Complex Interplay Between Health and Successful Aging: Role of Perceived Stress, Resilience, and Social Support

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Psychological and psychosocial resources, including resilience and social support, have traditionally been studied in the context of the stress paradigm and, more recently, in the context of successful aging. This study used moderated mediation analyses to examine the role of perceived stress in the relationships between physical and mental health functioning and self-rated successful aging (SRSA) and whether differences between people in level of resilience and social support changes the role of perceived stress in these relationships. A cross-sectional study of 1,006 older adults (mean age: 77 years) completed scales addressing SRSA, physical and mental health functioning, perceived stress, resilience, and social support. Results indicated that the strength of relationships between both physical and mental health functioning and SRSA were reduced after accounting for variation in level of perceived stress. The role of perceived stress in the association between mental health functioning and SRSA was found to be stronger among participants with the highest levels of resilience, and the influence of perceived stress on the degree of relationship between physical health functioning and SRSA was stronger among those with greatest social support. These findings suggest that interventions to reduce perceived stress may help break the link between disability and poor well-being in older adults. The findings further suggest that the impact of such interventions might differ depending on psychological resources (i.e., resilience) for mental health disabilities and external resources (i.e., social support) for those with physical health problems. The complex interplay of these factors should be taken into account in clinical settings. (Am J Geriatr Psychiatry 2015; 23:622−632)

Key Words: Aging, perceived stress, resilience, disability, emotional health, psychosocial functioning

INTRODUCTION

Levels of physical health (PH) and mental health (MH) are important contributors to subjective well-being in late life. Successful aging is a way to conceptualize overall well-being in older adults and is no longer considered merely longevity or absence of disease or disability; rather, successful aging has been theorized to include various states of well-being with multiple determinants.[1,2] The National Institutes of Health identified a growing interest in patient-reported outcomes in PH and MH,[3] and self-rated successful aging (SRSA) has been described as a meaningful way for individuals to assess and integrate the multidimensional components of their past, present, and future.[2,4] From a mechanistic perspective, the achievement of SRSA can be enhanced though the various pathways of health functioning.[5] Indeed, several models of successful aging have been proposed involving complex associations between physical, cognitive, emotional, and psychosocial functioning. Doyle et al.'s model[6] consists of objective and subjective components to successful aging, including physical function, activity, social engagement, and psychological traits, with particular emphasis on resilience and social engagement. Our research group previously found support for a model in which the level of SRSA was a downstream effect of the complex interactions between psychosocial protective traits (including resilience), PH, and MH.[7] Another study found that positive psychological factors, such as resilience and self-efficacy, were predictive of future quality of life in older adults.[8]

The centrality of resilience (i.e., "ability to bounce back from the variety of challenges that can arise in life" [p. 1026])[9] to many models of well-being among older adults raises the question of how stressful life events and individuals' responses to these events may play a role in successful aging. Unsurprisingly, high and/or chronic stress has been found to negatively influence well-being in older adults.[10–13] It has been suggested that perceived stress (i.e., subjective report of how stressful life situations are) has a bidirectional relationship with health and well-being outcomes such that perceived stress can lead to a decline in health and sense of well-being, and, conversely, health problems and a sense of poor well-being can cause one to appraise circumstances as exceptionally stressful.[14] Additionally, it has been reported that health problems may only affect well-being and successful aging if a person *perceives* his or her health problems as stressful.[15] Collectively, the literature suggests that PH and MH relate to subjective well-being in late life and points to a potential role of perceived stress in mediating these relationships, perhaps influenced by level of resilience and social support (i.e., the frequency of social interactions). To date, however, researchers have not considered the complex interrelationships between all these factors.

Building on previous research, the present study had three objectives. First, we investigated whether PH and MH were related to SRSA in a sample of older adults. Next, we examined whether or not the strength of these relationships would be changed by accounting for variation in levels of perceived stress. We hypothesized that perceived stress would serve an intermediary role between health and SRSA, thereby weakening the direct relationship between these factors. Such a finding would provide preliminary support for the notion that perceived stress is a pathway through which health affects well-being among older adults. We acknowledge that although some researchers believe mediation and moderation analyses cannot be done with cross-sectional data, we believe that despite inherent limitations, analyses with cross-sectional data provide useful information for future hypothesis-based longitudinal or intervention studies. Our final objective was to investigate the role of resilience and social support, both widely cited stress buffers, in the health→perceived stress→successful aging association. Specifically, we tested models examining the degree to which the potential influence of perceived stress on the strength of the association between health and SRSA might be altered depending on participants' level of resilience or social support. We expected among those with higher levels of resilience and social support that the strength of association between health and SRSA would be more diminished by accounting for simultaneous relationships of these measures with perceived stress.

