Development and Validation of the Aging Stereotypes and Exercise Scale

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This article presents the development and validation of the Aging Stereotypes and Exercise Scale (ASES), which measures different dimensions of aging stereotypes in the exercise domain. Drawing on past research on older adults’ perceived barriers to exercise, these dimensions include stereotypes about positive and negative exercise outcomes for older adults and about older adults’ psychological barriers to exercise (i.e., lack of self-efficacy and motivation). Four studies involving 714 participants examined the factorial structure and invariance, temporal stability, and external validity of the scale. The results supported a 3-factor model that was invariant across age. Age differences in stereotype content appeared, with older adults holding more positive stereotypes than younger adults. Also as predicted, the more older adults endorsed negative stereotypes, the lower their physical self-worth, self-rated health, and subjective age. Last, responses to the ASES appeared to be stable over a 6-wk period.

Keywords: elderly, barriers, outcomes

Adequate levels of daily physical activity may be beneficial for older adults’ health (e.g., Hogan, 2005). Indeed, regular exercise has been shown to increase muscle strength and mobility (e.g., Fiararone et al., 1994), slow the progression of functional decline (e.g., Gill et al., 2002), and promote quality of life and successful aging (e.g., Baker, Meisner, Logan, Kungl, & Weir, 2009). Despite these benefits, fewer than 40% of the individuals age 65 years or more are sufficiently active worldwide (World Health Organization, 2001). Why are older adults reluctant to exercise? We argue that negative exercise-related aging stereotypes may contribute to the low rate of participation observed among older adults, and the goal of the current study was to develop a scale measuring such stereotypes.

The assumption that negative stereotypes influence exercise participation is based on the stereotype-embodiment theory (Levy, 2009). According to this model, people assimilate aging stereotypes during the socialization process, notably the belief that aging is associated with an inevitable functional decline (e.g., Löckenhoff...
et al., 2009). In other words, people learn stereotypes from the surrounding culture without questioning their veridicality, since it is not necessary to do so as a younger person. These beliefs have important consequences when entering old age. Indeed, negative aging stereotypes held earlier in life may predict worse health in older individuals (Levy, Zonderman, Slade, & Ferrucci, 2009). This influence is assumed to occur because as individuals age, they direct aging stereotypes at themselves, which gives rise to negative self-perceptions of aging. In turn, these self-perceptions may have long-term effects on the adoption of health-related behaviors (e.g., Levy & Myers, 2004; Wurm, Tomasik, & Tesch-Römer, 2010), functional health, and survival (e.g., Levy, Slade, & Kasl, 2002; Levy, Slade, Kunkel, & Kasl, 2002; Wurm, Tesch-Römer, & Tomasik, 2007). For example, Wurm et al. (2010) longitudinally demonstrated that positive views on aging promote physical activity (e.g., walking) among middle-aged and older adults. More particularly, they showed that older adults with worse health walked as much as those with good health, provided they had a positive view on aging, in other words, that they viewed aging as a time of personal growth and development.

Self-perceptions of aging are close to the concept of stereotype; however, these two constructs should not be confounded, as aging stereotypes refer to beliefs about older adults in general. Although the relationships between self-perceptions of aging and exercise participation have been documented, little is known about how endorsement of aging stereotypes affects exercise participation. Only one study to our knowledge has examined this question (Sanchez Palacios, Trianes Torres, & Blanca Mena, 2009). The results confirmed that the more older adults endorse negative stereotypes, the less they report exercising. However, the stereotypes examined in that study were not specific to exercise but were instead related to health, social activity, and personality. We argue that aging stereotypes in the exercise domain may be an important factor of exercise-related behaviors. Although this question has not been investigated, past research on perceived barriers to exercise provides support for this assumption. For example, older adults often report barriers such as “I am not the sporty type” or “I am too old to exercise” (e.g., Booth, Bauman, & Owen, 2002; Netz, Zeev, Arnon, & Tenenbaum, 2008) as reasons for not exercising. In line with the stereotype-embodiment theory (Levy, 2009), these negative self-perceptions could reflect the internalization of stereotypes of older adults as not capable of exercising. Given the importance of such beliefs in predicting exercise participation, more research is needed to better understand them.

