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Assessing aging stereotypes: Personal stereotypes, self-stereotypes and self-perception of aging

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Abstract

Background: There is a broad semantic network of aging stereotypes; where different concepts and their measurement are confused: personal stereotypes, self-stereotypes and self-perception of aging. **Method:** First, we analyze the translated version of the Image of Aging Scale (IAS) measurement model through exploratory and confirmatory factor analysis, with two representative sub-samples of the Spanish population aged over eighteen (N = 1,105) and in a sample of gerontologists and geriatricians (N = 325). Second, in an effort to disentangle the theoretical relationships between personal stereotypes, self-stereotypes and self-perception of aging, both the IAS (with different instructions) and Lawton's 5-item scale were administered to a representative sample of Spanish people over 50. **Results:** Our results indicate that the Spanish version of the IAS has a similar psychometric structure to that proposed by the authors. Furthermore, the factorial structure (equal form and metric invariance) is replicated in both samples, but latent means and factor correlations were higher in the professional group. **Conclusions:** We discuss Levy's theoretical assumptions about personal-stereotypes and the self-stereotype measured with IAS and their relationship to self-perception of ageing.

Keywords: Aging stereotypes, personal aging stereotypes, aging self-stereotypes self-perception of aging.

Resumen

Evaluando estereotipos del envejecimiento: estereotipos personales, auto-estereotipos y auto-percepción del envejecimiento. **Antecedentes:** existe una amplia red semántica sobre los estereotipos del envejecimiento; donde se confunden diferentes términos como: los estereotipos personales, auto-estereotipos y la auto-percepción del envejecimiento; así como la manera en que se evalúan. **Método:** con el objetivo de clarificar esta red semántica, se analiza la versión traducida del modelo de medición Image of Aging Scale (IAS) a través del análisis factorial exploratorio y confirmatorio, en dos sub-muestras representativas de la población española mayor de 18 (N = 1.105) y en una muestra de gerontólogos y geriatras (N = 325). También se administran el IAS (con diferentes instrucciones) y la escala de 5 ítems de Lawton a una muestra representativa de españoles mayores de 50 años. **Resultados:** nuestros resultados indican que la versión española de la IAS tiene una estructura psicométrica similar a la propuesta por los autores. La estructura factorial se replica en ambas muestras, las medias latentes y las correlaciones de los factores fueron mayores en el grupo profesional. **Conclusiones:** se discuten los supuestos teóricos de Levy sobre los estereotipos personales y el auto-estereotipo medidos con el IAS y su relación con la auto-percepción del envejecimiento.

Palabras clave: estereotipos del envejecimiento, estereotipos personales, auto-estereotipos y la auto-percepción del envejecimiento.

Aging stereotype is a broad concept defined as a cliché or a set of views used for characterizing older people, but encompassing a network of constructs that have not been well distinguished: *cultural stereotypes*, when the stereotype is attributed to a given culture, country, community; *personal stereotypes*, when the stereotype is attributed to the respondent; *self-stereotyping*, when the stereotype refers to the respondent him/her-self; and *self-perception of aging*, when an individual is referring to him/her-self and the process of aging.

Moreover, aging stereotype is more a research issue than an applied field, and each researcher has developed his or her own measure focused on research objectives. For example, Levy and her group administered the IAS asking respondents to express their views about older people (personal stereotypes) through rating scales made up of positive and negative traits; self-stereotypes are studied by priming these items within experimental situations (e.g., Levy & Langer, 1994). In another instance, Fiske and her team assessed contrasting groups (older versus younger, men versus women) through rating scales made up of only positive traits, measuring the opinions of respondents regarding the extent to which a particular view is attributed to a group in a given society (cultural stereotypes) (e.g., Fiske, Cuddy, Glick, & Xu, 2002). As a last example, Kornadt and Rothermund (2011) studied the pathway through which personal age stereotypes become internalized into future self-views, developing an instrument assessing those concepts through different life domains (family, leisure, religion, etc).

Over the last 20 years, the field of aging stereotypes has become an extremely important applied area, given their repercussions in

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a range of gerontological contexts. Thus, aging stereotypes are considered an important threat in health and clinical settings (e.g., Ory, Hoffman, Hawkins, Sanner, & Mockenhaupt, 2003); even being referred to as "silent killers" in relation to collaboration and productivity (e.g., Blauth, McDaniel, Perrin, & Perrin, 2011). Meanwhile, in the field of education, aging stereotypes are impeding lifelong learning due to the common belief at a population level that older adults are "unable to learn" (e.g., Fernández-Ballesteros et al., 2013).

