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So you think you look young? Matching older adults' subjective ages with age estimations provided by younger, middle-aged, and older adults

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Abstract

Perceived age plays an important role in the context of age identity and social interactions. To examine how accurate individuals are in estimating how old they look and how old others are, younger, middle-aged, and older adults rated photographs of older target persons (for whom we had information about objective and subjective age) in terms of age and other characteristics. Whereas the older targets had quite accurate perceptions of how old they look, the raters' age estimations for those targets were rather inaccurate. Older raters and those with frequent contact with older adults provided the most accurate age estimations. Targets that were rated more favorably with respect to attractiveness or fitness were perceived as younger than those with negative ratings.

Keywords

age estimation accuracy, age stereotypes, attractiveness stereotype, subjective age

Subjective age is a multidimensional construct (e.g., Kastenbaum, Derbin, Sabatini, & Artt, 1972) assessing how old individuals feel (*felt age*), how old they would like to be (*desired age*), and how old they think they look (*self-perceived age*). Most middle-aged and older adults feel younger, want to be younger, and think that they look younger than they are (e.g., Kleinspehn-Ammerlahn, Kotter-Grühn, & Smith, 2008; Montepare & Lachman, 1989). Whereas it has been proposed that this underestimation of subjective age represents either a form of self-regulation (Sneed & Whitbourne, 2005) or denial (Bultena & Powers, 1978), it has not been considered that a younger subjective age might in fact match the perception of others. The present study tests this idea by comparing older adults' objective age (i.e., chronological age) and subjective age to age estimations provided by younger, middle-aged, and older adults.

Why is it important to investigate older adults' self-perceived age and the accuracy with which other persons estimate the age of an older adult? From the perspective of the older person, a younger subjective age can be beneficial as indicated by its positive relationship with well-being, health, and longevity (e.g., Kotter-Grühn, Kleinspehn-Ammerlahn, Gerstorf, & Smith, 2009; Uotinen, Rantanen, & Suutama, 2005; Westerhof & Barrett, 2005). In fact, feeling younger and looking younger are considered crucial in older adults' way of dealing with their age and aging. Similarly, how old a person looks (i.e., the age that others assign to a person) can be used as an indicator of health and mortality in clinical settings. For instance, Christensen and colleagues (2009) demonstrated that, when identical twin pairs were judged in terms of their age, the older-looking twin in a twin pair had a significantly higher likelihood of dying before the younger-looking twin.

How old a person looks can also be highly relevant in social interactions. When forming first impressions, only the most accessible information about a person (e.g., age, attractiveness) is processed (Brewer, 1988), which can result in stereotyping on the basis of physical appearance (e.g., Greenwald & Banaji, 1995). When individuals estimate an older adult's age, *age stereotypes* may be activated, which often depict older people as sick, lonely, or unattractive (e.g., Kite, Stockdale, Whitley, & Johnson, 2005). Positive age stereotypes (e.g., wise, kind) are mainly attributed to persons aged 55 to 64 years. However, the number of positive age stereotypes associated with older persons decreases with age, and negative age stereotypes (e.g., lonely, depressed) are mainly paired with persons over 75 years of age (Hummert, 1994; Hummert, Garstka, & Shaner, 1997). Thus the age an older person looks influences the valence and content of age stereotypes that others assign to him/her, and it most likely also influences the way people interact with this person. Consequently, looking younger may be beneficial for an older person because their social interactions may be less influenced by negative age stereotypes.

The accuracy of the age that others assign to a person (i.e., *other-perceived age* or *estimated age*) can be crucial, for instance, for determining the eligibility of a person for age-related services (e.g., senior discounts) and in the context of eyewitness testimony. Previous studies have shown that, on average, individuals make relatively accurate age estimations, with estimates deviating from targets' objective age by 3 to 4 years (Rhodes, 2009). Little is known, however, about the accuracy of age estimations for very old target persons.

