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Perceived Age Discrimination across Age in Europe: From an Ageing Society to a Society for

All Ages

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Abstract

Ageism is recognized as a significant obstacle to older people's well-being, but age discrimination against younger people has attracted less attention. We investigate levels of perceived age discrimination across early to late adulthood, using data from the European Social Survey (ESS), collected in 29 countries ($N = 56,272$). We test for approximate measurement invariance across countries. We use local structural equation modeling as well as moderated non-linear factor analysis to test for measurement invariance across age as a continuous variable. Using models that account for the moderate degree of non-invariance we find that younger people report experiencing the highest levels of age discrimination. We also find that national context substantially affects levels of ageism experienced among older respondents. The evidence highlights that more research is needed to address ageism in youth and across the life span, not just old adulthood. It also highlights the need to consider factors that differently contribute to forms of ageism experienced by people at different life stages and ages.

Keywords: perceived discrimination, ageism, measurement invariance, European Social Survey

From and Ageing Society to a Society for All Ages:

Perceived Age Discrimination across Age in Europe

Older people's experiences as targets of ageism has become an increasingly important avenue of research especially in the context of global population ageing (Levy & Macdonald, 2016; Nelson, 2005). As a form of social exclusion, age discrimination can negatively impact social cohesion, health, and well-being (Garstka, Schmitt, Branscombe, & Hummert, 2004; Hagestad & Uhlenberg, 2005; Levy & Macdonald, 2016; Stuckelberger, Abrams, & Chastonay, 2012), and poses significant challenges to the organization of labor (WHO, 2011).

Whereas discrimination against older people is widely acknowledged, research has relatively neglected that a high proportion of younger people also report experiences of age discrimination (Abrams & Houston, 2006; Garstka et al., 2004; Hagestad & Uhlenberg, 2005; Snape & Redman, 2003). Relatively little is known about the prevalence of younger people's experiences of age discrimination compared to older people's, or whether their experiences differ across the cultural and national contexts of different countries. A potential obstacle to such research, is the need to establish measures of perceived age discrimination that have comparable meaning across age and across different cultural contexts. Only then is it possible to make meaningful comparisons across age and context. The present research therefore uses data from 29 countries and the whole adult age range to explore whether a measure of perceived age discrimination that was developed for use in the European region does meet these requirements for comparability across country and age. We then consider substantive differences in perceived age discrimination across age, and address whether the evidence is consistent with the common assumption that age discrimination is a problem faced primarily by older people.

Based on prior research with Age UK, the largest charity working with older people in the United Kingdom (see Abrams, Eilola, & Swift, 2009; Ray, Sharp, & Abrams, 2006), Abrams, Lima and Coudin (2007) constructed three items to assess experiences of age-based discrimination, which formed part of the "Experiences and Expressions of Ageism Module" in the 2008/9 European Social Survey. These three items assessed perceived age discrimination among older and younger respondents, and across 29 countries in the European region (plus Israel).

Finding support for the assumed cross-national and cross-age validity of the age discrimination measure would be valuable both for analyses of the ESS data and for providing confidence that the present measurement of age discrimination offers an internationally comparable tool for more global use. However, nuances in languages as well as cultural and contextual differences between countries might result in different meanings being attributed to the same questions in each country. Also, there could be generational differences in how the items are interpreted. Consequently, the data might not satisfy the requirement of measurement invariance, which is a prerequisite of analyses of differences among countries or across age, or more generally, a prerequisite of analyzing differences across groups (Horn & McArdle, 2007; Vandenberg & Lance, 2000). Therefore, one aim of this research is to determine whether the measure of age discrimination can be compared across countries and age to ensure high-quality cross-generational and cross-national comparative evidence. These tests of measurement invariance are prerequisites for the main aim of the present research: to use these measures to conduct the first large scale empirical test of whether the prevalence of ageism toward older people differs from that toward younger people.

In analyses of measurement invariance *across countries* we use the recently developed

test of approximate measurement invariance (Asparouhov & Muthén, 2014). In analyses of

measurement invariance *across age* we treat age explicitly as a continuous variable, using two

recently developed methods: local structural equation modeling, LSEM (Hildebrandt, Lüdtke,

Robitzsch, Sommer, & Wilhelm, 2016; Hildebrandt, Wilhelm, & Robitzsch, 2009), and

moderated non-linear factor analysis, MNLFA (Bauer, 2016). In addition, we use a narrow age-

span (5 years) to define 15 age groups from ages 15 to 89 and investigate approximate

measurement invariance across these age groups. The tests of approximate measurement

invariance across narrowly defined age groups go beyond identifying measurement non-

invariance across age (as done in LSEM and MNLFA) by also identifying at what age

measurement invariance does not hold. We conclude the analysis by using MNLFA and

approximate measurement invariance to estimate how levels of perceived age discrimination

vary across age, while accounting for age-dependent partial measurement non-invariance.

Ageism against Older and Younger People

The term ageism was introduced by Robert N. Butler (1969), referring to a set of beliefs,

stereotypes and prejudices held about the ageing process and older people. However, Butler

acknowledged that it is not only older people that may be targeted by ageism (Butler, 2005, p.

85):

"At the time I wrote that ageism could work in both ways—that older people could be

negative toward youth in the same way as younger people could be negative toward the old.

However, I recognized that, in general, ageism was most prevalent against older people."

Ageism is still predominantly defined as "negative attitudes toward older adults" (Levy &

Macdonald, 2016). Older adults are liable to be stereotyped as warmer but less competent than

younger people (Abrams, Swift, & Drury, 2016), a burden on economic and health resources,

forgetful, ill and unattractive (e.g., Cuddy, Norton, & Fiske, 2005; Kite, Stockdale, Whitley, & Johnson, 2005). Ageism negatively affects older people's cognitive, mental and physical health (e.g., Lamont, Swift, & Abrams, 2015). The media also tend to reinforce the idea that ageism is primarily a problem for older people. For example, the British newspaper The Observer reported findings from the ESS, Round 4 (2008) with the headline, "UK among Europe's worst countries for ageism" (Boffey, 2011), accompanied by a photo of five elderly people, implying strongly that older people but not younger people in the UK were the target of age discrimination.

Ageism toward older people has been the focus of most ageism research (Butler, 2005; Iversen, Larsen, & Solem, 2009; North & Fiske, 2012), and there is some evidence that people tend to hold more negative attitudes toward older than younger adults (Kite et al., 2005). Discrimination against younger people may be perceived to be less severe than discrimination against older people since youth is a temporary status (Garstka et al., 2004; Iversen et al., 2009). However, we believe that a developmentally balanced account of ageism should consider both older and younger people as targets of age discrimination (e.g., Duncan & Loretto, 2004; Hehman & Bugental, 2013; Zebrowitz & Montepare, 2000). Young people might experience age discrimination and it is quite possible that the consequences of age-based discrimination against younger people (e.g. Hammer, 2003) may be as serious for their material and psychological well-being, or even their physical health, as has been found among older adults.

