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Investigating the Portrait Values Questionnaire at two transitions in adulthood: Retirement and University

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Abstract In this study, two issues regarding the use of the Portrait Value Questionnaire (PVQ; Schwartz et al.: J. Cross. Cult. Psychol. 32:519–542, 2001) with older adults were addressed: (1) whether the quasi-circumplex structure of values, developed on younger adult samples, also emerges among older adults; and (2) whether the PVQ demonstrates measure- ment invariance across age groups and equivalence over time. The 40-item version of the PVQ was completed by 433 retired adults and 173 university students in Montreal, Canada. In both retired and student samples, the quasi-circumplex structure of values emerged using exploratory techniques, but was not supported by constrained confirmatory factor analyses. A modified 26-item model was necessary to achieve adequate fit indices in both samples, suggesting problems of multi-collinearity and internal discriminant validity. However, using the revised 26-item model of the values, support was found for most types of measurement invariance across age groups and time. The PVQ should, therefore, be considered appro- priate for use across the adult lifespan and in longitudinal research. Results are discussed with regard to the Schwartz (In: Zanna M (ed) Advances in experimental social psychology. New York: Academic Press, pp. 1–65, 1992) value theory and the conceptualizing of values across the lifespan.

Keywords Values · Portrait Value Questionnaire · Measurement invariance · Measurement equivalence · Multi-group confirmatory factor analysis

The Schwartz (1992) value theory postulates the existence of 10 universal values,

defined as desirable, trans-situational goals serving as guiding principles, (benevolence, universalism, self-direction, stimulation, hedonism, achievement, power, security, tradition, and conformity) for all people. The values and theoretical structure of their relations were based on motivational theory suggesting that values stem from three universal human needs: biological needs of individuals; interpersonal needs; and needs to ensure the welfare and survival of groups (Schwartz and Bilsky 1987, 1990). Two measures have been developed and extensively used to assess the 10 values, the Schwartz Value Survey (SVS; Schwartz 1992) and the Portrait Values Questionnaire (PVQ; Schwartz et al. 2001).

The goals humans seek vary according to their position on the developmental life span (Erikson 1982; Heckhausen et al. 2010). Two contrasting points in the adult lifespan are the final educational stage prior to entry into adult employment, and retirement from paid employment, usually regarded as entry into older adulthood. The guiding values in these two contexts differ greatly with decreased emphasis from competitive vocational goals of achievement and power which are no longer available to retired people. Instead, retirement from employment usually provides retirees with a major gain in unstructured time (Kim and Moen 2002), and goals usually emphasizing leisure activities, family and interpersonal relations. As a result of these different life contexts, the set of “healthy” values of achievement, self-direction, and stimulation (Sagiv and Schwartz 2000) may not be adaptive for older retired adults. To understand the motivational values of older retired people, the utility of value measures for this life stage must be determined. To date, only one study has explored these forms of developmental differences studying different aged adolescents (Bubeck and Bilsky 2004).

Consequently, the current study examines the adequacy of the most widely used values measure comparing retirees to university students from the same cultural background to determine if the PVQ is consistently appropriate across both student and retired samples. Steinmetz et al. (2009), recently stated that results examining the measurement invariance of the PVQ across education levels could not be generalized to groups differing on other variables. Because contexts differ greatly across the lifespan, it is important to determine the extent to which PVQ scores have invariant

properties across age groups. Otherwise, differences in scores between groups become ambiguous as to whether they reflect differences in life stage development and context or limitations of the scale. Further, measurement invariance properties across groups is required for the comparison of the structural associations among values.

1 The circumplex structure of the PVQ

Many aspects of Schwartz's theory of the 10 basic human values have been assessed and generally supported in over 200 samples in more than 60 countries (Fischer and Schwartz 2010; Schwartz and Boehnke 2004). Close inspection of the existing support for the structural aspects of the theory, however, reveals there is an absence of clear support for the theoretical model when CFA techniques are employed and an absence of data on values in older adult- hood. Although Schwartz and colleagues have collected data on personal values using the SVS and PVQ from thousands of participants (e.g., Schwartz and Rubel 2005), these samples consist largely of younger and working adults. The current study seeks to extend this literature by assessing the measurement and structural aspects of the Portrait Value Questionnaire (PVQ) on retired adults.

Measurement and structural invariance of the PVQ has so far only been established between groups differing in education (Steinmetz et al. 2009) with a shortened version of the PVQ. To ensure the validity of observed mean differences in PVQ scores between age groups or across time, the similarity of the measurement properties and structure of the PVQ in both younger and older adults at two different time points must be established for the same individuals.

The PVQ asks respondents to rate the similarity of 40 brief descriptions of individuals in terms of their goals and importance, to themselves. Short versions of the PVQ are included in two large-scale international research programs, the European Social Survey and the World Values Survey (http://www.europeansocialsurvey.org; http://www.worldvaluessurvey.org). The PVQ is, in short, one of the most important and popular measures of values in current psychological and sociological research.

