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How Do Negative Self-Perceptions of Aging Become a Self-Fulfilling Prophecy?

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Recent studies have provided considerable evidence on long-term effects of self-perceptions of aging (SPA) on indicators of successful aging such as health or life satisfaction. To date, little is known about the mechanisms underlying these effects. This study therefore examined whether negative SPA impair the use of self-regulation strategies that include selection, optimization, and compensation (SOC) in case of a serious health event and thus turn into self-fulfilling prophecies for health and life satisfaction. Based on a longitudinal nationwide study with 2 measurement points over a 6-month period in 309 older people (65+ years of age) with multiple illnesses, 2 major findings emerged: First, the occurrence of a serious health event predicted increased use of SOC strategies, which in turn predicted higher self-rated health and life satisfaction. Second, this effect was moderated by negative SPA, that is, in case of a serious health event, the perception that aging is associated with physical losses led to lower use of SOC strategies promoting a healthy lifestyle ($B = -0.43$, $SE = 0.15$, $p < .01$). These findings contribute to a better understanding of the underlying mechanisms of SPA on health by showing that negative SPA as associated with physical losses might impair health-related strategies that are important for maintaining a healthy lifestyle. Future intervention studies could attempt to challenge negative SPA to support effective strategy use in older adults with serious illnesses.

Keywords: self-perceptions of aging, health, self-regulation, life satisfaction, moderated mediation

Aging is intrinsically tied to physiological changes, which also include a worsening of health. Can this process be accelerated or decelerated by how we perceive our own aging process (self-perceptions of aging)? In recent years, a growing body of research has examined this intriguing question. Self-perceptions of aging (SPA) have been found to predict mortality (Kotter-Grühn, Kleinspehn-Ammerlahn, Gerstdorf, & Smith, 2009; Levy & Myers, 2005; Levy, Slade, Kasl, & Kunkel, 2002; Maier & Smith, 1999), physical health (Wurm, Tesch-Römer, & Tomasik, 2007), physical functioning (Levy, Slade, & Kasl, 2002; Sargent-Cox, Anstey, & Luszcz, 2012), and self-rated health, as well as life satisfaction (Wurm, Tomasik, & Tesch-Römer, 2008). These studies suggest that positive SPA promote health, well-being, and longevity, and negative SPA seem to have detrimental effects. Most of these studies examined unidimensional measures of SPA, but this is currently being complemented by studies examining domain-specific SPA (e.g., the perception that one's own aging is strongly associated with physical losses; Steverink, Westerhof, Bode, & Dittmann-Kohli, 2001; Wurm et al., 2007). However, we still know little about the pathways that link SPA to health and other indicators of successful aging. In this study, we proposed that the use of self-regulation strategies is a psychological pathway that explains how self-perceptions of one's own aging as being associated with physical losses contribute to a downward spiral of health and life satisfaction in older adults with severe illnesses.

SPA and Health Change

SPA are a conglomerate of societal age stereotypes as well as individual expectations and experiences (Levy, 2003). Although it is obvious that positive and negative SPA depend on individual health status, several studies suggest that the impact of SPA on health is stronger than the impact of health on SPA (Sargent-Cox et al., 2012; Wurm et al., 2007). This means that SPA are less a result of health changes but rather drive changes in health and can result in self-fulfilling prophecies: Positive and negative expectations can evoke cognitive and behavioral processes, which in turn

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can make the expectation true (Jussim, Palumbo, Chatman, Madon, & Smith, 2000). Three pathways are discussed in this context: physiological processes (Levy, Hausdorff, Hencke, & Wei, 2000), behavioral pathways (Levy & Myers, 2004; Sarkisian, Prohaska, Wong, Hirsch, & Mangione, 2005; Wurm, Tomasik, & Tesch-Römer, 2010), and psychological mechanisms (Levy, Slade, & Kasl, 2002). Experimental studies on age stereotypes suggest that these can have temporary physical and cognitive effects (for an overview, see Hess, 2006; Levy, 2003). However, we still know relatively little about psychological mechanisms explaining how SPA operate over a longer time span. So far, only two longitudinal studies have addressed psychological pathways. One study showed that perceived control partially mediated the relationship between SPA and functional health (Levy, Slade, & Kasl, 2002), and the other identified will to live as a partial mediator in the relationship between SPA and longevity (Levy, Slade, Kasl, & Kunkel, 2002).

Our study adds to these previous studies by examining the role of SPA for the adaptive use of the life-management strategies selection, optimization, and compensation (SOC; Baltes & Baltes, 1990). We examined whether SPA have a varyingly strong impact on SOC strategy use dependent on whether or not a serious health event (SHE) occurred and its consequences for indicators of successful aging. In addition, whereas the majority of previous longitudinal studies looked at general SPA (i.e., across different life domains; Lawton, 1975), the present study helps to disentangle this question by examining domain-specific SPA that focus on aging as being associated with physical losses.

