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Self-Perceptions of Aging Predict Adjustment During the COVID-19 Pandemic

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Individuals faced extraordinary challenges during the COVID-19 pandemic. However, psychosocial strengths may promote individuals' adjustment during times of challenge. Positive self-perceptions of aging (SPA) have been found to predict a variety of health and well-being indicators outside the context of the pandemic. In the present study, we examined SPA (measured prior to the pandemic) as a prospective predictor of COVID-19-related behavior, adaptation, and functioning in a sample of 3,620 adults (M_{age} = 65.88; 61.1% women; 65.4% White) from the 2016 to 2020 waves of the Health and Retirement Study. Linear regressions revealed that more positive SPA in 2016 were associated with a higher likelihood of socially distanced behavior ($\beta = .07$, $p < .001$), less worry ($\beta = -.27$, $p < .001$), less stress ($\beta = -.24$, $p < .001$), less loneliness ($\beta = -.27$, $p < .001$), and greater positive functioning ($\beta = .20$, $p < .001$) during the first year of the pandemic (2020). Confounding variables explained SPA's associations with preventive behavior and (to an extent) socially distanced behavior. Findings support SPA theories, suggesting linkages between SPA and flexible, adaptive behaviors and outcomes in the face of external challenges.

Public Significance Statement
The present study sheds light on positive self-perceptions of aging as potential pathways for supporting healthy behavior and functioning in response to the health and well-being challenges posed by the COVID-19 pandemic. Findings highlight the importance of positive self-perceptions of aging as protective resources in the context of challenges, and emphasize the value of policy to support positive views of aging and address the impact of societal ageism.

Keywords: attitudes toward own aging, health behavior, views of aging, COVID-19, Health and Retirement Study

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Self-perceptions of aging (SPA) have been identified as important predictors of health and well-being as individuals grow older. A growing body of literature demonstrates that positive SPA are associated with a higher likelihood of engaging in preventive health behaviors (E. S. Kim et al., 2014; Levy & Myers, 2004; Nakamura et al., 2022) and a lower likelihood of engaging in risky health behaviors (Hooker et al., 2019), and may even buffer against the negative effects of stress (Levy et al., 2016; Witzel et al., 2022). Much of the research on SPA examines linkages with health and well-being outcomes in the context of everyday lifestyle behaviors (e.g., physical activity, smoking) or specific personal health decisions and experiences (e.g., seeking preventive health care, experiencing a cardiovascular event). But what role might SPA play in the context of broader societal challenges and public health

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A data use agreement prevents the authors from sharing Health and Retirement Study (HRS) data publicly, but the data set can be requested from William J. Chopik or downloaded from the HRS website. A copy of the syntax and a list of measures from the psychosocial module of HRS is provided at the Open Science Framework site for this project: https://osf.io/yb8j9/; see Giasson et al. (2024), for more details. This project was not preregistered. Results from this project were presented at the Annual Scientific Meeting of the Gerontological Society of America. The presentation abstract appeared in Giasson et al. (2022).

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threats, like the COVID-19 pandemic? The present study examined whether SPA, measured prior to the pandemic, predicted COVID-19-related behavior, adaptation, and functioning among middle-aged and older adults in the early months of the COVID-19 pandemic (Spring/Summer 2020).

Self-Perceptions of Aging and Health Behavior, Well-Being, and Functioning

Associations between SPA and late-life health have been demonstrated in cross-sectional, longitudinal, and experimental studies, and in large nationally representative U.S. and international samples (e.g., Chang et al., 2020; Westerhof et al., 2014). A key mechanism through which SPA are thought to influence health is via health-related behaviors. According to age stereotype embodiment theory (Levy, 2009), positive and negative SPA stem from internalized positive and negative age stereotypes that accumulate across the lifespan and can be primed by factors in the immediate context. Internalized negative stereotypes that portray poor health as an inevitable part of aging can lead to a sense of futility around practicing healthy behaviors (Levy, 2009). Individuals who hold a more positive view that it is possible to be healthy as they age may be more likely to engage in healthy lifestyle behaviors.

Indeed, SPA prospectively predict the likelihood of engaging in a number of preventive health behaviors, like eating a balanced diet, exercising, and following directions for taking prescription medications (Levy & Myers, 2004). They are also associated with using preventive health services, like going for cholesterol tests, mammograms, and prostate screenings (E. S. Kim et al., 2014). In studies of specific aspects of SPA, positive physical health-related aging expectations are associated with greater participation in strenuous sports and recreational activities (Meisner & Baker, 2013). More positive overall aging expectations (e.g., expectations of achievement and maintenance of health with age) are associated with a higher likelihood of going for regular physical exams (Meisner & Baker, 2013). On the flipside, lower positive SPA and higher negative SPA are associated with cancer-related risk behaviors (e.g., Hooker et al., 2019) and delays in seeking health services (Sun & Smith, 2017). Recent experimental research has also shown that antiageism messages designed to promote positive perceptions of aging can increase physical activity motivation among adults ages 72 and over (Menkin et al., 2022). This work suggests that perceptions of aging may play a causal role in predicting health behavior and outcomes.

In addition to health behavior, SPA were also associated with emotional well-being and functioning (i.e., positive health and emotional outcomes despite contexts that present challenges to maintaining these outcomes). Although older adults generally experience better mental health compared to younger adults (National Center for Health Statistics, 2020), negative perceptions of aging predict the onset and persistence of depression and anxiety (Freeman et al., 2016). Like the association between SPA and physical health, associations between SPA and emotional well-being might, in part, be related to beliefs about the importance or efficacy of taking steps to improve mental health. For example, older adults who attribute depression to "old age" rather than to illness (a negative perception of aging) are more likely to believe it is not important to discuss feeling depressed with a doctor (Sarkisian et al., 2003). Positive SPA, on the other hand, may be protective against the development of psychiatric conditions (Levy et al., 2019; Levy, Pilver, & Pietrzak, 2014) and act as a buffer against cumulative stress over time (Levy et al., 2016).

