PA and NA, and in different age groups. In contrast to our initial hypotheses, self-esteem did not act as a buffer on daily PA or NA, although self-esteem showed an overall effect on daily affect. The self-esteem literature has provided a plethora of evidence on the important role of self-esteem as a psychological resource of resilience. Our findings attest to the value of the examination of the role of self-esteem as a resilience factor in the lifespan development of emotional well-being. These findings converge with results from the aging literature that late life entails increasing vulnerabilities that challenge individuals' well-being (Baltes & Smith, 2003). Future research may substantiate our findings by examining both vulnerability and resilience that self-esteem may bring in coping with the varying challenges across the adult lifespan.

Acknowledgments

The research presented in this article was supported by grants R01 AG09203, R01 AG21147, and R56 AG021147 from the National Institute on Aging, National Institutes of Health (Principal Investigator: Manfred Diehl).

Declaration of Conflicts of Interest

The authors declare that no conflicts of interest exist.

References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, London: Sage.

Allen, B. P., & Potkay, C. R. (1981). On the arbitrary distinction between states and traits. *Journal of Personality and Social Psychology, 41*, 916–928. doi 10.1037/0022-3514.41.5.916

Anusic, I., & Schimmack, U. (2016). Stability and change of personality traits, self-esteem, and well-being: Introducing the meta-analytic stability and change model of retest correlations. *Journal of Personality and Social Psychology, 110*, 766–781. doi 10.1037/pspp0000066

Asar, Ö. (2014). mmm: an R package for analyzing multivariate longitudinal data with multivariate marginal models. Retrieved from http://CRAN.R-project.org/package=mmm

Asar, Ö., & İlk, Ö. (2013). mmm: An R package for analyzing multivariate longitudinal data with multivariate marginal models. *Computer Methods and Programs in Biomedicine, 112*, 649–654. doi 10.1016/j.cmpb.2013.07.022

Baltes, P. B., & Smith, J. (2003). New frontiers in the future of aging: From successful aging of the young old to the dilemmas of the fourth age. *Gerontology, 49*, 123–135. doi 10.1159/000067946

Barefoot, J. C., Mortensen, E. L., Helms, M. J., Avlund, K., & Schroll, M. (2001). A longitudinal study of gender differences in depressive symptoms from age 50 to 80. *Psychology and Aging, 16*, 342–345. doi 10.1037/0882-7974.16.2.342

Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychological Science in the Public Interest, 4*, 1–44. doi 10.1111/1529-1006.01431

Brambor, T., Clark, W. R., & Golder, M. (2006). Understanding interaction models: Improving empirical analyses. *Political Analysis, 14*, 63–82. doi 10.1093/pan/mpi014

Brown, J. D. (2010). High self-esteem buffers negative feedback: Once more with feeling. *Cognition and Emotion, 24*, 1389–1404. doi 10.1080/02699930903504405

Charles, S. T. (2010). Strength and vulnerability integration: A model of emotional well-being across adulthood. *Psychological Bulletin, 136*, 1068–1091. doi 10.1037/a0021232

Chui, H., & Diehl, M. (2014, November). *Self-esteem buffers the effect of physical symptoms on negative affect less in older adults.* Paper presented at the Gerontological Society of America, Washington D. C.

Chui, H., Gerstorf, D., Hoppmann, C. A., & Luszcz, M. A. (2015). Trajectories of depressive symptoms in old age: Integrating age-, pathology-, and mortality-related changes. *Psychology and Aging, 30*, 940–951. doi 10.1037/pag0000054

Chui, H., Hoppmann, C. A., Gerstorf, D., Walker, R., & Luszcz, M. A. (2014). Social partners and momentary affect in the oldest-old: The presence of others benefits affect depending on who we are and who we are with. *Developmental Psychology, 50*, 728–740. doi 10.1037/a0033896

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. NJ: Erlbaum.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98*, 310–357.