SHEs and the Use of SOC Strategies

Becoming older is accompanied by increases in the likelihood of suffering from more chronic illnesses in general, but also of experiencing health events such as a new diagnosis of a severe illness (e.g., cancer; Yancik, 2005). Moreover, older adults are more likely to experience acute health events such as falls and fractures (Fried, 2000). With increasing health-related losses, the question of how older people can age successfully becomes more and more relevant (e.g., Rowe & Kahn, 1997). Many studies in this context operationalize successful aging as life satisfaction, subjective appraisal of well-being, and a delayed onset of disability (e.g., Baltes & Carstensen, 1996). One of the most prominent theories in this context is the metatheory of selection, optimization, and compensation (Baltes & Baltes, 1990). According to this framework, successful aging is a process encompassing three strategies of self-regulation: selection, optimization, and compensation. *Selection* refers to the assumption that development is associated with a specific set of goals. *Elective selection* refers to the process of setting goals and directing resources toward the achievement of those goals, and *loss-based selection* describes a strategy that incorporates an adjustment of goals or a rearrangement of the goal hierarchy in response to losses of goal-relevant resources. *Optimization* describes processes of goal pursuit such as the investment of time and effort to reach a goal, and *compensation* refers to the use of alternative means to counteract losses in order to maintain the original goal. The three components are closely intertwined, and the SOC strategies are therefore considered an integrated ensemble (Freund & Baltes, 2000).

A number of studies have examined the effects of SOC strategies in different domains. They point to a high importance of SOC strategy use for health behavior (Reuter et al., 2010; Ziegelmann, Lippke, & Schwarzer, 2006) and adaptation to disability (Gignac, Cott, & Badley, 2002), as well as for well-being in older adults (Jopp & Smith, 2006). These findings suggest that using SOC strategies is an adaptive response to health declines and thus might serve as a mediator in the relation of SHEs and successful aging.

Negative SPA Might Impede the Use of SOC Strategies

Due to the fact that aging is associated with physiological changes and a worsening of health, the distinction between health changes due to illnesses or due to aging becomes more difficult with age (Levy, Ashman, & Slade, 2009). One facet of negative SPA is the tendency to attribute these physical losses more to the process of aging than to occurring illnesses. Sarkisian, Hays, and Mangione (2002) showed that most people age 65 or older regarded having less energy and becoming more dependent on others as normative changes in age. Sometimes, even specific illnesses are perceived as caused by the aging process rather than by other factors (such as unhealthy behavior, genetics): It has been shown that illnesses such as arthritis, stroke, or even heart attacks are often considered as caused by aging (Keller, Leventhal, Prohaska, & Leventhal, 1989).

Several other studies have also shown that these negative SPA are associated with less adaptive psychological outcomes: Older adults with a higher propensity to attribute symptoms and illnesses to aging experience lower control over diseases and show more passive coping compared with older adults who attribute health problems to other causes (Gump et al., 2001; Keller et al., 1989; Prohaska, Keller, Leventhal, & Leventhal, 1987). Moreover, such negative SPA are associated with lower levels of health behaviors and worse health (e.g., Goodwin, Black, & Satish, 1999; Leventhal & Prohaska, 1986; Levy et al., 2009; Sarkisian et al., 2002). A recent study demonstrated that older adults who were affected by a serious illness and attributed this illness to "old age" rather than to other causes not only perceived more symptoms and showed less healthy behavior, but also had a twofold likelihood risk of dying within the study period of 2 years (Stewart, Chipperfield, Perry, & Weiner, 2012).

Taken together, these studies suggest that if people perceive aging as causing illnesses, they also perceive these illnesses as less curable, less preventable, and less controllable. Earlier studies suggested this effect particularly for mild symptoms (e.g., Prohaska et al., 1987), and more recent studies found this effect also in serious illnesses and disabilities (e.g., Sarkisian, Liu, Ensrud, Stone, & Mangione, 2001; Stewart et al., 2012). This age–illness heuristic is based on self-regulation theories assuming that "experiential changes would affect self-perceptions, and that these self-perceptions would influence perceptions of vulnerability to specific health threats, shaping behavioral strategies for maintaining health" (Aldwin, Park, & Spiro, 2007, p. 356). Accordingly, it is possible that SPA might determine the differential use of self-regulation strategies. Thus, negative perceptions that aging is strongly associated with physical losses might substantially impair the use of SOC strategies in the case of an SHE, whereas they might have less of a detrimental effect for those without such an event.

The present study goes beyond previous studies in three respects. First, by examining whether SPA shape the use of health behavior-related SOC strategies following an SHE, we determined whether people who have experienced an SHE and who have more negative SPA tend to use less adaptive SOC strategies than those with more positive views on aging. Second, we examined whether this would be additionally associated with an adverse impact on successful aging (e.g., life satisfaction), as several studies have pointed to a long-term impact of SPA on physical functioning, self-rated health, and life satisfaction (e.g., Levy, Slade, & Kasl, 2002; Sargent-Cox et al., 2012; Wurm et al., 2008). Third, our study extends this research by investigating whether or not the impact of negative SPA on health and life satisfaction depends on the occurrence of an SHE.

Hypotheses

The present study therefore examined a potential mechanism—the use of SOC strategies for leading a healthy lifestyle—that might help explain the effects of SPA on health and would help in unveiling how SPA can turn into self-fulfilling prophecies (Levy & Leifheit-Limson, 2009). This mechanism would imply that older people who experience serious health deterioration and have negative SPA invest less effort in maintaining a healthy lifestyle than those with less negative SPA and consequently have lower values on indicators of successful aging.

In particular, we focused on three hypotheses as opposed to the null hypothesis that there would be no differential impact of SPA as a function of experiencing SHEs:

Hypothesis 1: We expected that negative SPA would moderate the relationship between SHEs and SOC strategy use. That is, in the case of an SHE, we expected a higher increase in the use of SOC strategies by individuals who less strongly associate their own aging with physical losses, and a comparably smaller increase (or decrease) in the use of SOC strategies by individuals who more strongly associate their own aging with physical losses (moderation pathway; see Figure 1a, Path a_3).

