Assessing age stereotypes in the German population in 1996 and 2011: socio-demographic correlates and shift over time

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Published online: 15 May 2017
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Abstract The present study aimed to extend the knowledge regarding dimensionality, socio-demographic correlates and shifts in age stereotypes over the past 15 years using a time-sequential design. In 1996 and 2011, we assessed age stereotypes in two independent samples of the German population aged ≥ 45 years ($N = 970$ in sample 1, $N = 1545$ in sample 2). Three scales with six items each were assessed. Two scales cover negative (i.e., rigidity/isolation, burden), and one scale covers positive age stereotypes (wisdom/experience). Dimensionality of the scale, associations with socio-demographic variables and whether the stereotypes have shifted were tested using confirmatory factor analyses, structural equation modeling and analyses of variances. Three dimensions were identified and replicated following an exploratory as well as a confirmatory approach. Age stereotypes did shift between 1996 and 2011 in the dimension burden (i.e., becoming more negative). Our results further underpin the finding

that age stereotypes are multifaceted and suggest that dimensions do not change over time. Additionally, our data provide some evidence that societal age stereotypes partly change over time.

Keywords Age stereotypes · General population · Socio-demographic variables · Confirmatory factor analysis

Introduction

Human aging is accompanied by gains and losses (Baltes and Smith 2003; Wurm and Benyamini 2014). Numerous studies have analyzed beliefs and judgments about aging, older people and old age. In this context, the term age stereotypes has been used to characterize general perceptions of older persons as a group (Kruse and Schmitt 2006). In the past years, several studies have shown that age stereotypes are often evaluative and multifaceted. Positive and negative age stereotypes can coexist in one person (Gluth et al. 2010; Kruse and Schmitt 2006; Kornadt and Rothermund 2011; Kite et al. 2005). In general, attitudes toward older people are more negative than toward younger people (Kite and Johnson 1988; Kite et al. 2005). Context-related factors moderate results. For instance, the assessment of attitudes yields different results depending on the target used (global, e.g., “old person,” vs. a specifically described person) or type of judgment (global, e.g., related to personality vs. specific, e.g., related to a specific competence; Kite et al. 2005; Kite and Johnson 1988).

Studying societal as well as individual age stereotypes is important for different reasons (Wurm and Huxhold 2012). Numerous laboratory studies with older participants have demonstrated that positive as well as negative age

Responsible editor : D.J.H. Deeg

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stereotypes can lead to individually adverse or advantageous outcomes in cognitive and physical functioning (e.g., Levy et al. 2006; Levy and Leffheit-Limson 2009; Levy 2009; Coudin and Alexopoulos 2010; Wurm and Benyamini 2014). A large body of research has analyzed the influence of age stereotypes on health and health behavior (Levy et al. 2002; Wurm et al. 2007, 2010). Links between more positive age stereotypes and longevity, better functional health (Levy et al. 2002; Stewart et al. 2012; Westerhof et al. 2014), and more preventive health behavior (Wurm et al. 2010; Levy and Myers 2004; Quinn et al. 2009) have been demonstrated, while more negative stereotypes have shown to be associated with impaired mental health, i.e., depression (Bryant et al. 2012; Chachamovich et al. 2008). Age stereotypes apparently play a role in successful aging, i.e., the absence of physical disability and cognitive impairment, subjective health and psychological well-being (Depp and Jeste 2006).

Domain-specific age stereotypes

Several studies have demonstrated that the assessment of age stereotypes distinguishing different domains or dimensions leads to more differentiated results (Gluth et al. 2010; Kruse and Schmitt 2006; Bryant et al. 2012; Kornadt and Rothermund 2011). Older people were evaluated more positively in some domains (e.g., “family/partnership” and “religion/spirituality”), but received more negative ratings in other domains (e.g., “friends/acquaintances,” “leisure/activities,” “social/civic commitment” and “health/fitness”) (Kornadt and Rothermund 2011).