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How do people estimate the age they and others appear to be? When individuals are asked to estimate how old they look (self-perceived age), they are likely to take into account information they received from others. Persons who repeatedly hear that they look young might adjust their self-perceived age accordingly. Thus their self-perceived age might in fact be a relatively accurate representation of their other-perceived age. When estimating the age of others, both characteristics of the rater/perceiver and characteristics of the target person determine the age estimation process and accuracy. Most importantly, the rater's age plays a role. Older adults might have an advantage in correctly estimating the age of older adults because they can use aging-related cues of their own physical appearance as a reference. Older adults relative to younger persons likely have more contact with other older adults as well, thereby increasing their familiarity with faces and facial characteristics of older people (Harrison & Hole, 2009; He, Ebner, & Johnson, 2011). This familiarity provides them with more information about aging-related cues and with specific exemplars (e.g., spouses, friends) that serve as reference categories when estimating the age of older faces. In contrast, younger and middle-aged raters typically have only occasional contact with older adults, making them less familiar with facial characteristics indicative of specific ages in very old age.

Age estimations are further dependent on target person characteristics. When estimating the age of older targets, perceivers rely on observable aging-related cues such as the thinning and graying of hair, changes in skin texture and pigmentation, or the enhanced accentuated bony structure of the face (e.g., George & Hole, 1995). The more aging-related cues a face shows, the older it is perceived to be (Aznar-Casanova, Torro-Alves, & Fukusima, 2010). Another relevant facial cue that may be related to age estimation is the target's attractiveness, which may also lead to stereotyping. When forming impressions of others, individuals are likely to assign more positive attributes (e.g., warm, sociable) to attractive than to unattractive persons (attractiveness stereotype; e.g., Bassili, 1981; Eagly, Ashmore, Makhijani, & Longo, 1991). So what happens when perceivers deal with two rather opposing stereotypes, for instance, when a target is clearly categorized as old but at the same time looks attractive or physically fit? Whereas the old age of a target is likely to activate negative stereotypes (thereby excluding attractiveness), attractiveness may activate positive stereotypes (thereby excluding old age). In the present study we focused on the interplay of age and attractiveness stereotypes and examined how attractiveness and other target characteristics are related to the estimated age of a person.

In our study, we asked participants to look at photographs of older adults' faces and to estimate the age of each depicted person. Our goal was to compare those age estimations with the objective and subjective ages of the depicted target. First, we investigated the extent to which a target person's subjective age matches the age estimation provided by others. That is, do older adults who feel younger and who think they look younger in fact look younger to others? Based on the idea that persons take into account information they receive from others when rating their self-perceived age, we hypothesized that a target's subjective age is more similar to his/her other-perceived age (i.e., the age estimated by others) than to his/her objective age.

Second, we examined how accurate individuals are in estimating older adults' ages and which variables predict age estimation accuracy. Whereas most studies focused on age estimations for targets younger than 80 years of age, we examined age estimations for very old targets (82+ years). We hypothesized that older adults and persons who have more frequent contact with older adults are most accurate in estimating the targets' age because of their higher familiarity with older adult faces. Similarly, we expected that the relationship between raters' age and age estimation accuracy could be explained by the raters' frequency and/or quality of contact with older adults.

Third, we examined whether target characteristics predicted age estimations. Since attributes such as attractiveness and physical fitness are typically linked to younger ages, the question arises whether such positive target characteristics are also predictive of younger perceived ages. Using targets from one age group (age 82+ years) allowed us to focus more clearly on the impact of such target characteristics, which would normally be confounded with objective age. We expected that targets who appear fitter and more attractive are perceived as younger than persons who receive less positive ratings.

Finally, we explored effects of gender. It is well documented that there is a double standard of aging. Women are perceived as old earlier than are men (e.g., Seccombe & Ishii-Kuntz, 1991). Body image and age(ing) play a bigger role in women's life and they therefore are more likely than men to conceal their true age (e.g., Harris, 1994). There is also a stronger age-related decline in attractiveness in women than men (e.g., Deutsch, Zalenski, & Clark, 1986). Following this line of reasoning, we hypothesized that: (a) female targets underestimate the age they look more than male targets; and (b) attractiveness ratings are lower for female than male targets.