Coleman, P. G., Ivani-Chalian, C., & Robinson, M. (1993). Self-esteem and its sources: Stability and change in later life. *Ageing and Society, 13*, 171–192. doi 10.1017/S0144686X00000842

Conner, T. S., Tennen, H., Zautra, A. J., Affleck, G., Armeli, S., & Fifield, J. (2006). Coping with rheumatoid arthritis pain in daily life: Within-person analyses reveal hidden vulnerability for the formerly depressed. *Pain, 126*(1–3), 198–209. doi 10.1016/j.pain.2006.06.033

Costa, P. T., Jr., & McCrae, R. R. (1992). *NEO-PI-R: Revised NEO Personality Inventory and NEO Five-Five Inventory (NEO-FFI)*. Odessa, FL: Psychological Assessment Resources.

Crocker, J., & Park, L. E. (2004). The costly pursuit of self-esteem. *Psychological Bulletin, 130*, 392–414. doi 10.1037/0033-2909.130.3.392

Diehl, M., Chui, H., Hay, E. L., Lumley, M. A., Grühn, D., & Labouvie-Vief, G. (2014). Change in coping and defense mechanisms across adulthood: Longitudinal findings in a European American sample. *Developmental Psychology, 50*, 634–648. doi 10.1037/a0033619

Diehl, M., & Hay, E. L. (2007). Contextualized self-representations in adulthood. *Journal of Personality, 75*, 1255–1284. doi 10.1111/j.1467-6494.2007.00475.x

Diehl, M., Hay, E. L., & Chui, H. (2012). Personal risk and resilience factors in the context of daily stress. *Annual Review of Gerontology and Geriatrics, 32*, 251–274. doi 10.1891/0198-8794.32.251

Dixon, H. C., & Overall, N. C. (2016). Dispositional mindfulness attenuates the link between daily stress and depressed mood. *Journal of Social and Clinical Psychology, 35*, 255–268. doi 10.1521/jscp.2016.35.3.255

Donnellan, M. B., Kenny, D. A., Trzesniewski, K. H., Lucas, R. E., & Conger, R. D. (2012). Using trait-state models to evaluate the longitudinal consistency of global self-esteem from adolescence to adulthood. *Journal of Research in Personality, 46*, 634–645. doi 10.1016/j.jrp.2012.07.005

Eid, M., & Diener, E. (1999). Intraindividual variability in affect: Reliability, validity, and personality correlates. *Journal of Personality and Social Psychology, 76*, 662–676. doi 10.1037/0022-3514.76.4.662

Eizenman, D. R., Nesselroade, J. R., Featherman, D. L., & Rowe, J. W. (1997). Intraindividual variability in perceived control in a older sample: The MacArthur successful aging studies. *Psychology and Aging, 12*, 489–502. doi 10.1037/0882-7974.12.3.489

Friedrich, R. I. (1982). In defense of multiplicative terms in multiple regression equations. *American Journal of Political Science, 26*, 797–833.

Gallo, L. C., Bogart, L. M., Vranceanu, A., & Matthews, K. A. (2005). Socioeconomic status, resources, psychological experiences, and emotional responses: A test of the Reserve Capacity Model. *Journal of Personality and Social Psychology, 88*, 386–399. doi 0.1037/0022-3514.88.2.386

Gentile, B., Twenge, J. M., & Campbell, W. K. (2010). Birth cohort differences in self-esteem, 1988–2008: A cross-temporal meta-analysis. *Review of General Psychology, 14*, 261–268. doi 10.1037/a0019919

Gerstorf, D., Hoppmann, C. A., & Ram, N. (2014). The promise and challenges of integrating multiple time-scales in adult developmental inquiry. *Research in Human Development, 11*, 75–90. doi 10.1080/15427609.2014.906725