Self-Perceptions of Aging as a Protective Factor in the Unique Context of the COVID-19 Pandemic

Although there is robust evidence to suggest that more positive SPA are beneficial for health and well-being, much of this research has been conducted outside the context of a global pandemic—a time that introduced many challenges for maintaining health and well-being, particularly for middle-aged and older adults (Ayalon et al., 2021; Chen, 2020; Lebrasseur et al., 2021; Li & Mutchler, 2020; Morrow-Howell et al., 2020). In the early months of the pandemic, everyday routines and behaviors required adjustment, and the ability to rely on usual sources for support (e.g., family, friends, social connections, church groups, social networks) was limited. Suddenly, "practicing preventive healthy behavior" in this context looked very different from the health behaviors typically studied in the SPA literature—it meant being socially distanced and not venturing out (even for routine preventive health screenings), attending group exercise classes, or engaging in in-person social activities. In fact, during the pandemic, reducing transmission required doing the *opposite* of what is normally considered the "healthier" choice: During this time, the public was told that it was safer to socially distance than to go out and take part in physical or social activities with others. Adaptation to this new context of health and safety in everyday life was required.

Positive SPA have been found to be protective in the context of personal health-related events and experiences. For example, positive aging self-stereotypes (which may be internalized as positive SPA) predict better physical recovery after a life-threatening acute myocardial infarction (Levy et al., 2006). Likewise, positive SPA are found to be associated with improved recovery and adaptation after experiencing a fall (Mejía et al., 2022). Collectively, these studies suggest that SPA might allow people to adaptively and flexibly respond to discrete and prolonged health challenges in ways that can maximize health and longevity.

In the context of the COVID-19 pandemic, older persons who held more negative age self-stereotypes (which may be internalized as negative SPA) were more likely to oppose the idea of hospitalization for older individuals extremely sick with COVID-19 (Levy et al., 2021). This highlights negative age stereotypes (and associated negative SPA) as potential risk factors that may have worsened outcomes among older people, as they may have discouraged older adults from seeking medical care. With regard to emotional well-being and functioning, evidence from the early weeks of the COVID-19 pandemic suggests a longitudinal link between negative SPA and loneliness and distress (Losada-Baltar et al., 2020, 2022).

These patterns, along with the general finding that SPA predicts a variety of health and well-being indicators (Nakamura et al., 2022), suggest that more positive SPA may serve as a protective factor in the face of COVID-19-related challenges. Furthermore, previous research has formally distinguished between *positive* SPA and *negative* SPA—namely, that someone can hold mostly positive SPA (and few negative SPA), mostly negative SPA (and few positive SPA), a mixture of positive and negative SPA simultaneously, or not hold particularly strong SPA at all. Conceptualizing SPA as being comprised of both positive and negative SPA has been fruitful in

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enhancing the predictive validity of SPA on individual health behaviors and outcomes (e.g., Hooker et al., 2019; Mejía et al., 2022). In our study, we continue this practice to more precisely examine the role of SPA as potential strengths and risk factors in the face of public health-related challenges, like the COVID-19 pandemic.

The Present Study

The present study examined SPA as a predictor of COVID-19-related behavior, adaptation, and functioning in a sample of over 3,620 middle-aged and older adults followed over a 4-year period. Specifically, SPA were measured in 2016 and used to predict variation in COVID-19-related health behavior, emotional experiences, and functioning in 2020. Given associations between SPA and a variety of positive health, health behavior, and well-being indicators (Nakamura et al., 2022), we hypothesized that more positive SPA, overall, would be associated with more preventive COVID-19 behavior, less risky COVID-19 behavior, less negative emotional responses to COVID-19, and more COVID-19-related positive functioning longitudinally. In a series of supplementary analyses, we also examined subconstructs of positive SPA and negative SPA as separate predictors of COVID-19-related outcomes. In considering hypotheses about potential differential associations with positive SPA and negative SPA, we felt that the previous research on these subconstructs was too preliminary to make a priori hypotheses. Thus, we treated these supplementary analyses as exploratory.

Method

Participants

Participants were 3,620 middle-aged and older adults (M_{age} = 65.88, SD = 10.77; 61.1% were women) from the Health and Retirement Study (HRS). The HRS is a nationally representative prospective panel study that has surveyed more than 22,000 Americans ages 50+ every 2 years (Sonnega et al., 2014). Data have been collected since 1992. The University of Michigan's Institute for Social Research is responsible for the study and provides extensive documentation about the protocol, instrumentation, sampling strategy, and statistical weighting procedures. Regarding race/ethnicity, 65.4% identified as White, 17.9% identified as Black, 12.7% identified as Hispanic/Latino, and 4.0% identified as mixed race/other. Participants averaged 13.52 (SD = 2.86) years of education.

Data from the present study come from the 2016 to 2020 waves of data collection. A random 50% of HRS respondents were selected and then visited for an enhanced face-to-face interview in 2016 and then followed up in 2020 via mail for an expanded COVID-19-related survey. An additional 2,684 participants completed measures in 2016 but not 2020. Compared to those with complete data, those with data only at Time 1 had more negative SPA overall (d = .25), lower positive SPA (d = .19), greater negative SPA (d = .23), and lower levels of education (d = .38). The samples were otherwise comparable (e.g., d = .02 for age). Because we analyzed an existing data source, the Michigan State Institutional Review Board (IRB) considered this research exempt from ethical oversight as it did not constitute human subjects research (IRB No. STUDY00002967).

