








Article

Self-perceptions of Aging and Distress in Middle-aged and Older Adults. The Role of Perceived Control and Pleasant Activities

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Abstract

Previous studies have shown the importance of self-perceptions of aging in predicting psychological distress throughout the life cycle. However, little is known about the processes through which self-perceptions of aging influence distress. The aim of the present study is to analyze the potential indirect effects of perceived control and pleasant activities in the association between self-perceptions of aging and depression and anxiety symptoms in middle-aged and older adults. A total of 315 people over 40 years of age ($M_{\text{age}} = 58.8$; $SD = 10.8$; 67.9% women) participated. Two indirect effects analysis models were conducted in serial with the aim of analyzing the role of perceived control and pleasant activities in the relationship between the self-perceptions of aging and depressive (model 1) and anxiety (model 2) symptomatology. A direct effect was observed between self-perceptions of aging and depressive, and anxious symptomatology. In addition, indirect associations through the variables perceived control and pleasant activities were significant. The tested models explained 46.1% of the variance in depressive symptomatology and 34.8% of the variance in anxiety. The results of this study confirm the association between self-perceptions of aging and psychological distress. This association is exerted through lower perception of control and fewer pleasant activities. Interventions aimed at promoting effective coping strategies that favor perceived control, activity and emotional well-being should include a module on identifying and modifying of negative self-perceptions of aging in middle-aged and older adults.

Keywords: anxious symptomatology; depressive symptomatology; direct effects analysis; indirect effects analysis; self-perceptions of aging

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Introduction

One of the most researched constructs in middle and late adulthood is the so-called perceptions of aging. This construct can be understood as “beliefs about older people in general” (Levy, 2009, p. 332). Perceptions of aging are internalized throughout the life cycle, operate unconsciously, become self-relevant, and manifest through multiple pathways. This whole process is developmentally influenced by society, which inculcates these beliefs since childhood (Levy, 2003, 2009). Rothermund et al. (2021) provide additional insights into how perceptions of aging operate in the lives of older adults. They establish that, when negative changes occur in old age (due to critical events such as, for example, retirement), if negative perceptions of aging are present, changes associated with the negative events are more likely to be attributed to age, producing negative consequences in people’s life satisfaction. Finally, according to the Stereotype-Embodiment Theory (Levy, 2003, 2009), upon reaching

old age, these beliefs about older people are directed towards oneself, giving rise to what are known as self-perceptions of aging.

Several studies have related self-perceptions of aging to the aging process and older adults’ health. For example, classic data on this issue show how older adults with more positive self-perceptions of aging had longer life expectancy (Levy, Slade, Kunkel et al., 2002). Levy, Slade and Kasl (2002) conducted a longitudinal study and found that those participants with more positive self-perceptions of aging reported better functional health 18 years later. Subsequent findings indicate that having more positive self-perceptions of aging is related to better physical functioning (Bryant et al., 2012) and negative self-perceptions with worse self-reported health status (Kornadt et al., 2021; Sánchez Palacios et al., 2009; Vauclair et al., 2015), lower physical activity (Sánchez Palacios et al., 2009) and cognitive impairment (Laidlaw & Kishita, 2015). Wurm and Schäfer (2022) recently provided data in favor of the impact that negative self-perceptions of aging have on mortality.

In addition to having an impact on physical health in old age, self-perceptions of aging play an important role in people’s mental health. For example, Bryant et al. (2012) indicate that more positive self-perceptions of aging are associated with higher levels of life satisfaction and lower levels of anxiety and depressive symptoms. Levy et al. (2014, 2019) found that negative perceptions of aging

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were associated with greater psychopathological symptomatology such as suicidal ideation, anxiety, depression, and post-traumatic stress. Additional studies have found a significant association between negative self-perceptions of aging and a higher frequency of symptoms of psychological distress such as depression, anxiety, or loneliness, through the life cycle (Chang et al., 2020; Fernandes-Pires et al., 2023; Losada-Baltar et al., 2021; Pedroso-Chaparro et al., 2021, 2022, 2023a; Wurm & Schäfer, 2022). In the longitudinal study by Losada-Baltar et al. (2022), more negative self-perceptions of aging were associated with a risk of higher levels of emotional distress later in life. Moreover, Kwak et al. (2014) found that older adults who received more care tended to view their aging more negatively, which, in turn, led to an increase in depressive symptoms two years later. Zhu et al. (2024), in their systematic review, showed the mental health benefits of intervening in older adults' self-perceptions of aging.

The previous studies mentioned show the relationship between self-perceptions of aging and emotional distress; however, knowledge about the possible mechanisms that explain this relationship is scarce. This is important because, if the pathways through which self-perceptions of aging act are known, these variables can be considered in prevention and intervention programs aimed at improving adults' mental health. Variables such as perceived control and activity level may play a role in this relationship. Some aspects of these variables are explored below.

Robinson and Lachman (2017, p. 436) define perceived control as "beliefs about the likelihood that one's actions will produce desired outcomes". Multiple studies have examined this construct in relation to chronological age and negative self-perceptions of aging. On the one hand, regarding chronological age, from a longitudinal perspective, perceived control varies throughout the life cycle, showing a decrease in late adulthood (Drewelies et al., 2017; Infurna & Okun, 2015). In relation to negative self-perceptions of aging, several studies suggest that they are associated with lower levels of perceived control (Lee et al., 2020; Pedroso-Chaparro et al., 2021, 2022). Using longitudinal data, Luo et al. (2020) found that, although the relationship between self-perceptions of aging and perceived control is bidirectional, the impact of self-perceptions of aging on perceived control is greater than vice versa. Perceived control has also been related in the scientific literature to psychological well-being, including associations with life satisfaction and well-being, and depressive symptoms (Infurna & Okun, 2015; Kwak et al., 2014; Lachman & Weaver, 1998; Robinson & Lachman, 2017). A possible explanation for the impact of perceived control on people's physical and mental health is that higher levels of perceived control are associated with increased levels of activity (Rodin, 1986). In fact, activity is another key variable for understanding older adults' mental health, and engaging in pleasant activities has also been addressed in the scientific literature in relation to self-perceptions of aging. Evidence has been found supporting the association between positive self-perceptions of aging and greater involvement in pleasurable activities (De Paula Couto et al., 2022; Hicks & Siedlecki, 2017; Lee et al., 2020; Robertson & Kenny, 2016).