Method

Participants

Two samples are included in this study. The *Berlin Aging Study* (*BASE*) *sample* provided the stimulus material (pictures and self-ratings) that was rated by the *rater sample*.

The BASE sample. The Berlin Aging Study (BASE) is an interdisciplinary longitudinal study on aging (Baltes & Mayer, 1999). Data collection started in 1990–1993 (T1) with a core sample of $N = 516$ individuals. Data used in the present study came from the $N = 44$ persons (28 women, 16 men) who were still in the sample at the sixth measurement occasion in 2004/2005 ($M_{age} = 89.07$ years, $SD = 4.5$, range: 82.5 – 100.5).[1] Trained research assistants took a picture of each person at the participants' homes. The instruction for participants was not to show any emotional expression while their picture was taken.

The rater sample. This sample consisted of 183 adults aged 18 to 92 years ($M_{age} = 48.72$, $SD = 23.16$) comprising 60 younger adults (18–35 years, $M_{age} = 22.05$, $SD = 5.58$; 52% women), 62 middle-aged adults (36–60 years, $M_{age} = 47.50$, $SD = 6.48$; 56% women), and 61 older adults (61–92 years, $M_{age} = 76.20$, $SD = 8.60$; 54% women). Participants were recruited from the community in the Raleigh/Durham/Chapel Hill area (North Carolina, USA) through newspaper advertisements, flyers, and a local retirement community. About two-thirds of younger adults were college students at North Carolina State University participating for an optional course requirement. All other participants received US$15 per hour as compensation. The average number of years

of education was 14.95 ($SD = 2.54$), with age being positively related to education, $r = .46$, $p < .001$.

Material and procedure

The rating of photographs was part of a larger study on perceptions of aging. During the first part of the session, which was unrelated to the present research question, two-thirds of the participants were primed with age stereotypes and completed questionnaires assessing perceptions of aging (results reported in Kotter-Grühn & Hess, 2012). After a break, participants were instructed on a computer screen that they would see photographs of faces and their task was to rate those faces in terms of several characteristics. A multivariate analysis of variance with priming category (positive, negative, no priming) as between-subjects factor, and ratings of age and other characteristics (described later) as dependent variables, revealed no significant effect, $F(10, 328) = 0.74$, $p = .69$, $\eta_p^2 = .02$, indicating that the stereotype priming from the first part of the study had no effect on the subsequent picture ratings.

Photographs in the picture rating task were presented one at a time on the computer screen. Below each photograph the rating category (see later) was listed. Participants entered their ratings on the keyboard. We used 44 color head-and-shoulder photographs of older adults from the BASE sample. Photographs were standardized by replacing the existing picture background through a standard grey background and by eliminating overly salient personal features such as flashy jewelry (Ackermann, 2007). To reduce the length of the picture rating task, three picture sets were created (set A: 10 female, five male; set B: nine female, six male; set C: nine female, five male). Each person in the rater sample rated one set in terms of six characteristics (see later). Raters were randomly assigned to one set ($n_{\text{Set A}} = 59$, $n_{\text{Set B}} = 63$, $n_{\text{Set C}} = 55$). Six persons provided no ratings and were excluded from the analyses. Each set was rated by a similar number of men and women and by a similar number of younger, middle-aged, or older adults. Within each set, pictures and rating dimensions were presented in a random order.

Measures

Age estimation. For each target, raters responded to the question "How old do you think this person is?".

Attribute ratings. For each target, five ratings were assessed on a scale from 1 (*not at all*) to 5 (*very much*): (a) How physically fit do you think this person is?; (b) How cognitively fit do you think this person is?; (c) How much do you like this person?; (d) How much does this face express an emotion?; (e) How attractive do you find this person?