Greenberg, J., Solomon, S., Pyszczynski, T., Rosenblatt, A., Burling, J., Lyon, D., . . . Pinel, E. (1992). Why do people need self-esteem? Converging evidence that self-esteem serves an anxiety-buffering function. *Journal of Personality and Social Psychology, 63*, 913–922. doi 10.1037/0022-3514.63.6.913

Gruenewald, T. L., Karlamangla, A. S., Hu, P., Stein-Merkin, S., Crandall, C., Koretz, B., & Seeman, T. E. (2012). History of socioeconomic disadvantage and allostatic load in later life. *Social Science and Medicine, 74*, 75–83. doi 10.1016/j.socscimed.2011.09.037

Hamaker, E. L. (2012). Why researchers should think "within-person": A Paradigmatic rationale. In M. Mehl & T. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 43–61). New York: Guilford.

Hank, P. (2015). Beyond an informal everyday concept of self-esteem: A latent state-trait model. *Journal of Individual Differences, 36*, 237–246. doi 10.1027/1614-0001/a000181

Harter, S. (2006). Developmental and individual difference perspectives on self-esteem. In D. K. Mroczek & T. D. Little (Eds.),

Handbook of personality development (pp. 311–334). Mahwah, NJ: Erlbaum.

Hay, E. L., & Diehl, M. (2010). Reactivity to daily stressors in adulthood: The importance of stressor type in characterizing risk factors. *Psychology and Aging, 25*, 118–131. doi 10.1037/a0018747

Hay, E. L., & Diehl, M. (2011). Emotion complexity and emotion regulation across adulthood. *European Journal of Ageing, 8*, 157–168. doi 10.1007/s10433-011-0191-7

Heppner, W. L., Kernis, M. H., Nezlek, J. B., Foster, J., Lakey, C. E., & Goldman, B. M. (2008). Within-person relationships among daily self-esteem, need satisfaction, and authenticity. *Psychological Science, 19*, 1140–1145. doi 10.1111/j.1467-9280.2008.02215.x

Kernis, M. H. (2005). Measuring self-esteem in context: The importance of stability of self-esteem in psychological functioning. *Journal of Personality, 73*, 1569–1605. doi 10.1111/j.1467-6494.2005.00359.x

Koster, A., Bosma, H., Kempena, G. I. J. M., Penninx, B. W. J. H., Beekman, A. T. F., Deeg, D. J. H., & van Eijk, J. T. M. (2006). Socioeconomic differences in incident depression in older adults: The role of psychosocial factors, physical health status, and behavioral factors. *Journal of Psychosomatic Research, 61*, 61927.

Lahey, B. B. (2009). Public health significance of neuroticism. *American Psychologist, 64*, 241–256. doi 10.1037/a0015309

Leary, M. R. (1999). Making sense of self-esteem. *Current Directions in Psychological Science, 8*, 32–35. doi 10.1111/1467-8721.00008

Leary, M. R., & Baumeister, R. F. (2000). The nature and function of self-esteem: Sociometer theory. *Advances in Experimental Social Psychology, 32*, 1–62. doi 10.1016/S0065-2601(00)80003-9

Li, S. C., & Schmiedek, F. (2002). Age Is not necessarily aging: Another step toward understanding the 'clocks' that time aging. *Gerontology, 48*, 5–12.

Liang, K.-Y., & Zeger, S. L. (1986). Longitudinal data analysis using generalized linear models. *Biometrika, 73*, 13–22. doi 10.1093/biomet/73.1.13

McCrae, R. R., & Costa, P. T. J. (2003). *Personality in adulthood: A Five-Factor Theory perspective* (2nd ed.). New York: Guilford.

Moen, P., & Spencer, D. (2006). Converging divergences in age, gender, health, and well-being: Strategic selection in the third age. In R. H. Binstock & L. K. George (Eds.), *Handbook of aging and the social sciences* (6th ed., pp. 127–144). Amsterdam, The Netherlands: Elsevier.