Measures

Self-Perceptions of Aging

In 2016, HRS measured SPA. Eight HRS items derived from the Philadelphia Geriatric Center Morale Scale (Lawton, 1975) and the Berlin Aging Study assess participants' positive and negative evaluations of their personal experiences of aging. Examples of negative items are "Things keep getting worse as I get older" and "The older I get, the more useless I feel." Examples of positive items are "So far, I am satisfied with the way that I am aging" and "I am as happy now as I was when I was younger." Response categories range from 1 (*strongly disagree*) to 6 (*strongly agree*). After reverse coding four negative items, we averaged responses to form a composite score for SPA (higher scores reflected more positive SPA). Cronbach's α for the eight items was α = .81.

Based on previous research demonstrating separability between the positive and negative aspects of SPA (Hooker et al., 2019), we also computed subscales for positive and negative SPA. Specifically, we averaged the four negatively valenced items to represent negative SPA (α = .75) and the four positively valenced items to represent positive SPA (α = .78). In a series of supplementary analyses, we used these two composites as predictors of COVID-19-related outcomes instead of the overall composite to determine if some of the results could be attributed specifically to positive SPA rather than negative SPA (or vice versa).

COVID-19-Related Outcomes

In 2020, several COVID-19-related behaviors and functioning were measured. We thematically grouped them into behaviors and functioning.

COVID-19-Related Behaviors.

Preventive Behavior. Preventive health behavior was assessed with a four-item measure that asked, "Since the coronavirus pandemic, have you," to which participants responded on a 3-point scale with the options 1 (*never*), 2 (*sometimes*), and 3 (*always*). The behaviors included (a) worn a mask around other people outside your home (e.g., in shops), (b) washed your hands with soap more frequently, (c) kept distance from others when you went outside your home, and (d) used special hand sanitizers or disinfectants? We computed an average across these four preventive health behaviors (α = .76).

Risky Behavior. Risky behavior was operationalized as five activities participants could engage in public that, at the time of the survey, were deemed to be particularly risky. The question asked, "Since the coronavirus pandemic, have you changed how often you …" and participants responded on a 3-point scale with the options 1 (*do less often*), 2 (*about the same*), and 3 (*do more often*). The behaviors included (a) leave your home, (b) go shopping, (c) travel to visit family members, (d) travel to visit friends, and (e) attend religious services outside your home. We computed an average across these five risky health behaviors (α = .82).

Socially Distanced Behavior. Socially distanced behavior indexed the number of activities people did that did not explicitly involve the participation of other people (in-person), as a 10-item index of activity/engagement (α = .76). The question asked, "Since the coronavirus pandemic, have you changed how often you," and participants responded on a 3-point scale with the options 1 (*do less often*), 2 (*about the same*), and 3 (*do more often*). The behaviors

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included (a) pray or do other spiritual activities at home; (b) exercise at home; (c) walk outside your home for more than 20 min; (d) do hobbies, crafts, or puzzles; (e) watch TV, Netflix, stream movies, or shows; (f) listen to music; (g) do garden work or home repairs; (h) read books, magazines, or newspapers (in print or digitally); (i) meditate; and (j) meet with social groups on Zoom or other online video conference sites. We computed an average across these ten socially distanced-type behaviors ($\alpha = .77$).

COVID-19-Related Functioning.

Worry. Worry was assessed with a five-item scale in which participants responded to the prompt, "Because of the coronavirus pandemic, how worried are you about …" on a scale ranging from 0 (*not at all worried*) to 10 (*very worried*). The worries included (a) your own health; (b) the health of others in your family; (c) your financial situation; (d) being able to get help if you needed it from family, friends, or others; and (e) what will happen in the future. We computed an average across these five items to yield a composite of COVID-19-related worry ($\alpha = .87$).

Stress. Stress was measured with two items: "Since the coronavirus pandemic, how often did you feel emotionally overwhelmed?" and "Since the coronavirus pandemic, how often did you feel stressed?" on a scale with the options 1 (*hardly ever or never*), 2 (*sometimes*), and 3 (*often*). We computed an average across these two items to yield a composite of COVID-19-related stress ($\alpha = .85$).

Loneliness. Loneliness was assessed with a single item, "Since the coronavirus pandemic, how often have you felt lonely?" on a response scale with the options 1 (*hardly ever or never*), 2 (*sometimes*), and 3 (*often*).

Positive Functioning. Positive functioning was measured with six items tapping into positive thinking and benefit finding. Participants responded to the prompt, "How much do the following statements describe your experiences since the coronavirus pandemic?" on a scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). The items included (a) "I tend to recover quickly after difficult times like this one," (b) "I have learnt some positive things from this situation about myself," (c) "I found greater meaning in work or my other activities and hobbies," (d) "I now feel more in touch with people in my local community," (e) "I found new ways to connect socially with other people," and (f) "I am now more appreciative of things that I had taken for granted before." We averaged across these six items to yield a composite for COVID-19-related positive functioning ($\alpha = .80$).