Furthermore, theories of ageism would benefit from an exploration of the extent to which ageism directed at older people is interrelated with ageism directed at younger people. Sociologists suggest age segregation in modern societies as a source of separation and prejudice between age groups, resulting in ageist attitudes between older and younger people (Coleman, 1982; Hagestad & Uhlenberg, 2005). Psychological theory also suggests that age-based prejudice

should go both ways. Social identity theory (Tajfel & Turner, 1986) explains why younger people develop discriminatory attitudes toward older people (Kite et al., 2005; North & Fiske, 2012), and why older people maintain negative evaluations of their own age group (Bodner, 2009). However, social identity theory also suggests that older people's desire to maintain a positive identity may motivate them to hold negative evaluations of younger people (North & Fiske, 2012), or indeed that both younger and older people are likely to be discriminated against by the higher status middle aged majority (Abrams, Russell, Vauclair, & Swift, 2011; C.-M. Vauclair et al., 2015).

The Three Ageism Items in the ESS

Very few people are explicitly ageist but many more people report having been a victim of ageism (Abrams & Houston, 2006; Abrams, Houston, Van de Vyver, & Vasiljevic, 2015). Therefore, people's own experiences of age discrimination or perceived age discrimination is likely to be a more trustworthy source of the prevalence of ageism (Pascoe & Smart Richman, 2009). Theories of (old) ageism propose that it can manifest in hostile forms (e.g. neglect, abuse or mistreatment), but also in more benevolent, subtle ways (e.g., patronizing, simplified and slow communication) (Cary, Chasteen, & Remedios, 2017, p 1 in advance access publication; Chonody, 2015; Kite et al., 2005; North & Fiske, 2012; Palmore, 2015). Thus, it is essential to assess age discrimination by asking both older and younger people about their experiences of hostile and benevolent forms of discrimination to provide a complete picture of perceived age discrimination. Informed by research on different forms of discrimination (Fiske, Cuddy, Glick, & Xu, 2002), the ESS assessed perceived age discrimination with items that distinguished between (1) insult or abuse and (2) patronizing or ignoring members of a particular group.

The item "how often has anyone shown prejudice against you or treated you unfairly

because of your age" was created and used first in a program of research for the UK's Equalities

and Human Rights Commission (Abrams & Houston, 2006), and was also used in several

national surveys of age prejudice in the UK (Age Concern England, 2004; Ray et al., 2006). On

the basis of that work, and collaboratively with Age UK, Abrams et al. (2009) also developed

more specific measures to assess different elements of experiences of age discrimination which

clustered into the two dimensions of ill-treatment and lack of respect (Abrams et al., 2009).

Specifically, they confirmed that ageism was experienced in both hostile and benevolent

manifestations. For the ESS, they therefore devised and pilot tested two additional items: "How

often in the past year has someone treated you badly because of your age, for example by

insulting you, abusing you or refusing you services?" as a measure of hostile ageism, and "How

often, if at all, in the past year have you felt that someone showed you a lack of respect because

of your age, for instance by ignoring or patronising you?", a measure that also could capture

benevolent discrimination. These items were also included in the final survey, and their validity

verified in additional data collection (C.-M. Vauclair, Abrams, & Bratt, 2010).

The three age discrimination items in the ESS have undergone extensive testing,

including pilot studies with qualitative and quantitative means to justify their use in various

countries in the ESS.[1] Using three items to assess perceived age discrimination provides a

relatively brief measurement, but this limitation is compensated for by the sample size available

in the ESS. However, it is still necessary to test statistically whether the items in fact measure the

same concept across multiple countries and across age. The three age discrimination items were

originally developed as a measure of perceived discrimination among older people in the UK

(Ray et al., 2006), and it was assumed that these items would be applicable for comparisons of

perceived age discrimination among older as well as younger people in various countries.

Moreover, if the measure is to assess the degree of perceived age discrimination among older and younger people compared to middle-aged, the measurement needs to demonstrate substantial degree of measurement invariance across all these ages.

To the extent that prejudice and discrimination are fueled by negative intergroup stereotypes (see Nelson, 2009) ageism toward older and younger people could differ in that ageism toward older people may primarily be subtle (Chonody, 2015; Palmore, 2015). For example, older people are often ignored and not given the power and voice to express concern or control over their own situation, this behavior is often rooted in patronizing attitudes and beliefs that competence and capacity decline with age (Fiske et al., 2002). In contrast, discrimination toward younger people might be more hostile, due to stereotypes of their perceived competence but relatively colder (unfriendly) nature (Fiske et al., 2002). Ageism toward younger people may also originate in stereotypes derived from youth delinquency (Agnew, 2003). Ageism toward younger and older people may also differ in that ageism toward older people seems "qualitatively different as it is associated with deterioration and death rather than with the developmental potential of youth. The challenges of youth will be overcome as time goes by, whereas old age will be succeeded by death" (Iversen et al., 2009, p.3).

Testing for Measurement Invariance

The ESS assessed perceived age discrimination across age in 29 countries. For tests of levels of perceived age discrimination to be valid, the same latent construct needs to be assessed -- independently of country and the age of the respondent. The items should relate to the latent variable of perceived age discrimination in the same way for all individuals. Ideally, two individuals with similar experiences of age discrimination should respond to the three items in a similar way, independently of country and independently of age.

Measurement Invariance across Countries

The first task in the present research was thus to test for measurement invariance across countries. In statistical terms, country differences represent group differences and can be tested with multi-group factor analysis (see Vandenberg & Lance, 2000). Studies of measurement invariance across groups typically investigate three types of measurement invariance: configural, metric, and scalar invariance. Configural invariance simply means that the factor structure (a factor and its indicators) will be the same across groups. The measurement of perceived age discrimination in the ESS, Round 4, used three items, for which a one-factor model will always fit, because it is a saturated model with no degrees of freedom. Consequently, tests of metric and scalar invariance are more interesting in the present research. *Metric invariance* (weak measurement invariance) allows factor means to vary across groups, but factor loadings are assumed to be invariant. *Scalar invariance* (strong measurement invariance) adds invariant intercepts/thresholds for factor indicators to the invariant factor loadings already tested in the metric invariance model. If both factor loadings and thresholds and for perceived age discrimination can be fixed to be invariant across countries, then the latent factor means are on the same scale (or more generally, the scale of the factor is the same across groups). That is, the relationship between the estimated factor and the observed variables would not depend on which country an individual belongs to and scalar invariance would allow for comparisons of factor means across countries (see Vandenberg & Lance, 2000).

In practice, strong measurement invariance (identical factor loadings and identical indicator intercepts/thresholds) is unlikely when many groups are involved, as in the ESS (Asparouhov & Muthén, 2014). Even metric invariance may be difficult to achieve with this many groups. One alternative might be to use partial measurement invariance with an

exploratory adaption of the measurement model (Byrne, Shavelson, & Muthén, 1989;

Steenkamp & Baumgartner, 1998). However, this approach is unlikely to be very helpful when

many groups are analysed (see Asparouhov & Muthén, 2014). We therefore turned to the newly

developed method of *approximate measurement invariance* (Asparouhov & Muthén, 2014),

available in Mplus 7 (Muthén & Muthén, 2012). In approximate measurement invariance, the

analysis estimates approximately equal factor loadings and approximately equal indicator

intercepts/thresholds across groups, allowing for some wiggle room for these parameters (see the

Methods section and the Supplemental Materials available online for details).