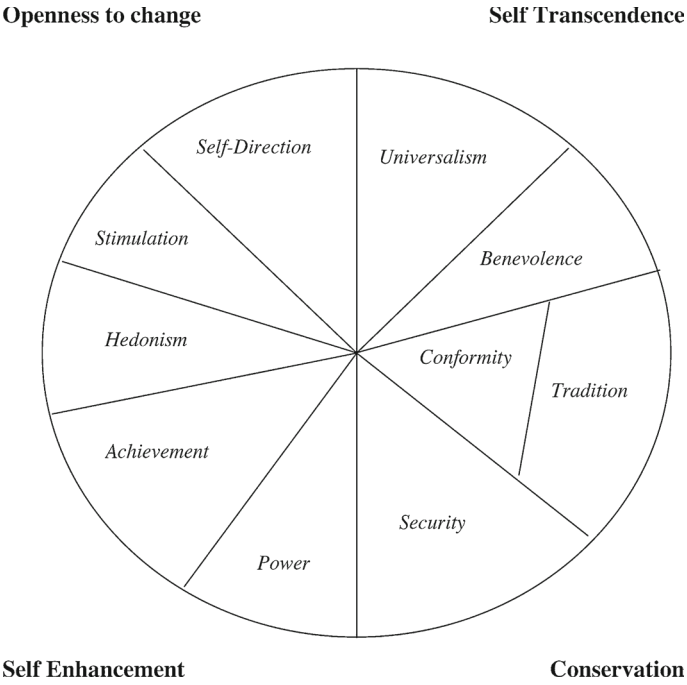


Fig. 1 Theoretical model of relations among 10 types of values (adapted from Schwartz and Rubel 2005).

This pattern of congruity and conflict among PVQ values forms a two-dimensional circular structure called a circumplex (Schwartz and Bilsky 1987, 1990; Schwartz and Boehnke 2004). Within this circumplex structure, values adjacent to one another are the most compatible, while those on opposite sides of the circumplex are the most conflicting. For example, the values of power and achievement, which are based on enhancing the self, are closely related to one another but conflict with the values of benevolence and universalism, which are focused on concern and caring for others (see Fig. 1). Schwartz 1992, 1994) found that a quasi- circumplex structure best fit the data he had collected. Tradition was found to have a more peripheral location on the value circle than conformity, but the two values were on the same polar angle (see Fig. 1). This quasi-circumplex structure became the definitive version of the structure of human values (Schwartz and Boehnke 2004).

Support for the circumplex structure rested, until recently, on visual plots of the relations among value items (Schwartz and Boehnke 2004) produced by multi-dimensional scaling (MDS) analyses or similarity structure analyses (SSA) of SVS (e.g., Schwartz 1992) or PVQ (e.g., Schwartz et al. 2001) data. An important limitation of this

procedure is the absence of any kind of statistical test to assess the goodness of fit of the circumplex structure to the observed data. Schwartz and Boehnke (2004) provided the first statistical test of the quasi- circumplex structure of the Schwartz (1992) value theory, using constrained CFA on SVS data from 23 different samples from 27 countries (*N* = 10,857). Various alternative models were tested. Although fit indices were similar for several of these models, the definitive model was reported to be the original quasi-circumplex model, where tradition and conformity occupy a shared space on the circumplex but have particular positioning unlike the other values with tradition more peripheral on the circumplex (see Fig. 1). Schwartz and Boehnke concluded that the quasi-circumplex model was supported through their CFAs. Perrinjaquet et al. (2007) however, noted that the best of the fit indices reported were only marginally acceptable and other indices indicated poor fit for most of the models tested. In addition, Perrinjaquet and colleagues argue that several important fit indices which would have allowed more conclusive assessment of the model were not reported.

Perrinjaquet et al. (2007) tested the quasi-circumplex structure, based on SVS data, in large samples of French and Swiss respondents, using constrained CFA technique similar to the procedure employed by Schwartz and Boehnke (2004). Initial multi-dimensional scaling analyses showed support for the quasi-circumplex structure of values, but constrained CFA resulted in lack of fit for any models. Perrinjaquet and colleagues suggest that the failure to support the quasi-circumplex reflect problems of the SVS's construct and discriminant validity.

The quasi-circumplex structure as assessed by the PVQ has received less research attention. In the original PVQ article, Schwartz et al. (2001), using smallest space analyses of PVQ data, concluded that these spatially-mapped data supported the circular structure of the 10 values. Hinz et al. (2005) failed to find support for the quasi-circumplex structure of values, applying a variety of exploratory statistical techniques (including MDS and principal component analyses (PCA) to investigate the quasi-circumplex structure measured by the PVQ. Both techniques that typically have supported the quasi-circumplex structure, in this case failed to support it for the PVQ.

The Schwartz value theory, while having extensive support for the existence of the 10 values, has mixed statistical support for the presence of a quasi-circumplex

structure of relations among the values. Some studies evaluating the SVS and the PVQ have reported support for the quasi-circumplex, but the majority of that support comes from exploratory data analyses methods. Where stricter CFA methods have been employed, results have been mixed, with one study supporting the circumplex structure (Schwartz and Boehnke 2004) and the other failing to support it (Perrinjaquet et al. 2007).

Another important statistical issue facing the PVQ is the establishment of its measurement invariance (Byrne et al. 1989). Measurement invariance refers to the similarity of the measurement properties (i.e., item intercepts, factor loadings, and error covariances) as well the similarity in the structure of a measure (i.e., the variances and co-variances of the latent variables) across groups or across time (Steinmetz et al. 2009). Steinmetz and colleagues reported partial invariance for most of the 10 PVQ items. They suggest that the assumption that there is no systematic variation of measurement structure across different sub-samples, time or stages of the lifespan is risky because without actually testing this assumption, observed differences between sub-samples or across time could be due to systematic differences in the measurement and structural properties of the measure.