Possible Confounding Characteristics

In evaluating the effect of SPA on pandemic-related outcomes, we wanted to test the robustness of our results by including a series of covariates that might explain some of the associations. Specifically, we sought out variables that share substantial overlap with SPA and the outcomes but also might serve as mediators linking SPA to pandemic-related functioning. Because HRS has such comprehensive measurements of psychological and physical and mental health characteristics, we were able to do so with self-rated health (Idler & Benyamini, 1997), activities of daily living (e.g., Katz et al., 1963), employment status, depressive symptoms (Radloff, 1977), neuroticism and conscientiousness (Lachman & Weaver, 1997), life satisfaction (Diener et al., 1985), optimism (Scheier et al., 1994), and perceived mastery (Pearlin & Schooler, 1978). Specifically, we tested the inclusion of these possible confounding variables in separate "blocks" of covariates that represent different thematic collections of possible confounding or explanatory forces: Block 1 (self-rated health, activities of daily living, employment status, depressive symptoms), Block 2 (neuroticism, conscientiousness), Block 3 (life satisfaction and optimism), and Block 4 (perceived mastery).

Transparency and Openness

The study design, hypotheses, and analytic plan were not preregistered. We report how we determined our sample size, any data exclusions, all manipulations, and all measures in this study. At $\alpha = .05$, we had 99% power to detect effects larger than $f^2 = .006$ and 80% power to detect effects larger than $f^2 = .003$. All available data were used (i.e., no data exclusions were made). There were no manipulations. A data use agreement prevents us from sharing HRS data publicly. However, it can be requested from the second author or accessed via the HRS website, and a complete list of measures available in the psychosocial module of the HRS and the syntax for the project is provided at our Open Science Framework page (https://osf.io/yb8j9/). Gender, racial/ethnic, time frame for data collection, and geographic information of the sample are reported below (more specific geographic breakdowns are blinded to maintain anonymity).

Results

Preliminary Results

Table 1 provides bivariate correlations between study variables and descriptive statistics. More positive SPA were prospectively associated with a more socially distanced behavior, lower levels of negative emotional experiences (i.e., worry, stress, loneliness), and greater functioning. SPA were otherwise largely unrelated to preventive or risky behavior.

Worry, stress, and loneliness were all intercorrelated ($rs > .36$) and associated with worse functioning. People who were more worried, stressed, and lonely (but also those with higher functioning) were more likely to engage in preventive and socially distanced behavior and less likely to engage in risky behavior. Positive SPA and negative SPA were associated with the outcomes in consistent ways to the overall scale and were moderately correlated with each other ($r = -.45$). We more formally model them as predictors of COVID-19-related outcomes (while controlling for each other) in the analyses below.

Women engaged in more preventive behavior, were more likely to engage in socially distanced behavior, and engaged in fewer risky behaviors than men. They were also more worried, stressed, lonely, but had more positive functioning than men. People of color engaged in more preventive behavior and were more worried and stressed but better functioning than White participants. Older adults held more negative SPA compared to middle-aged adults, replicating previous research (Giasson et al., 2017). Older adults were less likely to engage in socially distanced behavior, were less worried and stressed, and had worse functioning than middle-aged adults. Finally, those with higher levels of education reported more positive SPA than those with lower levels of education. People with higher levels of education were more likely to engage in socially

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Table 1
Correlations and Descriptive Information for All Study Variables

Variable	*M*/%	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender	61.1% women		—													
2. Race	34.6% people of color		.04**	—												
3. Age	65.88	10.17	−.02	−.21***	—											
4. Education	13.35	2.90	−.03	−.24***	−.06***	—										
5. Self-perceptions 2016	4.00	1.02	.002	.01	−.06***	.16***	—									
6. Positive self-perceptions 2016	4.11	1.19	−.02	.03*	.04*	.06***	.85***	—								
7. Negative self-perceptions 2016	3.12	1.20	−.02	.01	.15***	−.22***	−.85***	−.45***	—							
8. Preventive behavior 2020	2.82	0.32	.15***	.19***	.01	−.06***	.03	.04*	−.01	—						
9. Risky behavior 2020	1.28	0.39	−.09***	.02	−.01	−.12***	−.02	−.001	.03	−.23***	—					
10. Socially distanced behavior 2020	2.25	0.34	.12***	−.03	−.05**	.13***	.09***	.07***	−.09***	.12***	−.16***	—				
11. COVID-19 worry	4.85	2.58	.08***	.22***	−.12***	−.17***	−.28***	−.21***	.27***	.25***	−.20***	.02	—			
12. COVID-19 stress	1.63	0.60	.23***	.08***	−.15***	−.06**	−.23***	−.21***	.19***	.15***	−.18***	.11***	.45***	—		
13. COVID-19 loneliness	1.55	0.65	.15***	−.02	.01	−.02	−.26***	−.24***	.21***	.06***	−.17***	.06***	.34***	.51***	—	
14. COVID-19 positive functioning	4.19	0.97	.09***	.15***	−.06***	.02	.21***	.21***	−.15***	.18***	−.04*	.19***	−.05**	−.06**	−.12***	—

Note. *N*s range from 3,459 to 3,620. Gender: −1: men, 1: women. Race: −1: White, 1: person of color.
* $p < .05$. ** $p < .01$. *** $p < .001$.

distanced behavior but less explicitly engaged in both preventive (although the association was small) and risky behavior. Highly educated people were less worried or stressed during the COVID-19 pandemic. Because of these associations between demographics and SPA and COVID-19-related outcomes, they were added as control variables for the linear regression analyses.