Measurement Invariance across Age

Assessing measurement invariance across age is more challenging, because age is a

continuous variable. Though many studies have tested for measurement invariance across

broadly defined age groups such as "older" and "younger" people, such categorizations tend to

introduce somewhat arbitrary borders between groups and should be avoided (Hildebrandt et al.,

2009; Tucker-Drob, 2009). Moreover, whereas measurement invariance across the broadly

defined groups is tested, measurement invariance within the groups is not. Instead, the approach

implicitly assumes homogeneity within each broad age category (Hildebrandt et al., 2009).

Several recent contributions to the statistical literature have tried to solve this problem in

traditional tests of measurement invariance. We apply two newly developed methods, which both

can be used to test for measurement invariance across age in the present research: LSEM and

MNLFA.

In LSEM, the full sample is analysed repeatedly, but in each run individuals in the

sample are weighted differently dependent on their age (Hildebrandt et al., 2016; Hildebrandt et

al., 2009). For instance, one factor model uses 20 years as focal point and assigns the weight of 1

to respondents who are 20 years old. Progressively lower weights are ascribed to respondents

who are younger or older. Thus, estimations in this model are formed predominantly by

respondents around 20 years, and the least by respondents at old age. Many focal points are used,

from young to old age, and models will give different factor loadings and different indicator

intercepts/thresholds if measurement invariance across age is not satisfied. This can be shown in

plots that graphically summarize how factor loadings and intercepts/thresholds vary across age.

The methods section and the Supplemental Materials provide further details on LSEM.

In MNLFA (Bauer, 2016) a continuous variable such as age is conceptualized as a

moderator not only of the factor in question (e.g., levels of perceived age discrimination), but

also of factor loadings and intercepts/thresholds in the model. Bauer uses the term differential

item functioning (DIF) to describe lack of measurement invariance. In partial measurement

invariance known from traditional tests of measurement invariance, some items demonstrate

DIF, meaning lack of measurement invariance for these items. MNLA estimates to what extent

model fit is improved by allowing for DIF for single (or several) items. An important aspect of

MNLFA, is that this method can estimate factor scores and analyze individual differences for

instance in perceived age discrimination with models that identify and include DIF as part of the

model (Bauer, 2016). MNLFA allows any parameter, including factor loadings and thresholds, to

differ as a function of individual characteristics, such as age. If age not only moderates the latent

factor perceived age discrimination, but even factor loadings or intercepts/thresholds, then this

represents DIF (i.e., measurement non-invariance).

An advantage of both LSEM and MNLFA is that they can test for measurement

invariance across age as a continuous variable. Graphical plots in LSEM also show at what age

measurement invariance does not hold. MNLFA on its part can estimate factor scores while

explicitly modeling age-dependent differences in item functioning. We add a third,

complementary approach to test for measurement invariance across age. As pointed out by

Hildebrandt et al. (2009), estimating age in full years is not the only possible approach to test for

measurement invariance across age. A traditional multi-group factor analysis could avoid using

arbitrarily defined, broad age categories by "collecting a high number of observations within a

narrowly defined age range (e.g. 5 years)" (Hildebrandt et al., 2009, p. 89). As argued by

Hildebrandt et al., this approach requires an overall large sample size so that each narrowly-

defined age group includes sufficient numbers of individuals. Such a method seems well suited

in the ESS, which includes more than 56,000 respondents. Adding this as a third approach to test

for measurement invariance across age is likely to improve analyses by giving a test of the

robustness of findings.

Investigating measurement invariance across many narrowly-defined age groups implies

numerous comparisons and may be unlikely to satisfy the requirements of scalar invariance.

However, tests with *approximate measurement invariance* are adequate. Comparing groups

across narrowly-defined age ranges represents an approximation of age as a continuous variable,

and as such, this approach poses less stringent assumptions than LSEM or MNFLA, where age is

measured in full years. However, approximate measurement invariance can combine advantages

of LSEM and MNLFA: approximate measurement invariance can estimate non-invariance for

single parameters and identify at what age invariance occurs, while simultaneously use these

estimations to compute factor scores for each narrowly-defined age group. Although representing

very different approaches to estimate degrees of measurement non-invariance, factor scores

derived from MNLA and from approximate measurement invariance should give comparable

distributions in perceived age discrimination, if these estimations are to be taken as indicative of age-dependent levels of perceived age discrimination.

The Present Research

Using data from Round 4 of the ESS, this research investigates perceived age discrimination across age in 29 countries. We first investigate to what extent the measurement exhibits measurement invariance across countries. Measurement across countries is analyzed by multi-group factor analysis, but we go beyond traditional tests of measurement invariance by using approximate measurement invariance (Asparouhov & Muthén, 2014). Next, we use LSEM and MNLFA to test for invariance across age as a continuous variable. In addition, we test for approximate measurement invariance across narrowly-defined age groups. We use factor scores derived from MNLFA and approximate measurement invariance for two separate tests of the fundamental question in the present research: how perceived age discrimination varies across age.

Methods

Data

We used data from the ESS Round 4, 3rd edition (European Social Survey Round 4 Data, 2008). Data were collected in 2008 and 2009 with personal interviews in 28 countries from the European region, plus Israel. The data are based on random probability samples and are highly representative of the eligible residential populations in each country (aged 15 and over), and representativeness is further increased by design weights available as part of the ESS data.[2] Age span included in the current research was thus 15 to 105 years, N = 56,272, 55% female, M_{age} = 47.54, SD_{age} = 18.5).

Measurements

Perceived age discrimination was assessed with three items (labeled E35, E38, E39 in the ESS questionnaire). In the English version, these items read: (1) "Please tell me how often, in the past year, anyone has shown prejudice against you or treated you unfairly because of your age?" (2) "And how often, if at all, in the past year have you felt that someone showed you a lack of respect because of your age, for instance by ignoring or patronizing you?" (3) "How often in the past year has someone treated you badly because of your age, for example by insulting you, abusing you or refusing you services?" The three items on prejudice/unfair treatment, lack of respect, and being treated badly because of age were all assessed with a five-point scale from 0 to 4, labeling only the extremes Never (0) and Very often (4).

The three age discrimination items had highly skewed distributions (e.g., skewness = 1.66 for "prejudice because of age", see the Supplemental Materials for details). The skewed distributions for the items implied that the analysis could not define them as continuous (Dolan, 1994; Rhemtulla, Brosseau-Liard, & Savalei, 2012) and we estimated the factor model by treating the three indicators explicitly as categorical variables. Due to few responses in the two highest response categories, we collapsed the three highest categories, giving 3-point ordinal scales for analyses. We used structural equation models to conduct a simple test of the convergent and discriminant validity of the three age discrimination items versus models that included either ethnic discrimination or gender discrimination, or both. These tests concluded with discriminant and convergent validity of the three items for perceived age discrimination (see the Supplemental Materials for details).