In order to study the idiosyncrasy of each age stereotype related concept and the relationship between them, we chose the IAS, which was translated into Spanish and applied it with different instructions.

The goals in developing the IAS were "to generate the items using an older sample, to develop a scale that measures both positive and negative age stereotypes, and to make sure that the scale is easily administered and scored" (Levy, Kasl, & Gill, 2004, p. 208). Nevertheless, who is holding the stereotype is only explained in the IAS Instructions, not in the goals. After testing several instructions in pilot studies, the final version was "After each word or phrase, please tell me… how well the word matches your image or picture of old people in general". What is being assessed with these instructions, we should stress, are respondents' personal group beliefs about older adults (personal stereotypes). However, it is important to note that by changing this instruction, other concepts in the aging stereotypes semantic network can be assessed. Thus, by substituting "… what you think" by "…what the people in this context/country think" the focus shifts from personal stereotype to cultural stereotype (e.g., Fiske et al., 2002); or by asking about "…the image you have of yourself" the response will reflect self-stereotype rather than personal stereotype.

Levy et al. (2004) report the following psychometric properties of the IAS: Test-retest and predictive reliability and convergent validity. However, there is a lack of research into the internal factorial structure of the IAS. Levy and colleagues have not performed exploratory or confirmatory factor analysis to study the IAS's latent dimensions and other studies do not support the author's assumptions (Bai, Chan, & Chow, 2012).

Moreover, Levy (2003) proposed a theory involving not only aging stereotypes but linking to them two other concepts embedded in the broad aging stereotypes semantic network and their relations: self-stereotypes and self-perception on aging. Thus, she posited that aging stereotypes are internalized, and when individuals reach old age those aging stereotypes become self-stereotypes. But, at the same time, Levy stressed that self-stereotype refers to the individuals' view of themselves becoming older (Levy, Slade, & Kasl, 2002) which seems to be very close to what she terms self-perception of aging; as she states "direct links have been found between self-stereotypes of aging and self-perceptions of aging" (p. 207). However, from a measurement point of view self-stereotypes and self-perception of aging are operationalized in a totally different fashion: a) aging self-stereotypes are inferred through task responses (memory or writing performances) to certain experimental tasks in which aging stereotypes (positive or negative) are primed; b) self-perception of aging is operationalized through 5 items from the Philadelphia Geriatric Center Moral Scale (PGCMS) by Lawton (1975) within a longitudinal study. The sum of these items, called self-perception of aging, predicts over time better functional health (Levy, Slade, & Kasl, 2002) and longer survival (Levy, Slade, Kunkel, & Kasl, 2002).

In conclusion, while the measurement model of the IAS questionnaire has not been explored yet, the other two concepts (self-stereotypes and self-perception of aging) embedded in a complex semantic network and their relations have not been thoroughly tested either (i.e., by confirmatory factor analysis and structural equation modeling).

This paper reports the Spanish version of the Image of Aging Scale (IAS) through two studies: 1) The first study aims to analyze the IAS measurement model through a factor analysis framework. Thus, latent structure was first analyzed via exploratory factor analysis (EFA). Then, in a second sub-sample, the latent structure was examined through confirmatory factor analysis (CFA). 2) In an effort to disentangle the theoretical relations between personal stereotypes, self-stereotypes and self-perception of aging (with the limitations that an correlational, cross-sectional and only-based on self-report measures study has as will be commented in the discussion section), both the IAS (with different instructions) and Lawton's 5-item scale assessing self-perception of aging data were studied.

Method

Study 1: Measurement model

Participants

To study the measurement model two samples were employed. This first one consisted of 1,105 participants (51.1% female; mean age=46.98, *SD* = 18.08) recruited as a random sample, representative by age and gender, of the Spanish population aged over 18 (standard group). Sample selection followed the random route procedure.

The second sample consisted of 325 volunteers members of the Spanish Association of Geriatrics and Gerontology (49% female; mean age= 43.5 years, *SD* = 10.18) (expert group). Participants represented 33% of all SEGG members. No significant demographic differences were found between participants and the total members reported by the association.

Instruments

The Image of Aging Scale (Levy et al., 2004), which measures personal group beliefs about aging and is made up of 18 bipolar adjectives with two subscales (9 positive items and 9 negative items), was adapted for the Spanish context by two experts using "forward translation" (Hambleton, 2001). As in the original version, 7-points-Likert response format were used. Higher subscale scores indicate a more stereotyped view, either positive or negative, of aging.