Linear Regression Analyses

We next formally examined self-perceptions as a predictor of COVID-19 behavior and adaptation. Specifically, we ran regressions predicting each of the COVID-19-related outcomes (i.e., preventive behavior, risky behavior, socially distanced behavior, worry, stress, loneliness, and positive functioning) in 2020 from SPA in 2016. We also controlled for age, gender (−1: men, 1: women), race (−1: White, 1: person of color), and education.[1]

The results from these analyses can be found in Figure 1 (converted to correlation coefficients and 95% confidence intervals), and the full regression results can be seen in Supplemental Table S1. Consistent with the bivariate correlations, more positive SPA were associated with a higher likelihood of socially distanced behavior ($\beta = .07$, $p < .001$), less worry ($\beta = -.27$, $p < .001$), less stress ($\beta = -.24$, $p < .001$), less loneliness ($\beta = -.27$, $p < .001$) and more positive functioning ($\beta = .20$, $p < .001$). Inconsistent with the correlations above, more positive SPA were associated with more preventive behavior ($\beta = .03$, $p = .04$). SPA were not significantly associated with risky behavior ($\beta = .01$, $p = .61$).[2]

Additional Analyses With Possible Confounding Variables

To test the robustness of our SPA analyses, we examined how the results changed upon inclusion of a number of potentially confounding variables. These included mental/physical health-related characteristics, neuroticism, conscientiousness, life satisfaction, optimism, and perceived mastery that were tested in separate blocks according to thematically related variables.

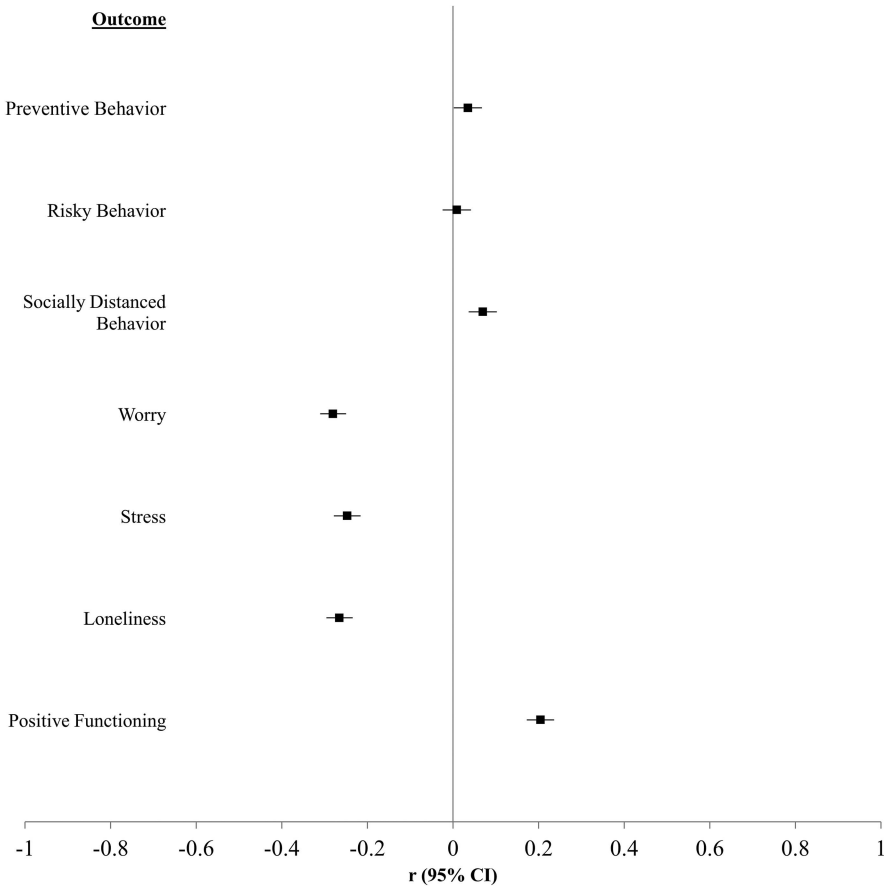
As seen in Table 2, the effects of SPA on worry, stress, loneliness, and positive functioning were robust to the inclusion of these variables. The effects of SPA on risky behavior were not significant

[1] Given the large age range of the sample, we tested the moderating effect of age on the association between self-perceptions of aging and each outcome. Age did not moderate the associations between self-perceptions of aging and prevention ($p = .450$), risky behavior ($p = .974$), socially distanced behavior ($p = .403$), worry ($p = .902$), stress ($p = .095$), loneliness ($p = .086$), and positive functioning ($p = .786$).

[2] SPA assessments were also available in 2020. Given evidence that SPA have changed during the COVID-19 pandemic (Seifert, 2021), we also examined the predictive validity of SPA measured more proximally (in 2020) by swapping out SPA measured in 2016 with SPA measured in 2020. Mostly consistent with the 2016 analyses, more positive SPA in 2020 were associated with more preventive behavior ($\beta = .039$, $p = .019$), more socially distanced behavior ($\beta = .057$, $p < .001$); less worry ($\beta = -.321$, $p < .001$); less stress ($\beta = -.312$, $p < .001$); less loneliness ($\beta = -.364$, $p < .001$); and more positive functioning ($\beta = .286$, $p < .001$). In addition, more positive SPA were associated with more risky behavior ($\beta = .055$, $p = .001$), which is inconsistent with the main analyses but somewhat consistent with our robustness analyses (see Table 2). In comparing the magnitude of effect sizes, these 2020 coefficients were often larger than those from 2016 or comparable (in the cases of socially distanced behavior and preventive behavior; see Supplemental Table S1).