Research has shown an association between pleasant activities and physical and mental health in middle-aged and older adults. Specifically, this variable has been found to be related to physical (Chang et al., 2014; Sala et al., 2019), cognitive (Chen et al., 2018; Sala et al., 2019) and mental health (Kim et al., 2020; Yoshida et al., 2021). In particular, it has been related to psychological dimensions such as subjective well-being (Kuykendall et al., 2015), life satisfaction (Col et al., 2022; Sala et al., 2019), positive affect (Sala et al., 2019),

depressive symptoms (Col et al., 2022; Dupuis & Smale, 1995) and stress (Col et al., 2022).

Even though there are studies that have analyzed the indirect effect of perceived control in the association between self-perceptions of aging and functional health (Levy, Slade & Kasl, 2002) and depressive symptoms (Kwak et al., 2014), no previous study has conducted a joint analysis of potential variables that might explain the association between negative self-perceptions of aging and mental health. Therefore, the aim of the present research, drawing upon Becca Levy's (2009) Stereotype-Embodiment Theory, lies in providing data about potential psychological processes that explain the relationship between self-perceptions of aging and psychological distress in middle-aged and older adults. Specifically, this study aims to analyze the relationship between self-perceptions of aging and emotional problems (symptoms of depression and anxiety) in middle-aged and older adults, exploring the role of perceived control and pleasant activities in this relationship. Our hypotheses are: (1) negative self-perceptions of aging will be directly and significantly related to symptoms of depression and anxiety; (2) negative self-perceptions of aging will have an inverse and significant relationship with perceived control and pleasant activities; (3) perceived control and pleasant activities will show an inverse and significant association with symptoms of depression and anxiety; and (4) the association of negative self-perceptions of aging with symptoms of depression and anxiety will be indirect and serial through perceived control and pleasant activities.

Method

Participants and Procedure

The sample of the present study consisted of 315 participants aged between 40 and 90 years ($M=58.8$; $SD=10.8$), of whom 67.9% were women. The inclusion criteria to participate were: (1) being 40 years of age or older; (2) not having a diagnosis of mild cognitive impairment/dementia or showing an apparent cognitive deficit that would prevent the correct execution of the assessment; and (3) not attending a daycare center or nursing home. Power analysis showed that the sample size was sufficient to detect a medium effect size ($f^2 = .15$) with a target power of .80, which is adequate according to Cohen (1988).

Regarding the procedure, the project was approved by the Ethics Committee of Rey Juan Carlos University. Participants were recruited through social networks (Whatsapp, Facebook, and LinkedIn) and cultural centers for seniors that collaborated with the research team. Therefore, the type of sampling for the present study was non-probabilistic by convenience. All participants were required to complete informed consent before the evaluation and did not receive financial or any other type of compensation for their participation. Since data collection took place while COVID-19 pandemic restrictions were still in effect, assessments were conducted online.

Measures

The following sociodemographic variables were collected: gender, age, marital status, educational level, and current employment status. These variables were included as covariates in both models.

Self-perceptions of aging. This variable was measured by the Attitudes Toward One's Own Aging Subscale (Liang & Bollen, 1983), using the correction of Levy, Slade, Kunkel et al. (2002). It consists of five items (e.g., "Things keep getting worse as I get

older”). Higher scores indicate higher levels of negative self-perceptions of aging. Cronbach’s α in the present study was .70.

Perceived control. Perceived control was assessed through the Spanish version (Pedroso-Chaparro, Cabrera et al., 2023) of the Perceived Restrictions of Personal Control and Perceived Dominance scale (Smith et al., 2013). This is a 10-item scale (e.g., “What happens in my life is often out of my control”; “I can do almost anything I set my mind to”). Higher scores indicate more perceived control. Cronbach’s α in the present study was .86.

Pleasant activities. The Pleasurable Activities Questionnaire (PES-AD; Logsdon & Teri, 1997) was used. Specifically, the modified version of the PES-AD (Chattillion et al., 2012) was used and showed good psychometric properties (e.g., Cronbach’s alpha of .80). It includes 12 of the 20 total items of the questionnaire (e.g., “Spending time away from home”; “Listening to music”), with the item “Receiving or sending letters” changed to “Receiving or making calls” in order to be more representative of today’s communication behaviors. The response options are Likert-type and range from 1 (“Not at all”) to 3 (“Frequently”). Higher scores indicate more frequency of pleasant activities. A Cronbach’s α coefficient of .71 was obtained in the present study.

Depressive symptoms. Depressive symptomatology was assessed through the Spanish version (Losada et al., 2012) of the Center for Epidemiological Studies Scale (CES-D; Radloff, 1977). It consists of 20 items (e.g., “I felt depressed”). Higher scores indicate more depressive symptoms. Cronbach’s α in the present study was .92.

Anxiety symptoms. The Spanish version (Márquez-González et al., 2012) of the Geriatric Anxiety Inventory (GAI; Pachana et al., 2007) was used, which consists of 20 dichotomous items (e.g., “I spend a lot of time worrying”). Higher scores indicate more anxiety symptoms. This scale has been validated in younger adults (Zhai et al., 2022). Cronbach’s α for the present study was .93.

Data Analysis

Version 28 of the IBM SPSS Statistics program with the Process macro was used for the data analysis. Initially, a descriptive analysis of the sample’s sociodemographic variables was conducted. Subsequently, Pearson correlations of all the variables and covariates were analyzed as a previous step for testing indirect effects (Hayes, 2018). Finally, two multiple mediation models were run in serial to test the direct and indirect effects of self-perceptions of aging on symptoms of depression (Model 1) and anxiety (Model 2) through the variables perceived control and pleasant activities. To control for the potential effect of other variables, the following covariates were introduced in both models: gender, age, marital status, educational level, and employment status. Marital status was included with all its categories in the descriptive analyses but was dichotomized as partner/non-partner for Pearson correlations and both models. As recommended by Hayes (2018), 95% confidence intervals were used to test the indirect effects and 10,000 bootstrapping samples were generated. All contrasts were performed with a significance level (α) equal to .05.

Results

Descriptive Analysis of Sociodemographic Variables

Regarding the marital status of the 315 participants (100%), 63.2% of them were married, 6.3% were widowed, 8.9% were single, 10.1% divorced, 3.5% separated, 7% had an unmarried partner, and 1%

reported another marital status (e.g., they were in the process of divorce). Regarding educational level, 0.6% had no formal education, 6% had primary education, 12.5% had secondary education, 21.9% had completed high school, 40% had a university degree, and 19% had postgraduate studies. Finally, regarding current employment status, 55.2% of the total sample were employed, while 44.8% were not.