Tests for measurement and structural invariance assess four types of questions: are the measurement parameters (factor loadings, measurement errors, etc.) the same across groups or time; are there pronounced response biases in a particular group or at a particular time point; can mean differences be unambiguously interpreted between groups or across time; and was the same construct measured in all groups or at all time points (Steinmetz et al. 2009)?

The most widely used method to answer these questions (i.e., to test for measurement invariance) is multi-group confirmatory factor analyses (MGCFA). The particular tests for measurement invariance examine configural, metric, and scalar invariance, as well as invariance of factor variance, factor co-variance, latent means, and error variances (see Steinmetz et al. 2009, for complete definitions of these tests of invariance). Steinmetz and colleagues describe the types of invariance that may be established, in the order that they should be tested: *configural invariance*, a pre-requisite for all other tests of invariance; *metric invariance*; *scalar invariance*; *invariance*

of factor variance; *invariance of the factor covariances*; *invariance of latent means*; and finally *invariance of error variance*. Full measurement invariance is demonstrated only if *all* of the parameters in a test of invariance are equal across groups or time. Byrne et al. (1989) suggest a less conservative approach, mainly invariance of factor loadings and intercepts in a minimum of two items per latent variable indicates that latent mean comparisons between groups or across time are meaningful.

Support for the measurement invariance of the PVQ has begun to emerge through a shortened version of the PVQ that has been included in the on-going international and longitudinal European Social Survey (ESS). Using MGCFA on the first wave of ESS data, configural and metric invariance of the short-form PVQ were established across 20 countries, but with a model of seven rather than 10 values (Davidov et al. 2008). Several pairs of adjacent values (achievement/power; universalism/benevolence; conformity/tradition) had to be unified in order to achieve adequate fit indices. MGCFA of PVQ data from the second round of ESS (Davidov et al. 2008) did confirm the configural invariance of the seven-value model established at the first wave for 14 of the 25 countries involved. Metric and scalar invariance were also established between the first and second rounds of the ESS data collection (Davidov et al. 2008).

Measurement and structural invariance of the PVQ has so far only been established between groups with different levels of education using MGCFA in a German sample (Steinmetz et al. 2009) with a shortened version of the PVQ. Invariance of measurement and factor structure has not been tested in this manner, however, across age groups or across time with the full-length PVQ. A first step to ensure the validity of any observed mean differences in PVQ scores between age groups or across time would therefore be to use MGCFA to establish the similarity of the measurement properties and structure of the PVQ in both younger and older adults, and at two different time points for the same individuals.

2 The current study

The aims of the current study were as follows: to test the validity of the quasi-circumplex structure of values in both retirees and students using a constrained CFA approach and to test measurement invariance of the PVQ across age cohorts and

across a one-year interval using MGCFA. This study examines the properties of the PVQ within one country, but across different stages of the adult lifespan. Working within one city (Montreal, Canada), this study evaluated PVQ data from two age groups (retired adults and university students) from the same region.

These tests of the measurement and structural invariance of the PVQ are an important precursor to research questions addressing value comparisons of different age cohorts, for comparing the associations among values and other variables across age groups, and for examinations of the stability of values across time.

3 Method

3.1 Participants

Older adults. Older participants were part of a larger longitudinal study investigating adjustment to retirement. Information about the study was distributed by mail to retirees' associations or by ads in French and English local newspapers. Criteria for participation in the study included fluency in French or English, having worked full-time for at least 20 years, not currently having paid employment for more than 10 hours per week, and mobility permitting attendance of annual testing sessions at Concordia University. A total of 446 retirees participated in the study. Of these, 13 (2.9 %) were eliminated because of difficulty understanding instructions, or excessive missing data, leaving a final sample size of 433 retired adults (48.5 % male, n = 210). Age ranged from 44 to 79 years, with a mean of 59.20 years (SD = 5.21). Participants were generally healthy and well-educated (M = 14.8 years of education, SD = 2.52), had worked full-time for an average of 34.16 years (SD = 6.76), and had been retired for an average of 1.8 years (SD = 1.77).

Of the 433 participants in the first year of the study (T1), 393 returned for the second year (T2) for a retention rate of 91 %. Participants that did not return were either not reachable or did not respond when contacted; withdrew voluntarily because they were too busy, were no longer interested, or had health problems; and four participants were eliminated because of difficulty following instructions.

Younger adults. A total of 199 students volunteered to complete a package of questionnaires. Only those aged 30 or less (N = 173) were selected given the focus on

age comparisons with older adults. The demographic characteristics of this sample of younger adults were: 44.5 % male (*n* = 77); age ranged from 18 to 30 years, with a mean of 22.73 (SD = 2.67). Student participants were from a range of academic departments and completed the materials in English.

3.2 Procedure

Older adults. Individuals contacted the researchers by telephone or email. Those who met inclusion criteria were given the choice of participating in either French or English, and scheduled to come for testing at Concordia University in groups of up to 6 people. Upon completion of a battery of questionnaires and cognitive tests, participants received a cheque for $50.

Younger adults. Student participants were recruited at a booth at the university advertising participation in psychology research in exchange for being entered into a draw for three cash prizes ($200; $100; $50). Completion of the battery of self-report questionnaires took approximately 15 minutes.