Rater characteristics. *Social interactions with older adults* were assessed with three items on a scale from 1 (*none or not at all*) to 5 (*very much/very good*): (a) How much contact do you typically have with people who are over 65 years old?; (b) How well, do you think, you get along with people who are over 65 years old?; (c) How much do you enjoy spending time with people who are over 65 years old? Because of their high intercorrelation ($r = .71$, $p < .001$) and their conceptual relatedness, the items "getting along with older adults" and "enjoying spending time with older adults" were aggregated into one indicator ("quality of contact with older adults") to avoid multicollinearity in subsequent analyses.

Target characteristics. Targets in the BASE sample rated two facets of their *subjective age* by responding to the items: "How old do you feel?" (felt age) and "How old would you say you look?" (self-perceived age). They were shown a scale ranging from 0 to 120 and asked to select a specific age for felt and self-perceived age.

Results

Comparing subjective age with age estimations

Are targets who feel younger and who think they look younger than they are in fact perceived as younger? To investigate this question, we examined the accuracy of targets' self-perceived age by comparing their subjective age with age estimations provided by raters. Unless otherwise noted, the values presented are means. At the measurement point when pictures were taken, the target persons' felt age was 76.7 years ($SD = 10.4$) and their self-perceived age was 78.8 years ($SD = 8.0$). That is, on average they felt 12 years younger and thought they looked 10 years younger than they were (range for felt age: −29.4 to 1.4 years; range for self-perceived age: −35.7 to 0.39 years; negative scores indicate younger subjective ages and positive scores indicate older subjective ages in comparison to objective age). Across all raters, the estimated age was 1.1 years ($SD = 9.5$) younger than the felt age and 3.2 years ($SD = 9.0$) younger than the self-perceived age. Figure 1 presents mean estimated age, objective age, and self-perceived age for each target. As hypothesized, the targets' subjective age was closer to the estimated age than to their objective age.

In addition, we compared the targets' subjective age with age estimations provided by raters in different age groups. For each of the 44 target persons and for each rater, we calculated two discrepancy scores by subtracting target's felt age and target's self-perceived age from rater's age estimation. We then calculated mean discrepancy scores (separately for female and male targets) for felt and self-perceived age for each rater. Two separate age group × gender × target gender analyses of variance (ANOVAs) with target gender as a within-subjects factor revealed significant age effects for felt age discrepancy, $F(2, 172) = 23.86$, $p < .001$, $\eta_p^2 = .22$, and self-perceived age discrepancy, $F(2, 170) = 17.48$, $p < .001$, $\eta_p^2 = .17$. Bonferroni post-hoc tests revealed all age groups differed from each other, $ps < .05$. As illustrated in Figure 2 (middle and right side), younger raters provided age estimations that were most discrepant from the targets' felt age ($M = -4.1$, $SD = 5.1$) and self-perceived age ($M = -6.1$, $SD = 5.4$). Age estimations by middle-aged raters were closer to the targets' felt ($M = -1.1$, $SD = 4.8$) and self-perceived age ($M = -2.9$, $SD = 5.4$). Older raters' age estimations differed from the targets' felt age by +1.9 years ($SD = 4.3$) and from the targets' self-perceived age by −0.1 years ($SD = 5.1$). A main effect of target gender for the discrepancy between estimated and self-perceived age, $F(1, 170) = 168.05$, $p < .001$, $\eta_p^2 = .50$, indicated that female targets underestimated the age they look more than male targets did when comparing targets' self-perceived age with the mean estimated age ($M_{\text{female}} = -4.57$, $SD = 5.64$ vs. $M_{\text{male}} = -0.83$, $SD = 6.57$). For the discrepancy between estimated and felt age, gender of rater or target had no significant effect, $ps > .35$.

Figure 1. Objective, self-perceived, and mean estimated age for the 44 target persons. Each vertical axis represents one target person (sorted by objective age).