Correlational Analysis of the Variables and Covariates

Table 1 shows the correlations between the variables and covariates. As observed, more negative self-perceptions of aging were negatively correlated with perceived control and engagement in pleasant activities, while they were positively correlated with depressive and anxious symptomatology. Perceived control, in addition to its inverse relationship with self-perceptions of aging, was positively correlated with engagement in pleasant activities and negatively correlated with depressive symptomatology and anxiety. Pleasant activities, in addition to being negatively associated with self-perceptions of aging and positively associated with perceived control, were associated with lower depressive and anxiety symptoms. Finally, symptoms of depression and anxiety, besides being significantly related to the rest of the variables mentioned, had a significant association between them.

Regarding the covariates, being a woman was associated with higher levels of negative self-perceptions of aging as well as greater symptoms of depression and anxiety; older participants had more negative self-perceptions of aging, as did those without a partner and who were not employed; finally, individuals with lower levels of education reported engaged in pleasant activities less frequency and experienced more symptoms of depression and anxiety.

Model 1: Self-perceptions of Aging, Perceived Control and Pleasant Activities on Depressive Symptoms

The obtained findings for Model 1 are shown in Table 2 and Figure 1. The analysis of the total direct effect of self-perceptions of aging on depressive symptoms (Figure 1A) showed that higher levels of negative self-perceptions of aging were associated with higher depressive symptoms. Without including perceived control and pleasant activities, the model explained 35.6% of the total variance of depressive symptomatology ($F[6, 308] = 28.36; p < .01$).

As shown in Figure 1B, when perceived control and pleasant activities were included, the direct effect of self-perceptions of aging on depressive symptoms was still significant (Table 2). Higher levels of negative self-perceptions of aging were related to lower levels of perceived control. In addition, more negative self-perceptions of aging and less perceived control were associated with lower levels of pleasant activities. Thus, lower levels of perceived control and pleasant activities were related to higher symptoms of depression. With respect to the covariates, younger age and lower educational level were significantly associated with greater depressive symptoms (none of the others showed significant effects).

Indirect effects of negative self-perceptions of aging on depressive symptoms were found through the two proposed variables (Table 2): the first through perceived control, and the second through pleasant activities. Finally, a serial indirect effect was found through perceived control and pleasant activities (i.e., participants with worse self-perceptions of aging showed a lower level of perceived control and, in turn, a lower frequency of pleasant activities, which was associated with higher symptoms of depression). This model explained 46.1% of the total variance of depressive symptoms ($F[8, 306] = 32.65; p < .01$). Therefore, including the variables

Table 1. Correlations between the study variables and covariates

	1	2	3	4	5	6	7	8	9
1. Gender ^a	–								
2. Age	–.15**	–							
3. Marital status ^b	.17**	.04	–						
4. Educational level	–.09	–.17**	–.01	–					
5. Employment status ^c	–.02	.64**	.14*	–.16**	–				
6. Self-perceptions of aging ^d	.15**	.13*	.11*	–.06	.15**	–			
7. Perceived control	–.04	–.08	–.05	–.03	–.07	–.46**	–		
8. Pleasant activities	–.01	–.11	.04	.26**	–.02	–.26**	.22**	–	
9. Depressive symptoms	.18**	–.02	.10	–.14*	.09	.57**	–.51**	–.31**	–
10. Anxiety symptoms	.14*	–.06	.02	–.14*	.03	.45**	–.46**	–.30**	.73**

^a1 = male, 2 = female;^b1 = with a partner, 2 = without a partner;^c1 = working, 2 = not working;^dHigher scores indicate higher levels of negative self-perceptions of aging.* $p < .05$;** $p < .01$.**Table 2.** Direct and indirect effects of the relationship between self-perceptions of aging and depressive symptoms across perceived control and pleasant activities

				Bootstrapping	
				S. C.	95% L
Total direct effect					
Self-perceptions of aging	Depressive symptoms		.56**	3.40	4.76
Direct effects					
Self-perceptions of aging	Depressive symptoms		.38**	2.04	3.46
Self-perceptions of aging	Perceived control		−.46**	−3.11	−1.98
Self-perceptions of aging	Pleasant activities		−.20**	−.85	−.21
Perceived control	Pleasant activities		.14*	.01	.12
Perceived control	Depressive symptoms		−.32**	−.54	−.29
Pleasant activities	Depressive symptoms		−.14**	−.63	−.13
Gender	Depressive symptoms		.07	−.39	3.73
Age	Depressive symptoms		−.18**	−.30	−.08
Marital status	Depressive symptoms		.03	−1.37	2.76
Educational level	Depressive symptoms		−.10*	−1.35	−.08
Employment status	Depressive symptoms		.10	−.16	4.73
Serial indirect effects					
Self-perceptions of aging	Perceived control	Depressive symptoms	.15	.09	.21
Self-perceptions of aging	Pleasant activities	Depressive symptoms	.03	.01	.05
Self-perceptions of aging	Perceived control—Pleasant activities	Depressive symptoms	.01	.00	.02
Total serial indirect effects			.18	.12	.25

Note: L = lower; S.C. = standardized coefficients; U = upper.

* $p < .05$;** $p < .01$.

analyzed for understanding the association between self-perceptions of aging and depressive symptoms, the total variance explained for depressive symptomatology increased from 35.6% to 46.1%, while the standardized regression weight of self-perceptions of aging on symptoms of depression decreased from .56 to .38.