Procedure

Participants received the same instructions as in the original version, so that it can be assumed that the IAS is assessing personal beliefs about older adults: "We are interested in knowing, when you think of old people in general (not including yourself), how much the following words match the images or pictures that you have. There are no right or wrong answers". It is measured in a 0-6 scale, with 0 being furthest from what the participant think and 6 being closest to what the participant think.

Data analysis

The Spanish population sample of 1,105 participants was divided into two random groups to validate the factorial structure of the IAS. A preliminary EFA was conducted in a random sample (sub-sample 1, $N = 552$). Then a second independent sample (sub-sample 2, $N = 553$) was used. This second analysis was conducted in a confirmatory factor analysis (CFA) framework given the results obtained in the previous EFA study with sample 1. As there were some modification indices suggesting changes in the final latent model, a third group of 325 volunteers members of the Spanish Association of Geriatrics and Gerontology was included (sample 2, $N = 325$). Thus, a cross-validated model was completed (a CFA replication of the previous results).

The polychoric correlation matrix was analyzed using Mplus 7.0 latent software (Muthén & Muthén, 1998-2011) given the categorical metric of our data (Likert scale). WLSMV was the estimation method (Abad, Olea, Ponsoda, & García, 2011; Brown, 2015). Goodness of fit statistics to assess the models were absolute fit indices χ^2 and Standardized Root Mean square Residual (SRMR; Brown, 2015). Additionally, the parsimony correction index Root Mean Square of Approximation (RMSEA) and its 90% confidence interval were applied. Finally, two comparative indices were also used: the Tucker-Lewis Index (TLI, Tucker & Lewis, 1973) and Comparative Fit Index (CFI; Bentler, 1990). Acceptable model fit was defined as RMSEA < .08, CFI (> .90), TLI (> .90) and SRMR (<.08) (Brown, 2015).

Results

Factorial Structure of the IAS

A preliminary EFA was conducted (geomin rotation, KMO = .801, Barlett's sphericity text $p < .001$). In the first place, items 14 ("Wrinkled") and 2 ("Familiar") were removed. Both of them showed different correlation patterns compared to the other IAS indicators. In addition, both items were highly and unexpectedly correlated, and this caused one factor affecting both items in the EFA solution. This factor cannot be substantively justified. Then, an EFA was conducted with the remaining 16 items. Parallel analysis suggested three factors (the fourth random 95 percentile eigenvalue exceeds the fourth empirical eigenvalue). Moreover, in the three-factor model solution, three goodness of fit indices showed acceptable values (RMSEA = .08; SRMR < .044; CFI > .92; only TLI was < .90). The first factor has a strong conceptual basis because the primary loadings correspond exclusively with *positive factor* supporting by Levy et al (2004). However, the set of negative stereotypes proposed by Levy et al. (2004) were split into two distinct factors: the former, called *negative factor,* is loaded by "slowly", "helpless", "lonely", "grumpy", and "sick" (factor loadings > .30, $p < .05$; see Table 1). This is called negative stereotype factor close to the Levy et al. (2004) negative-scale but data yielded a third factor, called *pathological factor* loaded by "sick", "senile", "given up", and "dying" (factor loadings > .30, $p < .05$). Eigenvalues for the unreduced correlation matrix were 4.05, 2.61, and 1.25 and the explained variance was 49.4%.