3.3 Materials

Participants in both the student and retired samples completed a consent form, demographic questionnaire, the Portrait Value Questionnaire IV as a measure of personal values, and a series of other self-report measures. Only the PVQ is described here in detail.

The Portrait Value Questionnaire IV. The PVQ includes verbal portraits of 40 different people, gender matched with the participant. Both English and French versions of the PVQ were used, with the latter adapted for the linguistic context of Quebec from an existing French version. Each portrait describes a person in terms of their goals and what is important to them. For example: “It is very important to him to help the people around him. He wants to care for their well-being” describes a person for whom benevolence values are important. Participants indicate how much the portrait is similar to them on a 6-point scale, labeled from “very much like me” to “not like me at all.” Each value is represented by between three and six items, depending on the conceptual breadth of the value.

Internal reliability coefficients for the values are provided in Table 1. Test-retest reliability of the PVQ has been reported to be moderate to high, ranging from .66 to .88 (Schwartz et al. 2001). Schwartz et al. (2001) reported that convergent and discriminant validity of the PVQ has been demonstrated to be adequate.

3.4 Statistical analyses

Statistical analyses for tests of the quasi-circumplex structure and measurement invariance were performed using structural equation modeling (SEM) in M-Plus ver 6.1 (Muthén and Muthén 2011). The first step of the SEM analyses involved a confirmatory factor analysis (CFA) to ensure that the individual items of the PVQ loaded solely onto each respective latent factor for (1) the retired sample and (2) for the student sample. The second step of the analyses required fitting the predicted quasi-circumplex model (Schwartz and Boehnke 2004) onto the latent factor covariance matrix for (3) the retired sample and (4) for the student sample. Finally, tests of measurement invariance were conducted to ensure (5) invariance between the retired and student samples and (6) measurement equivalence across time.

4 Results

Observed values for each of the factors were calculated separately for the retired sample and the student sample. Table 1 illustrates the observed correlations between the 10 values including means and standard deviations for each sample.

4.1 Retired sample: CFA

Beginning with the retired sample, a latent factor model was tested in which the 40 items loaded onto a total of the 10 factors/constructs as defined by Schwartz et al. (2001). Compared to the standards for reasonably good fit for SEM models (where CFI ≥ .90 and RMSEA ≤ .06; Kline 2005) the overall fit statistics for this model were poor (all model fit statistics are pro- vided in Table 2). Modification indices revealed that fit would improve by loading PVQ items with weak loadings on their expected factors onto additional factors. There was however, no theoretical justification for allowing PVQ items to load onto multiple factors, given that each value is intended to represent a distinct

motivational domain. Instead, a revised model using only items that were strong and unique indicators of their respective factors were retained.

This revised latent factor model in which 26 items loaded onto a total of 10 latent factors was then tested (see Appendix for included and excluded items). The overall fit statistics were substantially improved compared to the first model based on 40 PVQ items, suggesting that the simplified model was a significantly better fit to the data.

4.2 Student sample: CFA

Consistent with the approach for the retired sample, a latent factor model was tested for the student sample in which the 40 items loaded onto a total of 10 latent factors. The over- all fit statistics were again poor. Similar to analyses in the retired sample, modification indices revealed model fit would be improved by loading PVQ items with weak loadings to their expected factors onto other factors. As with the retired sample, there was no theoreti- cal justification for allowing PVQ items to load onto multiple factors. Therefore, the same 26-item latent factor model that was generated on the retired sample was tested in the student sample. The overall fit statistics were substantially improved compared to the theoretical model, suggesting that the 26-item model was a significantly better fit to the data.

In both the student and retired samples, then, the original model of 10 values based on 40 PVQ items was a poor fit. The revised 26-item model was used for all subsequent analyses because it showed the best fit indices for both retired and student samples.

4.3 Testing the quasi-circumplex model using constrained CFA

To test the degree to which the Schwartz quasi-circumplex model fit the retired sample, the covariances between the latent factors were constrained to the values suggested by Schwartz and Boehnke (2004). It was not possible, however, to constrain the covariances between the factors according to the established criteria and maintain a working model. In other words, the predicted model and the observed data failed to converge. The same problem occurred when attempting to constrain the covariances in the student sample: the hypothesized associations did not match those in the current

Table 1 Observed and predicted correlations among values with descriptive statistics and internal reliabilities for retired and student samples