Murrell, S. A., Meeks, S., & Walker, J. (1991). Protective functions of health and self-esteem against depression in older adults facing illness or bereavement. *Psychology and Aging, 6*, 352–360. doi 10.1037/0882-7974.6.3.352

Nesselroade, J. R., & McCollam, K. M. S. (2000). Putting the process in developmental processes. *International Journal of Behavioral Development, 24*, 295–300. doi 10.1080/01650250050118277

Noftle, E., E., & Fleeson, W. (2015). Intraindividual variability in adult personality development. In M. Diehl, K. Hooker, & M. J. Sliwinski (Eds.), *Handbook of intraindividual variability across the life span* (pp. 176–197). New York: Routledge.

Ong, A. D., & Zautra, A., J. . (2015). Intraindividual variability in mood and mood regulation in adulthood. In M. Diehl, K. Hooker, & M. J. Sliwinski (Eds.), *Handbook of intraindividual variability across the life span* (pp. 198–215). New York: Routledge.

Ong, A. D., Zautra, A. J., & Reid, M. C. (2010). Psychological resilience predicts decreases in pain catastrophizing through positive emotions. *Psychology and Aging, 25*, 516–523. doi 10.1037/a0019384

Orth, U., & Robins, R. W. (2014). The development of self-esteem. *Current Directions in Psychological Science, 23*, 381–387. doi 10.1177/0963721414547414

Orth, U., Robins, R. W., & Meier, L. L. (2009). Disentangling the effects of low self-esteem and stressful events on depression: Findings from three longitudinal studies. *Journal of Personality and Social Psychology, 97*, 307–321. doi 10.1037/a0015645

Orth, U., Robins, R. W., & Widaman, K. F. (2012). Life-span development of self-esteem and its effects on important life outcomes. *Journal of Personality and Social Psychology, 102*, 1271–1288. doi 10.1037/a0025558

Orth, U., Trzesniewski, K. H., & Robins, R. W. (2010). Self-esteem development from young adulthood to old age: A cohort-sequential longitudinal study. *Journal of Personality and Social Psychology, 98*, 645–658. doi 10.1037/a0018769

Paradise, A. W., & Kernis, M. H. (2002). Self-esteem and psychological well-being: Implications of fragile self-esteem. *Journal of Social and Clinical Psychology, 21*, 345–361.

Preacher, K. J., Curran, P. J., & Bauer, D. J. (2006). Computational tools for probing interactions in multiple linear regression, multilevel modeling, and latent curve analysis. *Journal of Educational and Behavioral Statistics, 31*, 437–448. doi 10.3102/10769986031004437

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.

Röcke, C., Li, S.-C., & Smith, J. (2009). Intraindividual variability in positive and negative affect over 45 days: Do older adults fluctuate less than young adults? *Psychology and Aging, 24*, 863–878. doi 10.1037/a0016276

Rosenberg, M. (1989). *Society and the adolescent self-image* (Rev. ed.). Middletown, CT: Wesleyan University Press.

Routledge, C., Ostafin, B., Juhl, J., Sedikides, C., Cathey, C., & Liao, J. (2010). Adjusting to death: The effects of mortality salience and self-esteem on psychological well-being, growth motivation, and maladaptive behavior. *Journal of Personality and Social Psychology, 99*, 897–916. doi 10.1037/a0021431

Ryff, C. D. (1995). Psychological well-being in adult life. *Current Directions in Psychological Science, 4*, 99–104.