Figure 1

Forest Plot of the Effect of Self-Perceptions of Aging on COVID-19-Related Outcomes



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(Although they were also not significant in the original model). The originally significant effect of SPA on social distancing behavior became nonsignificant (albeit in the same direction) after controlling for mental/physical health (Block 1) and well-being covariates (Block 3), but was still significant in the other blocks. The formerly nonsignificant effect of SPA on risky behavior was significant after including the covariates in Block 3, but was otherwise not significant (both in the original analyses and all the other control analyses), so this result likely stems from a suppression effect with those particular variables. Finally, for the preventive behavior outcome, the original effect was relatively small with a p value just under .05 ($\beta = .03$, $p = .04$). After controlling for these variables, the

Table 2

Robustness of Self-Perceptions of Aging Results to Different Controls

	Original effect		Block 1		Block 2		Block 3		Block 4	
Outcome	β	p	β	p	β	p	β	p	β	p
Preventive behavior	.034*	.039*	.014	.467	.018	.341	.028	.159	.0004	.981
Risky behavior	.009	.515	.020	.311	.007	.698	.068*	<.001*	.022	.237
Socially distanced behavior	.070*	<.001*	.019	.332	.062*	<.001*	.025	.220	.060*	.001*
Worry	−.274*	<.001*	−.209*	<.001*	−.203*	<.001*	−.202*	<.001*	−.263*	<.001*
Stress	−.241*	<.001*	−.170*	<.001*	−.137*	<.001*	−.184*	<.001*	−.215*	<.001*
Loneliness	−.226*	<.001*	−.178*	<.001*	−.173*	<.001*	−.187*	<.001*	−.232*	<.001*
Positive functioning	.204*	<.001*	.140*	<.001*	.161*	<.001*	.115*	<.001*	.156*	<.001*

Note. All models control for age, gender, race, and education. Beyond this set, each block introduces a different set of control variables: Block 1 (self-rated health, activities of daily living, employment status, depressive symptoms); Block 2 (neuroticism, conscientiousness); Block 3 (life satisfaction and optimism); and Block 4 (perceived mastery).

* $p < .05$.

effect became nonsignificant, although it was still in the same direction. Thus, for most of the significant associations reported in Figure 1 (Supplemental Table S1), the effect of SPA is robust to the inclusion of these particular covariates (although these covariates might explain some of the SPA—outcome associations). However, the results for preventive behavior and socially distanced behavior were a little more unreliable and can be partially explained by variation in other characteristics (particularly mental/physical health and well-being).

Distinguishing Between Positive and Negative Self-Perceptions of Aging

We next tested whether the aforementioned results could be attributable to positive SPA or negative SPA. Specifically, we entered positive SPA and negative SPA as simultaneous predictors (replacing the overall SPA composite) in the above regressions. We then reran those regressions.

The results from these analyses can be seen in Supplemental Table S2. The results largely reproduced the conceptual pattern seen above, such that positive SPA were associated with more positive outcomes, and negative SPA were associated with more negative outcomes. In general, positive SPA had a larger effect on most outcomes (i.e., preventive behavior: $\beta = .04$, $p = .05$; socially distanced behavior: $\beta = .06$, $p = .003$; loneliness: $\beta = -.17$, $p < .001$; and positive functioning: $\beta = .19$, $p < .001$). The effects of negative SPA were often smaller or not significant at all (i.e., preventive behavior: $\beta = -.002$, $p = .61$; socially distanced behavior: $\beta = -.02$, $p = .21$; loneliness: $\beta = .14$, $p < .001$; and positive functioning: $\beta = -.05$, $p = .01$).

The only exceptions to this pattern were for stress (for which they were relatively comparable in magnitude, positive SPA: $\beta = -.14$, $p < .001$; negative SPA: $\beta = .15$, $p < .001$), and worry (for which negative SPA was a larger predictor $\beta = -.11$, $p < .001$, negative SPA: $\beta = .21$, $p < .001$). Again, SPA were largely unrelated to risky COVID-19-related behavior; although the magnitude was once again larger for positive SPA ($\beta = .007$, $p = .70$) rather than negative SPA ($\beta = -.003$, $p = .89$), neither was a significant predictor.

In summary, more positive SPA were associated with more preventive and socially distanced behaviors during COVID-19. More positive SPA were associated with better emotional experiences and positive functioning as well. Finally, in decomposing the facets of SPA, positive SPA were more commonly associated with COVID-19-related outcomes.

Discussion

Consistent with our hypotheses, we found that more positive SPA were associated with a higher likelihood of socially distanced behavior, less worry, less stress, less loneliness, and more positive functioning during the early months of the COVID-19 pandemic. Contrary to our hypotheses, SPA were not significantly associated with risky behavior. Further, the results for preventive behavior were explained by other demographic and psychosocial characteristics (as were the results of socially distanced behavior, although less consistently so). When examining the unique contributions of positive SPA and negative SPA to COVID-19-related behavior, adaptation, and functioning, positive SPA were found to have a larger effect on most of the outcomes measured (preventive behavior, socially distanced behavior, loneliness, and positive functioning). Exceptions to this pattern emerged for stress, for which positive and negative SPA had comparable effects, and for worry, for which negative SPA had a stronger effect than positive SPA.