Socio-demographic correlates of age stereotypes

Age stereotypes differ not only between different domains but also between different social groups (e.g., with regards to sex, age, region, education or employment status). For example, the German Aging Survey has shown that lower educational status was associated with more negative self-perceptions of aging while higher educational status showed an association with more positive self-perceptions. In addition, Eastern German participants reported more negative self-perceptions in comparison with Western German participants. Knowledge about these differences is important because of the described association between age stereotypes and health and health behavior (Wurm and Huxhold 2012). Younger age is related to a more negative age stereotype (Kite et al. 2005; Gluth et al. 2010; Kornadt and Rothermund 2011). This effect is often explained by *inter-group theory*, i.e., other social groups than one's own social group are perceived less positively (Kruse and Schmitt, 2006). The occurrence of an *accommodative shift* provides an alternative explanation for the age effect in age

stereotypes. In order to protect positive self-views, individuals shift toward more positive age stereotypes when growing older (Kornadt and Rothermund 2011). In subscales measuring age stereotypes, mean level of agreement also differed according the age group of respondents: the oldest age group agreed more strongly than middle-aged adults on the statement that old people are a burden on society (i.e., perceiving the own group less positively), and the middle aged agreed more strongly that old age is associated with developmental gains and chances for development (i.e., perceiving another group more positively). *Inter-group theory* and the existence of an *accommodative shift* fail to explain these findings (Kruse and Schmitt 2006; Kornadt and Rothermund 2011).

Bryant and colleagues (2012) have found an association between having a relationship and positive attitudes to old age, whereas Kruse and Schmitt (2006) found a link between employment and more agreement with positive age stereotypes. These findings have been explained by the *forward projection hypothesis*. This hypothesis assumes that individual objective living conditions influence age stereotypes, i.e., positive conditions such as having a partner, being needed and valued in a working environment or being well-off will be forward projected and thus lead to a more positive view of old age (Kruse and Schmitt 2006).

Importance of societal age stereotypes

The *stereotype embodiment theory* (Levy 2009) emphasizes the importance of age stereotypes held by society for the process of individual stereotype internalization. On the contrary, self-perceptions of aging can also influence general age stereotypes (Rothermund and Brandtstadter 2003). As Kruse and Schmitt (2006) have pointed out, prevalence and salience of age stereotypes have generally increased along with demographic change. In the United States, a study using computational linguistics has illustrated that age stereotypes have been increasing in negativity in the last 200 years (Ng et al. 2015). A recent meta-analysis by North and Fiske (2015) suggests that negative age stereotypes are driven by the rapid change in population aging. Besides demographic trends, it was shown that regional and cultural differences appear to be of importance for perceptions of the aged. Public debates about future challenges, e.g., the adjustment of the social security systems in light of an aging population, are influenced by age stereotypes. In this context, it is also important to be aware of prevailing age stereotypes and promote a differentiated view on aging on a societal level (Ory et al. 2003; Kruse and Schmitt 2006; Wurm and Benyamini 2014; Ng et al. 2015). In recent years, German policy has increasingly recognized the importance of age stereotypes within the Government Reports on Older

People. The sixth report has specifically dealt with age stereotypes in German society and has evaluated their impact on different domains, e.g., the health care system (Berner 2011). There is some evidence that societal changes are accompanied by changing age stereotypes (Ory et al. 2003; Baltes and Smith 2003), although these shifts are considered to occur rather slowly (Cheng and Heller 2009). On the one hand, it is argued that age stereotypes have become more positive in the past years. The so called third age, for example, reflects a time of late freedom and high subjective well-being for older individuals. On the other hand, it seems likely that in light of demographic change, economic crisis and rapid evolution of information technology, age stereotypes increasingly emphasize negative aspects such as societal burden or lack of competency (Baltes and Smith 2003; Berner 2011). The German Ageing Survey has shown that self-perceptions of aging have become more positive over three assessment periods (1996, 2002, 2008) (Wurm and Huxhold 2012). However, studies analyzing societal shifts in age stereotypes so far are rare.

Aims of the study

We aimed to extend the knowledge regarding socio-demographic correlates and shifts in age stereotypes in different domains over the past 15 years using a time-sequential design. In 1996 and 2011, we assessed age stereotypes in two independent samples of the German population.

1. We aimed at investigating if age stereotypes are captured by the same dimensions in both samples, i.e., we analyzed the factorial structure of the assessment instrument.
2. We aimed at describing the relationships between socio-demographic variables and age stereotypes in both samples. Based on existing research, we expected increasing age to be associated with more positive and less negative age stereotypes in the assessed domains. According to the *forward projection hypothesis*, we assumed that more positive living conditions (living with a partner, higher household income) are associated with more positive and less negative age stereotypes. We also investigated if participants' formal education was connected with age stereotypes, but had no specific expectations regarding this association.
3. We further investigated if age stereotypes have changed over the past 15 years. As noted before, we expected that age stereotypes have simultaneously become more positive and more negative, depending on the evaluated dimension.