	CO	TR	BE	UN	SD	ST	HE	AC	PO	SE
CO	**.73/.71**	.59* (.88)	.30* (.68)	.28* (.48)	−.09 (.28)	−.09 (.08)	.10* (.08)	.21* (.28)	.09 (.48)	.52* (.68)
TR	.71* (.88)	**.60/.59**	.25* (.68)	.24* (.43)	−.05 (.18)	−.04 (−.07)	.03 (−.07)	.12 (.18)	.01 (.43)	.40* (.68)
BE	.20* (.68)	.30* (.68)	**.67/.74**	.46* (.68)	.25* (.48)	.20* (.28)	.20* (.08)	.17* (.08)	.04 (.28)	.25* (.48)
UN	.25* (.48)	.32* (.43)	.60* (.68)	**.77/.79**	.32* (.68)	.20* (.48)	.10* (.28)	.04 (.08)	−.06 (.08)	.35* (.28)
SD	−.14 (.28)	−.04 (.18)	.46* (.48)	.43* (.68)	**.62/.60**	.47* (.68)	.21* (.48)	.26* (.28)	.27* (.08)	.12* (.08)
ST	−.15 (.08)	−.10 (−.07)	.24* (.28)	.23* (.48)	.48* (.68)	**.70/.74**	.47* (.68)	.31* (.48)	.25* (.28)	−.06 (.08)
HE	.05 (.08)	.09 (−.07)	.20* (.08)	.14 (.28)	.21* (.48)	.43* (.68)	**.82/.72**	.35* (.68)	.24* (.48)	.13* (.28)
AC	.05 (.28)	.01 (.18)	.06 (.08)	−.03 (.08)	.20* (.28)	.06 (.48)	.16* (.68)	**.79/.78**	.59* (.68)	.28* (.48)
PO	.15* (.48)	.12 (.43)	.10 (.28)	.08 (.08)	.15* (.08)	.13 (.28)	.25* (.48)	.59* (.68)	**.72/.71**	.15* (.68)
SE	.55* (.68)	.39* (.68)	.21* (.48)	.28* (.28)	.05 (.08)	−.13 (.08)	.21* (.28)	.32* (.48)	.40* (.68)	**.67/.68**
Retirees										
M	4.27	3.07	5.01	4.95	4.74	3.64	4.41	3.20	2.95	4.07
SD	.99	1.25	.79	.85	.94	1.11	1.08	1.15	1.23	1.23
Students										
M	3.96	2.76	5.03	4.85	5.07	4.61	4.58	4.39	3.35	3.72
SD	1.04	1.36	.81	1.00	.93	1.01	.96	1.06	1.30	1.39

Note Upper diagonal of matrix represents the retired sample (N = 433); lower diagonal represents the student sample (N = 173); first set of numbers in each cell represent the observed correlation; the values in parentheses represent the correlation predicted by the modified quasi-circumplex model (Schwarz & Boehnke, 2004, p. 241)

M and *SD* calculated based on the 26-item model of the 10 values. Internal reliability coefficients (Cronbach's alpha) for the 10 values (as measured by 40 PVQ items) are provided in bold in the diagonal, indicated in terms of retired/student samples

CO Conformity, *TR* Tradition, *BE* Benevolence, *UN* Universalism, *SD* Self-Direction, *ST* Stimulation, *HE* Hedonism, *AC* Achievement, *PO* Power, *SE* Security

* $p_{(two-tailed)} < .05$

Table 2 Summary of model fit indices

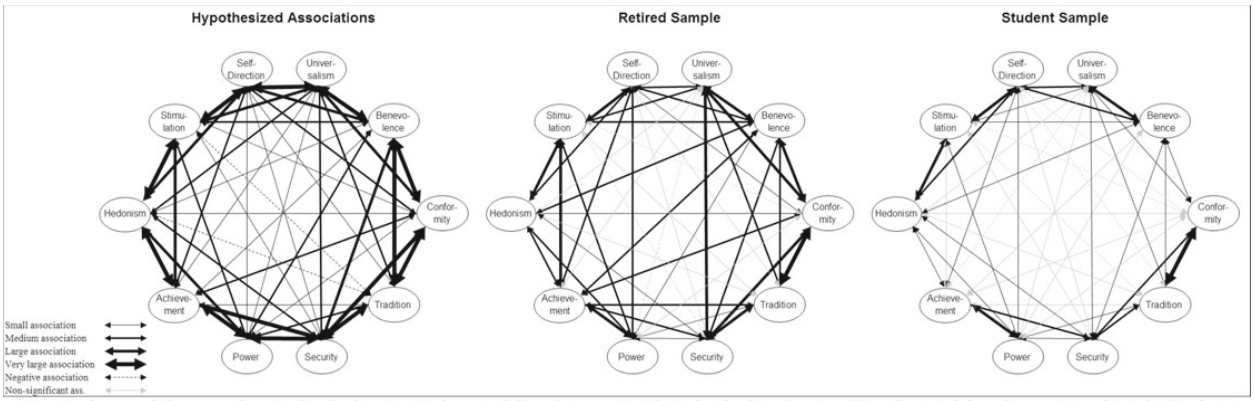
Model description	χ^2	df	AIC	CFI	RMSEA	SRMR
1a. Retired sample: CFA—full 40 item scale	1806.81	657	49946.426	.802	.064	.065
1b. Retired sample: CFA—26-items	612.40	254	33356.261	.908	.057	.049
2a. Student sample: CFA—full 40 item scale	1124.41	657	20396.546	.795	.064	.079
2b. Student sample: CFA—26-items	347.20	254	13558.499	.930	.046	.064
3 & 4. Applying the hypothesized quasi-circumplex model	–	–	–	–	–	–
5a. Comparing the retired sample to the student sample	635.99	254	47273.255	.929	.050	.045
5b. Configural invariance, metric invariance and scalar invariance	1128.89	540	47020.052	.887	.060	.060
5c. Invariance of error variance	1269.89	566	47109.052	.865	.064	.083
5d. Invariance of error variance (partial)	1154.76	559	47007.922	.886	.059	.064
5e. Invariance of factor variance	1179.80	569	47012.959	.883	.060	.077
6a. Comparing the retired sample across time	898.94	254	63051.048	.913	.055	.045
6b. Complete invariance	1232.63	631	63051.048	.919	.048	.056

study enough to maintain a working model, and the models failed to converge. Applying the full 40-item model instead of the revised 26-item model made no difference. In other words, the quasi-circumplex model, when tested with constrained CFA, was not supported. The pattern of correlations among the 10 values in the current sample and the pattern proposed by Schwartz and Boehnke varied substantially. The differential patterns of hypothesized and observed associations among the 10 values are depicted visually in Fig. 2.