Schimel, J., Landau, M., & Hayes, J. (2008). Self-esteem: A human solution to the problem of death. *Social and Personality Psychology Compass, 2*, 1218–1234. doi 10.1111/j.1751-9004.2008.00104.x

Sliwinski, M. J., Almeida, D. M., Smyth, J., & Stawski, R. S. (2009). Intraindividual change and variability in daily stress processes: Findings from two measurement-burst diary studies. *Psychology and Aging, 24*, 828–840. doi 10.1037/a0017925

Sowislo, J. F., & Orth, U. (2013). Does low self-esteem predict depression and anxiety? A meta-analysis of longitudinal studies. *Psychological Bulletin, 139*, 213–240. doi 10.1037/a0028931

Sowislo, J. F., Orth, U., & Meier, L. L. (2014). What constitutes vulnerable self-esteem? Comparing the prospective effects of low, unstable, and contingent self-esteem on depressive symptoms. *Journal of Abnormal Psychology, 123*, 737–753. doi 10.1037/a0037770

Stawski, R. S., Smith, J., & MacDonald, S. W. (2015). Intraindividual variability and covariation across domains in adulthood and aging. In M. Diehl, K. Hooker, & M. Sliwinski (Eds.), *Handbook of intraindividual variability across the life span* (pp. 258–279). New York: Routledge.

Trautwein, U., Ludtke, O., Koller, O., & Baumert, J. (2006). Self-esteem, academic self-concept, and achievement: How the learning environment moderates the dynamics of self-concept. *Journal of Personality and Social Psychology, 90*, 334–349. doi 10.1037/0022-3514.90.2.334

Trzesniewski, K. H., Donnellan, M. B., & Robins, R. W. (2003). Stability of self-esteem across the life span. *Journal of Personality and Social Psychology, 84*, 205–220. doi 10.1037/0022-3514.84.1.205

Twenge, J. M., & Campbell, W. K. (2001). Age and birth cohort differences in self-esteem: A cross-temporal meta-analysis. *Personality and Social Psychology Review, 5*, 321–344. doi 10.1207/s15327957pspr0504_3

Wagner, J., Gerstorf, D., Hoppmann, C., & Luszcz, M. A. (2013). The nature and correlates of self-esteem trajectories in late life. *Journal of Personality and Social Psychology, 105*, 139–153. doi 10.1037/a0032279

Wagner, J., Lang, F. R., Neyer, F. J., & Wagner, G. G. (2014). Self-esteem across adulthood: The role of resources. *European Journal of Ageing, 11*, 109–119. doi 10.1007/s10433-013-0299-z

Wagner, J., Lüdtke, O., & Trautwein, U. (2015). Self-esteem is mostly stable across young adulthood: Evidence from latent STARTS models. *Journal of Personality, Advance online publication*. doi 10.1111/jopy.12178

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063–1070. doi 10.1037/0022-3514.54.6.1063

Webb, E., Blane, D., McMunn, A., & Netuveli, G. (2011). Proximal predictors of change in quality of life at older ages. *Journal of Epidemiology and Community Health, 65*, 542–547. doi 10.1136/jech.2009.101758

Wilt, J., Noftle, E. E., Fleeson, W., & Spain, J. S. (2012). The dynamic role of personality states in mediating the relationship between extraversion and positive affect. *Journal of Personality, 80*, 1205–1236. doi 10.1111/j.1467-6494.2011.00756.x

Zakoscielna, K. M., & Parmelee, P. A. (2013). Pain variability and its predictors in older adults: Depression, cognition, functional status, health, and pain. *Journal of Aging and Health, 25*, 1329–1339. doi 10.1177/0898264313504457

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

Zeger, S. L., Irizarry, R., & Peng, R. D. (2006). On time series analysis of public health and biomedical data. *Annual Review of Public Health, 27*, 57–79. doi 10.1146/annurev.publhealth.26.021304.144517

Zuckerman, M. (1983). The distinction between trait and state scales is not arbitrary: Comment on Allen and Potkay's "On the arbitrary distinction between traits and states." *Journal of Personality and Social Psychology, 44*, 1083–1086. doi 10.1037/0022-3514.44.5.1083

Manuscript received: 26.01.2016
Manuscript accepted after revision: 30.06.2016

Helena Chui
School of Psychology
Australian Catholic University
Strathfield Campus (Mount St. Mary's)
Locked Bag 2002
Strathfield NSW 2135
Australia
Helena.Chui@acu.edu.au