Analytical Strategy

      Measurement Invariance across Countries. The alignment method in Mplus starts with the configural model (the same factor model for all groups, but no restrictions imposed on factor loadings or intercepts/thresholds). It then adds approximate cross-group invariance to the extent that such invariance is supported by the data. Invariance is approximate in the sense that it allows for statistically non-significant differences in factor loadings and intercepts/thresholds. This alignment procedure can either be free or fixed, the latter uses one group as a baseline group when estimating measurement invariance. By allowing for some flexibility, approximate measurement invariance is more realistic than conventional scalar invariance, but serves the same objective: to develop a factor model that allows for computation of factor means and factor variances. The moderate differences across groups in factor loadings and intercepts/thresholds should have little effect on the estimated factor mean. The Supplemental Materials describe approximate measurement invariance and explains how Mplus estimates such measurement invariance with an alignment method. For further details, we refer to Asparouhov and Muthén (2014).

      Measurement Invariance across Age. Tests of measurement invariance across age used methods that could reflect the continuous nature of age. We first applied LSEM, using centered age, so that 0 for age was the average age of 47.5 years. Following Hildebrandt *et al.* (Hildebrandt et al., 2016; Hildebrandt et al., 2009), we used focal points in the LSEM models varying from two standard deviations above to two standard deviations below 0 of centered age, giving focal points that represented ages from 10.5 to 84.5 years. LSEM weights were developed so that respondents with an age close to the focal point received a high weight, weights were progressively lower the older or younger respondents were than respondents at the focal point.

The use of two SDs below and above the average implied that the first of the many models estimated gave the largest weight to 15 years old, since these were the youngest respondents. Respondents older than 84 were represented by their relatively high weights in models of respondents close to 2 SDs above the average.

Using a particular age as a focal point meant that respondents at this age would have the weight of 1. Weighting of the other respondents was determined by a bandwidth for the weighting procedure. Following Hildebrandt *et al.*, we used a Gaussian kernel function to define the bandwidth in each model. The density function given by the weighting procedure implied no upper or lower limit, meaning that the whole sample was included in each model, but respondents much older (younger) than the focal point had a very low weight. We used many iterations, moving the focal point slightly from model to model, estimating in total 401 models for an analysis with LSEM. The Supplemental Materials give details on how the bandwidth was defined and how we moved the focal point from model to model. The Supplemental Materials also show input code for Mplus analysis using LSEM (which include the respective input code and definitions of the bandwidth and weights).

A second method to analyze measurement invariance across age was MNLFA, as described by Bauer (2016) who builds on a similar methods (e.g Tucker-Drob, 2009). MNFLA can estimate how a continuous variable moderates parameters in a factor analysis. MNFLA can also estimate such potential measurement non-invariance for categorical indicators, as used in the present research.

The main point of interest was how age might moderate perceived age discrimination. Moderation by age could also exist for factor loadings and for thresholds in the factor model, implying some degree of non-invariance in measurement. The moderation effect (of the factor

itself and of parameters in the measurement model) need not be linear, it can also be nonlinear. It was reasonable to expect that levels of perceived age discrimination could to some extent demonstrate a U-shaped distribution, meaning that it was reasonable to add squared age as a second moderator above and beyond non-squared age.

Following Bauer (2016), we tested models with DIF for a particular item by comparing each of them with a model with no DIF, i.e., with a model with full measurement invariance. We then kept DIF for the item resulting in the largest improvement in fit and added DIF for a second item, testing whether fit improved further. Finally, we used the model with the best fit to estimate factor scores for each respondent, accounting for measurement non-invariance. The Supplemental Materials give further details on analyses with MNLFA.

Measurement Invariance across 15 Age Groups. We also conducted tests of approximate measurement invariance across 15 age groups, using a 5-year span from the age of 15 to 89 to group respondents (sample size was too low for respondents aged 90 and more). In tests of approximate measurement invariance, we used the alignment method first with a free alignment and then with a fixed alignment (with one age group as baseline group). We compared the factor scores derived from approximate measurement invariance across 15 age groups with factor scores derived from MNLFA.

Estimation Procedures. Analyses used Mplus 7.4 (Muthén & Muthén, 2012), supplemented by R version 3.3.2 (R Core Team, 2016), with MplusAutomation (Hallquist & Wiley, 2016) and ggplot2 (Wickham, 2009) as add-on packages. RStudio was used as an integrated development environment for R.

Analyses applied maximum likelihood estimations, and the three age discrimination items were defined as categorical. We used full information analyses, meaning that cases with

missing data were included in the analysis (Enders, 2010). We note, however, that the ESS data includes little missingness (about 1.5% for each item, see the Supplemental Materials for details). Analyses used robust standard errors, with Mplus' MLR estimator when possible. We used the MLF estimator in Mplus when MLR estimations failed. MLF is a simpler estimation method than MLR, using only the sums of products of first-order derivatives for the estimation of standard errors, MLR also uses approximations of second-order derivatives.

Analyses of cross-age differences with local structural equation modeling and with moderated non-linear factor analysis considered country as a clustering variable by using a sandwich estimator (Asparouhov, 2005). Analyses with MNLFA also included sampling weights (the variable called "pspwght" in the ESS data), other analyses of age discrimination across age could not use sampling weights because these are not available in estimations with MLF and because weights were already used for focal points in the analysis with LSEM. Models tested in MNLFA were nested and we used the scaled difference Chi-square test of Satorra and Bentler (2001) to compare fit of MNLFA models.

Results

Measurement Invariance across Countries

The overarching goal in the present research using ESS data was to investigate whether younger respondents would report equal or possibly even higher levels of perceived age discrimination than older respondents. This analysis first had to test for measurement invariance across countries and age.

As expected, the data did not support metric invariance across all 29 countries ($p < .001$). An alignment analysis (aiming at approximate measurement invariance) to further investigate measurement invariance across countries confirmed that there was substantial measurement non-

invariance across countries. Many parameters for single countries were significantly lower or higher than the overall mean for each of these parameters. We solved this measurement problem by using results from the alignment analysis to develop two groups of countries, each with a high degree of measurement invariance. Approximate measurement invariance (approximately invariant factor loadings and approximately invariant thresholds) was satisfied, with few non-invariant parameters for single countries.[3] No obvious explanation for the grouping was evident, countries that were similar in geography, culture, GDP, or welfare state policies did not cluster into one group, neither did countries with similar languages. We assumed that the subsequent analysis would reveal differences between the two groups of countries.

In Country Group 1, only 17 out of 171 parameters (factor loadings and thresholds for each of the 19 countries) were non-invariant. In the second group of countries, 15 out of 90 parameters were non-invariant. The item *lack of respect due to age* showed a high degree of measurement invariance within each of the two groups of countries. Its factor loading and both thresholds were approximately invariant across all 19 countries in Country Group 1. In Country Group 2, only one of its parameters (threshold #1 for respondents from Finland) was not approximately invariant.