4.4 Testing invariance across age groups

To ensure that the latent factors (i.e., the 10 value constructs) were comparable between samples, it was necessary to test for measurement invariance, starting specifically with *configural, metric invariance, and scalar invariance*. The revised 26-item model was first constructed using the total sample (retirees and students, $N = 606$) with a reasonable fit. To ensure *con- figural invariance* (i.e., same number of factors and same items loading substantially on the same factors)*, metric invariance* (i.e., same factor loadings) and *scalar invariance* (i.e., same intercepts), the identical 10-factor model was tested in each group constraining the item coefficients and item intercepts to be equal for both students and retirees. While this led to a significant decrease in the overall fit of the model ($\Delta x^2_{(286} = 492.90$, $p < .05$), the model itself was still acceptable. Therefore, *configural invariance, metric invariance and scalar invariance* were supported for both retired and student samples using the 26-item model.

The next test of measurement invariance, *invariance of error variances,* assessed whether measurement error in each of the PVQ items was the same for both younger and older adults. The error variances on the indicators were therefore constrained to be equal between both samples. The resulting model was a significantly poorer fit than the previous model ($\Delta x^2_{(26)} = 140.99$, $p < .05$). However, once one error variance for the factors with at least two indicators were freed, the resulting model fit was acceptable and the difference between this and the previous model was not significant ($\Delta x^2_{(19)} = 25.11$, $p > .05$). Therefore, only partial *invariance of error variances* across age groups may be assumed in this dataset.



Note: Very large associations = more than 73% shared variance (r > .85); large associations = between 41% and 73% shared variance (r = .64 to .85); medium associations = between 18% and 41% shared variance (r = .43 to .64); small associations = less than 18% share variance (r < .43).

Fig. 2 Associations among values predicted by the quasi-circumplex model (Schwartz and Boehnke 2004) and the observed matrix in retired and student samples.

Finally, *invariance of factor variance* was tested by constraining the variance of each of the 10 factors to be equal for student and retired samples. The resulting model fit was acceptable though the difference between this and the previous model was significant ($\Delta x^2_{(10)} = 25.80$, $p < .05$). Based on the above, the criteria for measurement invariance across the age groups were met and therefore the idea that values can be measured similarly in each group was supported.

Although value measurement appears to occur in an invariant way across age groups when using the PVQ, there were large differences in the obtained means of the latent factors and in the pattern of factor covariance between the student and retired samples. It appears then, that *latent value means* and *factor covariances* may vary across the two age groups. To delineate these differences, a series of follow-up analyses were conducted.

In terms of similarity among the latent means of the values across age groups, only the means of benevolence (*z*-diff = −.05, $p > .05$) and universalism (*z*-diff =.04, $p > .05$) were not significantly different between samples. Meanwhile, achievement (*z*-diff = 1.26, $p < .05$), stimulation (*z*-diff = 1.07, $p < .05$), self-direction (*z*-diff = .49, $p < .05$), hedonism (*z*-diff = .41, $p < .05$) and power (*z*-diff = .37, $p < .05$) were significantly higher in the student sample. On the other hand, conformity (*z*-diff = −.35, $p < .05$), security (*z*-diff = −.32, $p < .05$) and tradition (*z*-diff = −.28, $p < .05$) were higher in the retired sample.

Moreover, there were large differences in the covariances of the factors between

retirees and students (see Table 1 and Fig. 2). In other words, the 10 values did not hang together in exactly the same way for younger and older adults. A visual representation of the pattern of associations (Fig. 2) reveals that the pattern of associations among the values differs between students and retirees, especially in terms of strength of association. To summarize the pattern depicted in Fig. 2 in terms of strength of associations, the covariance between the factors were tabulated in terms of the number of very large, large, medium, and small associations based on Cohen (1983) guidelines.

The strength of the covariances between the factors varied between the student and retired groups with the retired sample having generally more large and medium associations (one very large association, 10 large associations, 17 medium associations and seven small associations with 10 non-significant associations) and the student sample having more small or non-significant associations (one very large association, four large associations, six medium associations and 17 small associations with 17 non-significant associations). Retirees appear, therefore, to have greater interconnections among values than students, whose values show a lesser degree of inter-relatedness.

4.5 Comparing the retired sample across time

To ensure that the measurement and structural properties were stable over time, measurement equivalence across a one-year interval was tested using only the retired sample, for whom longitudinal data was available. The revised 26-item model was reconstructed with a reason- able fit. To ensure configural, metric, scalar, factor variance, factor covariance, latent mean and error variance equivalence, the model was tested constraining the item coefficients, item intercepts, error variances, factor variances, factor covariances and means to be equal over time. This led to a non-significant decrease in the overall fit of the model ($\Delta x^2_{(377)} = 333.69$, $p > .05$) supporting all aspects of measurement equivalence in the PVQ over time in the retired sample.

5 Discussion

We investigated the validity of the quasi-circumplex structure of relations among the 10 values in the Schwartz (1992) value theory measured by the PVQ in a sample of

younger and older adults. Tests assessing goodness of fit of the observed data to the predicted pattern of associations through CFA analyses did not support the circumplex model.