Given this exploratory factorial structure, a CFA solution was fitted in sub-sample 2: A factor structure was tested where eight items (from "will to live" to "wise") loaded onto factor 1 (positive stereotypes factor), items "slowly", "helpless", "lonely", "grumpy" and "sick" loaded onto factor 2 (negative stereotypes) and the last four items (from "sick" to "dying") loaded onto factor 3 (pathological stereotypes). The overall goodness of fit indices suggested that the model did not fit the data well: $\chi^2(100) = 214.78$, $p < .001$, RMSEA = .046 (90% CI = .037 – .054), CFI = .84, TLI = .81, SRMR = .071. Several modification indices (MIs) and high residual correlations revealed local areas of strain. In particular, the residual correlations and MIs suggested freeing several positive residual correlation: between items 1 ("will to live") and 5 ("full of life") since both refer to the vitality of aging people; between items 5 ("full of life") and 7 ("healthy") as both refer to good health and vitality of aging people; and between items 4 ("positive outlook") and 6 ("groomed") because both indicators refer to external appearance. Items 7 ("healthy") and 13 ("sick") have a negative residual correlation. Finally, item 8 ("wise") and item 11 ("helpless") share a positive residual correlation. Other MIs did not make sense and were discarded. Freeing all these parameters resulted in a model with acceptable goodness of fit indices: $\chi^2(95) = 414.26$, $p < .001$, RMSEA = .077 (90% CI = .070 – .086), CFI = .90, TLI = .86, SRMR = .064. Only TLI was lower than .90. Completely standardized factor loadings are presented in Table 2. In addition, the cross-loading from indicator "sick" in the pathology factor was not significantly different from zero. However, this factor loading was not removed given that is important from a theoretical point of view for this factor. The correlation between positive stereotype factor and negative stereotype factor was .04 (*n.s*), between positive stereotypes factor and pathology factor was significant and negative -.42 ($p < .001$) and between negatives stereotype factor and pathology factor was significant and positive .59 ($p < .001$).

Finally, in order to make a cross-validation of the three-factor model, a new CFA analysis was conducted with our second sample: volunteer members of the national association of Geriatrics and Gerontology. A three factor solution with the same residual covariances was found; thus, the goodness of fit indices showed

Table 1
EFA of the 16 items of IAS in the study sub-sample 1 (N = 552)

Item	Positive stereotypes	Negative stereotypes	Pathology stereotypes
Will to live	**.584**	.148	-.296
Capable	**.544**	-.132	-.043
Active	**.667**	-.185	.007
Positive Outlook	**.644**	-.007	.129
Full of life	**.530**	-.002	-.250
Groomed	**.595**	.047	.041
Healthy	**.466**	-.074	-.253
Wise	**.387**	.050	.083
Slowly	-.065	**.727**	-.027
Helpless	.122	**.553**	.138
Lonely	.000	**.678**	.007
Grumpy	.077	**.332**	.247
Sick	-.094	**.394**	**.320**
Senile	.009	.180	**.601**
Given up	-.127	.124	**.478**
Dying	.005	-.030	**.783**

Note: Exploratory Factor Analysis conducted by robust weighted least squares, geomin rotation. Factor loading > .30 are in bold

that the factor model fits the data well: $\chi^2(95) = 232.89$, $p < .001$, RMSEA = .066 (90% CI = .055 – .077), CFI = .95, TLI = .94, SRMR = .058. Table 2 shows the standardized factor loadings. All factor loadings were statistically significant (*ps* < .001) and strongly related to their latent factors (> .50 except "slowly" and "sick").

Table 2
Factorial structure in sub-sample 2 (N = 553) and professional sample (sample 2; N = 325)

	Sample 2			Sample 3		
Item	**P.S.**	**N.S.**	**P.S.**	**P.S.**	**O.S.**	**P.S.**
Will to live	.617			.596		
Capable	.617			.713		
Active	.618			.729		
Positive Outlook	.499			.509		
Full of life	.457			.698		
Groomed	.529			.618		
Healthy	.369			.551		
Wise	.354			.418		
Slowly		.584			.437	
Helpless		.628			.646	
Lonely		.639			.587	
Grumpy		.540			.591	
Sick		.492	.036		.311	.481
Senile			.715			.627
Given up			.599			.672
Dying			.537			.676

Note: P.S. = Positive stereotypes; N.S. = Negative stereotypes; P.S. = Pathology stereotypes

Table 3
Reliabilities for the IAS Subscales in the General and Expert Samples

	Positive stereotype subscale (8 items)	**Old negative stereotype subscale (5 items)**	**Health subscale (4 items)**
General sample (*N* = 1,089)	.750	.706	.635
Professional (expert) sample (*N* = 325)	.807	.695	.600

Factor correlations showed a moderate negative relationship between positive stereotypes factor and negative factor ($r = -.46$, $p < .001$), high negative relationship between positive and pathology factors ($r = -.63$, $p < .001$) and high positive relationship between negative stereotypes and pathology factors ($r = .85$, $p < .001$).

Cronbach's Alpha reliability of the three IAS factors

Table 3 shows the reliabilities for the general sample and the professional (geriatricians and gerontologists) sample in the three subscales (observed scores of the three factors).