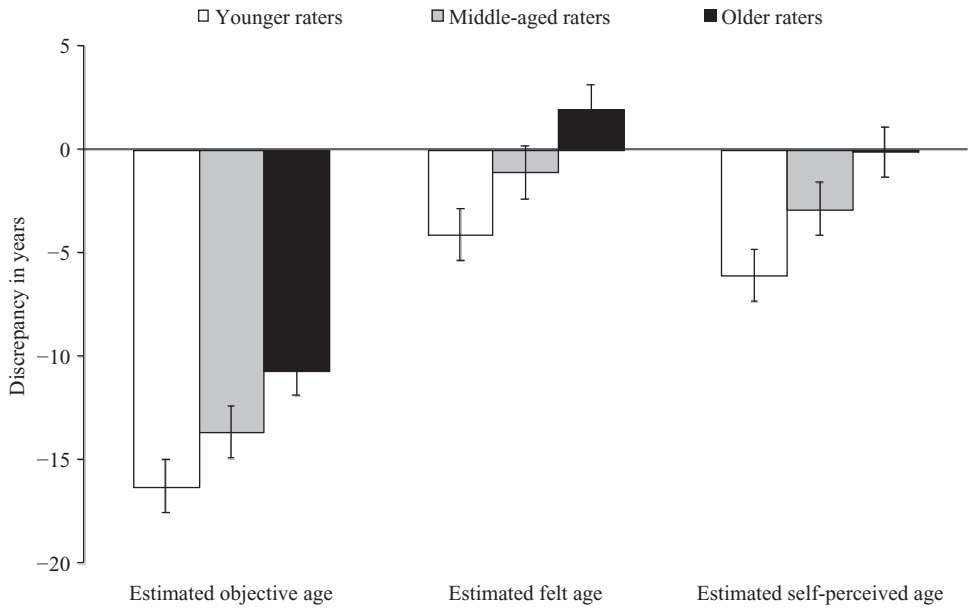

Figure 2. Discrepancy between mean estimated age and objective/felt/self-perceived age of targets as a function of age group. Error bars are 95% confidence intervals.

Comparing objective age with age estimations

For our second research question we examined how accurate raters are in estimating older targets' ages by comparing the target's objective age with the estimated age. First, we calculated a discrepancy score between a rater's age estimation and the objective age of each target person. A mean discrepancy score was then calculated for each rater. This score indicates overall age estimation accuracy, with negative scores representing underestimation and positive scores representing overestimation of age. No rater overestimated the age of the targets and the estimated target age deviated, on average, from the objective age by −13.63 years ($SD = 5.3$). Thus the accuracy of estimating the age of older adults was poor.

Age and contact predicting age estimation accuracy.

We further examined whether age and two indicators of social interactions with older adults (contact frequency and quality) predicted age estimation accuracy. Bivariate correlations revealed

that: (a) older ages were related to having more frequent contact ($r = .67$, $p < .001$) and getting along better ($r = .35$, $p < .01$) with older adults; and (b) older adults ($r = .48$, $p < .001$) and those who had more frequent ($r = .43$, $p < .01$) or more positive ($r = .16$, $p < .05$) interactions with older adults were more accurate in estimating the age of target persons.

Next, we entered age, quality of contact, and frequency of contact in one step in a regression analysis to examine which variables best predict age estimation accuracy. Supporting our hypothesis, raters who were older ($\beta = .33$, $p < .001$) or had more frequent contact with older adults ($\beta = .26$, $p = .008$) exhibited greater age estimation accuracy. Quality of contact with older adults was not a significant predictor ($\beta = -.08$, $p = .31$). Together, all predictors explained 23.7% of the variance in the outcome variable, $F(3, 172) = 19.15$, $p < .001$. To illustrate the age effect found in the regression analysis, we conducted an age group × gender × target gender mixed measures ANOVA on age estimation accuracy. Younger raters showed the strongest underestimation of age ($M = -16.3$ years, $SD = 5.0$), followed by middle-aged raters ($-13.$ 7 years, $SD = 5.1$) and older raters (-10.7, $SD = 4.2$), $F(2, 171) = 20.24$, $p < .001$, $\eta_p^2 = .19$ (Figure 2, left). Bonferroni post-hoc tests revealed all age groups differed from each other ($ps < .01$). We also found a significant main effect for target gender: The underestimation of the actual age was slightly stronger for male targets ($M = -14.0$ years, $SD = 5.6$) than for female targets ($M = -13.4$ years, $SD = 5.7$), $F(1, 171) = 4.18$, $p = .04$, $\eta_p^2 = .02$. Male and female raters did not differ in their age estimation accuracy, $F < 1$, and none of the interactions were significant.