Model 2: Self-perceptions of Aging, Perceived Control and Pleasant Activities on Anxiety Symptoms

The results of Model 2 are shown in Table 3 and Figure 2. The total direct effect of self-perceptions of aging on anxious symptomatology (Figure 2A) showed that higher levels of negative self-perceptions of

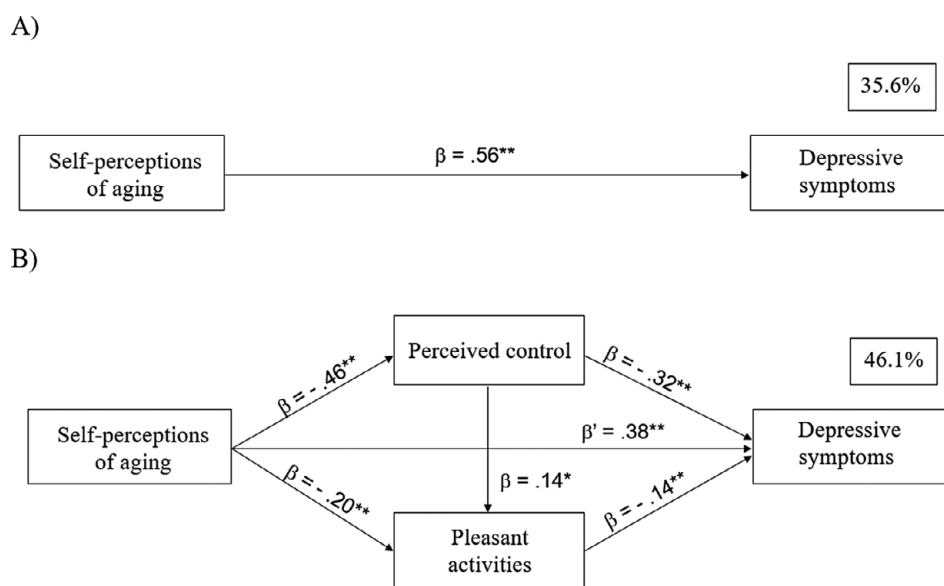


Figure 1. A) Total direct effect of self-perceptions of aging on depressive symptomatology. B) Direct and indirect effects of self-perceptions of aging on depressive symptomatology through perceived control and pleasant activities.

Note: Covariates have been included in the model, but have not been represented graphically to facilitate its understanding; * $p < .05$; ** $p < .01$.

aging were related to the presence of higher anxious symptomatology. Without considering perceived control and pleasant activities, the model explains 23.9% of the total variance of anxious symptomatology ($F[6, 308] = 16.10$; $p < .01$).

Regarding the model analysis incorporating perceived control and pleasant activities (Table 3, Figure 2B), the results showed that higher levels of negative self-perceptions of aging were associated with lower levels of perceived control and increased anxious

Table 3. Direct and indirect effects of the relationship between self-perceptions of aging and anxiety symptoms across perceived control and pleasant activities

			S.C.	Bootstrapping	
				95% L	95% U
Total direct effect					
Self-perceptions of aging	Anxiety symptoms		.45**	1.37	2.17
Direct effects					
Self-perceptions of aging	Anxiety symptoms		.27**	.63	1.46
Self-perceptions of aging	Perceived control		−.46**	−3.11	−1.98
Self-perceptions of aging	Pleasant activities		−.20**	−.85	−.21
Perceived control	Pleasant activities		.14*	.01	.12
Perceived control	Anxiety symptoms		−.32**	−.30	−.15
Pleasant activities	Anxiety symptoms		−.14**	−.36	−.07
Gender	Anxiety symptoms		.04	−.66	1.77
Age	Anxiety symptoms		−.21**	−.18	−.05
Marital status	Anxiety symptoms		−.03	−1.63	.80
Educational level	Anxiety symptoms		−.12*	−.83	−.08
Employment status	Anxiety symptoms		.09	−.41	2.47
Serial indirect effects					
Self-perceptions of aging	Perceived control	Anxiety symptoms	.15	.09	.21
Self-perceptions of aging	Pleasant activities	Anxiety symptoms	.03	.01	.06
Self-perceptions of aging	Perceived control—Pleasant activities		.01	.00	.02
Total serial indirect effects			.18	.13	.25

Note: L = lower; S.C. = standardized coefficients; U = upper.

* $p < .05$;

** $p < .01$.

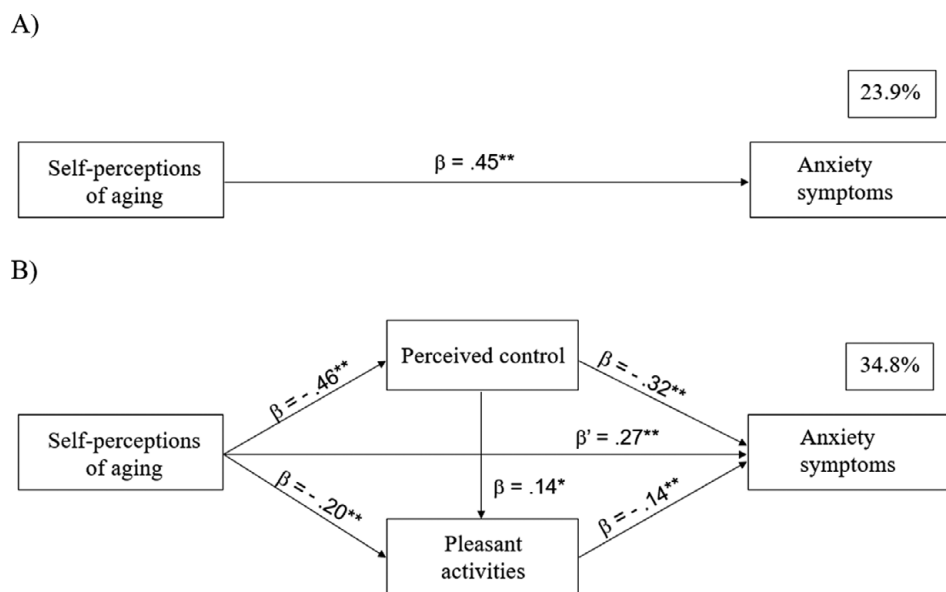


Figure 2. A) Total direct effect of self-perceptions of aging on anxiety symptomatology. B) Direct and indirect effects of self-perceptions of aging on anxiety symptomatology through perceived control and pleasant activities.

Note: Covariates have been included in the model, but have not been represented graphically to facilitate its understanding; * $p < .05$; ** $p < .01$.

symptoms. In turn, more negative self-perceptions of aging and less perceived control were related to reduced frequency of pleasant activities. Also, lower levels of perceived control and lower frequency of pleasant activities were associated with higher levels of anxious symptoms. With respect to the covariates, higher levels of anxiety symptoms were associated with younger age and lower educational level (none of the other covariates were significant).

Finally, indirect effects of negative self-perceptions of aging on anxiety symptoms were identified (Table 3) through perceived control and pleasant activities. Additionally, a serial indirect effect was observed, operating through perceived control and then pleasant activities (i.e., more negative self-perceptions of aging were associated with lower levels of perceived control and, in turn, to lower pleasant activities, which were associated with higher symptoms of anxiety). This model explained 34.8% of the total variance of anxiety symptoms ($F[8, 306] = 20.37$; $p < .01$). Thus, considering the variables analyzed in this model to understand the relationship between self-perceptions of aging and anxious symptoms, the total explained variance of anxiety symptomatology increased from 23.9% to 34.8%, and the standardized regression weight of self-perceptions of aging on symptoms of anxiety decreased from .45 to .27.