METHODS

Participants

This study was approved by the University of California, San Diego Institutional Review Board,

and all participants provided written informed consent. One thousand six middle-aged and older adults participated in the Successful Aging Evaluation study. To study successful aging in a community-dwelling sample of adults living in San Diego county, the Successful Aging Evaluation study used a structured multicohort longitudinal design[2]; cross-sectional data from the first round of survey collection are used here. To be eligible for enrollment, participants were required to be 50 years of age or older, have a telephone in the home, be physically and mentally able to participate in both a phone interview and paper and pencil mail survey, and be fluent in English. Participants were excluded if they resided in a nursing home or skilled nursing facility or were previously diagnosed with dementia or a terminal illness.

Measures

The following measures from the self-report mailed survey were included in this study.

Self-Rated Successful Aging. Participants were asked to rate themselves in terms of successful aging on a single-item, 10-point scale with 1 indicating *least successful* and 10, *most successful*.[16] The rationale for participants providing their own definition of successful aging and not researchers was previously described.[2]

PH and MH Functioning. PH and MH functioning were obtained from the Medical Outcome Study 36-Item Short-Form version 1.0 (MOS-SF-36).[17] The MOS-SF-36 consists of eight health and well-being scales and provides both a PH and MH component score. Component scores were used in this study, with higher scores reflective of better functioning on both components.

Perceived Stress. Participants completed the 10-item Perceived Stress Scale[18] to evaluate their thoughts and feelings about stressful life events that occurred during the past month. Higher scores indicate greater perceived stress.

Resilience. Resilience was assessed with the Connor-Davidson Resilience Scale-10 item (CD-RISC-10),[9] which asks participants to indicate how confident they are in dealing with life's challenges. Higher scores indicate greater resilience.

Social Support. The Duke Social Support Scale-Social Interaction subscale (DSSI)[19] was used to assess participants' amount of social support. Higher scores indicate a greater number of social interactions.

Data Analysis

SPSS Statistics version 20.0 (IBM Corp., Chicago, IL) was used for all analyses. Variables were examined for deviations from normality with the adjusted Fisher—Pearson standardized third moment coefficient[20]; values greater than 1.25 were considered to be significantly skewed. The following skewed variables were log transformed to normalize their distributions: SF-36 PH and MH, SRSA, and CD-RISC-10. Pearson correlations were conducted to analyze the relationships between the study variables. We then examined whether accounting for shared variation between perceived stress and measures of health and SRSA diminished the strength of the direct relationship between these variables by comparing the direct relationship between PH or MH and SRSA (path c versus path c′) in models with and without indirect paths (paths a and b) going through perceived stress (Fig. 1). A significant intermediate role of perceived stress is indicated if the direct PH/MH to SRSA relationship is significantly lower in the model that includes perceived stress (c′ < c). This pattern of results suggests the possibility that perceived stress mediates the relationship between health and SRSA, although longitudinal intervention studies are necessary to determine causal links.

Next, a series of analyses was conducted to test our hypotheses about how participant characteristics (resilience and social support) may influence the degree to which perceived stress plays an intermediate role in the associations between health and SRSA. For these analyses, we used the moderated-mediation framework described by Preacher et al.[21] Specifically, we examined whether the strength of the role of perceived stress was different (i.e., moderated) depending on level of resilience and social support. Models such as those in Figure 1 were constructed, which additionally included paths from the interaction of PH/MH and participant characteristics to perceived stress and SRSA (a_3 and c'_3). A significant path strength from the interaction to perceived stress (a_3) indicates that the relationship of PH or MH to perceived stress may differ under higher versus lower resilience or social support. Although such effects could also exist along the pathway from perceived stress to SRSA, we focused on the first pathway because we assumed the variables we chose would have their moderating effects between the

FIGURE 1. Example models of the relationships between IVs, DVs, intermediate variables, and participant characteristics.

A   Linear Regression
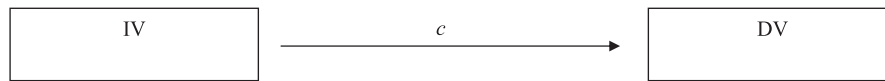
B   Simple Role for Intermediate Variable
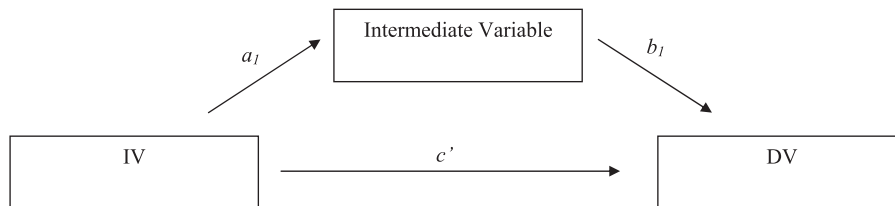
C   Role of Intermediate Variable Influenced by Participant Characteristics
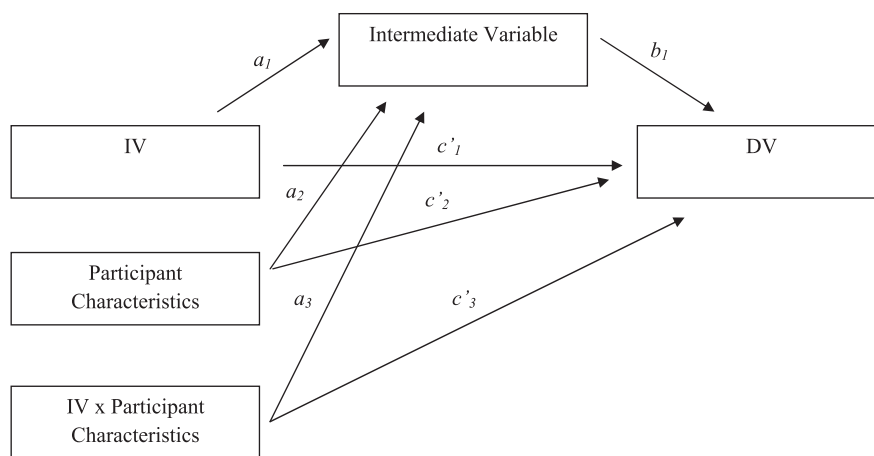
Notes: IV = independent variable; DV = dependent variable.