Materials and methods

Study samples

Data were collected as part of two nation-wide face-to-face household surveys conducted in Germany. Both studies were carried out by professional interviewers of a demographic consultation company (USUMA, Berlin, Germany). Data collection took place in March/April 1996 (sample 1) and in June/July 2011 (sample 2).

The surveys met the ethical guidelines of the international code of marketing and social research practice by the International Chamber of Commerce and the European Society of Opinion and Marketing Research. The local ethical review board approved the study protocol.

In 1996, a representative sample of the general German population aged ≥ 16 years was approached using 250 sample points. In this survey, East and West Germany were equally represented in the sample (around 50% each), whereas the second survey followed a different scheme representing the population of Germany in a representative manner. In 2011, persons aged ≥ 14 years were approached at 258 sample points. The sampling points were not identical but selected to ensure representativeness. In both samples, households of the respective area and members of the household fulfilling the inclusion criteria (age at or above 14/16, able to read and understand the German language) were selected randomly (random-route-procedure, kish-selection-grid). If the target person was not at home, a maximum of three attempts was made to contact him or her. All subjects were visited by a study assistant, informed about the study and were presented self-rating questionnaires. Written informed consent was provided by all participants after the procedures had been fully explained. Of the initially selected addresses, 3190 (sample 1) and 4572 (sample 2) were valid. In total, 2179 persons took part in study 1 and 2512 persons took part in study 2 (participation rate 68.3 and 54.9%). Age stereotypes were assessed in persons aged ≥ 45 years ($N = 970$ in sample 1, $N = 1545$ in sample 2). Table 1 shows demographic characteristics of the two cross-sectional samples.

Instruments

In study 1, 61 either positive or negative statements about aging, older people and old age were presented. These items were used in an earlier study by Kruse and Schmitt (see Kruse and Schmitt 2006 for details regarding the item pool). Participants rated the items on a scale ranging from 1 (*does not apply*) to 4 (*applies completely*). Dimensionality was examined by exploratory factor analysis (EFA) with Varimax rotation, resulting in four factors (Eigenvalue 8.7,

Table 1 Socio-demographic characteristics of the two samples

Age	Sample 1996		Sample 2011	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	60.51	9.4	61.74	11.1
	<i>N</i>	%	<i>N</i>	%
Gender				
Male	430	44.3	727	47.1
Female	540	55.7	818	52.9
Age group				
45–54 years	275	28.4	498	32.2
55–64 years	400	41.2	429	27.8
65–74 years	208	21.4	391	25.3
≥75 years	87	9.0	227	14.7
Marital status				
Married	628	61.7	883	57.4
Single	50	5.2	113	7.3
Divorced	90	9.3	242	15.7
Widowed	202	20.8	307	19.9
Living with a partner				
Yes	721	74.3	927	60.4
No	249	25.7	608	39.6
Household income¹				
Low	397	43.1	785	25.8
Middle	444	48.2	733	48.8
High	80	8.7	380	25.3
Education²				
Low	609	63.2	814	52.8
Middle	227	23.5	518	33.6
High	128	13.3	210	13.6
East versus West Germany				
East Germany	461	47.5	337	21.8
West Germany	509	52.5	1208	78.2

¹ Low = < 1,250 €; middle = 1250–2500 €, high < 2500 €² Low = less than 10th grade, middle = 10th grade, high = German Abitur (university entrance diploma), college or university degree

5.3, 3.2 and 2.0) that explained 31.4% of the variance. Following a common approach in scale development, the number of items and number of scales were reduced for statistical (i.e., factor loadings > .50, no substantial cross-loadings) and theoretical reasons (i.e., with regard to item content) in a second step. Finally, three scales with six items each were derived: rigidity/isolation (R/I), burden (B) and wisdom/experience (W/E). With the exception of one item all items refer to “older people,” i.e., perceptions of older persons as a group. Two scales cover negative age stereotypes, i.e., being rigid and lonely (R/I: “Most old persons feel lonely.”) or emphasize the social burden caused by older people (B: “The growing proportion of

older people causes many problems and little benefit”). Positive age stereotypes, i.e., potentials and resources, are assessed by the third scale (W/E: “Young people can benefit from advice of older people in individual matters”). These three scales were assessed in sample 2. Additionally, examined by exploratory factor analysis (EFA) with Varimax rotation, the variance explained by those three factors was 48.6% in 1996 (Eigenvalue 3.8, 3.2 and 1.8) and 53.3% in 2011 (Eigenvalue 4.7, 3.3 and 1.6). For each scale, a mean score was calculated. In the scales R/I and B higher values indicate a more negative stereotype, whereas in the scale W/E higher values indicate a more positive stereotype.