The item *treated badly because of age* showed a relatively high degree of measurement invariance within each of the two groups of countries (with invariant factor loadings, but some non-invariance for thresholds, see the Supplemental Materials for details). Measurement invariance was lower for the item *prejudice because of age*. The Supplemental Materials show output with all results for approximate measurement invariance across countries, including rank order of the countries within each of the two country groups (see the section "Approximate Measurement Invariance Across Countries" in the Supplemental Materials, starting at page 21).

Measurement Invariance across Age

Models using LSEM. Having established a high degree of approximate measurement invariance within two groups of countries, we turned to the question of interest in the current research: perceived age discrimination across age. Analyses were performed on each of the two groups of countries separately. One advantage of this strategy was that we conducted analyses on data where we already had established approximate measurement invariance across countries and might achieve a similar degree of measurement invariance across age. A second advantage of the strategy was that in addition to using two statistical approaches (MNLFA and the alignment analysis) to develop age-dependent factor scores and seek confirmation that these two different methods would indicate similar tendencies for perceived age discrimination across age), we could test the robustness of the findings also by conducting analyses on two separate samples (two parts of the original data).

The results from LSEM analyses are shown in Figure 1. Because of differences in age-dependent weighting of respondents in the many models, factor loadings and thresholds might vary between the models. LSEM indicated more measurement invariance across age in Country Group 1 (as the previous alignment analysis had done for measurement invariance across countries). Among these respondents, thresholds were relatively stable across age and factor loadings varied only moderately.

Variation across age was larger for respondents in Country Group 2. Here, factor loadings for *treated badly* (blue line) showed a wave-like formation, with lower factor loadings among the youngest and people in their 50s and 60s (0 on the centered age variable equals 47.5 years). Even factor loadings for the two other items showed variation across age, with factor loadings for *prejudice because of age* (green line) being higher among the older half of the

sample. We also note that factor loadings were overall lower in Country Group 2 than in Country Group 1. Simultaneously, thresholds for prejudice were clearly lower in Country Group 2 than in Country Group 1. In general, thresholds varied more across age among respondents in Country Group 2 than in Country Group 1, but these variations were moderate.

Overall, the findings from LSEM corroborated the conclusion in the initial alignment analysis of country differences to distinguish between two groups of countries. Also, the LSEM analysis indicated that estimations of factor means for perceived age discrimination needed to apply models that could account for some degree of measurement invariance across age.

Models using MNLFA. We used MNLFA to further test for measurement non-invariance across age. Models attempting to use MNLFA with the 3-point scales did not converge and we recoded all items into dichotomous, thus following the template by Bauer (2016). Again, we completed separate analyses on respondents from the two groups of countries. We first compared models allowing for measurement non-invariance (DIF) for one item with a model imposing full measurement invariance across age.

Results were similar for respondents from the two groups of countries. For both, model fit was improved by adding DIF for either the item prejudice because of age ($p < .001$, as tested with the nested scaled Chi-square) or for the item treated badly because of age ($p < .001$). Using DIF for the item lack of respect did not result in a statistically significant improved fit ($p = 0.13$ in Country Group 1, $p = .10$ in Country Group 2). Using DIF for both prejudice because of age and for treated badly because of age gave further improvement in fit over using DIF for only one of these items ($p = .02$ for Country Group 1, $p = .001$ for Country Group 2).

We focused on the model allowing for DIF both for prejudice across age and for treated badly because of age. Using this model, we estimated factor scores across age for perceived age

discrimination. In the upper part of Figure 2 we plotted the smoothed means across age for these individual factor scores. As shown in Figure 2, MNFLA indicated substantially higher levels of perceived age discrimination among the youngest respondents, both for Country Group 1 and for Country Group 2. A notable difference between the two analyses, however, was that only for respondents in Country Group 1 did the analysis indicate increased levels of perceived age discrimination among older respondents.

A limitation in the MNLFA analysis was its use of dichotomous indicators. Also, the MNLFA could identify which factor loadings and thresholds varied significantly across age, but not at what age. Furthemore, the test of DIF in MNLFA relied on a significance test with very high sensitivity, given the sample sizes used for analyses. Thus, we returned to tests with approximate measurement invariance as a supplement to the analysis with MNLFA.

Approximate Measurement Invariance across Age

We tested for approximate measurement invariance across age groups defined by a narrow age span (5 years), letting 15 age groups represent an approximation of age as a continuous variable. One advantage of this additional approach, was that we could identify at what age factor loadings or thresholds needed to be non-invariant. A second advantage was that we could estimate factor scores with models that accounted for these age-specific non-invariances and compare them with factor scores derived from the MNLFA models.

Analyses were conducted on respondents from Country Group 1 and Country Group 2 separately, first with a free alignment across age groups. In both analyses, Mplus concluded that the youngest group (aged 15 to 19) should be used as a baseline group in a fixed alignment. The fixed alignment analysis indicated a high degree of (approximate) measurement invariance across age. Among respondents from Country Group 1, only 10 of the 135 parameters were non-

invariant, among respondents from Country Group 2, only 3 of 135 parameters were non-invariant. In both groups of countries, factor loadings for prejudice because of age and for lack of respect because of age were approximately invariant across all 15 age groups. Even thresholds for these items were approximately invariant, except for threshold #1 for prejudice among 75 to 79 years old in Country Group 2 (higher than the average threshold in Country Group 2).

The item treated badly because of age required more non-invariance across age groups, with threshold #1 being higher among 15 to 19 years old and threshold #2 being lower among all four age groups between 15 and 34 years. At the same time, factor loadings for this item were lower than average among the same four age groups between 15 and 34, and among 65 to 69 years old. The Supplemental Materials show further details of results for approximate measurement invariance across age groups.

The two plots in the lower part of Figure 2 show factor scores, with estimations using the high degree of (approximate) measurement invariance across groups, but accounting for the non-invariance detected. As a baseline group, the youngest respondents had a factor score of zero for perceived age discrimination. Since this age group also had high levels of perceived age discrimination, factor scores for other age groups were negative, reflecting their relative score compared to the baseline group. The plots for factor scores from the alignment analysis of age groups were compatible with the plots for individual factor scores across age derived from MNLFA, and in both analyses, younger respondents were estimated to perceive substantially higher levels of age discrimination than any other age group. However, the alignment analysis indicated less perceived age discrimination among older people in Country Group 1 than MNLFA did.

Perceived Age Discrimination across Age in Single Countries

The analysis of perceived age discrimination across age had so far not distinguished between countries. The overall trends depicted in Figure 2 might not apply to all countries within the two country groups. We ran analyses with MNLFA within each country separately, estimating how perceived age discrimination varied across age with models that fixed the factor laoding and thresholds for lack of respect to be invariant but allowed for DIF for the two other items.