Hypothesis 2: Second, we expected that negative SPA after an SHE would be associated with lower physical functioning, self-rated health, and life satisfaction via the use of SOC strategies (moderated mediation; see Figure 1b, Paths $a_3 \rightarrow b_1$).

Hypothesis 3: Finally, we expected that negative SPA also would be directly associated with lower physical functioning, self-rated health, and life satisfaction (see Figure 1b, Path c_2).

Method

Participants and Procedure

The present study was an add-on study to the German Ageing Survey (DEAS; Motel-Klingebiel, Wurm, & Tesch-Römer, 2010), a population-based representative survey of adults ages 40 to 85 years. Whereas the DEAS recruits a new population-based representative sample every 6 years (in 2008, for the third time with a total $N = 6{,}204$), this add-on study examined short-term health changes in older people with multiple illnesses. Thus, participants were considered eligible for this side study if they were (a) 65 years of age or older ($n = 2{,}728$), (b) suffered from at least two conditions mentioned in either the Charlson Comorbidity Index (Charlson, Szatrowski, Peterson, & Gold, 1994) or the Functional Comorbidity Index (Groll, To, Bombardier, & Wright, 2005; $n = 644$),[1] and (c) had provided explicit consent to be contacted for further studies ($n = 443$).[2] Of the 433 eligible participants, 61 (13.8%) could not be reached by telephone after several attempts, 24 (5.4%) were in inpatient care, and 49 (11.1%) declined to participate. This left 309 (69.7%) participants who gave informed consent for this study and made an appointment for the first point of measurement (Time 1 [T1], March 2009). Participants were visited in their homes by trained interviewers and completed a 30-min personal interview and completed a questionnaire, which they returned in a prepaid return envelope. Six months later, participants were visited for a second personal interview and completed a second questionnaire, which was completed by 271 participants (87.7% of the initial sample). Participants who did not

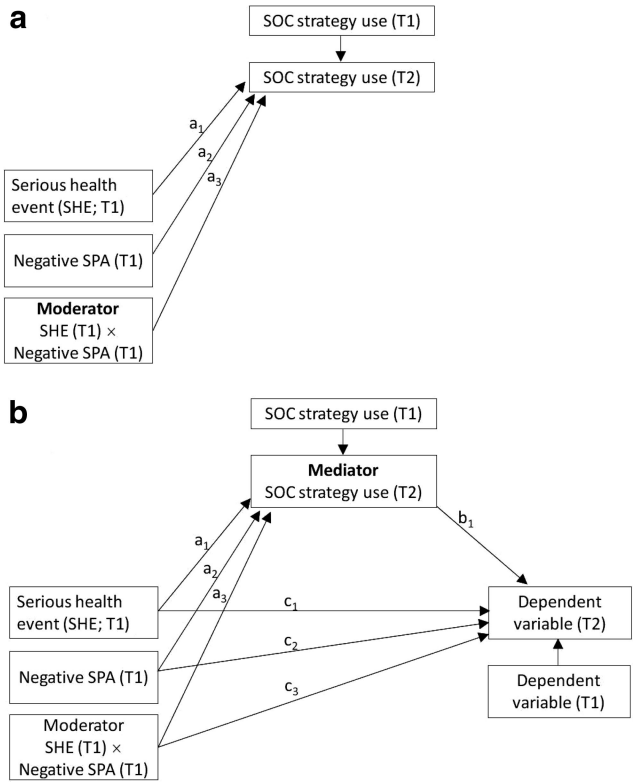

Figure 1. Basic models for the (a) assumed moderation and (b) moderated mediation. Serious health events (SHEs) were assessed at Time 1 (T1) and refer to events that occurred within the 6 months before T1. Figure b is based on Model 2 in Preacher et al. (2007). SOC = selection, optimization, and compensation; SPA = self-perceptions of aging. Dependent variables: physical functioning, self-rated health, and life satisfaction.

[1] These illnesses include frequent conditions in older adults such as peripheral vascular disease, congestive heart failure, chronic lung diseases (Charlson Comorbidity Index), and arthritis, osteoporosis, depression, anxiety, and diabetes (Functional Comorbidity Index).

[2] Ethical approval was obtained from the appropriate organization (German Psychological Society, SW.012009).

return the questionnaire within 2 weeks of each measurement point received one postal reminder. In the target group of elderly individuals with multiple illnesses, both acute events and substantial changes in health status are more likely to occur in relatively short time periods than in healthier populations (e.g., Miller & Weissert, 2000).

Measures

SHEs during the past 6 months were assessed by asking participants, "Have you had a serious illness or an accident since the last interview?" This one-item measure was validated in a previous study (Wurm et al., 2008). The time reference "last interview" refers to the initial interview conducted in 2008. Because data assessment in 2008 extended over an 8-month period, we considered only those SHEs that occurred within the past 6 months before the first interview (T1) in 2009 in order to harmonize the time reference for all participants.[3] To ensure that SPA were consistently based on an appraisal after an SHE had happened, we considered only those health events that occurred before T1.