What is the content of exercise-related aging stereotypes? Several measures of aging stereotypes exist (e.g., Kruse & Schmitt, 2006; Palmore, 1990), but no scale to our knowledge specifically focuses on exercise-related stereotypes. Existing aging-stereotype scales may sometimes include a measure of older adults’ physical abilities (e.g., “Physical strength tends to decline in old age,” Palmore, 1990). However, we hypothesize that these beliefs are not the whole picture of exercise-related stereotypes. Indeed, exercise-related aging stereotypes may include other components such as beliefs about older adults’ self-efficacy (i.e., Are they confident in their ability to exercise?), motivation for exercising (i.e., Do they want to exercise regularly?), and so on. It therefore seems necessary to develop an instrument that assesses the various dimensions of aging stereotypes in the exercise domain to have a more precise picture of their content and to deepen our understanding of their role in exercise-related behaviors. The goal of the current research was to
develop a scale measuring these stereotypes: the Aging Stereotypes and Exercise Scale (ASES).

**Development and Validation of the ASES**

Given the assumption that older adults’ perceived barriers to exercise partly reflect internalization of aging stereotypes, we considered that the content of these stereotypes would closely reflect such barriers. Therefore, the development of the ASES was based on the literature on subjective barriers to exercise among older adults (e.g., Booth et al., 2002; Cohen-Mansfield, Marx, & Guralnik, 2003; Netz et al., 2008; O’Brien Cousins, 2003; Vlachopoulos, Letsiou, Palaiologou, Leptokaridou, & Gigoudi, 2010). These studies have usually been based on self-efficacy theory (Bandura, 1997), which holds that behavior is influenced by two main factors: the expectation that a particular behavior will lead to certain outcomes (i.e., outcome expectation) and the conviction that one can successfully execute the behavior (i.e., self-efficacy expectation). In other words, older adults are reluctant to exercise when they perceive no benefits associated with this activity or when they believe they are not capable of exercising. The objective was thus to investigate whether there are shared beliefs in the general population (i.e., stereotypes) that reflect these two types of barriers. More particularly, the ASES measures stereotypes about exercise outcomes for older adults and their ability to exercise on a regular basis.

First, the development of items to measure exercise outcomes was inspired by existing scales such as the Older Persons’ Attitudes Toward Physical Activity and Exercise Questionnaire (OPATPAEQ; Terry, Biddle, Chatzisarantis, & Bell, 1997) and the Outcome Expectations for Exercise Scale-2 (OEES-2; Resnick, 2005). As in the latter scale, the ASES measures perceived positive outcomes (e.g., Does exercise enhance physical fitness? mood?) and perceived negative outcomes (e.g., Does exercise cause pain?) of exercise. However, the ASES differs from these scales in important regards: Whereas the OPATPAEQ and the OEES-2 assess older adults’ personal beliefs about exercise outcomes, the ASES measures people’s stereotypes about exercise outcomes in older adults. Second, the development of items to assess older adults’ abilities focused on two types of abilities: physical and psychological. More precisely, we initially wanted to assess whether people think that older adults have the physical abilities required to exercise regularly (i.e., physical ability stereotype), feel confident in their ability to support the demands associated with exercise (i.e., self-efficacy stereotype), and are motivated to exercise on a regular basis (i.e., motivation stereotype). Elaboration of these items was inspired by the Amotivation Toward Exercise Scale (ATES; Vlachopoulos & Gigoudi, 2008; Vlachopoulos et al., 2010), which measures the reasons that give rise to exercise amotivation within the framework of self-determination theory (Ryan & Deci, 2002). Again, the ASES differs from this scale as it assesses people’s stereotypes about older adults’ abilities to exercise, whereas the ATES measures older adults’ exercise-related personal beliefs.

Last, to measure stereotypes, respondents were asked to report their beliefs about exercise outcomes and older adults’ abilities to exercise in general. Although past studies have shown that the superordinate category “older adults” includes several subcategories such as severely impaired, recluse, or perfect grandparent (e.g.,
Hummert, 1990), measuring generalized beliefs about older adults is relevant as they may affect behavior (e.g., Harwood & Williams, 1998; Kruse & Schmitt, 2006).

Four studies involving 714 participants were conducted to validate the ASES. They examined the factorial structure and invariance, temporal stability, and external validity of the scale. Ethical approval was obtained for these studies along with participants’ informed written consents. These studies are described in detail herein.