Comparison between standard sample and expert sample (factorial invariance)

In a similar way to the study by Levy et al. (2004), we studied factorial invariance between a standard and an expert sample. The aim was to analyze whether the same factorial structure emerged in both populations, and whether different latent means and covariances exist between both groups. As is shown in Table 4, both models fitted conveniently when were tested separately. Moreover, the configural invariance model fitted reasonably. Then metric and scalar invariance was tested. In this case the model suffered a significant reduction of fit ($\Delta\chi^2(74) = 460.44$, $p < .001$). MIs suggested that some thresholds and factor loadings were noninvariant. Particularly the MIs for items 3, 9, 10, 13 and 15 are above 10. When these factor loadings and thresholds were freely estimated in both groups, partial metric and scalar invariance ($\Delta\chi^2(23) = 23.76$, $p = .417$) was obtained. After this partial invariance was found, we compared latent means and factor variance/covariances.

First, it can be assumed equal factor variances between both groups ($\Delta\chi^2(3) = 2.00$, $p = .573$). Secondly, it was rejected that factor covariances can be constrained to be equals (χ^2 ($\Delta\chi^2(3) = 54.28$, $p < .001$). Multiple comparisons (Bonferroni) showed statistically significant differences between positive and negative factor covariances. The expert group exhibited more negative covariance than the standard group ($r = -.422$ and $r = -.076$ respectively), showing more coherence in the older views. In addition, the correlation between positive and pathology factor was more negative in the expert group than in the standard group ($r = -.614$ vs. $r = -.402$). Finally, the negative and pathology factor correlation was more positive in the expert group than in the

Table 4
Factorial invariance models between general and expert samples

Models	χ^2	*Df*	$\Delta\chi^2$	Δdf	**RMSEA (90% CI)**	**CFI**	**TLI**
Popular sample (N = 1,105)	722.026	95			.077 (.072 - .083)	.903	.878
Expert sample (N = 325)	232.894	96			.066 (.055 - .077)	.951	.939
Measurement invariance							
Configural invariance	933.25	191			.074 (.069 - .079)	.917	.896
Metric and scalar invariance	1320.67	265	460.44 ($p < .001$)	74	.075 (.071 - .079)	.882	.893
Partial metric and scalar invariance	936.38	214	23.76 ($p < .417$)	23	.069 (.064 - .073)	.919	.909
Population heterogeneity							
Factor variances	884.91	217	2.00 ($p = .573$)	3	.066 (.061 - .070)	.925	.917
Factor covariances	977.54	220	54.28 ($p < .001$)	3	.069 (.065 - .074)	.915	.907
Latent means	901.81		23.67 ($p < .001$)	3	.066 (.061 - .070)	.924	.917

standard group (r = .924 vs. r = .581). It can therefore be concluded that factor relationships are closer in the expert sample than in the standard sample. Finally, latent means were compared between two populations. Results exhibited significant differences between latent means ($\Delta\chi^2(3) = 23.67$, $p < .001$). Multiple comparisons showed that the positive latent mean was higher in the expert group than in the standard group (d = .503, medium effect size). The standard latent mean was higher than the expert latent mean in the pathology factor (d = -.24, low effect size). There were no differences between negative latent means. The general conclusion is that the expert group has a more positive view about old people than the standard group, and that the correlation between factors is higher in the expert group than in the standard one.

Study 2. Personal group stereotypes, self-stereotypes and self-perception of aging

Following Levy's (Levy, Slade, & Kasl, 2002; Levy et al., 2004, Levy, 2009) theoretical assumptions, our predictions are as follows: there will be significant relationships between self-stereotypes of aging and personal beliefs about older adults (*H*1); the self-stereotyping measure will show significant relationships with the self-perception of aging measure (*H*2); and the self-stereotyping measure will mediate the relationships between personal beliefs about older adults and self-perception of aging (*H*3).

Participants

From the national survey participants recruited in Study 1, the subsample aged over 50 was selected. This sample was made up of 448 participants (54% females), being representative of the Spanish population by age and gender; age ranged from 50 to 91 (M = 65.38, SD = 9.60).

Instruments

Personal Aging stereotypes. The IAS was administered through the same procedure as in Study 1.

Self-stereotype of Aging Scale (SAS). In order to test self-stereotyping, the IAS instructions were modified as follow: "We would like to know the image that you have of yourself. Please indicate how much each word or phrase coincides with your own image of yourself. There are no right or wrong answers".