SOC strategies for leading a healthy lifestyle were assessed using a scale developed from the original generic SOC questionnaire (Freund & Baltes, 2002) by Reuter et al. (2010). The scale consists of four items answered on a 4-point scale ranging from *completely disagree* to *completely agree*: "Concerning my healthy lifestyle, I have defined my goals exactly and stick to them" (elective selection), "Concerning my healthy lifestyle, I do everything possible to make my plans to lead a healthy lifestyle come true" (optimization), "When it is getting more difficult to lead a healthy lifestyle, I only strive for my most important health goal" (loss-based selection), and "When it is getting more difficult to lead a healthy lifestyle, I increase my efforts even more" (compensation). In line with the SOC theory that considers SOC as a dynamic system that operates as an integrated ensemble, the scale shows satisfying internal consistency (Cronbach's alpha = .84), with higher scores indicating higher efforts in leading a healthy lifestyle.

Negative SPA were measured with a scale that refers to the view of aging as associated with physical losses (Steverink et al. 2001). The scale consists of four items (e.g., "Aging means to me that I am less healthy," "Aging means to me that I am less energetic and fit") with a 4-point response format (Cronbach's alpha = .77), with higher scores indicating more negative SPA.

Self-rated health (SRH) was measured with a single item asking "How would you rate your health at the present time?" that was answered with a 5-point scale from *very bad* to *very good*. This one-item measure is one of the most frequently used (Fayers & Sprangers, 2002) and has been shown to be an important predictor of functional health and longevity (Benyamini & Idler, 1999; Idler & Benyamini, 1997; Idler & Kasl, 1995).

Physical functioning (PF) was assessed with the 10-item Physical Functioning subscale of the SF-36 (Bullinger & Kirchberger, 1998; Ware & Sherbourne, 1992). The degree of limitation in activities such as lifting or carrying groceries, bending, kneeling, walking, bathing, dressing, and so forth was rated on a 3-point scale from 1 (*severely limited*) to 3 (*not limited at all*). Answers were transformed into a standardized score ranging from 0 to 100 according to the SF-36 manual. Higher scores indicate better PF (Cronbach's $\alpha_{T1} = .92$, $\alpha_{T2} = .94$).

Life satisfaction (LS) was assessed with the Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffin, 1985). This scale consists of five items with a 5-point response format. It has been used in numerous studies (for an overview, see Pavot & Diener, 1993) and forms a reliable and change-sensitive indicator of general satisfaction with life (Cronbach's alphas both at T1 and T2 = .79).

Age, sex, and educational status approximated with the International Standard Classification of Education (UNESCO, 1997), as well as the number of illnesses participants suffered from based on a list of 23 conditions informed by the Charlson Comorbidity Index (Charlson et al., 1994) and the Functional Comorbidity Index (Groll et al., 2005) were used as covariates in all analyses. In addition, SHEs between T1 and T2 were tested as further possible confounders to examine whether the findings remained stable if these more recent SHEs were considered as well. In total, 34 people (12.3%) reported an SHE between T1 and T2. For the sake of clarity (i.e., differentiation between the two SHE variables), the effects of this covariate are not reported in the tables and figures.

Data Analyses

All descriptive and preliminary analyses were conducted using SPSS 18.0. Mplus Version 6.11 (Muthén & Muthén, 1998/2012) was used to estimate a moderated mediation model. Full information maximum likelihood estimation (Arbuckle, 1996) was used to model missing data, which makes use of all available data in model estimation. Conventional tests of significance can be problematic for indirect effects because, in this case, the product of two regression coefficients is part of the significance test. The indirect effect was therefore tested by bias-corrected bootstrapping procedures with 10,000 bootstrap samples to estimate a total mediated effect and to compute a 95% confidence interval for this effect (Preacher, Rucker, & Hayes, 2007). A further advantage is that bootstrapping makes no assumptions about the shape of the sampling distribution of the statistic when conducting inferential tests. All predictors were grand-mean centered (Aiken & West, 1991).

Dropout Analyses

Participants dropping out between T1 and T2 were examined for significant differences in baseline variables. Dropouts indicated significantly better SRH ($p < .001$), but no significant differences on any of the other study variables.

Results

Sample Characteristics

Descriptive statistics can be found in Table 1. On average, participants were 73.27 years old ($SD = 5.1$), and 41.7% were women. Overall, 47 of the respondents (15.2%) reported a serious illness ($n = 36$, 76.6%) or a serious accident ($n = 11$, 23.4%) in the past 6 months prior to the first interview. If an SHE had

[3] We did, however, additionally conduct the analyses with all SHEs, that is, without harmonizing the time reference. Because the findings remained the same, we decided to report only on the harmonized indicator.