**Study 1:**

**Development of a Preliminary Version of the ASES**

**Pilot Study**

A preliminary version of the ASES was first developed and included five presumed components of exercise-related aging stereotypes: positive outcomes, negative outcomes, older adults’ physical ability, self-efficacy, and motivation. Items were adapted from the OPATPAEQ, OEES-2, and ATES. Those scales do not assess aging stereotypes but instead older adults’ personal beliefs about exercise. Therefore, items were adapted so that they measure stereotypes. For example, the ATES item “I do not exercise because I do not wish to coordinate my life to regularly attend an exercise program” was substituted in the ASES with “In general, I believe that older adults are willing to organize their lives so they can regularly exercise.” Six items were elaborated for each component, resulting in a pool of 30 items. Ten students (\(M_{age} = 22.50\) years, SD = 1.08) and 10 retired individuals (\(M_{age} = 67.45\) years, SD = 5.42) assessed the clarity of each item on a 7-point scale from 1 (not clear at all) to 7 (completely clear). When an item was attributed a score lower than 5, participants were invited to explain why they attributed this score. After this evaluation, three items were modified and the clarity of the new version was again evaluated by 10 students and 10 retired individuals. The results showed that all of the items were evaluated as clear (\(M \geq 5.00, SD < 1.50\)). The factor structure of the preliminary version was next examined in Study 1.

**Method**

The participants were 301 individuals (117 men and 184 women) ranging in age from 23 to 76 years (\(M = 42.67, SD = 12.06\)), 221 of whom (73.4%) reported exercising at least once a week. They were recruited through an announcement sent to faculty and staff on the mailing list of the Nice Sophia Antipolis University, and all responded to the questionnaire online. The participants were teachers and researchers (40.2%), administrative staff and technicians (36.5%), or students (23.3%). They were instructed to indicate their beliefs about older adults and exercise in general (e.g., walking, running, swimming). All items were preceded by the stem “I believe that, in general. . . .” Responses were provided on a 7-point Likert scale ranging from 1 (do not agree at all) to 7 (totally agree).

**Results and Discussion**

Principal-axis factor analyses (PFA) were performed to examine the factorial structure of the preliminary version of the ASES (oblimin-type rotation). These
analyses allow the identification of latent variables as the underlying causes of the measured variables in the context of scale development (Floyd & Widaman, 1995). Before running principal-axis factor analyses, a parallel analysis (Horn, 1965) was performed to determine the number of appropriate factors that could be extracted without constraining the model. In the random distribution, values lower than the factor weights were shown only for the first three factors: Factor 1 (random value) = 1.63, PFA value = 7.03; Factor 2 (random value) = 1.55, PFA value = 3.79; Factor 3 (random value) = 1.48, PFA value = 2.17. Based on this result, we next performed principal-axis factor analyses by constraining the number of factors to three.

The four best items per factor were selected to develop a short scale that was easy to use with older individuals. This selection was based on factor loadings: Items were not retained when they showed loadings below .60 or when they loaded above this value on two factors simultaneously (Guadagnoli & Velicer, 1988). Based on these selection criteria, 12 items were retained with factor loadings >.71 on the expected factor and <.16 on the other factors (see Table 1). While both positive and negative items were generated for each factor in the initial pool, only items that were in the same direction showed appropriate loadings.

A three-factor structure emerged from the principal-axis factor analysis, whereas we initially hypothesized a five-factor scale (i.e., positive outcomes, negative outcomes, sufficient physical abilities, self-efficacy, and motivation). More specifically, the results revealed that the self-efficacy and motivation items loaded on the same factor, which was called psychological barriers. This finding seems to contradict the ATES, in which self-efficacy and motivation appeared as separate factors (Vlachopoulos & Gigoudi, 2008). This may be explained by the fact that the ASES measures generalized beliefs about older individuals while the ATES assesses specific beliefs about oneself. In other words, one may hold similar beliefs about older adults’ self-efficacy and effort while having differentiated beliefs about one’s own self-efficacy and effort. The principal-axis factor analysis also showed that items measuring negative outcomes and sufficient physical abilities loaded on the same factor. This suggests that believing that exercise may be dangerous is similar to believing that older adults’ physical abilities are not sufficient to meet the demands of exercise. This factor was called risks of exercise. The third factor regrouped items measuring the positive psychological and physical outcomes associated with exercise and was called benefits of exercise.

At least 50% of the total variance should be explained by the extracted factors (Streiner, 1994), and this was the case in this study. Factor 1 (benefits of exercise) explained 34.16% of the variance, Factor 2 (risks of exercise) explained 21.17% of the variance, and Factor 3 (psychological barriers) explained 13.10% of the variance.