In order to achieve a good fitting model, 14 of the 40 items of the PVQ had to be dropped because they loaded weakly onto their respective factors and tended to be associated with other factors. The need to trim items from the PVQ in order to achieve a model with good fit is consistent with previous findings of a high degree of multi-collinearity among the values resulting in low levels of internal reliability and weak discriminant validity of SVS questionnaire items (Perrinjaquet et al. 2007). The resulting modified 26-item model loading onto 10 factors (see Appendix) had much improved fit indices over the poor fit of the 40-item model in both retired and student samples (Table 2), and was used for all subsequent tests.

When constrained CFA was used to test whether the observed pattern of value inter- correlations approximated that predicted by the modified quasi-circumplex model (Schwartz and Boehnke 2004), the models failed to converge. The quasi-circumplex structure did not meet CFA tests for goodness of fit. This contrasts with Schwartz and Boehnke (2004) who found support for the quasi-circumplex structure using a constrained CFA method, but is consistent with other findings of lack of support for the quasi-circumplex structure (Hinz et al. 2005; Perrinjaquet et al. 2007).

We then investigated PVQ measurement invariance between student and retired samples. Using the modified 26-item model, support was found in both samples for most types of measurement invariance. These findings suggest that the 26 item PVQ has the following qualities related to its validity as a measure for both young and older samples (Steinmetz et al. 2009): a similar model structure in both samples (*configural invariance*); the same factor loadings in both samples (*metric invariance*); the same intercepts (and therefore same systemic response bias) in both samples (*scalar invariance*); the same variance within factors in both samples (*invariance of factor variance*); and the same reliabilities in both samples (*partial invariance of error variance*). All this supports the validity of a 26-item version of the PVQ, and indicates it measures values in the same way across different lifespan stages. As a result, differences observed in the values of younger compared to older adults can be

interpreted as meaningful, and not as an artifact of differences in measurement or structural properties of the PVQ. However, more recent work might question the need for a more stream-lined model. Schwartz and Vecchione (2011) have begun validating a 57 item scale which appears to avoid problems of multicollinearity, in spite of the high number of items.

Consistent with previous reported correlations between age and values, (Schwartz et al. 2001), retirees reported higher scores on conformity, tradition, and security values, whereas students reported higher achievement, power, stimulation, hedonism, and self-direction values. Only the latent means of benevolence and universalism showed no differences between younger and older adults. As this part of the study did not examine the same people over time, but rather two different cohorts of different ages, there is no way to tease apart the two potential explanations of developmental change and cohort differences.

Along with differing value means, retirees and students showed a differential pattern of associations among the 10 values, as depicted in Fig. 2. The pattern among older adults (see Table 1 and Fig. 2) suggests a higher degree of inter-relatedness among all values, even between theoretically contradictory values (e.g., achievement and benevolence). In younger adults, only values theoretically similar in motivation showed large or medium sized associations.

Measurement invariance of the PVQ across a one-year interval was also tested. Support was found for all types of previously mentioned measurement invariance suggesting, that values can be measured in the same way at different time points in the same people using the 26-item form of the PVQ. It is striking that even in a time of great transition, the early stages of retirement, that none of the latent means of the 10 values showed any change across a one-year interval among retirees. This suggests that values, even if they do change with development and aging, or differ from one generation to the next, are not likely to show much change in the short term within individuals.

5.1 Implications for value measurement

If the quasi-circumplex structure of relations among the values of the Schwartz value theory does not hold up to statistical scrutiny, does this reduce the theory's

importance or utility in values research? Despite the lack of statistical support for the quasi-circumplex model, the PVQ remains a useful empirical measure of values. The PVQ captures the importance that individuals place on 10 distinct values, in a format that does not require abstract thought about values, and that can be completed in a matter of minutes. In addition, it is appropriate for use in research with both younger and older adults as well as in longitudinal studies, as reported here, as well as across nations and cultures as shown elsewhere (e.g., Davidov et al. 2008). The lack of support for the quasi-circumplex model, found here and elsewhere (Hinz et al. 2005; Perrinjaquet et al. 2007) impacts how we understand the set of relations among the 10 values, but not the capacity of the PVQ to measure values. There is no theoretical imperative to have a circumplex model of relations among values in order to have a valid measure of values.

Based on the results of this study, what appears be a greater threat to the integrity of the PVQ is the problem of multi-collinearity among items and among factors, and the resulting lack of discriminant validity among the 40 items of the PVQ, paralleling similar problems reported with the SVS (Perrinjaquet et al. 2007). Eliminating 35 % of the PVQ items to establish an adequate fit of all items onto 10 factors suggests that researchers consider using shorter forms of the PVQ, to avoid excessive overlap among items and the constructs. Although some information is lost, a more precise and valid measure of the 10 values as an entire system is gained, as conceptual and measurement overlap of the values are reduced. Further research is required to determine whether the 26-item model generated here represents the best fitting model in other types of samples. To that end, some research has been conducted which supports using a smaller number of items (Knoppen and Saris 2009).

The problem of low discriminant validity among the PVQ items raises a conceptual issue, the difficulty in finding items that load only on a single factor suggest that values in nature may not cleanly fall within value categories of the model. Value items may be associated with multiple value categories, and the particular pattern of associations among items and value categories may be highly idiosyncratic. The question is whether there is a better way to conceptualize values than dividing them up, somewhat arbitrarily, into 10 categories. What alternatives are there for the measurement of such a complex motivational continuum?