Table 1
Means, Standard Deviations, Ranges, and Intercorrelations of Study Variables

Variable	*M* or %	*SD*	Range	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age (T1)[a]	73.27	5.10	65–85													
2. Sex (2 = female, T1)	41.7%	—	1–2	−.09												
3. Education[b]	2.23	0.66	1–3	−.07	−.41**											
4. No. of illnesses (T1)	4.18	2.15	0–19	.16**	.02	−.15*										
5. SHE (1 = yes, T1)	15.2%	—	0–1	.02	.04	−.09	.11									
6. Negative SPA (T1)	2.92	0.59	1–4	.16**	.15*	−.17**	.30**	.04								
7. SOC (T1)	3.07	0.64	1–4	−.06	.09	−.05	.00	−.05	.04							
8. SOC (T2)	3.07	0.60	1–4	−.02	−.06	.02	−.12	−.06	−.13*	.54*						
9. PF (T1)	77.12	24.1	0–100	−.28**	−.19**	.28**	−.44**	−.13*	−.51*	−.02	.16*					
10. PF (T2)	77.45	25.8	0–100	−.21**	−.21**	.26**	−.51**	−.12	−.52**	−.01	.17*	.84*				
11. SRH (T1)	3.36	0.80	1–5	−.03	−.03	.11*	−.33**	−.16**	−.40**	−.02	.07	.50**	.47**			
12. SRH (T2)	3.47	0.76	1–5	−.13*	−.13*	.18**	−.38**	−.15*	−.39**	.07	.23**	.44**	.50**	.56**		
13. LS (T1)	2.92	0.64	1–5	.03	.03	.06	−.27**	.00	−.10	.24**	.25**	.17**	.19**	.18**	.25**	
14. LS (T2)	2.91	0.64	1–5	−.03	−.03	.08	−.25**	−.12*	−.20**	.25**	.38**	.24**	.31**	.27**	.38**	.68**

Note. SHE = serious health event in the past 6 months before the T1; SPA = self-perceptions of aging; SOC = selection, optimization, and compensation; PF = physical functioning; SRH = self-rated health; LS = life satisfaction.
[a] Majority (98%, $n = 302$) was retired; 7 mentioned other reasons for not working (mostly, they have never had a main job). [b] Education was assessed at the 2008 interview.
* $p < .05$. ** $p < .01$.

occurred, we additionally asked the participants to name the illness or accident (open response format). The most frequently mentioned incidents were serious falls, serious lung diseases (e.g., pneumonia, chronic obstructive pulmonary disease), and cancer.

Preliminary Regression Analyses

In preliminary analyses, we first tested whether SHE predicted PF, SRH, and LS at follow-up (see Figure 1, Path c_1). In this first series of regression analyses, SHE significantly predicted LS at T2 ($B = -0.16$, $SE = 0.09$, $p < .05$, adjusted for LS at T1 and covariates; cf. Table 2), but did not predict PF ($B = -1.03$, $SE = 2.44$, $p > .05$) or SRH at T2 ($B = -0.08$, $SE = 0.11$, $p > .05$; adjusted for PF and SRH at T1, respectively). This means that SHEs were only partially able to predict the three dependent variables.

Hypothesis 1: Negative SPA as a Moderator

For the first hypothesis that negative SPA would moderate the relation between SHE and SOC strategy use, we initially tested whether negative SPA (see Figure 1a, Path a_2) at T1 were associated with a decrease in SOC strategy use at T2 (see Table 3, Model 1), which was significant ($B = -0.12$, $SE = 0.06$, $p < .05$). That is, people with less negative SPA were more likely to increase SOC strategy use. No covariate had a significant impact on SOC strategy use. To test whether negative SPA additionally work as a moderator (see Figure 1a, Path a_3), we added the interaction term SHE × Negative SPA in the second step. As expected, this interaction predicted SOC strategy use at T2 ($B = -0.43$, $SE = 0.15$, $p < .01$; see Table 3, Model 2). Figure 2 illustrates the moderator effect of negative SPA. Older adults who experienced SHEs generally increased their SOC strategy use compared with those without SHEs. However, and as expected, especially those with less negative SPA increased their SOC strategy use, which is in line with Hypothesis 1.

Next, Hypotheses 2 and 3 were tested in one step with a moderated mediation analysis (see Figure 1b). The dependent variables (PF, SRH, and LS) were regressed on the independent variable (SHE), the mediator (SOC), the moderator (negative SPA), and the interaction SHE × Negative SPA.

Table 2
Hierarchical Regression Analyses of Physical Functioning, Self-Rated Health, and Life Satisfaction on Serious Health Events

Predictor	Physical functioning (T2) *B* (*SE*)	Self-rated health (T2) *B* (*SE*)	Life satisfaction (T2) *B* (*SE*)
Dependent variable at T1	0.83 (0.04)**	0.47 (0.05)**	0.67 (0.05)**
Serious health event (T1)	−1.03 (2.44)	−0.08 (0.11)	−0.19 (0.08)*
Age (T1)	−0.13 (0.18)	0.00 (0.01)	0.00 (0.01)
Sex (T1)	−1.77 (1.96)	−0.14 (0.09)	−0.04 (0.07)
Education[a]	−0.45 (1.49)	0.03 (0.07)	−0.02 (0.05)
No. of illnesses (T1)	−1.72 (0.45)**	−0.07 (0.02)**	−0.02 (0.01)
R^2	.72	.36	.48

[a] Education was assessed at the 2008 interview.
* $p < .05$. ** $p < .01$.

Table 3
Hierarchical Regression Analyses of SOC Strategy Use on Serious Health Events, Negative SPA (Model 1), and Their Interaction (Model 2)

Predictor	SOC strategy (T2)	
	Model 1 *B* (*SE*)	Model 2 *B* (*SE*)
SOC (T1)	0.51 (0.05)**	0.49 (0.05)**
SHE (T1)	−0.06 (0.09)	−0.07 (0.09)
Negative SPA (T1)	−0.13 (0.06)*	−0.13 (0.06)*
SHE (T1) × Negative SPA (T1)		−0.42 (0.15)**
Age (T1)	0.00 (0.01)	0.00 (0.01)
Sex (T1)	−0.14 (0.07)	−0.13 (0.07)
Education[a]	−0.02 (0.05)	−0.02 (0.05)
No. of illnesses (T1)	−0.01 (0.02)	−0.02 (0.02)
R^2	.33	.35
ΔR^2		.02**

Note. SOC = selection, optimization, and compensation; SHE = serious health event in the past 6 months before the T1; SPA = self-perceptions of aging. Analyses controlled for SHE between T1 and T2.
[a] Education was assessed at the 2008 interview.
* $p < .05$. ** $p < .01$.