stressor of PH and MH and the person's perception of that stress. The degree to which levels of resilience and social support may alter the strength of the direct relationship between health and SRSA was also tested in these models by examining path c'_3.

All variables were centered before model entry. Linear regression analyses were used to identify coefficients for individual paths, and the Sobel test with a 95% confidence interval was used for our test of the influence of the intermediate variable, perceived stress.[22] We used the SPSS macro for moderated mediation, Model 2, developed by Preacher et al.[21] For our analyses, 5,000 bootstraps were conducted for each model to estimate the sampling distribution of the conditional indirect effect,[1] with bias-corrected and accelerated confidence intervals. In the models where path a_3 was significant, we used the Johnson-Neyman technique to determine whether it was at low, medium, or high levels of resilience/social support that the relationship of health to perceived stress was altered.[21]

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[1] According to Preacher et al.,[21] conditional indirect effects are "the magnitude of an indirect effect at a particular value of a moderator" (p. 186).

TABLE 1. Summary of Clinical Measures and Correlations Among Variables (N = 1,006)

Clinical Characteristics	Possible Range of Scores	Mean (SD)
SRSA	1−10	8.19 (1.47)
Physical functioning (MOS-SF-36-PC)	0−100	42.72 (11.55)
MH functioning (MOS-SF-36-MC)	0−100	54.46 (9.35)
Perceived stress (PSS)	0−40	12.26 (5.41)
Resilience (CD-RISC-10)	0−40	31.13 (6.32)
Social support (DSSI-SI)	4−12	8.64 (1.59)

Correlations Among Study Variables

	1. SRSA	2. MOS-SF-36-PC	3. MOS-SF-36-MC	4. PSS	5. CD-RISC−10
1. SRSA	—				
2. MOS-SF-36-PC	0.26[a]	—			
3. MOS-SF-36-MC	0.25[a]	−0.12[a]	—		
4. PSS	−0.38[a]	−0.20[a]	−0.59[a]	—	
5. CD-RISC-10	0.41[a]	0.22[a]	0.38[a]	−0.58[a]	—
6. DSSI-SI	0.20[a]	0.09	0.04	−0.11[a]	0.17[a]

Notes: MOS-SF-36 PC: Physical Component; MOS-SF-36 MC: Mental Component; PSS: Perceived Stress Scale.
[a] $p < 0.003$.

In additional follow-up analyses, we created separate models specifically comparing the direct and indirect associations between health, perceived stress, and SRSA at high and low levels of resilience or social support to better understand any conditional indirect effects. High values of social support or resilience were created by subtracting one standard deviation from the centered variable, and low values were created by adding one standard deviation to the centered variable. These follow-up models were run using the same SPSS macro as the original models. In each of our analyses, age, gender, education, and race/ethnicity were entered as covariates.

RESULTS

Summary statistics for participant clinical characteristics and correlations among study variables are presented in Table 1. All study variables were highly correlated, with a Bonferroni-adjusted critical value of $p < 0.003$ to control for multiple comparisons ($0.05/13 = 0.003$), with the exception of the correlations between PH and social support and MH and social support. Of most relevance to our study goals, we found that individuals who reported worse PH and MH had lower SRSA.

Role of Perceived Stress

The direct relationships between both PH and MH and SRSA were significantly weakened, as indicated by results of the Sobel test (PH: $z = -5.60$, $p = 0.000$; MH: $z = -9.59$, $p = 0.000$) after accounting for shared variance with perceived stress. The association between PH and SRSA was reduced from B = 1.71, standard error (SE) = 0.20 ($p = 0.000$) to B = 1.30, SE = 0.19 ($p = 0.000$), and the association between MH and SRSA was reduced from B = 2.23, SE = 0.26 ($p = 0.000$) to B = 0.14, SE = 0.31 ($p = 0.65$).