Figure 3 shows plots of (smoothed) means of individual factor scores across age in 28 countries, the estimation for Bulgaria did not converge. No single pattern fitted all countries, and no obvious difference between Country Group 1 and Country Group 2 was evident when we inspected distributions for single countries. Thus, Figure 3 does not consider the previous grouping of countries and instead uses an order that should make it easier to detect groups of patterns across the 28 countries. We note that the scale varied between countries due to differences in the variation in perceived age discrimination across age. Grey areas in single plots represent standard errors around the smoothed mean estimation and thus uncertainties associated with low sample size (in particular for respondents above 80 or 85). Also, estimations for some countries were associated with relatively high uncertainty due to overall low sample size or a very skewed age distribution (Turkey).

In 14 of the 28 countries, perceived age discrimination across age had a pattern strikingly inconsistent with the common assumption that older people are the foremost targets of age discrimination (Romania, United Kingdom, Slovenia, Estonia, Sweden, Switzerland, Norway, Denmark, Ireland, Belgium, Finland, France, Portugal, Hungary). In these countries, smoothed means for perceived age discrimination were estimated to be high among the youngest and

dropping steadily as respondents were older (all but Hungary), or to be constant over age and dropping among the very oldest (Hungary).

Nearly all of the remaining countries showed perceived age discrimination to be higher among the youngest respondents, but also relatively high among older respondents. Data from some countries indicated a clear U-shaped distribution (Poland, Germany, Spain, Ukraine), or a J-shaped distribution with the highest levels of perceived age discrimination among the oldest respondents (Czech Republic, Russia). Two countries stood out as clearly distinct from the other countries, with the analysis indicating a constant level of perceived age discrimination across age except for being much higher (Cyprus) or very much higher (Greece) among the oldest respondents.

Discussion

The purpose of this research was to investigate perceived age discrimination across age with data collected in 29 countries in the ESS (Round 4). Age discrimination against older people has received substantial attention in research (Butler, 2005; Iversen et al., 2009; North & Fiske, 2012). Discrimination against younger people has received limited attention, and it is commonly assumed that older, not younger people are the foremost targets of age-based discrimination. We investigated whether younger respondents experienced equal or even higher levels of age discrimination than older respondents. As part of this research, the analysis needed to demonstrate that the three age discrimination items are valid as measurements of perceived age discrimination across countries and age.

Once we distinguished between two groups of countries, the analysis showed a high degree of (approximate) measurement invariance within each of these country groups. Distributions in factor loadings and thresholds across age differed somewhat between the two

groups of countries, but overall the analysis indicated a robust conclusion: Younger people

reported experiencing the highest levels of age discrimination.

This conclusion is based on analyses with two complementary methods that could

account for some measurement non-invariance when estimating factor scores across age:

MNLFA and approximate measurement invariance. Further analyses conducted on each country

separately (with MNLFA) showed that no single pattern of perceived age discrimination across

age fitted all countries. However, in half of the countries the analysis indicated low levels of

perceived age discrimination among older people, and substantially higher levels among younger

people. For other countries, the data indicated U-shaped distributions with higher levels of

perceived age discrimination among older and younger than middle-aged people (but highest

levels among younger respondents). In only five countries (the Czech Republic, Russia, Ukraine,

Cyprus, Greece) did older respondents report experiencing more age discrimination than other

age groups. The Czech Republic, Russia, and Ukraine had high overall levels of perceived age

discrimination (potentially associated with lower level of modernization and low employment

rates for older people, see C.-M. Vauclair et al., 2015).

Implications for Understanding Age Discrimination

Though the consequences of ageism toward older adults are often in focus and well

documented (e.g., see the recent *Journal of Social Issues* on Ageism in Health and Employment

contexts, 2016), our analyses revealed higher levels of perceived age discrimination among

younger people than among older people. Ageism toward older people is often hidden and not

sanctioned (Cuddy et al., 2005), but the same seems true for ageism toward younger people. In

particular, countries in Northern Europe, often perceived to be more modern and egalitarian than

countries in Eastern or Southern Europe (Esping-Andersen, 2007), appear to be characterized by

low perceived discrimination among older people yet notably high perceived discrimination

among younger people (see Figure 3). It is interesting to speculate about whether similar patterns

apply when comparing (for example) North American with Latin American populations, or

different regions of Africa or Southern Asia, where perhaps cultures that are more traditional or

more collectivist may attach different levels of status to older versus younger people (C. M.

Vauclair, Hanke, Huang, & Abrams, 2016).

Discrimination based on old age could affect increasing numbers of people among the

ageing population of Europe and North America (e.g., Swift, Abrams, Lamont, & Drury, 2017).

Alternatively, the growing political power of older people (by voting representation, perhaps also

increased economic power) could mean that age discrimination against younger people may

become even more prevalent than at present.

Some authors (Hagestad & Uhlenberg, 2005) have suggested that age discrimination

against older and younger people are both caused by age segregation in modern societies. Age

segregation is likely to contribute to social distance and prejudice between the generations

(Drury, Hutchison, & Abrams, 2016), but the data in the ESS do not support the assumption that

a single cause accounts for perceived age discrimination among older as well as younger people

because the association between levels of perceived age discrimination among older and younger

respondents were not the same in different countries (see Figure 3).

The present findings are clearly inconsistent with the common assumption that older

people more than any other age group will experience age discrimination. However, this

conclusion applies to perceived age discrimination, i.e., the subjective experience of being

discriminated against because of age. It is uncertain to what extent differences in subjective

experiences of age discrimination reflect actual differences in age discrimination or to explicit or

implicit age prejudice. One possible explanation is that negative attitudes toward a social group

not always are expressed as overt discrimination (LaPiere, 1934). Though attitudes toward older

people may be more negative than toward younger people (e.g., Cuddy et al., 2005; Kite et al.,

2005), these negative attitudes might not be as easily expressed as overt discrimination toward

older people (potentially due to a social norm against expressing ageism toward older people,

Crandall, Eshleman, & O'brien, 2002).

A second possible explanation lies in the nature of perceived discrimination. The

perception of being discriminated against is a psychological variable, dependent not only on the

behavior of other people, but also on the individual's interpretation of interactions with other

people. Potentially, emotional problems could increase the tendency to blame conflicts in social

interactions on discrimination (Major, Kaiser, & McCoy, 2003). Possibly, younger people can be

relatively insecure compared to older people and might more readily attribute rejections or

conflicts to age discrimination. A third explanation could be that younger people are less

homebound than older people and thus likely to interact more with strangers, with more frequent

interaction with strangers comes more frequent opportunities to encounter conflicts (Hewstone &

Swart, 2011).

The Three Age Discrimination Items in the ESS

The three items on perceived age discrimination analyzed in this research have only been

used in Round 4 of the ESS. The present research has documented that at least when

distinguishing between two groups of countries in the ESS, the three age discrimination items

performed well as measures of perceived age discrimination, with approximate measurement

invariance across countries and age.