Hypothesis 2: SOC Strategies as a Mediator Between Negative SPA and Dependent Variables

The mediation path tested the second hypothesis that negative SPA after an SHE would be associated with lower PF, SRH, and LS at T2 via the use of SOC strategies (cf. Figure 1b, Paths $a_3 \rightarrow b_1$).

PF. Although negative SPA after an SHE were associated with a higher use of SOC strategies ($B = -0.41$, $SE = 0.20$, $p < .05$; see Figure 3a), the expected indirect effect of SPA after an SHE on PF via the use of SOC strategies at T2 was not significant and SOC strategy use was not associated with PF at T2 ($B = 0.86$, $SE = 1.52$, $p > .05$). Thus, the expected mediating pathway was not supported for PF.

SRH. In this model, an increase in SOC strategies was associated with better SRH, which is in line with Hypothesis 2 ($B = 0.20$, $SE = 0.06$, $p < .01$; see Figure 3b). Here, the indirect effect of negative SPA after an SHE on SRH was estimated to be significant ($B = 0.24$, $SE = 0.15$, 95% CI [0.031, 0.681]). This means that negative SPA after an SHE were associated with lower SRH via lower SOC strategy use.

LS. As for SRH, SOC strategy use was also associated with higher LS at follow-up ($B = 0.21$, $SE = 0.06$, $p < .001$; see Figure 3c). In line with the hypothesis, the indirect effect of SPA after an SHE on LS was significant ($B = 0.25$, $SE = 0.14$, 95% CI [0.045, 0.651]). Thus, negative SPA after an SHE were associated with lower LS via lower SOC strategy use.

Hypothesis 3: The Direct Impact of Negative SPA on Health and LS

Finally, we examined whether negative SPA (measured at T1) would not only moderate the pathway between SHE and SOC strategy use, but also would have direct effects on the three dependent variables (see Figure 1b, Path c_2).

PF. In line with the hypothesis, negative SPA at T1 predicted lower PF at T2 ($B = -5.38$, $SE = 2.11$, $p < .05$; T2 measures were controlled for the baseline; see Figure 1).

SRH. Negative SPA were associated with lower SRH at T2 ($B = -0.17$, $SE = 0.08$, $p < .05$).

LS. In contrast to the hypothesis, negative SPA were not directly associated with lower LS at T2 ($B = -0.07$, $SE = 0.06$, $p > .05$). However, the interaction effect of SHE × Negative SPA significantly predicted LS at T2 ($B = -0.33$, $SE = 0.12$, $p < .001$), which means that people who experienced an SHE and had more negative SPA reported lower LS at T2.

Discussion

The effect of SPA on health and other indicators of successful aging has attracted a lot of research interest in recent years. However, to date, little attention has been paid to the potential underlying mechanisms (Sargent-Cox et al., 2012). Our study therefore proposed that the use of SOC strategies (Baltes & Baltes, 1992) for leading a healthy lifestyle can be one underlying mechanism explaining the effects of SPA on health and well-being.

In line with our first hypothesis, the results indicate that the negative perception of one's own aging process as being associated with physical losses serves as moderator in the relation between SHEs and SOC strategy use. Older adults who experienced an SHE responded by using more or less SOC strategies depending on their view on their aging process: Individuals who associated their aging less with physical losses increased their efforts of maintaining a healthy lifestyle compared with those who more strongly associated their own aging with physical losses.

Based on moderated mediation analyses, the findings suggest that SOC strategy use serves as a mediator between negative SPA after an SHE and SRH and between negative SPA after an SHE and LS, whereas no moderated mediation was found for PF. This nonsignificant finding for PF might be partially due to low changes in PF over the 6-month period (see Figure 3a). Finally, negative

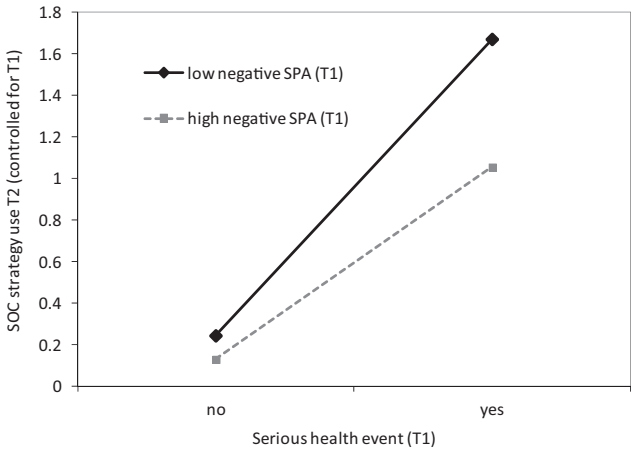

Figure 2. Interaction between the occurrence of a serious health event (in the past 6 months before the T1 interview) and the use of selection, optimization, and compensation (SOC) strategies as moderated by negative self-perceptions of aging (SPA; two-way interaction). Low and high negative SPA = 1 *SD* above and below mean, respectively.