Socio-demographic measures

The questionnaire also included a section assessing socio-demographic variables. Table 1 gives an overview which variables were used in our study.

Statistical analyses

The factorial structure of the scale and the influence of socio-demographic variables were tested using confirmatory factor analysis (CFA) using the maximum likelihood approach to estimate the model. Analyses were computed with AMOS 18.0. First, CFA was calculated testing the three-factor model derived from EFA in sample 1. Second, this structure was cross-validated in sample 2. Third, the influence of age, education, household income and partnership on the three scales was investigated in both samples using structural equation modeling.

Besides Chi-square statistics, which is very sensitive to sample size, we used various incremental and global fit indices reflecting different information regarding model fit: the minimum discrepancy, divided by its degrees of freedom (CMIN/DF); the root-mean-square error of approximation (RMSEA), the standardized root-mean-square residual (SRMR), the Tucker–Lewis-index (TLI), and the comparative-fit index (CFI). CFI and TLI indicate goodness of fit, while RMSEA and SRMR indicate badness of fit. CFI, TLI and RMSEA are moderately sensitive to simple model misspecifications and, SRMR on the contrary, is only moderately sensitive to complex model misspecifications but very sensitive to simple model misspecifications. The SRMR indicates misspecifications of the structural model, whereas the RMSEA indicates misspecified loadings (Beauducel and Wittmann 2005; Hu and Bentler 1998, 1999).

For a good model fit, the ratio CMIN/DF should be as small as possible (Arbuckle 2009). Values larger than .95 for CFI and TLI are considered as indicators of good fit (Schermelleh-Engel et al. 2003), whereas values larger

than .90 are usually interpreted as indicators for an acceptable fit (Arbuckle 2009; Hu and Bentler 1998; Kline 2005; Schermelleh-Engel et al. 2003). Further, RMSEA values smaller than .06 indicate a good model fit (Hu and Bentler 1999), and values smaller .08 still reflect an adequate fit. SRMR values smaller than .05 indicate a good fit, and values smaller than .10 indicate an acceptable model fit (Schermelleh-Engel et al. 2003). To evaluate whether each construct can be reliably estimated from its indicators, we report composite reliability (CR) and average variance extracted (AVE) for each latent construct (Fornell and Larcker 1981). Reliability can assumed if $CR > .7$ and convergent validity if $CR > AVE$ and $AVE > .5$ (Hair et al. 2010).

Additional analyses were conducted to test the invariance of the three-dimensional model across both time points (1996 and 2011) using multigroup CFA. Measurement invariance was tested in four steps using first the configural model (no constraints), followed by a metric invariant model (with unstandardized item loadings constrained to be equal across groups), a scalar invariant model (with unstandardized item loadings and unstandardized item intercepts simultaneously constrained to be equal across groups), and a fourth model of invariance that included additionally the constraint of equal covariances between the latent variables. Based on the hierarchy of these nested and increasingly restrictive models, the models were then compared to each other. Since the Chi-square statistic has often been criticized for its sensitivity to sample size, we focused mainly on the differences ΔCFI and $\Delta RMSEA$. Values smaller than .01 indicate the invariance of the models (Cheung and Rensvold 2002). From a statistical perspective, the test for measurement invariance is a prerequisite for a following comparison of means. Only if at least partial measurement invariance is given, a comparison of means between different groups is meaningful (Gregorich 2006).

In addition, structural equation modeling (SEM) was used to describe the associations with socio-demographic variables of interest. Socio-demographic variables were introduced in the optimized models (age, education, partnership, household income). If the correlations with the latent variables were not significant ($p > .001$), the variables were omitted from the models. Model fit was evaluated according the fit indices described above.

To investigate whether societal age stereotypes have changed over the past 15 years, univariate analyses of variance (ANOVA) were carried out to analyze the effects of time of study (1996, 2011) We included region (East vs. West Germany) as a covariate in order to control for differences between the two samples. Because of the large sample size, we considered only effects of at least $\eta^2 > .03$ as meaningful. η^2 is an effect size that refers to the

proportion of variance that is accounted for by the effects using ANOVA.

