Subjective Age and Social-Cognitive Determinants of Physical Activity in Active Older Adults

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Objective: The purpose of the current study was to examine the mediating role of self-efficacy in the relationship between subjective age and intention to engage in physical activity (PA) among active older adults. It was expected that subjective age would be positively related to PA intention because it is positively associated with self-efficacy. Method: A cross-sectional study was conducted with 170 older adults age 60–80 years (M = 66.10, SD = 4.78) who completed measures of subjective age, self-efficacy, behavioral intention, self-rated health, and past PA. Results: Bootstrap procedure revealed that self-efficacy partially mediated the positive relationship between feeling younger than one’s age and PA intention, while chronological age, self-rated health, and past PA were controlled. Discussion: These results emphasize the need to consider both subjective and objective components of age as correlates of social-cognitive determinants of health behavior.

Keywords: self-efficacy, behavioral intention, feeling younger than one’s age, self-rated health

Promotion of physical activity among older adults is a major public health concern. It is well established that regular participation in physical activity is an effective way to prevent functional and cognitive declines (Colcombe & Kramer, 2003; Haight, Tager, Sternfeld, Satiriano, & Van der Laan, 2005) and to promote quality of life and successful aging (Baker, Meisner, Logan, Kungl, & Weir, 2009). Despite these recognized benefits, studies have found that physical activity participation decreases with age (Hughes, McDowell, & Brody, 2008), notably around 60 years (French Ministry of Health and Sport, 2005). Consequently, examining the variables that predict physical activity is critical to help health educators identify possible interventions to promote physical activity among older adults.

Several social-cognitive models may be useful to understand physical activity participation, such as the theory of planned behavior (Ajzen, 1991), the health-belief...
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model (Becker, 1974), or the health action process approach (HAPA; Schwarzer, 1992). These models consider that behaviors are determined by intentions, defined as the amount of effort one is willing to exert to attain a goal (Ajzen, 1991). For example, a recent study based on the HAPA revealed that higher behavior intentions in older adults were related to higher physical activity participation 6 months later (Caudroit, Stephan, & Le Scanff, 2011). These models also propose that intentions to adopt health behaviors are predicted by social-cognitive variables, notably self-efficacy—the belief in one’s capability to successfully perform a behavior (Bandura, 1997). Caudroit et al. showed that self-efficacy is a better correlate of older adults’ physical activity intention than either risk perception or outcome expectancies. Although intention and self-efficacy emerge as important constructs for older adults’ involvement in physical activity, it has been found that they decrease with increasing age (Plotnikoff, Rhodes, & Trinh, 2009; Plotnikoff, Trinh, Courneya, Karunamuni, & Sigal, 2009).

However, when looking at the relationship between aging and social-cognitive determinants of physical activity, past studies have mostly focused on the contribution of chronological age and have neglected the potential role of individuals’ subjective experience of their age. This subjectivity about the aging process has been supported by several studies, which have shown that, despite the high prevalence of age-related losses, older adults report a youthful subjective age; that is, they tend to perceive themselves as younger than they actually are (Gana, Alaphilippe, & Bailly, 2004; Kleinspehn-Ammerlahn, Kotter-Grühn, & Smith, 2008; Westerhof, Barrett, & Steverink, 2003). This self-enhancing positive illusion (Westerhof & Barrett, 2005) or denial of aging (Barak, Mathur, Lee, & Zhang, 2001) is beneficial for a range of psychological and physical outcomes, including well-being (Stephan, Caudroit, & Chalabaev, 2011) and longevity (Kotter-Grühn, Kleinspehn-Ammerlahn, Gerstorf, & Smith, 2009). Furthermore, subjective age remains a significant predictor of well-being and health indicators when controlling for chronological age (Demakakos, Gjonca, & Nazroo, 2007; Kotter-Grühn et al., 2009; Westerhof & Barrett, 2005).