The repeating core module of the ESS measures age discrimination uses a different,

single, item: "Would you describe yourself as being a member of a group that is discriminated

against in this country?" Only those answering yes are then asked what group membership they

think of when responding positively to the question of discrimination. Moreover, the respondents

themselves name the group membership(s) that leads to discrimination. This question format can

be valuable for studies on self-categorization, but it does not suffice as a measurement of

discrimination. This is evident in the data. Only 1.1% of women in the ESS, Round 4, reported

gender discrimination with this question format -- an unrealistically low figure for the prevalence

of gender discrimination against women in Europe. Age discrimination is also underreported

with this question format, only 2.7% of those over 70 years reported age-based discrimination in

Round 4 (as opposed to 33% of respondents over 70 years reporting experience with age-based

prejudice with the measurement analyzed in the present research). Thus, the three-item measure

tested in the present research appears to have much better sensitivity, face validity and

measurement properties. This evidence has important implications for other measures of

prejudice and for the measures that should be adopted in future large scale international surveys

as well as smaller scale studies.

Strengths and Limitations of the Present Evidence

We recognize that the measure of perceived age discrimination used in the present

research is relatively restricted and that age discrimination takes multiple forms. The increasing

numbers of international surveys typically involve multiple research partners, often from

different academic disciplines and with competing demands for space within the instrument. This

type of collaboration makes it all the more important to establish economical but robust measures

that can be used for cross-group comparisons (be that international or at lower levels such as

regions or breakdowns by other demographic variables). The present measure of age

discrimination was itself distilled from a larger set of items and therefore was intended to capture most of these elements in a simple and efficient manner (Abrams et al., 2007). With only three items, the measure is brief, but the limited number of items is compensated for by the large sample size, both overall and in single countries.

We have analysed measurement invariance across countries and age separately. We have not considered how measurement invariance by country and age are interrelated, e.g., whether the mean age or variance in age across countries could affect measurement invariance across countries (see the Supplemental Materials for density plots showing age differences across countries). A further limitation might be the MNLFA finding DIF for two items. However, MNLFA relied on a Chi-square test which, with the current sample sizes ($N > 19,000$ and $N > 37,000$), is highly sensitive to very minor differences in factor loadings and thresholds across age. Consequently, we do not see the identification of statistically significant differences across (some point of) age for two items in MNLFA as an important objection to the measurement. Rather, we see this finding as illustrative of shortcomings in the traditional approaches to measurement invariance (Asparouhov & Muthén, 2014). From a substantive point of view, it is of less interest whether factor loadings and intercepts are fully equal across all ages. It is more interesting to know whether they are sufficiently equal to merit conclusions about levels of perceived age discrimination across age. LSEM indicated limited over-age differences in factor loadings and intercepts. Moreover, the tests of approximate measurement invariance across age groups defined by 5-year intervals revealed that only 10 of the 135 parameters were non-invariant among respondents from Country Group 1, and only 3 of 135 parameters were non-invariant among respondents from Country Group 2. Such moderate differences across age in

factor loadings and thresholds should have little effect on comparisons of levels of perceived age discrimination.

The present measure yielded estimates of experiences of discrimination that are much more plausible than those yielded by previous single item measures (e.g. that used in Eurobarometer surveys which seem subject to floor effects, and the measure of experience discrimination used in the main module of the ESS). Importantly, whereas the single item measures applied previously in the ESS and Eurobarometer yield responses that might easily be used to infer that age discrimination is a rare phenomenon experienced by less than 5% of the population, the present measure clearly reveals that experiences of ageism are quite widespread, in line with other evidence about people's views of whether ageism is a serious societal problem (AgeUK, 2011), particularly for younger people. Therefore, we believe that the present measure provides an important and fairly optimal balance between breadth and specificity, and to be sufficiently sensitive to adequately capture important developmental as well as cross-cultural variation in experiences. For this reason, we believe it should provide a good template for similar measures of perceived discrimination directed toward other social categories (e.g., gender, ethnicity) when measurements need to be brief. The approximate measurement invariance for the age discrimination items in the ESS countries also suggests that the three-item measurement of perceived age discrimination can be used well beyond a European context. We expect that the three items would do well as measurements of age discrimination in Northern America, but we also suggest that surveys in other parts of the world may consider the three items.

We recognize that the present measure does not distinguish between discrimination that arises in different types of context, such as within the workplace (Abrams et al., 2016), in public places, or even the home (Bai, Lai, & Guo, 2016). Future research will be required to determine

whether the addition of these more specific foci helps to capture experiences that are missed by the more general measure.

Conclusion

The ultimate goal of this research was to understand substantive differences in discrimination. The three-item measurement of perceived age discrimination used in the ESS, Round 4, was tested for measurement invariance across age and countries, with favorable results. Using these three items, the present research uncovered substantial perceived age discrimination not only among older people, but even more so among younger people. The consistency and international scope of this evidence strongly challenges the conventional wisdom that ageism is primarily a problem for the old. Rather, it affects all ages and the relationship between them. We conclude that more research is now required to understand ageism toward younger people and to consider developmental differences and changes over the lifespan. More work is also needed to understand how young children develop positive and negative attitudes toward their own and other ages. These goals will be easier to achieve given the confidence that there now exists a sufficiently valid instrument for measuring experiences of ageism from early adulthood to old age.

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Footnotes

[1] See http://www.europeansocialsurvey.org/methodology/pre-testing_and_piloting.html

[2] We excluded one respondent whose age had mysteriously been recorded as 123 years.

[3] *Country Group 1* included the following countries: Bulgaria, Switzerland, Cyprus, Czech Republic, Spain, France, United Kingdom, Croatia, Hungary, Ireland, Israel, Latvia, Norway, Poland, Portugal, Romania, Russia, Slovenia, Turkey. *Country Group 2* included the following countries: Belgium, Germany, Denmark, Estonia, Finland, Greece, Netherlands, Sweden, Slovakia, Ukraine.

Figure Captions

Figure 1

Factor loadings for lack of respect (red line), treated badly (blue) and prejudice because of age (green) and indicator thresholds estimated by local structural equation modeling

Figure 2

Factor scores across age, estimated with moderated non-linear factor analysis and with approximate measurement invariance

Figure note. Lines in the two plots for factor scores from MNLFA represent smoothed means of individual factor scores, as estimated by ggplot2. The alignment analysis (approximate measurement invariance) estimated respondents aged 50 to 54 in Country Group 2 to have very low perceived age discrimination (-4.00), below the scale used in the plot.

Figure 3.

Levels of perceived age discrimination across age, results from moderated non-linear factor analysis of data from single countries.