Results

Dimensionality of the instrument in both samples

CFA of the three-factor model failed to achieve satisfactory model fit ($\chi^2(df) = 762.233$ (133) $p < .001$, CMIN/DF = 5.731, CFI = .856, TLI = .835, SRMR = .061, RMSEA = .072). In order to optimize model fit, correlating error terms were allowed between two item pairs (7 and 8; item 17 and 18), according to modification indices and with regard to item content (see Fig. 1). While item 7 and 8 refer to feelings of depression and loneliness, item 17 and 18 both refer to the opinion that older people should not be given priority in comparison with younger people. Computing the optimized model resulted in acceptable to good model fit according fit indices ($\chi^2(df) = 485.793$ (131) $p < .001$, CMIN/DF = 3.708, CFI = .919, TLI = .905, SRMR = .054, RMSEA = .055). Reliability of the latent constructs was good (rigidity/isolation CR = .85, burden CR = .79, wisdom/experience CR = .84), while convergent validity failed to reach the criterion in two dimensions (rigidity/isolation AVE = .51, burden AVE = .39, wisdom/experience AVE = .47). The optimized model was cross-validated in sample 2. CFA resulted in satisfactory to good model fit ($\chi^2(df) = 767.394$ (131), $p < .001$, CMIN/DF = 5.858, CFI = .933, TLI = .922, SRMR = .048, RMSEA = .056). Again, reliability was good (rigidity/isolation CR = .89, burden CR = .84, wisdom/experience CR = .84), but convergent validity of the measure slightly failed to reach the criterion in two dimensions (rigidity/isolation AVE = .58, burden AVE = .48, wisdom/experience AVE = .48).

Furthermore, the invariance of the model (without the inclusion of different socio-demographic parameters) was tested across both time points. Results of the measurement invariance tests are shown in Table 2. Regarding the multigroup analyses, metric invariance could be confirmed, but—due to $\Delta CFI = .030$ —scalar invariance could not be confirmed completely across both assessments. Following the procedure described in Gregorich (2006), the constraint of equal intercepts was freed for items 5 (“Older people’s advice should be asked more frequently, when it comes to political decision making”), 8 (“Most old people feel lonely”), 12 (“Many older people have lost contact to the present”) and item 13 (“Older people are too expensive for public budgets”), and the model was re-estimated for partial scalar invariance. As shown in Table 2, partial invariance could be confirmed. Additionally, the results of the fourth step—including the constraint of equal

Fig. 1 Structural model of the age stereotypes in sample 1 (1996) with socio-demographic correlates

Table 2 Tests for invariance across both samples (1996, 2011)

	<i>N</i>	χ^2 (<i>df</i>)	$\Delta\chi^2$	Δp	CMIN/DF	CFI	ΔCFI	RMSEA	$\Delta RMSEA$
Multigroup analysis									
Configural model		1253.196 (262)			4.783	.929		.039	
Metric model		1335.895 (277)	82.699	<.001	4.823	.924	.005	.040	.001
Scalar model		1770.845 (295)	434.950	<.001	6.003	.894	.030	.045	.005
Partial scalar model ^a		1473.577 (291)	137.681	<.001	5.064	.915	.009	.041	.001
Partial scalar model ^a with structural covariances constraint to be equal		1797.900 (300)	324.323	<.001	5.993	.893	.022	.045	.004

df degrees of freedom, *CMIN/DF* minimum discrepancy, divided by its degrees of freedom, *CFI* comparative-fit index, *RMSEA* root-mean-square error of approximation

^a The constraint of equal intercepts was freed for items 5, 8, 12 and item 13

covariances—were not clear, because ΔCFI (.22) did not indicate the invariance of the models while $\Delta RMSEA$ (.004) did. The $\Delta\chi^2$ statistic indicated significant differences in all cases of the invariance tests, but due to its sensitiveness to sample size we focused on differences in values RMSEA and CFI (Schermelleh-Engel et al. 2003).