Discussion

The objective of this study was to examine the role of perceived control and engagement in pleasant activities in the relationship between negative self-perceptions of aging and symptoms of depression and anxiety in middle-aged and older adults. To achieve this, a serial analysis was conducted to examine the direct and indirect effects of self-perceptions of aging on distress, through perceived control and pleasant activities.

The findings align with previous research, demonstrating a strong association between negative self-perceptions of aging and symptoms of depression and anxiety. For instance, in a sample of individuals aged 60 and above, Bryant et al. (2012) observed that those with more positive views on aging scored lower on both the

Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) and the Geriatric Anxiety Inventory (GAI; Pachana et al., 2007). These results are also consistent with other studies (Levy et al., 2014, 2019).

The data also revealed a significant inverse relationship between negative self-perceptions of aging and both perceived control and engagement in pleasant activities. These findings are consistent with previous research. For instance, previous studies identified a connection between negative self-perceptions of aging and reduced levels of perceived control (Lee et al., 2020; Luo et al., 2020) as well as lower frequency of pleasant activities (De Paula Couto et al., 2022; Hicks & Siedlecki, 2017; Lee et al., 2020; Robertson & Kenny, 2016). The results further indicate that participants with lower levels of perceived control and engagement in pleasant activities also exhibited higher levels of depressive and anxious symptoms, consistent with prior research (e.g., Col et al., 2022; Dupuis & Smale, 1995; Kim et al., 2020; Kwak et al., 2014; Lachman & Weaver, 1998; Yoshida et al., 2021; Zautra et al., 2012).

Finally, regarding the main objective of the present study, the results suggest that the relationship between self-perceptions of aging and symptoms of depression and anxiety was indirect and serial through the perception of control and the frequency of pleasant activities. This means that higher levels of negative self-perceptions of aging were associated with lower levels of perceived control, which in turn were associated with lower engagement in pleasant activities, related to more symptoms of depression and anxiety. Moreover, the results showed that the standardized regression coefficient for self-perceptions of aging on depression and anxiety symptoms decreased when perceived control and pleasant activities were added to the models. Additionally, the percentage of variance in distress increased when the variables perceived control and frequency of pleasant activities were included, rising from 35.6% to 46.1% for depressive symptoms and from 23.9% to 34.8% for anxiety symptoms. These findings align with what Kwak et al. (2014), who highlighted the explanatory role of perceived control in the relationship between self-perceptions of aging and depressive symptoms, as well as with what Rodin (1986) stated, that

the impact of perceived control on mental health indicators could be explained by people's activity levels.

With respect to covariates, the results showed that higher levels of negative self-perceptions of aging were associated with being female, older, not having paid work, and not having a partner. Associations were also found between psychological distress and being female and having a low level of education. The fact that women report higher levels of self-perceptions of aging and more emotional distress could be explained in the context of the double standard of aging hypothesis (Settersten et al., 2020; Sontag, 1979) that suggests that women's aging process is perceived more negatively than men's aging process. The Stereotype-Embodiment Theory (Levy, 2009) also supports the idea that older individuals have stronger self-perceptions of aging, as these perceptions become more self-relevant upon reaching the final stage of the life cycle. Regarding marital status, our findings are coherent with other studies suggesting that being married is associated with more positive attitudes toward aging (Bryant et al., 2012). Finally, our findings align with research demonstrating associations between higher educational levels and better mental health in older adult samples (Cui et al., 2019; Sperandei et al., 2023). In relation to the indirect effects models, the only covariates with a significant impact on symptoms of depression and anxiety were low educational level (discussed above) and younger age. Regarding age, the findings align with those of Losada-Baltar et al. (2021), who found that younger participants presented higher levels of loneliness and distress. These data can be explained through the Socioemotional Selectivity Theory (Carstensen et al., 1999; Löckenhoff & Carstensen, 2004), which states that, as one progresses through the life cycle, one develops a series of strategies (e.g., smaller but closer social networks) that preserve psychological well-being and life satisfaction in the later stages of life.

The results of this study have practical implications. Given the importance of self-perceptions of aging, perceived control, and pleasant activities in explaining psychological distress among middle-aged and older adults, these variables should be considered key therapeutic targets for addressing symptoms of depression and anxiety in this population. Thus, to work on self-perceptions of aging, the guidelines developed by Laidlaw and Kishita (2015), which establishes the importance of considering this construct to enhance the benefits of psychological therapy for older people, which could be rather useful. Strategies for addressing and enhancing perceived control throughout adulthood (e.g., Robinson & Lachman, 2017; Zautra et al., 2012), which could be negatively impacted by losses and role transitions (e.g., retirement, onset of health problems, etc.) should also be considered in these interventions. These strategies could be integrated with empirically supported therapies aimed at promoting behavioral activation in older adults (e.g., Orgeta et al., 2017), which have been shown to be significantly associated with reducing emotional distress in this population.

Although the present study provides relevant data that contributes to the available scientific literature, it has several limitations. The convenience nature of the sample limits the representativeness of the sample and, therefore, the generalizability of the obtained results. The cross-sectional design of the study does not allow causal inferences to be tested and drawn and, with respect to the data analysis used in the present study, it does not allow the mediating role of the variables involved to be tested, merely data supporting their indirect effects to be found. Furthermore, the cross-sectional nature of the study does not allow for determining the direction of

the relationships between variables. Other indirect effects models have been performed (see [Supplementary Material](#)), which show that placing perceived control and pleasant activities as independent variables, with self-perceptions of aging as a mediator, and symptoms of depression and anxiety as dependent variables, the results remain significant. Therefore, the results and these supplementary analyses indicate a clear interaction between these variables, which ultimately appears to contribute to psychological distress. However, experimental and longitudinal studies are needed to properly determine the direction and causality between the assessed variables. It is also necessary to mention that the sample of the present study has a wide age range. Although there is research that studied self-perceptions of aging in people of very different ages (e.g., Kotter-Grühn & Hess, 2012; Losada-Baltar et al., 2021; Sargent-Cox & Anstey, 2015), future studies with enough statistical power should perform analyses testing the potential differential impact that self-perceptions of aging may have on psychological stress, controlling for mediating variables, by age group. Data collection took place during a period when several COVID-19-related restrictions were still in effect, which may have influenced the obtained results. As previous longitudinal findings suggest that a stressful situation such as COVID-19 might have a special impact on people with negative self-perceptions of aging (Losada-Baltar et al., 2022), future studies should consider replicating the obtained findings in a different general context to the one experienced during the pandemic. Finally, additional variables that could significantly contribute to explaining psychological distress, such as loneliness, social support, or physical health, were not included in this study. Future studies should examine whether the observed findings in this study persist after controlling for these variables.