Despite this evidence, no research to our knowledge has yet considered whether people’s experience of their age could shape their feelings of self-efficacy and their intentions to engage in physical activity. The current study was designed to fill this gap by examining these relationships. Although the relationship may be bidirectional (e.g., intentions may promote involvement in physical activity, improving, in turn, subjective age), we only consider the association between subjective age and social-cognitive determinants of physical activity. We hypothesized a positive relationship between subjective age and physical activity intention because the age a person feels is related to his or her susceptibility to ageist stereotypes and whether he or she conforms to these stereotypes (Eibach, Mock, & Courtney, 2010). Negative aging stereotypes are based on the assumption that health problems are an inevitable consequence of growing old and lead older individuals to consider preventive health behaviors futile (Levy, 2009). In addition, these stereotypes are associated with the idea that physical activity may be risky with advancing age (Thøgersen-Ntoumani, Ntoumanis, & Nikitara, 2008) and that older people are too weak or old to exercise (Roters, Logan, Meisner, & Baker, 2010). In turn, these beliefs may promote disengagement from physical activity (O’Brien Cousins & Gillis, 2005). However, self-evaluations of people with a youthful bias seem to be unaffected by negative aging stereotypes (Eibach et al., 2010). Therefore, there
are reasons to expect that a youthful subjective age may be associated with intention to engage in counterstereotypical behavior such as participating in physical activity as an older adult.

The current study also explores the role of self-efficacy as a potential pathway through which subjective age may be related to intention to engage in physical activity. According to existing research, self-efficacy is an important correlate of physical activity intention among older adults, even more important than risk perceptions or outcome expectancies (Caudroit et al., 2011; Renner, Spivak, Kwon, & Schwarzer, 2007). In addition, a youthful subjective age is related to higher general and specific self-efficacy beliefs (Boehmer, 2007; Infurna, Gerstorf, Robertson, Berg, & Zarit, 2010; Scharer & Shippee, 2010; Stephan et al., 2011). For example, Stephan et al. found that a youthful subjective age contributes to higher memory self-efficacy among older adults, which reflects positive beliefs in their ability to use their memory effectively in different situations. Taken together, these studies suggest that self-efficacy could be a mediator of the positive relationship between subjective age and physical activity intention. In other words, a youthful subjective age is likely to be related to higher confidence in one’s ability to engage in physical activity, which may in turn be associated with higher physical activity intention.

These questions were investigated with older adults who are members of a sport retirement organization. Studying active older people appears to be worthy of consideration because the number of older adults who take part in structured physical activity programs is limited (Centers for Disease Control and Prevention, 2004). In addition, many members of these organizations fail to reach the minimum amount of physical activity recommended for maintaining good health, that is, 30 or more minutes of moderate physical activity on five or more days per week (Warburton, Charlesworth, Ivey, Nettlefold, & Bredin, 2010). Identifying the factors associated with active engagement in physical activity in older individuals is thus essential for tailoring promotion interventions and designing programs likely to enhance regular participation among less active older adults and sedentary older people.

Chronological age, self-rated health, and frequency of past physical activity were included as covariates to examine the robustness of the relationship between subjective age and the social-cognitive variables. Indeed, previous research has shown that each of these covariates is related to self-efficacy and intention to engage in physical activity (Hagger, Chatzisarantis, & Biddle, 2002; McAuley et al., 2006; Motl, Snook, McAuley, Scott, & Douglass, 2006; Renner et al., 2007).

**Method**

**Participants and Procedure**

The current study was conducted with a convenience sample of members of the French Federation of Sport Retirement (FFSR) age 60 or older. The FFSR aims to promote and facilitate older adults’ physical activity participation. It proposes different sport and physical activities including cycling, walking, hiking, strength training, gymnastics, dancing, tennis, team sport, and martial arts. Given that the FFSR is not an intervention program, affiliated individuals are free to participate or not in the proposed activities. Participants were contacted via the directory of the
FFSR, who distributed a survey including questions about subjective age, physical activity intention, self-efficacy, physical activity level, health, and sociodemographic variables on site. A cover letter explained that the study was about their leisure activities and that their anonymity would be guaranteed. No time limit was given for returning the questionnaire, and participants were free to complete it on site or to return it by mail in a prepaid envelope. The study was approved by the university’s departmental ethics committee, and written informed consent was obtained from participants.