Influence of Resilience and Social Support on Role of Perceived Stress in the Relationship Between PH Functioning and SRSA

Results from these models are presented in Figures 2 and 3. In Figure 2, the independent variable (IV) was PH, the dependent variable (DV) was SRSA, the intermediate variable was perceived stress, and resilience was tested for its influence on the relationship of PH to perceived stress. As in the correlational analysis, both sides of the indirect path between PH and SRSA through perceived stress were significant in this model, such that those with better PH had lower perceived stress and those with lower perceived stress had higher SRSA. Although significantly reduced in magnitude in the simple model, the direct path (c'_1) from PH to SRSA remained strong and significant in the model that included resilience. More resilient participants had lower perceived stress and higher SRSA in this model, but level of resilience did not alter the relationship of PH to SRSA (path c'_3), and no evidence showed that the relationship of PH to perceived stress was different dependent on level of resilience (path a_3). Therefore, post-hoc analyses for conditional indirect effects were not performed.

Figure 3 included social support instead of resilience. The indirect paths (a_1 and b_1) from PH to SRSA via perceived stress were significant, as was the direct association (c'_1) between PH and SRSA. Those with higher social support had less perceived stress and higher SRSA, as in the univariate correlational analyses. The direct relationship between PH and SRSA did not appear to differ depending on one's level of social support, but significant conditional indirect effects on the influence of perceived stress were observed (path a_3). Specifically, post-hoc

FIGURE 2. Model including physical functioning, resilience, and perceived stress.
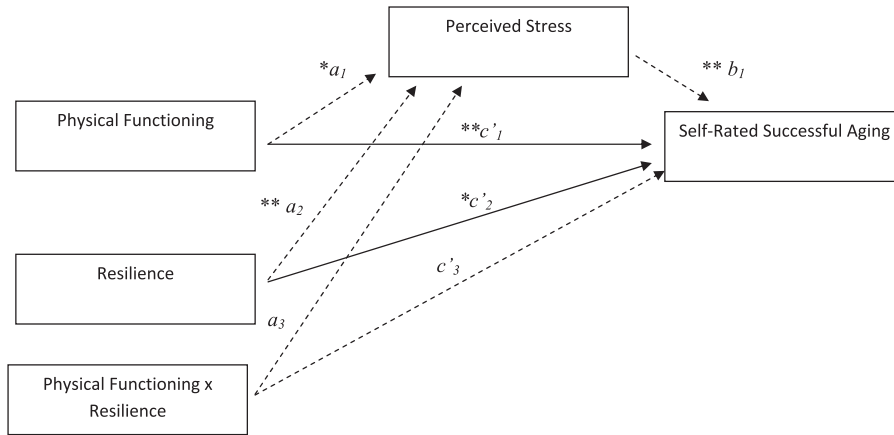
$a_1 = -1.675 \pm 0.699^*$
$a_2 = -2.759 \pm 0.138^{**}$
$a_3 = -0.782 \pm 0.574$
$b_1 = -0.062 \pm 0.001^{**}$
$c'_1 = 1.860 \pm 0.202^{**}$
$c'_2 = 0.277 \pm 0.048^{**}$
$c'_3 = -0.073 \pm 0.165$

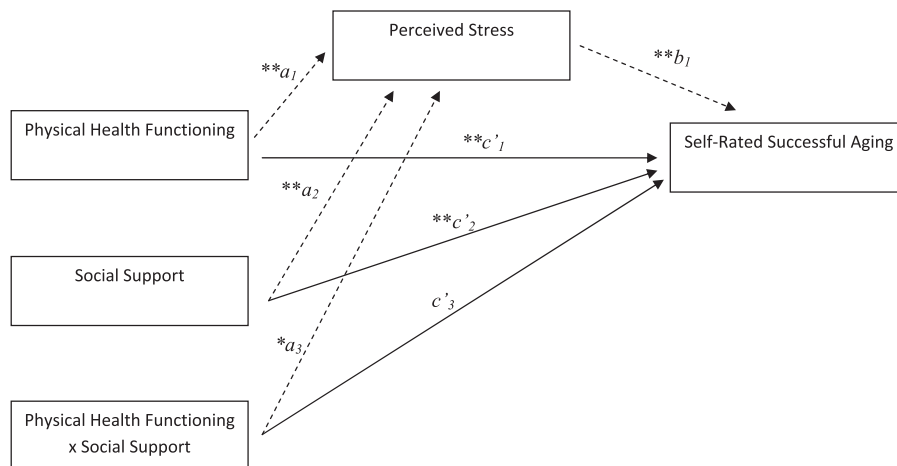** indicates p<.01 *indicates p<.05

———— indicates positive relationship - - - - - - indicates negative relationship

analyses revealed that at low levels of social support, accounting for perceived stress did not diminish the strength of the direct relationship between PH and SRSA (bootstrapped 95% confidence interval for conditional indirect effects: −0.01, 0.56), but when levels of social support were moderate to high, accounting for perceived stress did significantly weaken the PH–SRSA relationship (bootstrapped 95% confidence interval for conditional indirect effects at moderate social support: 0.22, 0.63; high social support: 0.34, 0.80). To further clarify this distinction, we used the Johnson-Neyman technique, which indicated the conditional indirect effect transitioned from nonsignificant to significant (using α = 0.05) at DSSI = 6.53, and the conditional indirect effects steadily increased from 6.53 to 12 (range of DSSI scores: 4–12). In other words, the role of perceived stress in explaining the association between PH and SRSA appeared to be strongest among those with high levels of social support.