Despite the above-mentioned limitations, the results are congruent with and provide additional support for the Stereotype-Embodiment Theory (Levy, 2009). Self-perceptions of aging influence psychological health through multiple pathways, including cognitive (perceived control) and behavioral (pleasant activities) paths. Although the indirect role of perceived control has been addressed by other studies (e.g., Levy, Slade & Kasl, 2002), the frequency of pleasant activities is a genuinely novel variable in this relationship. Negative self-perceptions of aging may adversely impact the mental health of middle-aged and older adults by activating maladaptive processes that decrease perceived control, which in turn reduce the chances of engaging in pleasant activities.

Supplementary Material. To view supplementary material for this article, please visit <http://doi.org/10.1017/SJP.2025.9>.

Data availability statement. The study materials, analytic methods, and data are available from the corresponding author for reproducing the results, replicating the procedure, or upon reasonable request.

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Competing interest. The authors declare none.

References

- Bryant, C., Bei, B., Gilson, K., Komiti, A., Jackson, H., & Judd, F. (2012). The relationship between attitudes to aging and physical and mental health in older adults. *International Psychogeriatrics*, *24*(10), 1674–1683. <https://doi.org/10.1017/S1041610212000774>
- Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*, *54*(3), 165–181. <https://doi.org/10.1037/0003-066X.54.3.165>
- Chang, E. S., Kanno, S., Levy, S., Wang, S. Y., Lee, J. E., & Levy, B. R. (2020). Global reach of ageism on older persons' health: A systematic review. *Plos One*, *15*(1), e0220857. <https://doi.org/10.1371/journal.pone.0220857>
- Chang, P. J., Wray, L., & Lin, Y. (2014). Social relationships, leisure activity, and health in older adults. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *33*(6), 516–523. <https://doi.org/10.1037/hea0000051>
- Chattillion, E. A., Mausbach, B. T., Roepke, S. K., von Känel, R., Mills, P. J., Dimsdale, J. E., Allison, M., Ziegler, M. G., Patterson, T. L., Ancoli-Israel, S., & Grant, I. (2012). Leisure activities, caregiving demands and catecholamine levels in dementia caregivers. *Psychology & Health*, *27*(10), 1134–1149. <https://doi.org/10.1080/08870446.2011.637559>
- Chen, Y. T., Holahan, C. K., Holahan, C. J., & Li, X. (2018). Leisure-time physical activity, subjective age, and self-rated memory in middle-aged and older adults. *International Journal of Aging & Human Development*, *87*(4), 377–391. <https://doi.org/10.1177/0091415017752939>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed). Lawrence Erlbaum Associates. <https://doi.org/10.4324/9780203771587>
- Col, B. K., Kose, B. G., & Basaran, A. G. (2022). The effect of leisure activities on successful aging. *Nigerian Journal of Clinical Practice*, *25*(11), 1904–1910. https://doi.org/10.4103/njcp.njcp_384_22
- Cui, S., Wang, R., Lu, L., Wang, H., & Zhang, Y. (2019). Influence of education level on mental health and medical coping modes: A correlation analysis in the elderlies. *American Journal of Nursing Science*, *8*(6), 324–328. <https://doi.org/10.11648/J.AJNS.20190806.16>
- De Paula Couto, M. C. P., Ekerdt, D. J., Fung, H. H., Hess, T. M., & Rothermund, K. (2022). What will you do with all that time? Changes in leisure activities after retirement are determined by age-related self-views and preparation. *Acta Psychologica*, *231*, 103795. <https://doi.org/10.1016/j.actpsy.2022.103795>
- Drewelies, J., Wagner, J., Tesch-Römer, C., Heckhausen, J., & Gerstorf, D. (2017). Perceived control across the second half of life: The role of physical health and social integration. *Psychology and Aging*, *32*(1), 76–92. <https://doi.org/10.1037/pag0000143>
- Dupuis, S. L., & Smale, B. J. A. (1995). An examination of relationship between psychological well-being and depression and leisure activity participation among older adults. *Loisir et Société/Society and Leisure*, *18*(1), 67–92. <https://doi.org/10.1080/07053436.1995.10715491>
- Fernandes-Pires, J. A., del Sequeros Pedroso-Chaparro, M., Jiménez-Gonzalo, L., Márquez-González, M., Cabrera, I., & Losada-Baltar, A. (2023). Marital satisfaction and mental health in adults over 40 years old. Associations with self-perceptions of aging and stress related to the covid-19 pandemic. *The Spanish Journal of Psychology*, *26*, e14. <https://doi.org/10.1017/SJP.2023.13>
- Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). The Guilford Press.