From the 400 questionnaires that were handed out, 197 were completed (49.25%). Five participants who were identified as multiple outliers and 22 incomplete questionnaires were excluded from data analysis. The final sample consisted of 170 participants, 118 women and 52 men, age 60–80 years ($M = 66.10$, $SD = 4.78$). Forty-seven percent of the sample ranged in age from 60 to 65 years, 28% from 65 to 70 years, 18% from 70 to 75 years, and 7% from 75 to 80 years. Before retirement, 2% had been unemployed, 2% had been farmers, 8% had been merchants, 7% had been laborers, 28% had been employees, 17% had been senior managerial staff, and 38% had been middle managers. Most participants (75%) had a partner (married, living as husband and wife, or in a civil union), and 25% lived alone (single, divorced, or widowed).

**Measures**

The current study used one- or two-item scales to assess the social-cognitive variables of interest. Although this approach may reduce the reliability and validity of the measures, these abbreviated scales are widely used in theory-of-planned-behavior or HAPA research (Ajzen, 1991; Schwarzer, 1992) because they do not jeopardize the validity of the measurement of the social-cognitive components (Jones, Courneya, Fairey, & Mackey, 2005).

**Intention.** In line with previous research conducted within different theoretical frameworks such as the theory of planned behavior (Abraham & Sheeran, 2004), the HAPA (Renner et al., 2007), or the protection motivation theory (Plotnikoff, Rhodes, & Trinh, 2009), one item assessed physical activity intention, namely “I intend to be physically active, at least five times a week for 30 minutes each time.” This item is based on the global physical activity recommendation for health (World Health Organization, 2010). Participants responded on a 7-point Likert scale ranging from 1 (never) to 7 (frequently).

**Self-Efficacy.** Self-efficacy was assessed using two items from Renner et al. (2007) asking how able individuals feel (a) to change to a physically active lifestyle and (b) to be physically active at least five times a week for 30 min each time. The answers were given on a 4-point Likert scale ranging from 1 (not at all true) to 4 (exactly true). Answers to the two items were averaged ($\alpha = .58$), with higher means indicating higher levels of self-efficacy.

**Subjective Age.** In line with existing research (e.g., Kleinspehn-Ammerlahn et al., 2008; Schafer & Shippee, 2010; Westerhof & Barrett, 2005), subjective age was indexed by felt age. Participants were asked the following question: “What age do you feel most of the time?” The difference between participants’ actual age
and felt age was the measure of subjective age. A positive value denotes a youthful subjective age, and a negative value represents an older subjective age.

**Self-Rated Health.** In line with existing research (Benyamini, Leventhal, & Leventhal, 2003; DeSalvo, Blosen, Reynolds, He, & Muntner, 2006; McFadden et al., 2009), self-rated health was assessed by a single item: “As a whole, how do you rate your current health?” with a 6-point Likert scale ranging from 1 (poor) to 6 (excellent). Higher scores indicate better perceived health.

**Past Physical Activity.** The measure of past physical activity was adapted from Renner et al. (2007) and from the French version of the Modifiable Activity Questionnaire (Vuillemin et al., 2000). Participants were asked to report, on average, all physical activities regularly performed during the last 12 months on a preestablished list of 48 activities (e.g., swimming, running, cycling, gymnastics, etc.) and how often they usually participated in each activity during a regular week, that is, their frequency of participation per week. Responses were summed for each activity to obtain a total frequency of physical activity participation per week, which was our indicator of past physical activity (range 0–7 times/week).