Influence of Resilience and Social Support on Role of Perceived Stress in the Relationship Between MH Functioning and SRSA

These models are presented in Figures 4 and 5. Figure 4 included resilience, and evidence was again found that including an indirect association with perceived stress weakened the direct association between MH and SRSA (with the c′1 path becoming nonsignificant), similar to our findings in the simpler model. There was also evidence that more resilient individuals had lower perceived stress and higher SRSA and that the positive relationship between MH and SRSA was stronger among those with greater resilience (path c′3). A significant conditional indirect effect of resilience level on the role of perceived stress in the model was also observed (path a3). Specifically, post-hoc analyses showed that with increasing resilience levels, the degree to which accounting for perceived stress diminished the strength of the relationship between MH and

FIGURE 3. Model including physical functioning, social support, and perceived stress.

$a_1 = -4.485 \pm 0.818**$
$a_2 = -0.371 \pm 0.112**$
$a_3 = -0.935 \pm 0.470*$
$b_1 = -0.092 \pm 0.008**$
$c'_1 = 1.950 \pm 0.201**$
$c'_2 = 0.122 \pm 0.027**$
$c'_3 = 0.116 \pm 0.114$

** indicates $p<.01$ *indicates $p<.05$

——— indicates positive relationship   - - - - - indicates negative relationship

SRSA steadily increased from low (CD-RISC-10 score: 0.38, 1.04) to moderate (CD-RISC-10 score: 0.54, 1.30) to high levels of resilience (CD-RISC-10 score: 0.67, 1.59). Post-hoc analyses using the Johnson-Neyman technique were also conducted to examine the strength of the conditional indirect effects at all levels of resilience and provided further support for the conditional indirect effect increasing from low to high resilience.

Social support was examined in our final model (Fig. 5). Accounting for perceived stress was again found to diminish the strength of the direct relationship between MH and SRSA. Individuals with low social support had greater perceived stress and lower SRSA. The strength of the direct association between MH and SRSA was not different depending on one's level or social support (path c'_3), and evidence did not show that level of social support influenced the degree to which perceived stress was associated with MH and therefore the role perceived stress played in reducing the relationship between MH and SRSA (path a_3).

Further Clarification of Conditional Indirect Effects

Figure 6 demonstrates the conditional indirect effects between PH and SRSA when social support is high versus low (Fig. 6A, B) and between MH and SRSA when resilience is high versus low (Fig. 6C, D). As seen in Figure 6, at low levels of social support or resiliency there continues to be a role for perceived stress in contributing to the associations between health and SRSA, but when these factors are high, perceived stress is a less influential player in the model.

DISCUSSION

As hypothesized, the relationship between worse PH and MH functioning and lower well-being, as measured by SRSA, was weakened when associations between these factors and perceived stress were taken into account. This provides preliminary cross-sectional