**Study 2: Factorial Structure of the ASES**

The goal of Study 2 was to confirm the factorial structure of the 12-item scale developed in Study 1 through confirmatory factor analyses (CFA). To ascertain the generalizability of the instrument, a different sample was surveyed in Study 2. This sample was broader in age, exercise participation, and education than the sample in Study 1. Study 2 also tested the invariance of the factorial structure across age, along with the internal consistency of each subscale. Finally, Study 2 examined the degree of agreement between participants on each subscale to determine whether there
Table 1  Descriptive Statistics and Factor Loadings of the Three-Factor Oblimin Solution of the Aging Stereotypes and Exercise Scale (ASES) in Study 1

<table>
<thead>
<tr>
<th>ASES item numbers and item wording</th>
<th>M</th>
<th>SD</th>
<th>Benefits</th>
<th>Risks</th>
<th>Psychological barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits Stereotype</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. <em>L’activité physique permet d’améliorer le moral des seniors</em> (Exercise raises older adults’ spirits).</td>
<td>6.43</td>
<td>0.78</td>
<td>–.87</td>
<td>.14</td>
<td>-.03</td>
</tr>
<tr>
<td>5. <em>L’activité physique améliore la forme physique des seniors</em> (Exercise enhances older adults’ physical fitness).</td>
<td>6.34</td>
<td>0.97</td>
<td>–.73</td>
<td>–.13</td>
<td>.01</td>
</tr>
<tr>
<td>8. <em>L’activité physique améliore le sentiment de bien-être des seniors</em> (Exercise enhances older adults’ psychological well-being).</td>
<td>6.34</td>
<td>0.90</td>
<td>–.82</td>
<td>–.06</td>
<td>.02</td>
</tr>
<tr>
<td>11. <em>L’activité physique permet aux seniors de se sentir bien physiquement</em> (Exercise makes older adults feel good physically).</td>
<td>6.28</td>
<td>0.93</td>
<td>–.86</td>
<td>–.03</td>
<td>–.04</td>
</tr>
<tr>
<td>Risks Stereotype</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. <em>Les seniors ont des capacités physiques trop limitées pour pratiquer une activité physique</em> (The physical capacities of older adults are too diminished for exercise).</td>
<td>2.10</td>
<td>1.22</td>
<td>–.07</td>
<td>.82</td>
<td>.14</td>
</tr>
<tr>
<td>9. <em>Les seniors n’ont pas assez de résistance physique pour pratiquer une activité physique</em> (Older adults do not have sufficient strength to exercise).</td>
<td>2.19</td>
<td>1.31</td>
<td>.02</td>
<td>.80</td>
<td>.15</td>
</tr>
<tr>
<td>12. <em>L’activité physique est dangereuse pour les seniors car elle entraîne trop d’essoufflement</em> (Exercise is dangerous because it causes older adults to become too short of breath).</td>
<td>2.31</td>
<td>1.35</td>
<td>–.01</td>
<td>.78</td>
<td>–.14</td>
</tr>
<tr>
<td>6. <em>L’activité physique doit être évitée par les seniors car elle provoque des blessures</em> (Exercise should be avoided by older adults because it provokes injuries).</td>
<td>2.12</td>
<td>1.15</td>
<td>.16</td>
<td>.72</td>
<td>–.10</td>
</tr>
<tr>
<td>Psychological-Barriers Stereotype</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. <em>Les seniors sont convaincus qu’ils sont capables de faire de l’activité physique</em> (Older adults are convinced that they are capable of exercising).</td>
<td>4.22</td>
<td>1.53</td>
<td>–.05</td>
<td>–.01</td>
<td>.86</td>
</tr>
<tr>
<td>7. <em>Les seniors se sentent capables de pratiquer une activité physique</em> (Older adults feel capable of exercising).</td>
<td>3.77</td>
<td>1.38</td>
<td>.01</td>
<td>.04</td>
<td>.84</td>
</tr>
<tr>
<td>10. <em>Les seniors ont suffisamment de volonté pour pratiquer une activité physique régulièrement</em> (Older adults have enough will to exercise regularly)</td>
<td>3.64</td>
<td>1.47</td>
<td>.05</td>
<td>–.03</td>
<td>.84</td>
</tr>
<tr>
<td>4. <em>Les seniors ont envie de consacrer une partie de leur temps à la pratique d’une activité physique régulière</em> (Older adults are willing to organize their lives so they can regularly exercise).</td>
<td>3.77</td>
<td>1.33</td>
<td>.04</td>
<td>.03</td>
<td>.81</td>
</tr>
</tbody>
</table>
are shared beliefs (i.e., stereotypes) about older individuals in the exercise domain. The content of these stereotypes (i.e., positive vs. negative) was also examined.