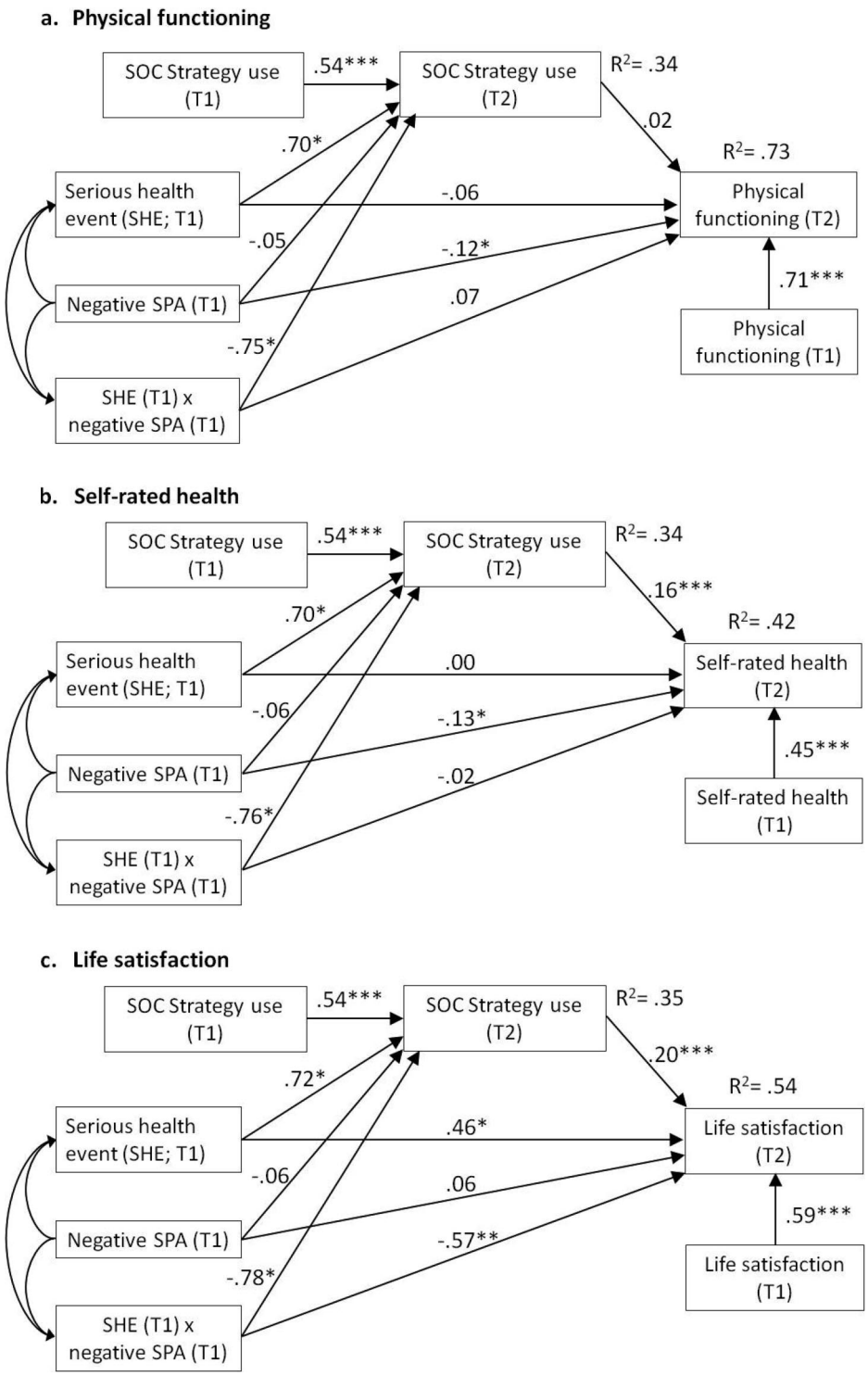

Figure 3. The role of negative self-perceptions of aging (SPA) as a moderator of the mediation pathway from a serious health event (SHE) to physical functioning, self-rated health, and life satisfaction via the use of selection, optimization, and compensation (SOC) strategies (moderated mediation). Values represent standardized path estimates. SHEs were assessed at Time 1 (T1) and refer to events that occurred in the 6 months before T1. The impact of SHE on life satisfaction is inverted ($\beta = .46$, $p < .05$) because of a suppressor effect. All analyses controlled for age, sex, educational status, the number of illnesses, and SHE between T1 and T2; $^{*}\ p < .05$. $^{***}\ p < .01$.

SPA were not only associated with lower SOC strategy use, but also with lower PF and SRH. This supports our third hypothesis and is in line with previous studies by showing that negative SPA are not only detrimental to those people who experience SHEs but also to others.

Whereas negative SPA were associated with PF, SRH, and LS, experiencing an SHE had only little direct impact on these three dependent variables. This may be due to the fact that the event lagged up to 6 months behind so that major changes in health and well-being already happened before the T1 interview.