FIGURE 4. Model including MH functioning, resilience, and perceived stress.
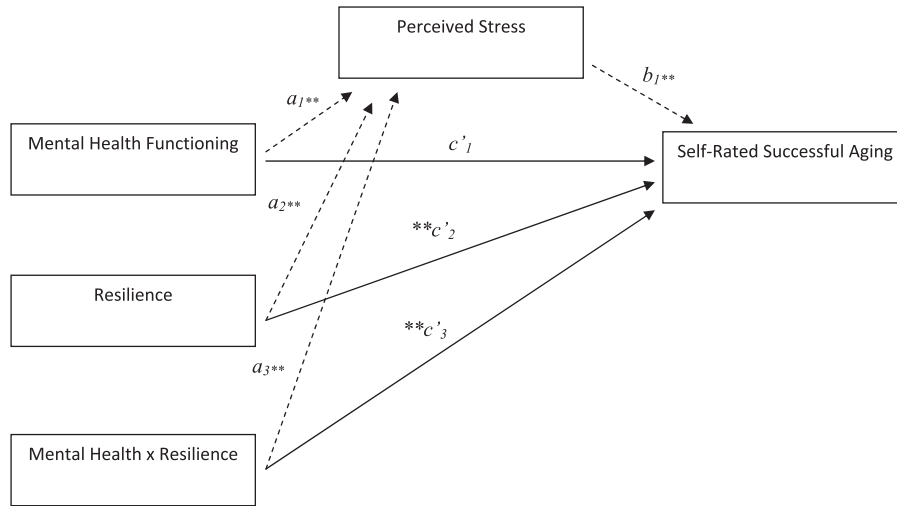
$a_1 = -13.123 \pm 0.791**$
$a_2 = -2.034 \pm 0.127**$
$a_3 = -3.046 \pm 0.586**$
$b_1 = -0.067 \pm 0.012**$
$c'_1 = 0.251 \pm 0.315$
$c'_2 = 0.363 \pm 0.050**$
$c'_3 = 0.716 \pm 0.207**$
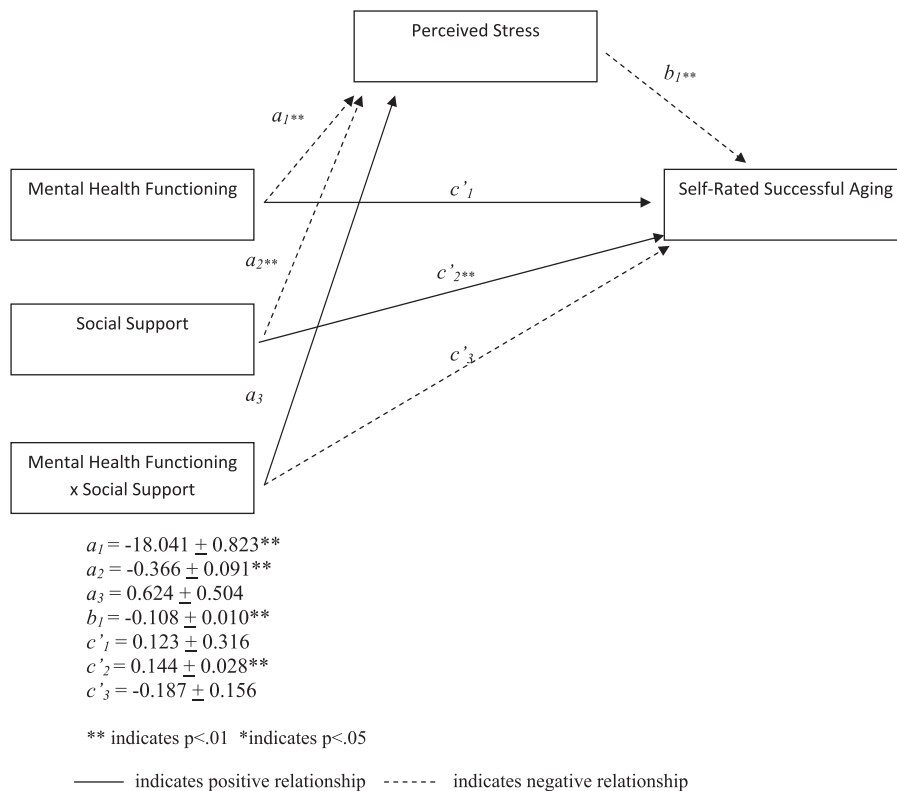
** indicates p<.01 *indicates p<.05

——— indicates positive relationship - - - - - - indicates negative relationship

evidence that declines in PH and MH may lead to greater perceived stress, which in turn would decrease perceptions of well-being and successful aging. We found only partial support for the idea that levels of the potentially buffering variables of social support and resilience influenced the magnitude of the role of perceived stress. Among those with higher social support, good PH is more strongly related to low perceived stress, and thus the indirect path from PH to SRSA via perceived stress is more influential than it is among those with low levels of social support. Resilience, on the other hand, influenced the role that perceived stress played in the link between MH, but not PH, and SRSA. In this case, there was evidence at all levels of resilience that poorer MH leads to poorer SRSA primarily through the associations of both of these with greater perceived stress. There was significant moderation because the higher one's resilience, the stronger the evidence for an intervening role of perceived stress.

There are limitations to this study that need to be taken into account when interpreting the results. First, in terms of the population, our sample was primarily white, and results cannot be generalized to other racial/ethnic groups. There may also be a selection bias in that those individuals who agreed to participate may be functioning better than those who refused to participate. Another possible selection bias is that our sample consisted of community-dwelling older adults, and the degree of MH, PH, resilience, social support, and SRSA may be higher in these participants than in the general population of older adults, in which a percentage reside in assisted living, nursing homes, or skilled nursing facilities.

Next, the cross-sectional design precludes determination of causal relationships with any certainty. Although true tests of mediation imply causality through the use of longitudinal data, it is also important to establish covariation in variables. According to Preacher and Hayes,[23] correlation is a

FIGURE 5. Model including MH functioning, social support, and perceived stress.

$a_1 = -18.041 \pm 0.823$**
$a_2 = -0.366 \pm 0.091$**
$a_3 = 0.624 \pm 0.504$
$b_1 = -0.108 \pm 0.010$**
$c'_1 = 0.123 \pm 0.316$
$c'_2 = 0.144 \pm 0.028$**
$c'_3 = -0.187 \pm 0.156$

** indicates p<.01 *indicates p<.05

⎯⎯⎯ indicates positive relationship   ------ indicates negative relationship

necessary condition for establishing mediation. Because our large dataset was cross-sectional in nature, for the purposes of building models that might make helpful predictions about likely results from longitudinal data, we assumed ordering of effects (e.g., that health→perceived stress→SRSA) based on theory and previous research. There are likely to be some bidirectional effects. Because we were not able to test whether our directional assumptions are correct, longitudinal follow-up is needed to take the next step in determining the direction of causal relationships.