Socio-demographic correlates in both samples

Model fit (see Figs. 1, 2 to see the final models) was satisfactory in both samples ($\chi^2(df) = 558.971$ (165) $p < .001$, *CMIN/DF* = 3.388, *CFI* = .912, *TLI* = .898,

SRMR = .053, *RMSEA* = .051 and $\chi^2(df) = 870.413$ (182) $p < .001$, *CMIN/DF* = 4.782, *CFI* = .934, *TLI* = .924, *SRMR* = .046, *RMSEA* = .050). In sample 1, only age and education showed small significant correlations. Increasing age was associated with a more positive age stereotype in the dimension wisdom/experience. Higher formal education was associated with lower ratings in rigidity/isolation (i.e., a less negative age stereotype) (see Fig. 1). In sample 2, only the dimension wisdom/experience showed associations with the socio-demographic variables under study (see Fig. 2). Increasing age and living in partnership was associated with higher ratings in

Fig. 2 Structural model of the age stereotypes in sample 2 (2011) with socio-demographic correlates

wisdom/experience, while higher household income was negatively correlated to wisdom/experience.

Shifts in views on old people

Mean agreement by year of study with the age stereotypes under study is displayed in Fig. 3. Analysis of variances showed no effect for year of study in the dimension rigidity/isolation ($F(1,2461) = .003$, n.s.). A main effect of year of study was found in the dimension burden ($F(1,2457) = 153.33$, $p < .001$, $\eta^2 = .059$) and in the dimension wisdom/experience ($F(1,2444) = 17.533$, $p < .001$, $\eta^2 = .007$). However, the effect in wisdom/experience was not meaningful according to effect size. The covariate region had a significant effect in wisdom/experience ($F(1,2444) = 43.803$, $p < .001$, $\eta^2 = .018$), but this effect was also small.

Discussion

The importance of age stereotypes for individual health has been increasingly recognized. Based on the assumptions that individual embodiment of stereotypes is influenced by

Fig. 3 Age stereotypes in the German population in 1996 and 2011. Mean scores (responses ranged from 1—does not apply at all to 4—applies completely)

prevailing age stereotypes in the society (Levy 2009; Wurm and Benyamini 2014; Wurm and Huxhold 2012) and that these play a central role in public discourse about societal challenges related to demographic change (Kruse and Schmitt 2006), we aimed to provide further results regarding age stereotypes in the German population based on representative samples.

We assessed age stereotypes in two independent samples aged 45 years and older in 1996 and 2011 using a time-sequential design. Whereas the sample size and the population-based sampling strategy are among the major strengths of our study, two methodological weaknesses have to be acknowledged. We assessed global age stereotypes using general targets (older persons) and did neither account for gender differences nor individual age thresholds (what is considered to be “old”) (Kite et al. 2005; Davis and Friedrich 2010; Diehl et al. 2014). More general, our study design does not allow any interpretations in terms of causality, although we think long-term intra-individual data regarding the reasons for shifting age stereotypes is of great interest (Davis and Friedrich 2010). Besides only adults aged 45 and older were assessed in this study, which might explain that the results differ from other studies in younger people.

Dimensionality of age stereotypes

Three dimensions were identified following an exploratory and confirmatory approach (i.e., rigidity/isolation, burden, wisdom/experience). One dimension (W/E) captures a positive age stereotype, while the other two reflect negative age stereotypes. Our results further underpin the finding that age stereotypes are multifaceted (Kornadt and Rothermund 2011; Gluth et al. 2010) and there is not a single evaluative dimension, but a differentiated view including both facets (Kruse and Schmitt 2006). Most importantly, the factorial structure could be replicated using CFA in the second sample leading to the assumption that these dimensions do not change over time. Convergent validity as measured by the average variance explained of the 3-factor structure was, however, not completely satisfactory, since average variance extracted (AVE) failed to reach the criterion for two of the three dimensions. Moreover, the dimensions had different associations with socio-demographic variables assessed in the study supporting the importance of assessing different domains on the one hand but questioning the validity of the measure on the other. Regarding the results of measurement invariance tests, we conclude that shifts between both time points seem to be of marginal importance. First, metric invariance could be confirmed, indicating same factor loadings for the three latent factors. Second, only partial scalar invariance could be confirmed, where the constraint of equal intercepts had to be freed for 4 out of 18 Items, but no linear trend for all four items could be confirmed. Third, the results comparing the correlation coefficients between the latent variables in the model remain inconsistent. This is probably due to similarly sized correlation coefficients between the dimensions “burden” and “wisdom/experiences” across the time, but the relatively great difference

between the correlations of dimensions “burden” and “rigidity/isolation” at both time points. To sum up, based on the present results we cannot confirm differences of great practical impact.