Method

Forty-seven men and 120 women ranging in age from 14 to 89 years ($M = 47.9$, $SD = 25.3$) took part in this study. One hundred eight (64%) reported exercising at least once a week. Participants were recruited at different places in the region of Nice, such as Nice Sophia Antipolis University, high schools, nursing homes, continuing education classes for older adults, and sports clubs. They were high school or college students (35.4%), workers (33.7%), and retired (30.9%). Sixty percent of the working and retired persons were employees, 35% were middle or senior managers, and 5% were merchants.

Results and Discussion

Confirmation of the Three-Factor Structure. CFA was performed with EQS software (Bentler, 1995) to test how the 12-item, three-factor model fit the data. Bootstrap resampling was used since the data presented significant multivariate nonnormality (normalized kurtosis: 28.49). The CFA showed that the 12-item model did not correctly adjust to the data, $\chi^2(51) = 111.74, p < .001$; nonnormed fit index (NNFI) = .88; comparative fit index (CFI) = .91; root-mean-square error of approximation (RMSEA) = .09; confidence interval (CI) RMSEA = .06/.11. The model was thus respecified based on the Lagrange multiplier test for adding parameters. Specifically, one covariance was added between the errors of two items measuring risks of exercise. The respecified model presented good fit to the data, $\chi^2(50) = 59.97, p > .15$; NNFI = .98; CFI = .98; RMSEA = .04; CI RMSEA = .00/.06 (see Figure 1).

Internal Consistency and Correlations Between Subscales. Each of the three subscales presented satisfactory internal consistency (psychological barriers, $\alpha = .84$; benefits of exercise, $\alpha = .87$; risks of exercise, $\alpha = .84$). The intersubscale correlation coefficients were .27 (risks-psychological barriers), –.61 (benefits-psychological barriers), and –.29 (benefits-risks).

Invariance. The invariance of the factorial structure across age was examined using multigroup CFA. This involves testing a series of increasingly restrictive hypotheses, each step examining a particular type of invariance: (a) configural invariance (i.e., same factors across groups), (b) metric invariance (i.e., equal loadings), and (c) equivalence of construct variance and covariance (i.e., equal measurement error variances-covariances; Byrne, 2006). CFA was performed on samples of 85 participants age 14 to 30 years ($M_{age} = 20.42, SD = 3.32$) and 82 retired participants age 60 to 89 years ($M_{age} = 72.75, SD = 7.42$) and showed good fit to the data (NNFI and CFI > .90; RMSEA < .06). The first invariance (configural) was tested across the two groups simultaneously without placing any constraints. The model yielded acceptable fit indices, $\chi^2(100) = 111.97, p > .19$; NNFI = .97; CFI = .98; RMSEA = .03; CI RMSEA = .00/.05. Next, metric invariance was tested by constraining all factor loadings to be equal across groups. Again, fit indices were
acceptable, $\chi^2(109) = 127.31, p > .11; \text{NNFI} = .96; \text{CFI} = .97; \text{RMSEA} = .03; \text{CI RMSEA} = .00/.05$. Finally, equivalence of construct variance and covariance was examined. The model showed good fit to the data, $\chi^2(128) = 152.51, p > .07; \text{NNFI} = .95; \text{CFI} = .95; \text{RMSEA} = .03; \text{CI RMSEA} = .00/.05$. Overall, these results suggest that the factorial structure of the ASES was similar across age.

Figure 1 — Coefficients of estimation and standard error of measurement of the Aging Stereotypes and Exercise Scale (Study 2). Note. $\lambda =$ standardized factor loadings; $\varphi =$ correlations between latent factors; $\delta =$ standard errors of measurement of latent factor indicators; $^* p < .05$. 

acceptable, $\chi^2(109) = 127.31, p > .11; \text{NNFI} = .96; \text{CFI} = .97; \text{RMSEA} = .03; \text{CI RMSEA} = .00/.05$. Finally, equivalence of construct variance and covariance was examined. The model showed good fit to the data, $\chi^2(128) = 152.51, p > .07; \text{NNFI} = .95; \text{CFI} = .95; \text{RMSEA} = .03; \text{CI RMSEA} = .00/.05$. Overall, these results suggest that the factorial structure of the ASES was similar across age.
Stereotype Content. After having confirmed the three-factor structure of the scale and its invariance across age, we next examined the content of participants’ responses. We did so by examining whether beliefs about older adults in the exercise domain were positive or negative. Overall, the results showed that the beliefs were positive. Exercise was on average perceived as beneficial ($M = 5.96$, $SD = 1.09$) for older adults and as presenting few risks for their physical health ($M = 2.70$, $SD = 1.27$). Beliefs about older adults’ psychological barriers to exercise were also rather positive, but to a lesser degree ($M = 3.44$, $SD = 1.40$).