Self-Perceptions of Aging and COVID-19-Related Health Behaviors, Well-Being, and Functioning

The extension of SPA as predictors of flexible and adaptive health behavior during the pandemic contributes to the literature demonstrating important behavioral pathways linking positive SPA with better health outcomes (Levy, 2009). The link between SPA, health behavior, and health outcomes has been previously explored in the context of chronic disease prevention (e.g., measuring healthy lifestyle behaviors like exercise, nutrition, and smoking and preventive health screenings related to cancer or heart disease). However, prior to this study, evidence for links between SPA and preventive health behaviors in the context of immediate health threats was more limited. There was also some ambiguity about whether SPA would have predictive significance for COVID-19-adjacent health behavior. For example, E. S. Kim et al. (2014) found no association between SPA and likelihood of obtaining a vaccine (i.e., flu shot), despite the associations found between SPA and other types of chronic disease-related preventive health care utilization. Thus, our finding also sheds light on the potential benefit of positive SPA in the context of the immediate threat of a public health emergency. Engagement in preventive health behavior (including socially distanced behavior) in this context would benefit not only an individual's immediate health and safety but also the broader public (as the prevention of infectious disease spread in this context relied on the cooperation of separate individuals' actions).

Contrary to our hypothesis, SPA were not significantly associated with risky behavior during the early months of the pandemic. Further, our results with respect to preventive behavior (and, to an extent, socially distanced behavior) were explained by other demographic and psychosocial characteristics. It may be that the mechanisms linking SPA with choosing to engage in a health-*promoting* activity (e.g., adopting preventive health practices, engaging in various activities at home) are different than the processes involved in *avoiding* risky behavior. This pattern may suggest differential processes between SPA and health behavior depending on whether they are motivated by *approach* versus *avoidance* (e.g., Moos et al., 1990; Sherman et al., 2006)—an important area for future research to investigate. Additionally, in the early months of the pandemic, some behaviors were initiated (or avoided) by individuals, and other behaviors were influenced more or less by broader societal interventions. For example, mask-wearing and handwashing could have largely been considered individual choices (in most contexts), whereas the suspension of retail business or in-person religious services reduced risky behavior but were outside the influence of individuals. Because community-level decisions regarding closures and in-person services varied across the United States (Bunis & Rough, 2021), engagement in such activities may have been determined more by external characteristics of where a person lived than their individual SPA.

The finding that positive SPA predicted less worry, less stress, less loneliness, and more positive functioning among adults over 50 during the early months of the COVID-19 pandemic in the United

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States aligns with prior literature on SPA and emotional well-being (e.g., Nakamura et al., 2022). This finding also contributes to recent research demonstrating links between negative SPA and loneliness and distress among adults over 18 in the early weeks of the COVID-19 pandemic in Spain (Losada-Baltar et al., 2020, 2022). Losada-Baltar et al.'s (2020, 2022) findings highlighted the contribution of negative SPA to the stress process, aligning with age stereotype embodiment theory (Levy, 2009). Our work extends these findings to show how pervasive the effects of SPA are on well-being outcomes—they predicted a wide variety of psychological well-being outcomes in the context of the COVID-19 pandemic.

Examining Robustness and Specificity of Associations

Our robustness analyses in which we controlled for additional mental/physical health and psychosocial characteristics help to contextualize effects of SPA on the outcomes. Some of the predictive validity of SPA (i.e., effect sizes) was diminished (but not eliminated) upon the inclusion of these additional covariates. Most striking was that the results for preventive behavior and socially distanced behavior were largely explained by the inclusion of these characteristics. This suggests that SPA may be affecting pandemic-related outcomes through its effects on things like mental and physical health and other positive characteristics (e.g., mastery). In this way, moving forward, it is important to consider the robustness of SPA—outcome associations by appropriately considering adjacent and cousin characteristics that might serve as either confounders or mechanisms. For example, there is considerable conceptual and empirical overlap between SPA and constructs like optimism and mastery. Indeed, many of the reasons why researchers conceptualize SPA as a protective resource necessarily involve people's evaluations of their future aging prospects (which implicates optimism) and the degree to which they can reasonably achieve their goals in the future (which implicates mastery). By considering the broader nomological network of SPA in the present study, we were able to somewhat zero in on effects that might be more specific to SPA and which effects might be more specific to other characteristics. Nevertheless, our study is but one attempt to contextualize the influence of SPA, independent of these other influences, and more research is needed to provide a complete picture regarding how SPA affects health and well-being. Future longitudinal research may also disentangle the unique role of SPA in the context of acute or ongoing public health challenges.

Inherent in clarifying the influence of SPA on important outcomes both during and outside the pandemic is a necessity to understand which components of SPA might be most beneficial or detrimental to people. Although some SPA measures and investigations distinguish between positive and negative SPA (e.g., Hooker et al., 2019), it is much more common in the literature to treat SPA as a unidimensional construct in which SPA ranges from negative to positive. However, conceptualizing positive and negative SPA as separate but related scales provides a more nuanced appreciation for how individuals think about themselves in the context of aging. Specifically, examining them separately allows individuals to simultaneously acknowledge both potential age-related gains (e.g., emotional balance) and losses (e.g., mobility, memory), each of which could initiate different psychological and coping processes in later life (Baltes & Baltes, 1990; Lachman, 2006).

In the present study, we found that positive SPA were more consistently related to COVID-19-related outcomes. Specifically, positive SPA more robustly predicted preventive behavior, socially distanced behavior, loneliness, and positive functioning, although some exceptions existed (i.e., They had comparable effects for stress, and negative SPA was a stronger predictor of worry). There are a few different explanations for why positive SPA might be more related to these health behavior and well-being outcomes. For example, positive SPA are likely related to perceptions of control and autonomy over the aging process, providing older adults with the motivation to successfully enact preventive health behavior and pursue meaningful (but safe) social relationships (to reduce loneliness), both of which are associated with better well-being (Hu & Li, 2022; Y. K. Kim et al., 2021; Lachman, 2006; Segel-Karpas et al., 2021; Xiao et al., 2019). The more common associations between negative SPA and stress and anxiety may stem from methodological reasons, such as the overlap between negative SPA items and worry and stress measures more broadly. For example, many negative SPA items have elements of perseveration and depression already inherent in the items (e.g., "Things keep getting worse as I get older" and "The older I get, the more useless I feel."). Because these negative evaluations might be closely aligned with additional mental health conditions, it may have made associations with stress and worrying (correlates and occasional symptoms of depression; Fried et al., 2016) more likely. Nevertheless, the unique predictive validity of positive and negative SPA found in the present study should motivate future studies to distinguish between these components.