A Possible Pathway of How Negative SPA Can Become Self-Fulfilling

Together, the findings suggest a possible psychological pathway of how negative SPA can turn into a self-fulfilling prophecy: Individuals with more negative SPA experiencing an SHE employed less adaptive strategies (in the form of SOC strategies for leading a healthy lifestyle) than those with more positive SPA. This differential use of SOC strategies was in turn associated with SRH and LS over time. The consequences of SRH and LS for health and longevity are well documented (e.g., Benyamini & Idler, 1999; Wiest, Schüz, Webster, & Wurm, 2011). Thus, our findings suggest that the onset of a severe disease or injury paired with negative SPA might lead to a downward spiral because of lower utilization of SOC strategies for leading a healthy lifestyle, lower SRH, and lower well-being, which in turn might increase the likelihood for further health deteriorations. Potentially, negative SPA can become "self-fulfilling" irrespective of whether they are based on a false or correct conception because they imply that a person explains a worsening of health by a perceived internal, stable, and global cause, namely aging. The detrimental effect of such an explanatory style on coping and health has been demonstrated in previous studies (e.g., Peterson & Seligman, 1987; Scheier & Carver, 1987). In this context, the findings of a clinical study on older people with acute myocardial infarction are insightful (Levy, Slade, May, & Caracciolo, 2006): Here, positive age stereotypes contributed to better physical recovery (i.e., higher PF) over a 7-month period, mediated by the patient's recovery expectations.

Self-Perception of Own Aging as Associated With Physical Losses

Most previous studies examined the importance of SPA for health behavior, health, and longevity by examining general attitudes toward own aging, whereas only a few studies focused on the domain-specific, negative SPA as strongly associated with physical losses (Steverink et al., 2001; Wurm et al., 2007). Our study is the first to examine pathways underlying the effects of this negative SPA on health and well-being. Our results indicate that negative SPA are not only detrimental for health and well-being per se, but that they are especially disadvantageous in the face of SHEs. The findings suggest that if those people who expect that aging is associated with physical losses experience real physical losses, they use fewer SOC strategies for leading a healthy lifestyle, which in turn predicts worse health. Our findings are in line with studies on illness representations showing that older adults who attribute illnesses to old age (rather than to other causes) are less likely to change their health behavior and have worse health outcomes (Gump et al., 2001; Stewart et al., 2012). Finally, it is notable that negative SPA did not have a protective buffer effect on LS following an SHE. It could have been assumed that older adults who strongly associate aging with physical losses are better able to manage the deterioration of health because they are prepared for illnesses as an inevitable part of aging; however, the findings do not support this assumption.

Limitations and Strength

A strength of our study is that we longitudinally examined older adults with multiple illnesses outside of a clinical setting, which allowed a comparison of older adults who experienced an SHE and older adults who did not. The sample was drawn from the nationwide representative study of the DEAS (Motel-Klingebiel et al., 2010), which is representative of community-dwelling older adults in Germany, but not of older adults in care institutions. Surveys with noninstitutionalized individuals are often positively selected. However, in the present study, only older adults with at least two chronic conditions mentioned in either the Charlson Comorbidity Index (Charlson et al., 1994) or the Functional Comorbidity Index (Groll et al., 2005) were included. Nevertheless, it is likely that especially those adults who experienced very serious or life-threatening health events were not able to participate. Provided that the sample might be biased in favor of healthier people, the significant differences between those older adults with and without an SHE are nevertheless remarkable because the health bias rather weakened than amplified the effect. Another limitation refers to the relatively small number of people who experienced an SHE, which did not allow for analyses of whether different types of events (e.g., acute or chronic, accidents or illnesses) vary in their importance for the outcomes. A further consideration relates to the limitation of examining only the impact of negative SPA on SOC strategies for leading a healthy lifestyle, but not on real health behavior. However, this was hardly feasible in a study of older adults who had experienced SHEs a relatively short time before, who might need physical recovery before health behavior change is achievable. Furthermore, behavioral recommendations differ according to medical recommendations and the type of health events encountered. Finally, data on changes in SOC strategy use, health, and LS referred to the same points of measurement; thus, the causal mechanisms of these variables are hard to disentangle. However, previous studies (e.g., Jopp & Smith, 2006; Reuter et al., 2010) suggest that the assumption that SOC strategy use can predict health and LS is tenable. A major limitation of self-reported data is common method variance, which might have biased the observed relations between variables. Podsakoff, MacKenzie, Lee, and Podsakoff (2003) discuss several possibilities for avoiding or controlling common method variance effects. The design of our study reduces this bias because SHE and SRH were measured via interviews, whereas the other variables were assessed via questionnaires. In addition, more concrete variables (i.e., health, LS, and SHE) are known to be less biased than abstract variables (i.e., SOC and SPA; cf. Cote & Buckley, 1987). According to Podsakoff et al., the best strategy to control for common method variance would be to include a method factor in structural equation modeling; however, both the sample size and

complexity of the mediation–moderation model led us to refrain from using this approach.

Conclusion

The findings have shown one possible pathway for how negative SPA as associated with physical losses could become a self-fulfilling prophecy. Our study suggests that SOC strategies for leading a healthy lifestyle might play an important role in this context, especially when an SHE occurs. The findings suggest that interventions to support older adults after negative health events should address negative expectations of aging and communicate both positive views on aging and the fact that even in very old age, individuals will profit from health behavior changes. First promising steps in this direction have been done (Bardach, Gayer, Clinkinbeard, Zanjani, & Watkins, 2010; Sarkisian, Prohaska, Davis, & Weiner, 2007) and should be extended in the future.

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