Self-Perceptions of Aging (SPA). This instrument consists of five items taken by Levy, Slade and Kasl (2002) from the PGMS (Lawton, 1975): "Things keep getting worse as I get older", "I have as much pep as I did last year"," As you get older, you are less useful", "I am as happy now as I was when I was younger", and "As I get older, things are (better, worse, or the same) as I thought they would be". With exception of item 5, items were presented in dichotomous format (Yes/No). Instruction was the following: "Could you please tell me, whether the following statements happen or not in your life".

Results

First of all, it was tested if the measurement model of SAS and SPA fitted well to the data. Given that only positive and negative old stereotypes were implied in Levy's theoretical approach, the items explained by pathology factor were excluded from this analysis (item 14, 15 and 16, Table 5). Thus, the IAS factorial structure was replicated in the SAS questionnaire. The goodness of fit indices showed that the factor model fit the data reasonably well: $\chi^2(59) = 225.90$, $p < .001$, RMSEA = .079 (90% CI = .068 – .090), CFI = .91, TLI = .88, SRMR = .062, and all the standardized factor loadings were positive and substantive (above .40, except two items).

The factorial structure of the SPA questionnaire was studied. A one-factor solution was tested. The one-factor model showed a reasonable fit to the data ($\chi^2(5) = 12.35$, p = .030, RMSEA = .059 (90% CI = .017 – .102), CFI = .98, TLI = .96, SRMR = .023. Thus, the five dichotomous items from SPA questionnaire are assumed to be unidimensional. The completely standardized loadings were also positive and substantive (above .50).

Levy's theoretical model was studied with the structural equation modeling framework (all the models are represented in Figure 1).

One general model was first conducted, that is, the model which regresses positive self-perception of aging onto stereotypes about aging (positive and negative factor from IAS) and self-stereotypes

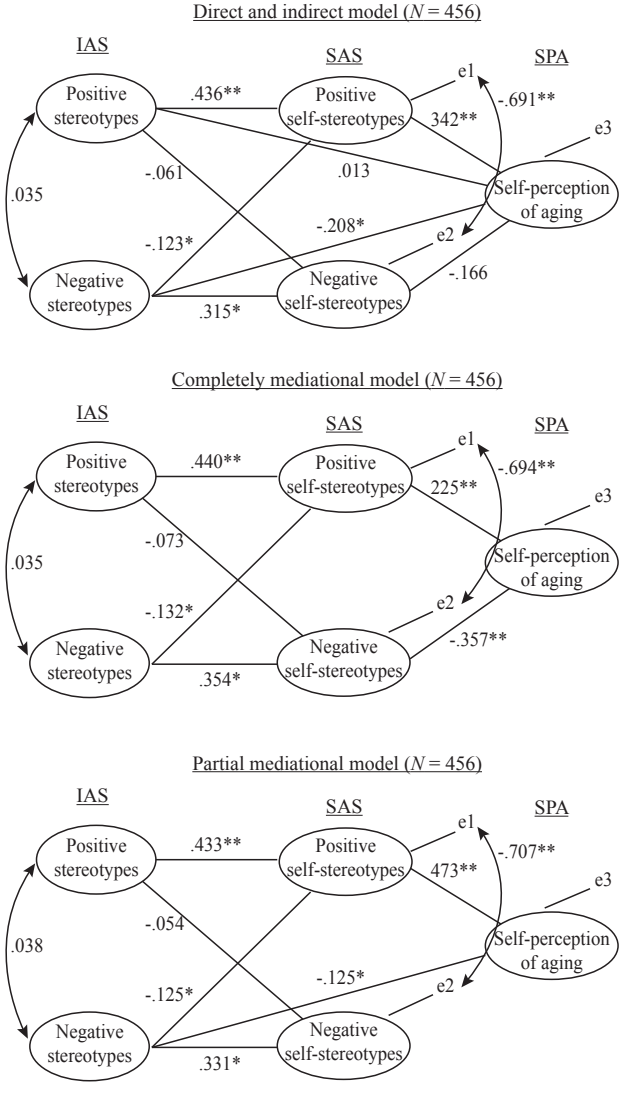

Figure 1. Three competing structural models

about aging (positive and negative factor from SAS). The structural part of this model is saturated (no degrees of freedom) and is called the direct and indirect effect model. Then, two nested (and rival) models were compared. One model is the completely mediational model proposed by Levy (stereotypes about aging affect self-perception of aging via self-stereotypes about aging). The models were compared statistically with the χ^2 difference test. As can be seen in Table 7, the completely mediational model suffered a reduction of fit compared to the direct and indirect model ($\Delta\chi^2(2) = 8.106$, $p = .013$). The best model (statistically) is the partial mediational model. In this model negative stereotype directly affects self-perception of aging (its indirect effect via negative self-stereotype is nonsignificant). Additionally, in this model the positive stereotype has a significant indirect effect on self-perception of aging via positive self-stereotype (.205, $p < .001$). In the partial mediational model (as well in the direct and indirect model), the explained variance of the **self-perception of aging depends more on the positive dimensions** (that is, the positive stereotype and self-stereotype part of the model) **than on the negative dimensions** (see the magnitude of the beta coefficients and the significant effects).