The beliefs differed by age. Although both age groups held positive beliefs about exercise outcomes, some differences emerged: Older adults considered exercise as more beneficial for other older adults ($M = 6.25$, $SD = 1.11$) than the younger participants did ($M = 5.46$, $SD = 0.96$), $t(165) = -4.78$, $p < .001$, and as less risky ($M = 2.57$, $SD = 1.28$) than these younger individuals did ($M = 2.96$, $SD = 1.14$), $t(165) = 1.97$, $p = .05$. Beliefs about older adults’ psychological barriers also differed by age: Whereas younger participants thought that psychological barriers (i.e., lack of self-efficacy and motivation) might prevent older adults from exercising ($M = 4.26$, $SD = 1.01$), this belief was not shared by older adults ($M = 2.79$, $SD = 1.43$), $t(165) = 7.29$, $p < .001$. A possible explanation for this difference in belief with age is that, unlike younger adults, older adults are directly concerned by aging stereotypes. Therefore, they are likely to mount defenses against them to have a positive image of their age group (e.g., Levy, 2009).

Study 3: Temporal Stability of the ASES

Study 3 tested the reliability of the ASES over time in younger people. This age population was chosen because negative aging stereotypes held earlier in life have been shown to have important consequences when entering old age, as they may result in worse health (Levy et al., 2009). Eighty college students ($M_{age} = 19.75$, $SD = 1.14$; 65 men and 15 women) voluntarily completed the ASES twice with a 6-week interval between. The results showed moderate correlations, indicating that responses to the three subscales were stable over time, $r_{benefits} = .57$, $p < .001$; $r_{risks} = .59$, $p < .001$; and $r_{psychological barriers} = .53$, $p < .001$.

Study 4: External Validity of the ASES

The goal of Study 4 was to test the external validity of the ASES by examining whether the responses to this scale are related to variables previously identified as correlates of stereotype endorsement. The variables were drawn from stereotype-embodiment theory (e.g., Levy, 2009), which posits that assimilating stereotypes from the surrounding culture affects self-perceptions, which in turn influence functioning and health (e.g., Levy & Myers, 2004; Sanchez Palacios et al., 2009). Based on this literature, we hypothesized that endorsement of negative aging stereotypes in exercise would be related to negative self-perceptions among older adults—more particularly physical self-worth and self-rated health—and to lower exercise participation.

In addition, we expected endorsement of negative stereotypes to be related to increased subjective age (i.e., how old a person feels; e.g., Barrett, 2005) among
older adults. Past research has shown that the majority of older people report a youthful bias by feeling and perceiving themselves to be younger than their chronological age (Gana, Alaphilippe, & Bailly, 2004; Rubin & Berntsen, 2006). This youthful bias has been found to influence susceptibility to aging stereotypes and may be a compensatory strategy that people use to counteract the negative stereotypes associated with aging (e.g., Eibach, Mock, & Courtney, 2010; Schafer & Shippee, 2010). We thus predicted that older adults’ youthful bias would be related to endorsement of aging stereotypes in exercise.

Finally, based on the assumption that aging stereotypes have negative consequences when entering old age (e.g., Levy et al., 2009), we predicted that the relationships between stereotype endorsement, self-perceptions, and exercise participation would be observed among older adults but not among younger adults.

Method

Participants and Procedure. Seventy-six retired individuals (\(M_{\text{age}} = 69.26, SD = 6.17;\) 19 men and 57 women) and 90 undergraduate students (\(M_{\text{age}} = 20.48, SD = 1.31;\) 42 men and 48 women) filled out a questionnaire on a voluntary basis during a course they were taking at a seniors’ college or at Nice Sophia Antipolis University. Before retiring, 50.7% of older adults had been senior managerial staff, 41.1% middle managers, 5.5% employees, and 2.7% merchants. Concerning undergraduate students, 26.6% of their parents were senior managerial staff, 17.8% were middle managers, 29.9% were employees, 6.7% were blue-collar workers, and 18.9% were merchants. Sixty-five retired participants (86%) and 81 undergraduate students (90%) exercised at least once a week.

Measures. The questionnaire included measures of physical self-worth, self-rated health, exercise participation, and subjective age.