Socio-demographic correlates of age stereotypes

According with previous research, we expected increasing age to be associated with less negative and more positive age stereotypes (Kornadt and Rothermund 2011).

The results are only partly in line with this hypothesis. In both samples, increasing age was associated with more positive ratings in the dimension W/E. This result might be explained by an accommodative shift (Kornadt and Rothermund 2011). However, negative age stereotypes showed no association with increasing age and contradicted explanations made by inter-group theory (where we would expect more negative stereotypes for the other group, i.e., “the old”) (Kruse and Schmitt 2006). Yet analyses only included participants in a restricted age range, and we did not distinguish between general and individual views. Possibly, the nature of the study sample (rather healthy and self-dependent participants, no nursing home inhabitants) has influenced the results, i.e., participants perceived themselves not as part of the “old.” As suggested in other studies (Kornadt and Rothermund 2011), differences in age stereotypes according to the respondent’s age might appear rather domain-specific. Positive living conditions did not consistently show the expected associations with age stereotypes under study, questioning the *forward projection hypothesis*. Contrary to other studies, living with a partner was not associated with more positive age stereotypes in sample 1 (Bryant et al. 2012). Yet, living with a partner was related to more positive ratings in W/E, while higher income showed an opposite association in sample 2. Interestingly, higher formal education was associated with a less negative age stereotype (i.e., lower ratings in R/I). As these associations did not appear consistently, further studies should analyze this links in more detail to shed light on possible explanations.

Did age stereotypes change over time in the German population?

Contrary to our expectations, age stereotypes did shift between 1996 and 2011 in two dimensions under study. Old people were rated more negatively in terms of being a burden to society in 2011. Besides, ratings in wisdom/experience were more positive in 2011. The small effect size, however, casts doubt on the importance of this difference beyond statistical significance. We interpret the change in the dimension burden to be related to the difficulties

provoked by demographic change (North and Fiske 2015). Ensuring the social security system, e.g., health insurance or pension, is increasingly perceived as a challenge for future generations. Greater awareness of this challenge is probably one of the most significant changes in the German society. In particular, young politicians have increasingly questioned the solidarity between generations which might have provided the ground for changing age stereotypes especially in the burden dimension (e.g., Bruder Müller and Birnbacher 2001). As suggested, age stereotypes appear to shift along with demographic change, even if the shift is of marginal size (Berner 2011; North and Fiske 2015). Apparently, the participants do not favor more positive aspects, but increasingly experience the assumed burden caused by older people, i.e., the age stereotypes have increased in negativity not only in the USA but also in Germany (Ng et al. 2015). It is important to note that even if age stereotypes change, neither the old nor the new stereotype has to be necessarily true (Ory et al. 2003).

General implications and directions for future research

Our study results support the evaluative and multifaceted nature of age stereotypes. These dimensions seem to be stable, as the factor structure could be replicated, but validity is somewhat limited. With regards to socio-demographic correlates, our findings are only partly in line with previous findings. Some inconsistencies (e.g., age effect in specific dimensions, associations between living conditions and age stereotypes) have been found that cannot be fully explained by explanatory approaches such as *inter-group theory* or the *forward projection hypothesis*. Yet our study was not specifically designed to test theoretically designed assumptions from these theories. Future research should thus shed further light on these issues. Our data provide some evidence that age stereotypes do change over time. We have studied change over 15 years only. Consequently, we might have failed to detect changes that might in general occur rather slowly. Age stereotypes possibly reflect current debates on demographic change (i.e., potential burden of older people in the future). Thus, the present study might contribute to public discourse about prevailing age stereotypes and their change in German society.

Because of the established link between positive age stereotypes and individual health (Westerhof et al. 2014), it is important to promote a differentiated and realistic view on old age in the German society, since successful aging obviously needs realistic goals and positive role models (Cheng et al. 2009; Horton et al. 2008; Davis and Friedrich 2010). For example, negative stereotypes can lead to more concern and enforce thinking about challenges in the

future, such as housing opportunities in case of impairment (Kornadt and Rothermund 2011; Spangenberg et al. 2012). One pathway to realistic age stereotypes is to mobilize public awareness campaigns that might specifically target social groups holding negative or positive age stereotypes (Ory et al. 2003; Wurm and Huxhold 2012).

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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