Figure note. Lines in each plot represent smoothed means of individual factor scores, as estimated by ggplot2. The y-scale for levels of perceived age discrimination varies between plots.
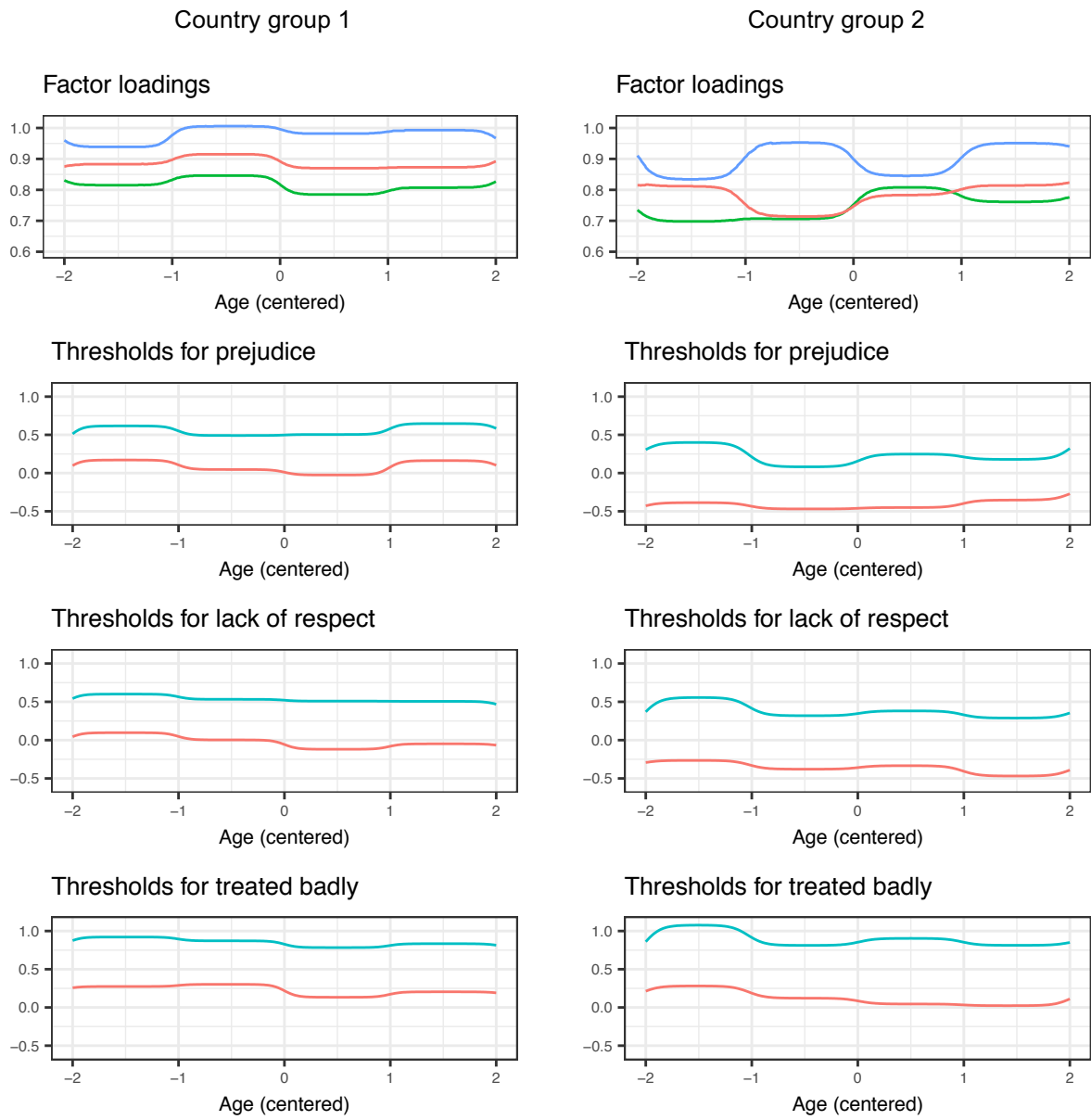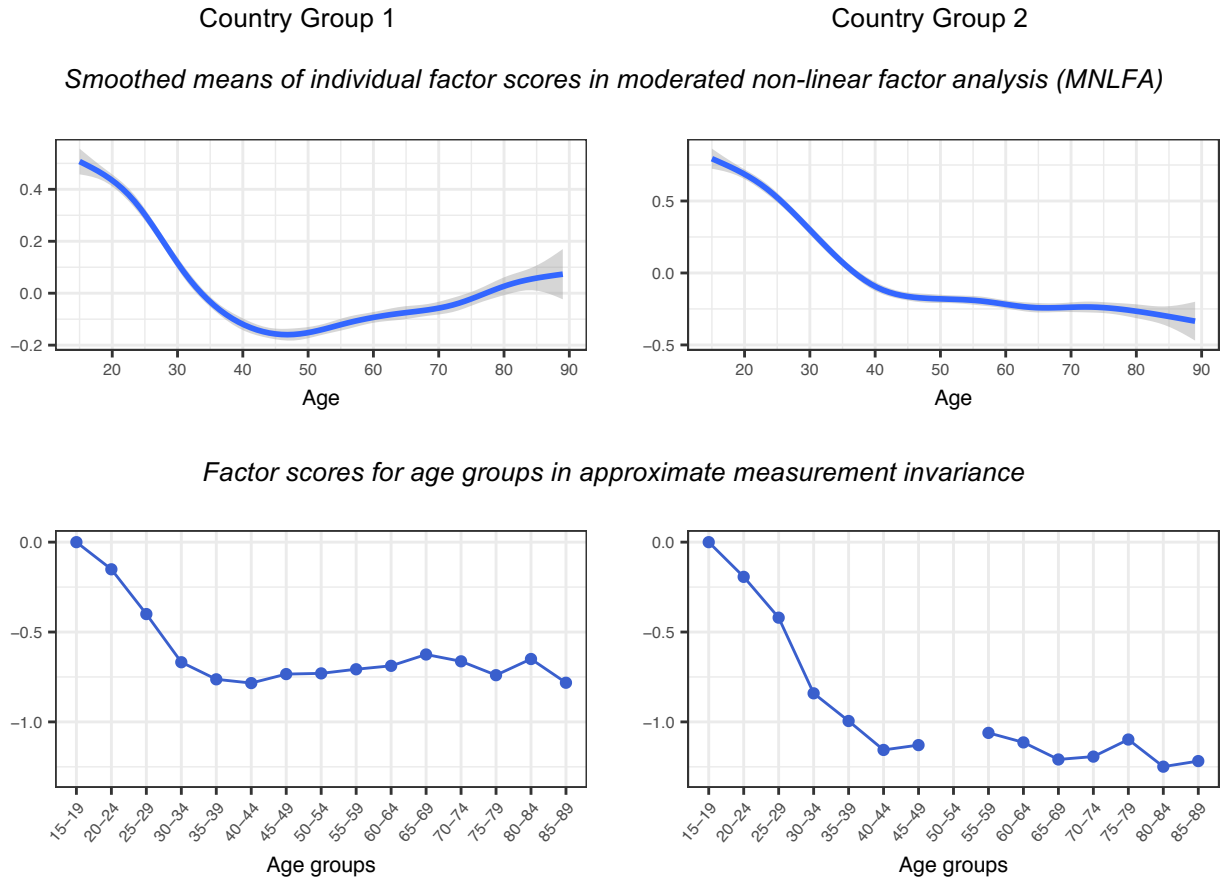
Figure 1

Figure 2

Country Group 1   Country Group 2

Smoothed means of individual factor scores in moderated non-linear factor analysis (MNLFA)

Factor scores for age groups in approximate measurement invariance

Figure 3