Table 5
Beta regression coefficients. Dependent variable SPA

	Model 1 (direct and indirect)		Model 2 (completely mediational)		Model 3 (partial mediational)	
	β	SE	β	SE	β	SE
Direct effects						
Positive (IAS)	.013	.078	–	–	–	–
Negative (IAS)	-.208**	.070	–	–	-.125*	.046
Positive (SAS)	.342**	.105	.225*	.092	.473**	.045
Negative (SAS)	-.166	.101	-.357*	.099	–	–
Indirect effects						
Positive (IAS)	.183**	.064	.146**	.038	.205**	.032
Negative (IAS)	-.073*	.034	-.143**	.040	-.026	.022
Model Fit						
R^2	.295		.284		.313	
$\Delta\chi^2(2)$	-		8.106 ($p = .017$)		2.332 ($p = .312$)	
RMSEA	.050		.050		.049	
CFI	.928		.927		.929	
TLI	.916		.915		.918	

Note: **$p < .01$; *$p < .05$; β = standardized regression coefficient; *SE* = Standard Error

Discussion

Factorial structure and internal consistency

In our study the two scales posited by Levy et al. (2004), both through EFA and CFA analyses (cross-validating this model), were partially replicated, either in sub-samples of our representative sample of the Spanish population, or our expert sample. The factorial solution reached with the three samples yielded a three factor solution. The first factor has a strong conceptual basis because the primary loadings correspond exclusively to positive items and are therefore equivalent to the positive scale proposed by Levy et al. However, the set of IAS negative items appears divided into two distinct factors: the first one, called negative factor, is loaded by "slow", "helpless", "lonely", "grumpy", and "sick" (see Table 1), close to the Levy et al. (2004) negative-scale. But our analysis yielded a third factor, called pathological factor, loaded by "sick", "senile", "given up", and "dying". Moreover, the three scales derived from its corresponding factors showed adequate internal consistency with the exception of the pathological factor (alpha = .600, four items).

After that, the factorial invariance between the representative Spanish (standard) sample and professional (expert) sample was also studied. Results showed partial invariance: equal form was found, but only partial metric and scalar invariance was obtained. Then, latent means and factor covariances between the two groups were compared. The expert group has a more positive view of old people than the standard group: the latent mean in the positive factor was substantially higher in the expert group ($d = .503$) and the latent mean in the pathological factor was higher in the standard group ($d = -.240$). Moreover, we found that the correlations between factors are higher in the expert group than in the standard one, showing a more coherent relationship between factors. This would suggest that for professionals, views of older adults are more positive than those of the general population and, at the same time, the negative views are closely associated to pathology. This conclusion could be interpreted as a result of more familiarity with the aging processes and with the diversity of the human aging as concepts spread out on the current gerontology science.

It must be kept in mind that the two scale model posited by Levy et al. (2004) has not been either tested through other factorial analyses since the only study performed by Bai et al. (2012) reached five factors, none of them being coincident with the two Levy et al. scales or to our three factor model.

This three factor model has an empirical base: the broad variability of the ways of aging synthetically conceptualized by Rowe and Khan (1997) as "pathological" "normal", and "successfully" aging. Over recent decades this conceptualization has enjoyed strong socio-cultural promotion and extension since being adopted by WHO (2002) and United Nations (UNECE, 2015). Therefore, it can be assumed also to have had repercussions on the cultural and personal images of aging and also that experts are much more aware of this new positive paradigm of gerontology and have a more coherent view than the general population.

Theoretical validity: relations among Personal Aging Stereotypes (PAS), Self-stereotypes of Aging Scale (SAS) and Self-Perception of Aging (SPA)

Stereotypes always imply broad conceptual networks because they are applicable to different human groups (age, gender, race, etc.) and attributed to a wide range of perceptions (cultural, personal, of oneself, etc.). In order to disentangle the relationships between the PAS, the SPA and the SAS, we cross-sectionally explore the relationships among these three scales.