Next, we tested mediation models with frequency or quality of contact with older adults as mediators for the relationship between raters' age and age estimation accuracy. In separate regression analyses, age was positively related to contact frequency ($\beta = .65$, $p < .001$), contact quality ($\beta = .35$, $p < .05$), and age estimation accuracy ($\beta = .48$, $p < .001$). When age and contact frequency were entered simultaneously into a regression analysis, higher contact frequency predicted better age estimation accuracy ($\beta = .22$, $p < .05$) and the regression coefficient for age was reduced ($\beta = .33$, $p < .001$), indicating that contact frequency partially mediated the relationship between age and age estimation accuracy. When entering age and contact quality into a regression analysis, contact quality did not predict age estimation accuracy ($\beta = .003$, $p = .97$) and the regression coefficient for age was not reduced ($\beta = .47$, $p < .001$), indicating that contact quality did not mediate the relationship between age and age estimation accuracy. In sum, our results show that older adults and persons with frequent contact with older adults were most accurate in their age estimations. However, higher frequency of contact with older adults cannot fully explain why older adults are most accurate.

Relationships between target characteristics and estimated age

Finally, we examined whether ratings of five target characteristics (physical fitness, cognitive fitness, attractiveness, likeability, and emotional facial expression) were (a) related to each other and (b) predictive of the estimated age of the respective target. Ratings for each target represent mean scores across all raters. In this analysis the targets and not the raters represent the unit of analysis. All five ratings were highly related to each other (Table 1).

Table 1. Bivariate correlations between target ratings

	CF	PF	L	E	EA–OA	EA
Attractiveness	**.77**	**.75**	**.90**	**.73**	**−.37**	−.23
Cognitive fitness (CF)		**.89**	**.70**	**.57**	**−.35**	**−.56**
Physical fitness (PF)			**.64**	**.52**	**−.40**	**−.46**
Likeability (L)				**.77**	−.24	−.05
Emotionality (E)					−.21	−.04
Estimated (EA)–objective age (OA)						**.46**

Note. Coefficients in bold are significant at $p < .05$.

Target persons who were rated high on one dimension were also rated high on other dimensions. For instance, targets perceived as attractive were also perceived as physically and cognitively fit, more likeable, and having more emotionally expressive faces. Due to high correlations between ratings (seven out of 10 coefficients were above .70), conducting a regression analysis with those ratings as predictors of estimated age was not possible because of potential multicollinearity. Alternatively, we looked at the bivariate correlations between target ratings, estimated age, and the average discrepancy between estimated and objective age per target (Table 1). Targets who received more positive ratings of attractiveness, cognitive fitness, and physical fitness looked younger (as indicated by a larger discrepancy between estimated and objective age) than targets with less positive ratings. Likeability and emotional facial expression were not related to the discrepancy between estimated and objective age. Note that the correlations between attractiveness or fitness and looking younger remained significant when controlling for emotional facial expression.

To examine gender effects for the attractiveness ratings, we conducted an ANOVA. On average, significant main effects of age group, $F(2, 166) = 21.54$, $p < .001$, $\eta_p^2 = .21$, gender of rater, $F(1, 166) = 8.52$, $p < .01$, $\eta_p^2 = .05$, and gender of target, $F(1, 166) = 7.52$, $p < .01$, $\eta_p^2 = .04$, indicated that older raters and women provided the most positive attractiveness ratings and female targets were perceived as more attractive than male targets. A significant gender of target × gender of rater interaction, $F(1, 166) = 23.35$, $p < .001$, $\eta_p^2 = .12$, indicated that female raters rated female targets ($M = 2.76$, $SD = 0.72$) as more attractive than male targets ($M = 2.46$, $SD = 0.77$), whereas male raters did not differentiate between female ($M = 2.27$, $SD = 0.76$) and male targets ($M = 2.35$, $SD = 0.82$).