**Data Analysis**

A path-analytic model was specified with subjective age as the predictor, self-efficacy as the mediator, and intention to engage in physical activity as the criterion. According to Kline’s (2005) recommendations, the current model has a satisfactory sample size for performing structural equation modeling, with a ratio of 10.62 participants to 1 parameter estimated. The model was tested with AMOS 4.0 (Arbuckle, 1999) using the maximum likelihood estimation. Several indices were used to evaluate the fit of the model: the $\chi^2$ goodness-of-fit statistic, the Lewis-Tucker Index, the comparative-fit index, and the root-mean-square error of approximation. According to Hu and Bentler (1999), comparative-fit-index and Lewis-Tucker-Index values above .95 and root-mean-square-error-of-approximation values less than .06 represent a good model fit. Paths were specified between subjective age and self-efficacy, between self-efficacy and intention to perform physical activity, and between subjective age and physical activity intention. Chronological age (in years), self-rated health, and frequency of past physical activity were included as covariates (see Figure 1).

A bootstrapping method with $n = 5,000$ bootstrap resample was employed to test the significance of the mediation. Bootstrapping provides a more accurate estimate of the indirect effect with small to moderate sample sizes than the Sobel tests (Shrout & Bolger, 2002). This nonparametric resampling procedure involves repeatedly sampling from the data set and estimating the indirect effects in each resampled set (MacKinnon, Lockwood, & Williams, 2004; Preacher & Hayes, 2004, 2008). An empirical approximation of the sampling distribution of indirect effects is generated and used to construct bias-corrected 95% CIs for the indirect effect. Point estimates of indirect effects are considered significant when zero is not contained in 95% CIs (see Preacher & Hayes, 2008).
Figure 1 — Path-analytic model of the relationships among subjective age, self-efficacy, and intention to perform physical activity. Standardized path coefficients are presented. Paths estimated but not significant are shown as dashed lines. The value outside of parentheses represents the direct contribution of subjective age to intention when self-efficacy is included. The value in parentheses represents the total contribution of subjective age to intention when self-efficacy is not included in the model. *p < .05. **p < .01. ***p < .001.
Results

Preliminary Analysis

Means, standard deviations, kurtosis, skewness, and Pearson’s correlation coefficients for the variables are presented in Table 1. Consistent with previous studies (Gana et al., 2004; Rubin & Berntsen, 2006; Westerhof & Barrett, 2005), approximately 90% of participants felt younger than their chronological age, 9.4% felt the same as their chronological age, and 0.6% felt older than their chronological age.

Path Analysis

The model yielded a satisfactory fit to the data, $\chi^2(df = 3, n = 170) = 3.09, p = .37$, Lewis-Tucker Index = .99, comparative-fit index = .99, root-mean-square error of approximation = .013; 90% CI = .00, .13. An examination of the paths revealed that all the preconditions for mediation were met, with significant paths from subjective age to self-efficacy ($\beta = .20, p < .01$) and from self-efficacy to intention ($\beta = .36, p < .001$). Subjective age was also significantly related to intention ($\beta = .20, p < .01$) and chronological age ($\beta = .20, p < .001$). Chronological age was negatively related to self-efficacy ($\beta = -.23, p < .01$), and no significant association was found with physical activity intention ($\beta = -.10$, n.s.). These relationships were obtained while controlling for the significant relationship between frequency of past physical activity and self-efficacy ($\beta = .34, p < .001$) and between frequency of past physical activity and intention to engage in physical activity ($\beta = .34, p < .001$). Overall, the model explained 24% of the variance of self-efficacy and 44% of the variance of intention to perform physical activity (see Figure 1).