Limitations and Future Directions

The present study sheds light on positive SPA as potential pathways for supporting adaptation in response to the health and well-being challenges posed by COVID-19. We examined outcomes related to SPA that were measured 4 years prior to 2020 (in 2016) in a large sample of middle-aged and older adults. Nevertheless, there are some limitations that are worth acknowledging.

For example, it is possible that people's SPA changed in the context of the pandemic (Seifert, 2021). This would be consistent with the increased attention drawn to the vulnerabilities of older age groups as explicit ageism became more pronounced on social media (Ayalon et al., 2021; Monahan et al., 2020). Indeed, there is evidence to suggest that age discrimination likely exacerbated negative SPA during the COVID-19 pandemic (Kornadt et al., 2021). An ideal design to test the impacts of the pandemic on changes in SPA (and any accompanying effects, such as age discrimination) would be to have multiple assessments of SPA before, during, and eventually after the COVID-19 pandemic. Our analyses here likely reproduce associations seen outside the context of a pandemic. Nevertheless, we thought it was still important to examine associations between SPA and these outcomes in the context of a pandemic. There are many benefits of positive SPA outside the context of a pandemic. However, when asking about these same benefits within the specific context of COVID-19 (i.e., all of our outcomes are framed and worded as being relevant to the pandemic), we found many of the same results. But we also acknowledge that we did not have comprehensive data to test if these associations were particularly strong during the pandemic, compared to before or after the pandemic. To date, HRS does

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not have these data available, but a natural future direction would be to test whether the pandemic had an acute or long-lasting effect on SPA and how these changes are related to health and well-being.

Further, although we used longitudinal data to test the prospective effect of SPA on adjustment during the pandemic, future experimental work can more carefully distinguish the role of SPA on pandemic-related adjustment. Experimental work thus far presents some promising possibilities that SPA might be malleable to intervention and that these interventions could cultivate downstream positive health behavior (Menkin et al., 2022). Similar experimental paradigms exist for shifting other age-related attitudes and cognitions (e.g., Levy, Pilver, Chung, et al., 2014). However, in evaluating the current intervention approaches for SPA, specificity for encouraging healthy, positive SPA or reducing the negative impacts of negative SPA (and which is more impactful) is not often examined. We encourage future research to examine whether experimental manipulations on SPA might affect the adoption of COVID-19-related health and social behavior, which may inform ongoing public health challenges or emergencies.

Another limitation of the present study is that we employed a correlational design which prevents us from making strong causal statements about whether SPA influences COVID-19-related outcomes. Ideally, experimental designs would provide more unambiguous evidence for the predictive power of SPA. There is a precedence for manipulating age-related attitudes and cognitions (Levy, 2009; Levy et al., 2000; Levy, Pilver, et al., 2014), and we encourage future researchers to examine the causal links between SPA and psychological outcomes. Specifically, future research can more deliberately examine the process through which SPA might impact psychological and physical health. For example, more positive SPA are often hypothesized to serve as a buffer that might reduce some of the deleterious effects of stress on health and well-being (Levy, 2009). Presumably, navigating stressors in adaptive ways might be an underlying reason why positive SPA were associated with ostensibly positive outcomes here. And the positive health behavior associated with positive SPA might also enhance mental health as a byproduct (Boeder & Tse, 2021). Further, SPA might be considered one of the intermediary characteristics that link some exposures to important outcomes. For example, SPA have been found to mediate the association between exposure to negative age stereotypes and worse mental and physical health (Brothers et al., 2021). Thus, SPA (as examined here) might constitute a more proximate outcome that explains why other characteristics are associated with mental and physical health disparities. Future work can more clearly lay out the causal sequence of how these characteristics are related through experimental and longitudinal designs.

Finally, we had some attrition between Time 1 and Time 2, and some of this attrition was attributable to our study variables. Because linear regressions use listwise deletion, our analysis could not capitalize on using all available data. Having additional waves of data would allow us to employ more sophisticated analytic techniques (e.g., curvilinear effects, if these effects persist beyond the worst of the pandemic) and more appropriately accommodate missing data. Related to this limitation is the observation that the HRS is a study strictly about the lives of middle-aged and older adults. Because the HRS is a cohort-sequential design, replenishment waves happen every 6 years and intentionally only sample people over the age of 50. As a result, there is an asymmetry in the study design (i.e., younger adults were not included, and those who survived to age 50 might differ from the general population). Without longer term longitudinal data, we were unable to adequately model early life predictors of SPA (and its outcomes) or changes in SPA over longer periods of life. A more age-inclusive sample would likely have provided a more comprehensive picture about how SPA affects pandemic-related functioning.

Conclusions

This study contributes valuable insights to our understanding of SPA as psychological resources that may protect health and well-being in the context of challenges. Our findings emphasize the importance of interventions to reduce ageism to support the development of more positive views of aging among people of all ages, thereby optimizing the health and well-being of all individuals as they progress through life.

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