Another limitation is the use of self-report-based assessments for all measures. A concern that has emerged with self-report measures is the tendency to provide socially desirable responses that may impact instrument validity. However, in previous work we found an absence of correlations or small relationships (r < 0.25) between a social desirability bias measure and the scales in this study.[24] There can also be a tendency for people to respond in a similar manner (e.g., response set) across scales when completing multiple self-report instruments. However, although the correlations between PH, MH, and SRSA were significant, they were modest (all below r = 0.3; see Table 1), indicating a lack of a strong responding bias.

A final limitation is that the MOS-SF-36 is a generic PH and MH measure. Future work would benefit from objective and subjective health-related quality of life instruments designed for use with older adults and that specifically address MH problems, such as the Geriatric Depression Scale. Notwithstanding these limitations, the results of our analyses have potentially important clinical implications for patients with physical or mental problems and/or disability. In patients with high levels of perceived stress due to physical or mental disability, interventions targeted at decreasing perceived stress may be beneficial.

Because we found social support and resilience to influence the role of perceived stress in the

FIGURE 6.   Models of conditional indirect effects at high and low levels of social support [A and B] and high and low levels of resilience [C and D].
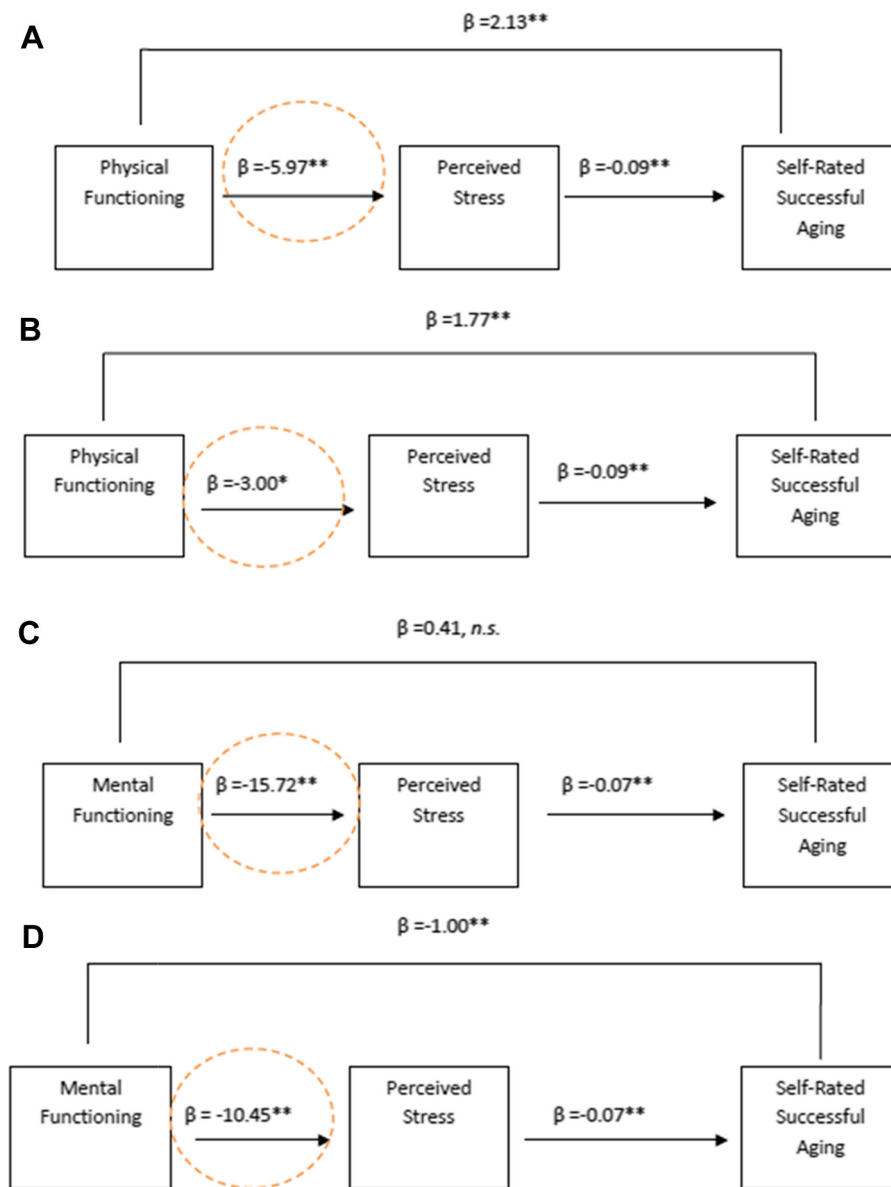
Note. *p<0.05; **p<0.01

relationships between health and SRSA, a further clinical implication is that a treatment focused solely on reducing perceived stress without focusing on the larger context of the interacting psychologic factors may be less effective. If a patient presents with low social support or low resilience, focusing on improving perceived stress may be a less effective way to improve well-being than if the patient presented with high social support or resilience. Specifically, for patients with *physical impairment and/or disability* who present with low social support and high perceived stress, it may be important to design an intervention that combines components of stress reduction and increasing social support. On the other

hand, for patients with *MH problems* who present with low resilience and high perceived stress, a treatment that combines components of stress reduction and resilience-enhancing interventions may be most effective.