Additional analysis revealed no significant gender differences for subjective age, $F(1, 168) = .02, p = .86$; intention to perform physical activity, $F(1, 168) = .83, p = .36$; self-efficacy, $F(1, 168) = .15, p = .69$; frequency of past physical activity, $F(1, 168) = .28, p = .59$; and self-rated health, $F(1, 168) = .00, p = .98$. In addition, when we included gender as a covariate in the model, the analysis revealed that the model yielded a poor fit across indices, $\chi^2(df = 5, n = 170) = 16.31, p = .001$, Lewis-Tucker Index = .93, comparative-fit index = .71, root-mean-square error of approximation = .12; 90% CI = .05, .18.

The mediational model was tested using the structural-equation-modeling approach to calculate the indirect effect and test it for significance. The results indicated that the total contribution of subjective age on intention to engage in physical activity was significant ($\beta = .26, p < .01$) and decreased when self-efficacy was included ($\beta = .20, p < .01$). The analyses confirmed that the indirect contribution of subjective age to intention through self-efficacy was significant, with a point estimate of .073 and a bias-corrected bootstrapped 95% CI of .023–.139. Therefore, since zero was not contained in the bootstrapped CI (Preacher & Hayes, 2008), self-efficacy for physical activity may be considered a significant partial mediator of the relationship between subjective age and intention to engage in physical activity, while controlling for chronological age, self-rated health, and frequency of past physical activity.

Further analysis of the proportion of the indirect effect revealed that 28% of the total contribution of subjective age to intention is mediated by self-efficacy. In
Table 1  Observed Correlations and Other Characteristics of the Variables in the Model (N = 170)

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
<th>Kurtosis</th>
<th>Skewness</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Chronological age</td>
<td>66.10</td>
<td>4.78</td>
<td>60–80</td>
<td>-0.235</td>
<td>0.708</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2. Self-rated health</td>
<td>4.79</td>
<td>0.74</td>
<td>3–6</td>
<td>-0.207</td>
<td>-0.234</td>
<td>-.10</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Past physical activity</td>
<td>2.86</td>
<td>1.61</td>
<td>0–7</td>
<td>0.274</td>
<td>0.759</td>
<td>-0.15*</td>
<td>.24**</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Subjective age&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8.04</td>
<td>5.43</td>
<td>-3 to 28</td>
<td>1.019</td>
<td>0.789</td>
<td>.18*</td>
<td>.23**</td>
<td>-.00</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>5. Self-efficacy</td>
<td>3.00</td>
<td>0.83</td>
<td>1–4</td>
<td>-0.630</td>
<td>-0.543</td>
<td>-0.25**</td>
<td>.23**</td>
<td>.40***</td>
<td>.17*</td>
<td>—</td>
</tr>
<tr>
<td>6. Intention</td>
<td>4.85</td>
<td>1.84</td>
<td>1–7</td>
<td>-0.991</td>
<td>-1.969</td>
<td>-0.21**</td>
<td>.28***</td>
<td>.50***</td>
<td>.24**</td>
<td>.56***</td>
</tr>
</tbody>
</table>

*<sup>p</sup> < .05, **<sup>p</sup> < .01, ***<sup>p</sup> < .001.

<sup>a</sup>Higher values represent younger subjective age.
addition, the total contribution of subjective age to intention was 1.39 times the direct effect.

**Discussion**

The current study examined whether subjective age is related to social-cognitive determinants of physical activity in older adults. As expected, the results revealed that the positive relationship between subjective age and physical activity intention was partially mediated by self-efficacy when chronological age, self-rated health, and frequency of past physical activity were included in the model. This finding suggests that feeling younger than one’s actual age is related to higher physical activity intention, in part because it is associated with higher confidence in one’s ability to exercise. One potential explanation for these relationships is that feeling younger than one’s actual age functions as a self-enhancing positive illusion (Westerhof & Barrett, 2005), which may promote optimistic beliefs about one’s physical abilities, leading individuals to formulate intention to adopt behaviors that are counterstereotypical for older adults (Eibach et al., 2010), such as physical activity. In addition, the mediating role of self-efficacy between subjective age and physical activity intention is consistent with separate research that found that self-efficacy is a strong correlate of physical activity intention among older adults (Caudroit et al., 2011) and that individuals with a youthful subjective age are more optimistic about maintaining their abilities in the cognitive domain (Stephan et al., 2011).