Discussion

One of the most intriguing findings of this study was that older adults are quite accurate when estimating how old they look: On average, the targets thought they look 10 years younger than they were and this matched the average age estimated by older raters. These results suggest that a younger self-perceived age might reflect a relatively realistic perception of one's actual physical appearance in old age. This, however, also means that the self-regulation hypothesis (i.e., younger subjective ages are indicative of self-regulation when older adults deal with aging-related losses; Sneed & Whitbourne, 2005) may not apply to perceived age. It needs to be taken into consideration, though, that this conclusion may not generalize to other age groups. The target persons in this study represent a positively selected sample and their younger self-perceived ages might therefore match younger estimated ages.

However, other studies have shown that most adults have the tendency to strongly underestimate their physical age (e.g., Rubin & Berntsen, 2006) and it is unlikely that all of them indeed look younger.

We further demonstrated that not only the self-perceived but also the felt age of targets was closer to the estimated age than the objective age was. This suggests that one's felt age reflects not only one's own perceptions of the self, but also those of others. This is particularly important in the context of clinical settings in that subjective age (felt age, self-perceived age) might be a more important marker of psychological and physical health than objective age (cf. Christensen et al., 2009). Along the same lines, others have stressed the importance of one's own view of age(ing) over and above the effects of objective age in the context of health and longevity (e.g., Levy, Slade, & Kasl, 2002).

The present study extends previous research on age estimation accuracy by using photographs of very old adults (82+ years) as stimuli. We found that raters underestimated the age of very old targets by 13 to 14 years (i.e., targets looked much younger than they actually were). This stands in contrast to findings from previous studies in which age estimations only slightly deviated from targets' objective age (e.g., Burt & Perrett, 1995; George & Hole, 2000). George and Hole (1995), however, argue that age estimations show regression towards the mean, with younger faces being overestimated and older faces being underestimated. Similarly, the very old ages of our targets might have resulted in a pronounced underestimation of age. In social interactions, a strong underestimation of older adults' age might, however, be a good thing in that less negative and more positive age stereotypes are assigned to those who are perceived as young-old rather than old-old (cf. Hummert et al., 1997).

Although our results support the idea that perceived age is a valid, important social indicator (cf. Christensen et al., 2009), the underestimation of age might be related to two additional factors. First, the targets whose age was estimated represent a highly selective sample (i.e., 44 BASE participants out of 516 persons who survived to the sixth measurement point). These persons are positively selected in terms of physical, cognitive, and/or psychological functioning, all of which are likely to be reflected in looking younger. It should be noted that this positive selection also limits the generalizability of our results. Second, even though more people reach very old ages, many persons only know a few (if any) very old people and they may therefore not know which facial cues differentiate young old persons (e.g., persons in their 60s or 70s) from persons over the age of 85. For instance, even though the number of wrinkles and the deepness of furrows is generally indicative of older ages (Aznar-Casanova et al., 2010), those cues don't necessarily differentiate between young-old and old-old persons.

Supporting our hypothesis, we found that the ability to accurately judge the age of older persons was lowest in younger adults and highest in older adults (cf. Johnson & Pittenger, 1984). Such an own-age bias has also been found in face recognition tasks (e.g., Anastasi & Rhodes, 2005). One possible explanation for our finding may be that older adults are around same-aged persons more often, with this increased exposure leading to more familiarity, knowledge, and cues on which to base one's age estimation. In addition, older adults may compare others to themselves and draw conclusions from their self-perceived age to the age of another older adult. The idea that familiarity with older adults facilitates age estimations was supported by our findings that: (a) over and above the effect of raters' age, frequency of contact with older adults was positively related to age estimation accuracy; and (b) frequency of contact with older adults partially mediated the relationship between age and age estimation accuracy (cf. Ebner & Johnson, 2009, for similar results on face recognition). This suggests that spending time with older adults can sensitize people to look out for the facial characteristics that are indicative of very old age (cf. Sörqvist & Eriksson, 2007).