- Hicks, S. A., & Siedlecki, K. L. (2017). Leisure activity engagement and positive affect partially mediate the relationship between positive views on aging and physical health. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *72*(2), 259–267. <https://doi.org/10.1093/geronb/gbw049>
- Infurna, F. J., & Okun, M. A. (2015). Antecedents and outcomes of level and rates of change in perceived control: The moderating role of age. *Developmental Psychology*, *51*(10), 1420–1437. <https://doi.org/10.1037/a0039530>
- Kim, J., Kim, J., & Han, A. (2020). Leisure time physical activity mediates the relationship between neighborhood social cohesion and mental health among older adults. *Journal of Applied Gerontology: The Official Journal of the Southern Gerontological Society*, *39*(3), 292–300. <https://doi.org/10.1177/0733464819859199>
- Kornadt, A. E., Albert, I., Hoffmann, M., Murdock, E., & Nell, J. (2021). Ageism and older people's health and well-being during the Covid-19-pandemic: The moderating role of subjective aging. *European Journal of Ageing*, *18*(2), 173–184. <https://doi.org/10.1007/s10433-021-00624-8>
- Kotter-Grühn, D., & Hess, T. M. (2012). The impact of age stereotypes on self-perceptions of aging across the adult lifespan. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *67*(5), 563–571. <https://doi.org/10.1093/geronb/gbr153>
- Kuykendall, L., Tay, L., & Ng, V. (2015). Leisure engagement and subjective well-being: A meta-analysis. *Psychological Bulletin*, *141*(2), 364–403. <https://doi.org/10.1037/a0038508>
- Kwak, M., Ingersoll-Dayton, B., & Burgard, S. (2014). Receipt of care and depressive symptoms in later life: The importance of self-perceptions of aging. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *69*(2), 325–335. <https://doi.org/10.1093/geronb/gbt128>
- Lachman, M. E., & Weaver, S. L. (1998). The sense of control as a moderator of social class differences in health and well-being. *Journal of Personality and Social Psychology*, *74*(3), 763–773. <https://doi.org/10.1037/0022-3514.74.3.763>
- Laidlaw, K., & Kishita, N. (2015). Age-appropriate augmented cognitive behavior therapy to enhance treatment outcome for late-life depression and anxiety disorders. *The Journal of Gerontopsychology and Geriatric Psychiatry*, *28*(2), 57–66. <https://doi.org/10.1024/1662-9647/a000128>
- Lee, S., Lee, C., & An, J. (2020). Psycho-social correlates of leisure-time physical activity (LTPA) among older adults: A multivariate analysis. *European Review of Aging and Physical Activity: Official Journal of the European Group for Research into Elderly and Physical Activity*, *17*, 6. <https://doi.org/10.1186/s11556-020-00238-6>
- Levy, B. (2009). Stereotype embodiment: A psychosocial approach to aging. *Current Directions in Psychological Science*, *18*(6), 332–336. <https://doi.org/10.1111/j.1467-8721.2009.01662.x>
- Levy, B. R. (2003). Mind matters: Cognitive and physical effects of aging self-stereotypes. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *58*(4), P203–P211. <https://doi.org/10.1093/geronb/58.4.p203>
- Levy, B. R., Chung, P. H., Slade, M. D., Van Ness, P. H., & Pietrzak, R. H. (2019). Active coping shields against negative aging self-stereotypes contributing to psychiatric conditions. *Social Science & Medicine*, *228*, 25–29. <https://doi.org/10.1016/j.socscimed.2019.02.035>
- Levy, B. R., Pilver, C. E., & Pietrzak, R. H. (2014). Lower prevalence of psychiatric conditions when negative age stereotypes are resisted. *Social Science & Medicine*, *119*, 170–174. <https://doi.org/10.1016/j.socscimed.2014.06.046>
- Levy, B. R., Slade, M. D., & Kasl, S. V. (2002a). Longitudinal benefit of positive self-perceptions of aging on functional health. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *57*(5), P409–P417. <https://doi.org/10.1093/geronb/57.5.p409>
- Levy, B. R., Slade, M. D., Kunkel, S. R., & Kasl, S. V. (2002b). Longevity increased by positive self-perceptions of aging. *Journal of Personality and Social Psychology*, *83*(2), 261–270. <https://doi.org/10.1037/0022-3514.83.2.261>
- Liang, J., & Bollen, K. A. (1983). The structure of the philadelphia geriatric center morale scale: A reinterpretation. *Journal of Gerontology*, *38*(2), 181–189. <https://doi.org/10.1093/geronj/38.2.181>
- Löckenhoff, C. E., & Carstensen, L. L. (2004). Socioemotional selectivity theory, aging, and health: The increasingly delicate balance between regulating emotions and making tough choices. *Journal of Personality*, *72*(6), 1395–1424. <https://doi.org/10.1111/j.1467-6494.2004.00301.x>
- Logsdon, R. G., & Teri, L. (1997). The pleasant events schedule-AD: Psychometric properties and relationship to depression and cognition in Alzheimer's