In conclusion, these data highlight the complex interplay between health, perceived stress, resilience, and social support on subjective well-being and suggest that interventions to reduce perceived stress may help break the link between disability and poor well-being in older adults. The existence of additional factors that may alter the nature or strength of the role of perceived stress suggests that such interventions should also aim to improve internal psychological resources (i.e., resilience) for MH problems and enhance external resources (i.e., social support) for those with PH problems.

References

1. Inui TS: The need for an integrated biopsychosocial approach to research on successful aging. Ann Intern Med 2003; 139:391−394
2. Jeste DV, Savla GN, Thompson WK, et al: Association between older age and more successful aging: Critical role of resilience and depression. Am J Psychiatry 2013; 170:188−196
3. Riley WT, Pilkonis P, Cella D: Applications of the National Institutes of Health Patient-reported Outcome Measurement Information System (PROMIS) to mental health research. J Mental Health Policy Econ 2011; 14:201−208
4. Jeste DV, Palmer BW: A call for a new positive psychiatry of ageing. Br J Psychiatry 2013; 202:81−83
5. Cheng ST: Defining successful aging: the need to distinguish pathways from outcomes. Int Psychogeriatr 2013; 18:1−5
6. Doyle YG, McKee M, Sherriff M: A model of successful ageing in British populations. Eur J Public Health 2012; 22:71−76
7. Vahia I, Thompson WK, Depp CA, et al: Developing a dimensional model for successful cognitive and emotional aging. Int Psychogeriatr 2012; 24:515−523
8. Bowling A, Iliffe S: Psychological approach to successful ageing predicts future quality of life in older adults. Health Qual Life Outcomes 2011; 9:1−10
9. Campbell-Sills L, Stein M: Psychometric analysis and refinement of the Connor-Davidson resilience scale (CD-RISC): Validation of a 10-item measure of resilience. J Traum Stress 2007; 20:1019−1028
10. Hamer M: Psychosocial stress and cardiovascular disease risk: the role of physical activity. Psychosom Med 2012; 74:896−903
11. Muller FL, Lustgarten MS, Jang Y, et al: Trends in oxidative aging theories. Free Rad Biol Med 2007; 43:477−503
12. Kahana E, Kelley-Moore J, Kahana B: Proactive aging: a longitudinal study of stress, resources, agency, and well-being in late life. Aging Mental Health 2012; 16:438−451
13. Wolkowitz OM, Reus VI, Mellon SH: Of sound mind and body: depression, disease, and accelerated aging. Dialog Clin Neurosci 2011; 13:25−39
14. Mitsonis CI, Potagas C, Zervas I, et al: The effects of stressful life events on the course of multiple sclerosis: A review. Int J Neurosci 2009; 119:315−335
15. VanderZee KI, Buunk BP: Social comparison as a mediator between health problems and subjective health evaluations. Br J Soc Psychol 1995; 34:53−65
16. Montross LP, Depp CA, Daly J, et al: Correlates of self-rated successful aging among community-dwelling older adults. Am J Geriatr Psychiatry 2006; 14:43−51
17. Ware J, Sherbourne C: The MOS 26-item short-form health survey (SF-36): Conceptual framework and item selection. Med Care 1992; 30:473−483
18. Cohen S, Kamarck T, Mermelstein R: A global measure of perceived stress. J Health Soc Behav 1983; 24:386−396
19. Blazer D, Hybels C, Hughes D: Duke Social Support Index. Princeton, NJ, Educational Testing Service, 1990
20. Tabachnick BG, Fidel LS: Using Multivariate Statistics. 4th ed. Needham Heights, MA, Allyn & Bacon, 2001
21. Preacher KJ, Rucker DD, Hayes AF: Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. Multivar Behav Res 2007; 42:185−227
22. Preacher KJ, Hayes AF: SPSS and SAS procedures for estimating indirect effects in simple mediation models. Behav Res Methods Instrum Comput 2004; 36:717−731
23. Preacher KJ, Hayes AF: Asymptotic and ressampling strategies for assessing and comparing indirect effects in multiple mediator models. Behav Res Methods 2008; 40:879−891
24. Dawes SE, Palmer BW, Allison MA, et al: Social desirability does not confound reports of wellbeing or of socio-demographic attributes by older women. Ageing Soc 2011; 31:438−454