Supporting the physical attractiveness stereotype, we found that persons who received higher attractiveness ratings were perceived to also possess other positive characteristics (cf. Feingold, 1992; Griffin & Langlois, 2006). Consistent with other studies (e.g., Ebner, 2008), physically attractive targets were rated as more physically and cognitively fit, and they received higher likeability ratings. Given that fitness and likeability cannot be evaluated simply by looking at a facial photograph, it is likely that participants judged those characteristics on the basis of more salient features such as attractiveness or age. Considering that most studies on the physical attractiveness stereotype focused on younger targets, the present study extends previous research by suggesting that, even for very old adults, the attractiveness stereotype seems to hold true. Most importantly, we demonstrated that targets who were perceived as more attractive and fit were also perceived as much younger. This is in line with findings from some studies (Henss, 1991; Korthase & Trenholme, 1982; McLellan & McKelvie, 1993), but inconsistent with others (e.g., Johnson & Pittenger, 1984). We argue that our results support the idea of attractiveness and old age being stereotypically mutually exclusive. That is, it may be less likely that both attributes (old and attractive) are simultaneously assigned to a person because 'attractive' does not fit the stereotypes typically related to old age and 'old' does not fit the stereotypes typically related to attractiveness.

Finally, the reported gender differences in self- and other-ratings of age and attractiveness are partly in accordance with notions of the double standard of aging. Female targets in our study underestimated the age they looked to a greater extent than male targets did. Since aging is often times experienced more negatively in women than in men, we speculate that looking young is more important for women and they therefore have a tendency to report younger subjective ages. In contrast to some previous studies (Deutsch et al., 1986), female targets were perceived as more attractive than male targets but the effect was specific to female raters. This female in-group favoritism might reflect women's stronger concern with physical appearance in the context of age and aging (Barrett & von Rohr, 2008).

Limitations and outlook

We did not include photographs of younger and middle-aged targets because, although such photographs are available, information about both the objective and subjective age of the pictured persons is not readily available. It would be interesting to examine whether our finding that age estimations are most accurate when targets and raters belong to the same age group (in our case older adults) is transferable to other age groups. Including pictures of only one age group allowed us to examine factors such as attractiveness without confounding them with age. Nevertheless, several questions remain open regarding the interplay between attractiveness and age stereotypes. For instance, are attractiveness and age stereotypes activated simultaneously, or is one stereotype more likely to overwrite the other?

Another limitation is that we only included Caucasian faces as stimulus material. It is possible that the racial/ethnic background of targets and raters influences age estimations. Furthermore, rather than using pictures of faces, a more ecologically valid approach would be to present whole-body pictures or have participants interact with older adults, all of which give the perceiver additional information (e.g., body build, posture, voice) when judging age or attractiveness of targets. Our finding regarding the relationship between frequency of contact with older adults and age estimation accuracy provided some support for the assumption that intergenerational contact can enhance the perception of older adults (cf. Downs & Walz, 1981). Future studies would benefit from detailed assessments of intergenerational contact and experimental and/or longitudinal investigations which allow conclusions about causal relationships between age perceptions and contact with older adults. Moving beyond age estimations, future studies could examine whether individuals are able to accurately rate older adults' well-being via photographic observation.

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Note

1. Selectivity analyses indicated that individuals who participated in the sixth measurement occasion were on average younger (–0.97 *SD*) and reported younger subjective ages than the 516-person T1 baseline sample (–0.54 *SD* for felt age, –0.46 *SD* for physical age). Such selection effects are expected in an older sample over the course of a 16-year longitudinal study.

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