First of all, it was found that the measurement model of SAS was coincident with PAS resulting in the existence of two factors: positive aging self-stereotypes and negative aging self-stereotypes. Moreover, the factorial structure of the SPA questionnaire was studied and a one-factor model showed a reasonable fit to the data. There are evidences that SAS and SPA scales measure distinct constructs, not equivalent as has been speculated by Levy (2003). Further evidence to maintain them as different constructs is the fact that positive and negative SAS show moderated correlations with SPA (.466 and -.456 respectively).

Let us attempt a post-hoc justification for this lack of agreement between our results and Levy´s theoretical model, regarding SAS and SPA. Two important methodological issues must be underlined: 1) the metric employed by Levy et al. for assessing the three stereotypes concept is diverse: while aging stereotypes are assessed through positive or negative labels (e.g.: capable, slow); self-stereotypes are inferred from experimental tasks in which positive or negative labels about aging are activated or primed, meaning that SAS acts at a non-awareness level, and finally, self-perception of aging is assessed through phrases referring to the respondent's past (e.g.: I have as much pep as I did last year) requiring several cognitive processes. 2) Levy´s statement about "direct links have been found between self-stereotypes of aging and self-perception of aging" (p. 207) is not supported. All these aspects can justify that the similarity or equivalence of SAS and SPA posited by Levy was not supported by our results.

After testing the measurement models of the three variables under scrutiny, PAS, SAS and SPA, the relationships between them were studied from the structural equation modeling framework (Figure 1).

Two nested (and rival) models were compared. The first one is the completely mediational model: stereotypes about aging affect self-perception of aging via self-stereotypes about aging. As can be seen in Table 5 this model suffered a reduction of fit compared to the direct and indirect model. It can be stated that the best model, from a statistical point of view, is the partial mediational model. In this model negative stereotypes directly affect self-perception of aging and positive stereotypes have a significant indirect effect on self-perception of aging via positive self-stereotypes (.205, $p < .001$).

Thus, a partially mediational model is congruent and is in line with data reported by Levy (2009) on base on experimental results and longitudinal re-analysis, at least when Aging Self-stereotype is assessed by self-reports: positive self-stereotypes mediate the influence of positive aging stereotypes in positive self-perception of aging. The importance of positive stereotyping are those studies on field of stereotype threat yielding that positive self-perception of aging and/or positive self-stereotypes could act as a buffer of negative cultural stereotypes (Fernández-Ballesteros, Bustillos, & Huici, 2015) or those studies showing that the promotion of positive information about aging influences self-perception of aging and aging stereotypes supporting the hypothesis that this relationship can be reversed (Fernández-Ballesteros et al., 2013). Nevertheless, despite the presence of longitudinal data on the predictive power of aging stereotypes and self-perception of aging and health, illness and longevity reported by Levy, and our own results it must be concluded that much more evidence is required in order to test the complex relationships between aging stereotypes, self-perception of aging, and aging self-stereotypes assessed with a similar metric.

This study of the assessment of Personal Aging Stereotypes, Self-stereotypes and Self-Perception of aging through the IAS has several limitations: 1) Firstly, stereotypes are internal events usually assessed by self-reports. The relationships between self-reports and other implicit instruments are not very well known as has been pointed out by Kotter-Grühn and Hess (2012), who did not find associations between self-perception of aging and self-stereotypes assessed through priming (though, other authors as Verhaeghen, Aikman, &Van Gulick, 2011, point out that the implicit stereotype assessment is even more unclear than that of self-reports). Therefore, all validation studies carried out only through self-reports must be considered as threatened by self-report bias (for a review, see Fernández-Ballesteros, 2003). In sum, although it is difficult to work with multitrait/multimethod matrices, research based on self-reports about stereotypes must be tested against studies using other experimental designs. 2) Secondly, the differential multitrait, multilevel status of stereotypes is subtle, depending only on the instructions of the self-report; as we pointed out, the IAS can be "converted" into the Self-stereotype on Aging Scale, or into the Cultural Stereotypes of Aging instrument. This introduces an important source of potential misunderstanding within the stereotype assessment field; 3) Finally, from a methodological point of view, the study of stereotype assessment tools must also take into account findings from the emerging field of Social Neuroscience (e.g., Kang & Inzlicht, 2010). In sum, much more research is required in the field of aging stereotypes assessment.

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