The ASES. The 12-item scale developed in Study 2 was used in this study. Each subscale presented good reliability, \(\alpha_{\text{benefits}} = .84, \alpha_{\text{risks}} = .78,\) and \(\alpha_{\text{psychological barriers}} = .83.\)

Physical self-worth was assessed using the French-language validation (Ninot, Delignières, & Fortes, 2000) of the Physical Self-Perception Profile (Fox & Corbin, 1989). More particularly, the five items of the physical self-worth subscale of this questionnaire were included in the current study (e.g., “I am proud of who I am and what I can do physically”). Participants answered on a 7-point Likert scale, ranging from 1 (completely disagree) to 7 (completely agree). This scale showed high reliability, \(\alpha = .95.\)

Self-rated health was assessed by the following item: “As a whole, how do you rate your current health?” (e.g., Benyamini, Leventhal, & Leventhal, 2003). Participants responded on a 6-point scale ranging from 1 (poor) to 6 (excellent).

Exercise Participation. Based on Renner, Spivak, Kwon, and Schwarzer (2007) and the French-language version of the Modifiable Activity Questionnaire (Vuillemin et al., 2000), we asked the participants to report all regular leisure-time physical activities over the past 12 months and how often they usually participated in each activity during a regular week. Responses were summed for each activity to obtain a total frequency of exercise participation per week.
Subjective age referred to felt age (e.g., Kleinspehn-Ammerlahn, Kotter-Grühn, & Smith, 2008; Schafer & Shippee, 2010; Uotinen, Rantanen, Suutama, & Ruoppila, 2006; Westerhof & Barrett, 2005) and was measured by the following question: “What age do you feel most of the time?” Subjective age was then indexed by the difference between participants’ actual age and felt age, a positive or negative value denoting a youthful or older subjective age, respectively.

Results and Discussion

Moderated regression analyses tested the effects of stereotype endorsement, age group (younger vs. older adults), and the Stereotype Endorsement × Age Group interaction on self-perceptions and exercise participation. Stereotype endorsement was centered around the sample mean, and age group was dummy coded (0 = younger adults, 1 = older adults). Analyses were conducted separately for each stereotype component.

Concerning the benefits-of-exercise stereotype, only the interaction effect between stereotype endorsement and age group on youthful bias was significant ($\beta = -0.39, p < .001$). Simple slope analyses indicated that stereotype endorsement predicted youthful bias among older adults ($\beta = -0.47, p < .001$) but not among younger ones ($\beta = 0.03, p = .80$). In other words, less stereotype endorsement predicted higher youthful bias. Significant simple effects of age on youthful bias ($\beta = 0.60, p < .001$) and on exercise participation ($\beta = -0.20, p = .01$) also emerged.

Concerning the risks-of-exercise stereotype, there was no significant simple effect of this stereotype component or significant interaction effect with age. Only a significant simple effect of age was observed on self-rated health ($\beta = 0.16, p = .04$), youthful bias ($\beta = 0.55, p < .001$), and exercise participation ($\beta = -0.20, p = .01$).

Concerning the psychological-barriers stereotype, results showed that the interaction effect between stereotype endorsement and age group on physical self-worth approached significance ($\beta = -0.22, p = .08$). Simple slope analyses revealed that stereotype endorsement predicted physical self-worth among older adults ($\beta = -0.26, p < .05$) but not among younger adults ($\beta = 0.07, p = .60$). Analyses of self-rated health showed only a marginal simple effect of age ($\beta = -0.16, p = .09$), whereas both the simple effect of age ($\beta = 0.68, p < .001$) and the interaction effect ($\beta = 0.31, p = .003$) were significant on youthful bias. Specifically, the more older adults endorsed the stereotype that they do not have sufficient psychological abilities to exercise regularly, the lower their youthful bias ($\beta = 0.45, p < .001$). This relationship was not significant among younger adults ($\beta = -0.01, p = .93$). Finally, only a significant simple effect of age was found on exercise participation ($\beta = 0.22, p = .02$).

Overall, in accordance with the literature, these results confirm that stereotype endorsement is associated with self-perceptions and that these relationships are observed among older adults only.

General Discussion

The goal of this research was to develop a measure of aging stereotypes in the exercise domain. Although aging stereotypes have been extensively studied (e.g., Levy, 2009), the content of these beliefs with regard to exercise remains relatively
unknown. What beliefs do people share about exercise outcomes for older adults and their abilities to exercise regularly? Are these stereotypes positive or negative? Investigating these questions is important insofar as stereotypes may affect behaviors, including exercise participation (e.g., Levy & Myers, 2004; Sanchez Palacios et al., 2009). Specifically, endorsement of exercise-related aging stereotypes could lead older individuals to impose barriers to exercise participation on themselves, such as believing that they are too old to exercise (e.g., Booth et al., 2002; Netz et al., 2008).