The findings revealed that subjective age is a better correlate of physical activity intention than chronological age, even with self-efficacy included in the model. However, the relationships between both subjective and chronological age and self-efficacy are almost equally importance. Taken as a whole, the current study emphasizes the need to consider both the contribution of individuals’ own experience of their age and chronological age in the prediction of social-cognitive determinants of physical activity. Furthermore, the relationships between subjective age, self-efficacy, and intention were significant while controlling for past physical activity. This is an important result, given that past physical activity is generally recognized as a crucial determinant of self-efficacy (McAuley et al., 2006) and significantly attenuates or negates the contribution of other variables to intention (Hagger et al., 2002).

The current study has theoretical and practical implications. In particular, it contributes to existing knowledge on the variables that may shape social-cognitive correlates of physical activity in older adults. However, the results indicated that the mediating role of self-efficacy in the relationship between subjective age and physical activity intention was partial. Therefore, other social-cognitive variables may play a role in this relationship, such as outcome expectancies, risk perception, or subjective norms (Ajzen, 1991; Schwarzer, 1992). This study also adds to a line of research interested in the correlates of subjective age and its implications for physical and psychological functioning (Montepare, 2009). For example, the findings suggest that how old individuals feel may play a role in the psychological process associated with adoption of health behavior such as physical activity. In addition, this study provides support for the contribution of subjective age as a correlate of self-efficacy beliefs (Boehmer, 2007; Infurna et al., 2010; Schafer & Shippee, 2010; Stephan et al., 2011).
The findings may have practical implications for health professionals who want to promote older adults’ involvement in physical activity. First, the investigation of older people’s subjective age could help practitioners target people at risk for health decline. For example, it is known that people who feel older than their age present increased mortality risk (Kotter-Grühn et al., 2009). Second, the results suggest that interventions that focus on promoting a younger subjective age could indirectly have positive consequences for the development of self-efficacy for physical activity and intention to engage in physical activity. In other words, inducing a youthful subjective age by providing positive feedback, redirecting attention to downward social comparison, and/or giving information about the misconception about aging and physical activity could improve the confidence of older adults about their abilities to perform physical activity and help them formulate higher physical activity intention.

Given its exploratory nature, the current study has limitations that should be considered when interpreting the results. Because the data are cross-sectional, it is not possible to conclude whether subjective age exerts a causal influence on social-cognitive variables. In addition, the tested model was unidirectional, although the relationships between variables of interest may be reciprocal. For example, intentions to engage in physical activity may lead to regular involvement in physical activity and ultimately result in a youthful subjective age. Future prospective studies are needed to disentangle the different relationships between self-efficacy, intentions, and subjective age and to test whether baseline subjective age leads to higher self-efficacy a few weeks later, ultimately resulting in higher intentions and involvement in physical activity. Moreover, the results are specific to a small sample of older people who were members of the FFSR. They do not apply to the experience of isolated or unhealthy older individuals, which raises doubt about the possibility of generalizing these findings. Future research should test the model in a larger cohort of retired older people to confirm the results obtained in the current study. Finally, the reliability of the findings may have been compromised by measurement limitations, given that the current study relied on one- and two-item scales. Although these measures have been used in previous studies (Abraham & Sheeran, 2004; Plotnikoff, Rhodes, & Trinh, 2009; Renner et al., 2007), the results must be considered with caution, because the small number of items does not guarantee that they adequately represent the observed constructs.

These limitations notwithstanding, the current study is a first step toward an in-depth understanding of the relationship between subjective age and social-cognitive determinants of physical activity in older adults. As a whole, it paves the way for future research focusing on both subjective and objective components of age as correlates of social-cognitive determinants of health behavior, with important implications for psychological and physical functioning among older adults.

References