- disease patients. *The Gerontologist*, 37(1), 40–45. <https://doi.org/10.1093/geront/37.1.40>
- Losada, A., de los Angeles Villareal, M., Nuevo, R., Márquez-González, M., Salazar, B. C., Romero-Moreno, R., Carrillo, A. L., & Fernández-Fernández, V. (2012). Cross-cultural confirmatory factor analysis of the CES-D in Spanish and Mexican dementia caregivers. *The Spanish Journal of Psychology*, 15(2), 783–792. https://doi.org/10.5209/rev_sjop.2012.v15.n2.38890
- Losada-Baltar, A., Jiménez-Gonzalo, L., Gallego-Alberto, L., Pedroso-Chaparro, M. D. S., Fernandes-Pires, J., & Márquez-González, M. (2021). “We are staying at home.” Association of self-perceptions of aging, personal and family resources, and loneliness with psychological distress during the lock-down period of COVID-19. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 76(2), e10–e16. <https://doi.org/10.1093/geronb/gbaa048>
- Losada-Baltar, A., Martínez-Huertas, J. Á., Jiménez-Gonzalo, L., Pedroso-Chaparro, M. S., Gallego-Alberto, L., Fernandes-Pires, J., & Márquez-González, M. (2022). Longitudinal correlates of loneliness and psychological distress during the lockdown situation due to COVID-19. Effects of age and self-perceptions of aging. *The Journals of Gerontology. Series B*, 77(4), 652–660. <https://doi.org/10.1093/geronb/gbab012>
- Luo, M. S., Li, L. W., & Chui, E. W. T. (2020). Self-perceptions of aging and control of life in late adulthood: Between-person and within-person associations. *Journal of Aging and Health*, 32(9), 1275–1281. <https://doi.org/10.1177/0898264320917303>
- Márquez-González, M., Losada, A., Fernández-Fernández, V., & Pachana, N. A. (2012). Psychometric properties of the Spanish version of the Geriatric Anxiety Inventory. *International Psychogeriatrics*, 24(1), 137–144. <https://doi.org/10.1017/S1041610211001505>
- Orgeta, V., Brede, J., & Livingston, G. (2017). Behavioural activation for depression in older people: Systematic review and meta-analysis. *The British Journal of Psychiatry: The Journal of Mental Science*, 211(5), 274–279. <https://doi.org/10.1192/bjp.bp.117.205021>
- Pachana, N. A., Byrne, G. J., Siddle, H., Koloski, N., Harley, E., & Arnold, E. (2007). Development and validation of the geriatric anxiety inventory. *International Psychogeriatrics*, 19(1), 103–114. <https://doi.org/10.1017/S1041610206003504>
- Pedroso-Chaparro, M. D. S., Antón-López, J. C., Cabrera, I., Márquez-González, M., Martínez-Huertas, J. Á., & Losada-Baltar, A. (2023a). ‘I feel old and have aging stereotypes’. Internalized aging stereotypes and older adults’ mental health: The mediational role of loneliness. *Aging & Mental Health*, 27(8), 1619–1626. <https://doi.org/10.1080/13607863.2022.2163376>
- Pedroso-Chaparro, M. D. S., Cabrera, I., Fernandes-Pires, J. A., Márquez-González, M., & Losada-Baltar, A. (2023b). Validation of the Spanish version of the Perceived Control Scale: Perceived constraints on personal control and perceived mastery. *Aging & Mental Health*, 28(2), 377–383. <https://doi.org/10.1080/13607863.2023.2262947>
- Pedroso-Chaparro, M. D. S., Cabrera, I., Márquez-González, M., Vara-García, C., Fernandes-Pires, J. A., Gallego-Alberto, L., & Losada-Baltar, A. (2022). Culpa por percibirse como una carga. Una variable relevante asociada al malestar psicológico de las personas mayores. *Revista Española de Geriatria y Gerontología*, 57(6), 303–311. <https://doi.org/10.1016/j.regg.2022.09.003>
- Pedroso-Chaparro, M. D. S., Márquez-González, M., Vara-García, C., Cabrera, I., Romero-Moreno, R., Barrera-Caballero, S., & Losada, A. (2021). Guilt for perceiving oneself as a burden in healthy older adults. Associated factors. *Aging & Mental Health*, 25(12), 2330–2336. <https://doi.org/10.1080/13607863.2020.1822291>
- Radloff, L. S. (1977). The CES-D Scale a self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1, 385–401. <https://doi.org/10.1177/014662167700100306>
- Robertson, D. A., & Kenny, R. A. (2016). “I’m too old for that”—The association between negative perceptions of aging and disengagement in later life. *Personality and Individual Differences*, 100, 114–119. <https://doi.org/10.1016/j.paid.2016.03.096>
- Robinson, S. A., & Lachman, M. E. (2017). Perceived control and aging: A mini-review and directions for future research. *Gerontology*, 63(5), 435–442. <https://doi.org/10.1159/000468540>
- Rodin, J. (1986). Aging and health: Effects of the sense of control. *Science*, 233(4770), 1271–1276. <https://doi.org/10.1126/science.3749877>
- Rothermund, K., de Paula Couto, M. C. P., Fung, H. H., Graf, S., Hess, T. M., Liou, S., & Nikitin, J. (2021). Age-related attributions of experienced changes in life: Origins and implications. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 76(5), 881–893. <https://doi.org/10.1093/geronb/gbaa160>
- Sala, G., Jopp, D., Gobet, F., Ogawa, M., Ishioka, Y., Masui, Y., Inagaki, H., Nakagawa, T., Yasumoto, S., Ishizaki, T., Arai, Y., Ikebe, K., Kamide, K., & Gondo, Y. (2019). The impact of leisure activities on older adults’ cognitive function, physical function, and mental health. *Plos One*, 14(11), e0225006. <https://doi.org/10.1371/journal.pone.0225006>
- Sánchez Palacios, C., Trianes Torres, M. V., & Blanca Mena, M. J. (2009). Negative aging stereotypes and their relation with psychosocial variables in the elderly population. *Archives of Gerontology and Geriatrics*, 48(3), 385–390. <https://doi.org/10.1016/j.archger.2008.03.007>
- Sargent-Cox, K., & Anstey, K. J. (2015). The relationship between age-stereotypes and health locus of control across adult age-groups. *Psychology & Health*, 30(6), 652–670. <https://doi.org/10.1080/08870446.2014.974603>
- Settersten, R., Day, J., & Hagestad, G. (2020). The double standard of aging for men and women: Evidence from Across Europe, 2006–2018. *Innovation in Aging*, 4(Suppl 1), 556–557. <https://doi.org/10.1093/geroni/igaa057.1829>
- Smith, J., Fisher, G., Ryan, L., Clarke, P., House, J., & Weir, D. (2013). *Psychosocial and Lifestyle Questionnaire*. Survey Research Center, Institute for Social Research.
- Sontag, S. (1979). The double standard of aging. In J. Williams (Ed.), *Psychology of women* (pp. 462–478). Academic Press.
- Sperandei, S., Page, A., Spittal, M. J., & Pirkis, J. (2023). Low education and mental health among older adults: The mediating role of employment and income. *Social Psychiatry and Psychiatric Epidemiology*, 58(5), 823–831. <https://doi.org/10.1007/s00127-021-02149-y>
- Vauclair, C. M., Marques, S., Lima, M. L., Abrams, D., Swift, H., & Bratt, C. (2015). Perceived age discrimination as a mediator of the association between income inequality and older people’s self-rated health in the European Region. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 70(6), 901–912. <https://doi.org/10.1093/geronb/gbu066>
- Wurm, S., & Schäfer, S. K. (2022). Gain- but not loss-related self-perceptions of aging predict mortality over a period of 23 years: A multidimensional approach. *Journal of Personality and Social Psychology*, 123(3), 636–653. <https://doi.org/10.1037/pspp0000412>
- Yoshida, Y., Iwasa, H., Ishioka, Y., & Suzukamo, Y. (2021). Leisure activity moderates the relationship between living alone and mental health among Japanese older adults. *Geriatrics & Gerontology International*, 21(5), 421–425. <https://doi.org/10.1111/ggi.14151>
- Zautra, A. J., Davis, M. C., Reich, J. W., Sturgeon, J. A., Arewasikporn, A., & Tennen, H. (2012). Phone-based interventions with automated mindfulness and mastery messages improve the daily functioning for depressed middle-aged community residents. *Journal of Psychotherapy Integration*, 22(3), 206–228. <https://doi.org/10.1037/a0029573>
- Zhai, T., Bailey, P. E., Rogers, K. D., & Kneebone, I. I. (2022). Validation of the geriatric anxiety inventory in younger adults. *International Journal of Behavioral Development*, 46(2), 148–156. <https://doi.org/10.1177/01650254211064348>
- Zhu, M., Chen, H., Ding, X., & Li, Z. (2024). Effects of self-perception of aging interventions in older adults: A systematic review and meta-analysis. *The Gerontologist*, 65(4), gnae127. <https://doi.org/10.1093/geront/gnae127>