Therefore, we believe that elaborating a measure of these stereotypes may allow a deeper understanding of the role of aging stereotypes in the low exercise-participation rate observed among older adults (e.g., World Health Organization, 2001). The current research aimed to develop such a measure, the ASES, which was elaborated from the literature on barriers to exercise among older adults (e.g., Resnick, 2005; Vlachopoulos et al., 2010).

Four studies were conducted to validate the ASES, involving 714 participants who varied in age, socioeconomic status, and level of exercise participation. A three-factor structure emerged from the principal-axis factor analyses conducted in Study 1 and was corroborated by CFA in Study 2. This structure included three factors measuring stereotypes about benefits and risks of exercise and stereotypes about older adults’ psychological barriers to exercise (i.e., lack of self-efficacy and motivation). In other words, the ASES measures stereotypes about exercise outcomes for older adults and their psychological abilities to exercise regularly.

Study 2 also revealed that the factorial structure of the scale was invariant across age but that younger and older individuals differed in the content of their beliefs about older adults. More particularly, although both age groups held positive beliefs about exercise outcomes by believing that exercise may be highly beneficial and of low risk for older adults, these beliefs were less positive among younger individuals. Moreover, contrary to older adults, younger individuals did not hold positive beliefs about older adults’ psychological abilities to exercise on a regular basis. Indeed, they believed on average that older adults are not confident in their ability to exercise and do not want to make the effort to exercise regularly. Two complementary hypotheses may explain these differences between age groups. On the one hand, for younger individuals, aging stereotypes concern a group to which they do not belong. Therefore, they do not need to mount defenses against these stereotypes, resulting in beliefs that may be negative. This finding corroborates the assumption of stereotype-embodiment theory (Levy, 2009) that individuals are particularly likely to develop negative aging stereotypes during childhood and adulthood because at this time these stereotypes have no strong self-referential implications (see also Rothermund & Brandstädter, 2003). In contrast, for older adults, aging stereotypes concern their own group. In line with research showing that a youthful bias serves as a self-enhancing positive illusion (e.g., Gana et al., 2004), holding positive stereotypes may be considered a self-enhancing perception that helps older adults cope with age-related decline. On the other hand, older adults may hold more positive stereotypes than younger ones on the basis of their own positive experiences (e.g., Rothermund & Brandstädter, 2003). In other words, when entering old age, aging stereotypes may reflect a projection of people’s own experiences.
Study 4 showed that endorsement of negative aging stereotypes in the exercise domain is related to older adults’ self-perceptions, such as physical self-worth and youthful bias, but not to younger adults’ self-perceptions. These findings corroborate past results indicating that aging stereotypes are internalized when they become self-relevant (i.e., when entering old age), resulting in negative self-views (e.g., Levy, 2009; Rothermund & Brandtstädter, 2003).

Last, although a rigorous validation procedure has been used to elaborate the ASES, some limitations exist. For example, the samples used in the studies were selective, comprising a majority of highly educated people who were physically active. This could explain why stereotype endorsement was not related to exercise participation in Study 4, whereas this relationship has been observed in past studies (e.g., Wurm et al., 2010). Moreover, while the ASES measures stereotypes about exercise in general (and not sport in particular), younger and older adults may have different representations of exercise. For example, younger adults may think of exercise as running while older adults may think of exercise as walking. It would be interesting to take into account these differences or to extend the ASES to beliefs about physical activity in general (e.g., housework, gardening) to deepen our understanding of the content of aging stereotypes in this domain. In addition, Study 4 used a cross-sectional design to test the differences in stereotype internalization between age groups; thus, future research should investigate such developmental processes based on a longitudinal design. Finally, the temporal stability of the ASES has been examined with younger adults only; whether the ASES is stable over time among older adults remains an empirical question.

Overall, these findings suggest that the ASES may be a relevant instrument to investigate the role of aging stereotypes in exercise-related behaviors. It would be interesting to examine in future studies whether endorsement of these stereotypes has long-term effects on older adults’ self-perceptions and exercise participation. The ASES could also be used to study the antecedents of stereotype endorsement, such as personality traits and past exercise participation. In sum, we believe that the development of an aging-stereotypes measure specific to the exercise domain may open the door to promising research on the determinants of older adults’ exercise participation.

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References