Schwartz (personal communication, July 11, 2008), suggests two reasons why the 10 categories of values on the PVQ are unlikely to hold up as distinct according to the rigorous requirements of CFA. First, with only a few items per value and with multiple motivations contained in each value, it is impossible to achieve high internal reliability unless the number of items is increased and the breadth of each value is limited to only one central motivation. Second, each value, according to the theory of quasi-circumplex structure, should be correlated with adjacent values on the value circle, and some item loading onto multiple adjacent values is therefore to be expected. Unfortunately, this creates difficulties with CFA analyses.

One possible alternative to the 10 value categories is using the two established higher-order value dimensions: openness to change vs. conservation and self-enhancement vs. self-transcendence (e.g., Caprara 2003; Ros et al. 1999; Verkasalo et al. 2009). Higher reliabilities for a smaller number of value categories does not necessarily translate into a better fit of the model to the data (Schwartz and Boehnke 2004). In follow-up tests in our older sample, combining the values into four higher order categories did improve alpha reliabilities to more acceptable levels but did not improve model fit indices over a 10-value model.

5.2 Limitations

This study involved some exploratory analyses, selecting PVQ items based on factor loadings that may invalidate tests of fit depending on the same relationships that were used to select the items. While the application of the 26-item model to the student sample represents a legitimate test of fit, as it was not generated in that sample, the 26-item model as applied to the retired sample would need to be replicated in a different sample of retired adults in order to be fully supported.

Moreover, the current sample of retired participants is comprised of French and English speakers who filled out the PVQ questionnaire in their native language. One alternative explanation for the findings obtained in this study could derive from the use of the PVQ questionnaire in two different languages. Although not detailed herein, we did run multi- group comparisons of the models to identify potential group differences based on language with no observable significant differences in the model

characteristics.

5.3 Future directions

Our analyses suggest that the pattern of covariance among the 10 factors differs between younger and older adults. While the means of particular values differed in expected ways between younger and older adults, the way in which values hang together as a system also differed across age groups. These differences may be due to developmental or cohort differences. If the differences in covariance among values reflect changes in values that occur with adult development across the lifespan, then values researchers should consider investigating a shift in not only value priorities with age, but also in value *structure* with age. Our findings suggest that such age-related changes in value structure might involve moving from more ordered priorities in young adulthood to a more pluralistic, paradoxical value structure in older adulthood, where values with seemingly opposite motivational underpinnings may be held simultaneously and applied more flexibly in the less structured retirement contexts.

6 Appendix

Modified 26-item model: Items included and excluded from original 40-item version of the PVQ (male version)

Value	PVQ items
Power	(#17): It is important to him to be in charge and tell others what to do. He wants people to do what he says. (#39): He always wants to be the one who makes the decisions. He likes to be the leader. **Excluded** (#2): It is important to him to be rich. He wants to have a lot of money and expensive things.
Achievement	(#13) Being very successful is important to him. He likes to impress other people. (#24): He thinks it is important to be ambitious. He wants to show how capable he is. (#32): Getting ahead in life is important to him. He strives to do better than others.

Excluded (# 4): It's very important to him to show his abilities. He wants people to admire what he does.

Hedonism (#10): He seeks every chance he can to have fun. It is important to him to do things that give him pleasure.

(#26): Enjoying life's pleasures is important to him. He likes to 'spoil' himself. (#37): He really wants to enjoy life. Having a good time is very important to him.

Stimulation (#6): He thinks it is important to do lots of different things in life. He always looks for new things to try.

(#15): He likes to take risks. He is always looking for adventures. (#30): He likes surprises. It is important to him to have an exciting life.

Self-Direction (#1): Thinking up new ideas and being creative is important to him. He likes to do things in his own original way

(#22): He thinks it's important to be interested in things. He likes to be curious and to try to understand all sorts of things.

Excluded (#11): It is important to him to make his own decisions about what he does. He likes to be free to plan and to choose his activities for himself.

Excluded (#34): It is important to him to be independent. He likes to rely on himself.

Universalism (#19): He strongly believes that people should care for nature. Looking after the environment is important to him.

(#23): He believes all the worlds' people should live in harmony. Promoting peace among all groups in the world is important to him.

(#29): He wants everyone to be treated justly, even people he doesn't know. It is important to him to protect the weak in society.

Excluded (#3): He thinks it is important that every person in the world be treated equally. He believes everyone should have equal opportunities in life.

Excluded (#8): It is important to him to listen to people who are different from him. Even when he disagrees with them, he still wants to understand them.

Excluded (#40): It is important to him to adapt to nature and to fit into it. He believes that people should not change nature.

Benevolence (#12): It's very important to him to help the people around him. He wants to care for their well-being.

(#18): It is important to him to be loyal to his friends. He wants to devote himself to people close to him.
(#27): It is important to him to respond to the needs of others. He tries to support those he knows.
Excluded (#33): Forgiving people who have hurt him is important to him. He tries to see what is good in them and not to hold a grudge.
Tradition (#20): Religious belief is important to him. He tries hard to do what his religion requires. (#25): He thinks it is best to do things in traditional ways. It is important to him to keep up
the customs he has learned.
Excluded (#9): He thinks it's important not to ask for more than what you have. He believes that people should be satisfied with what they have.
Excluded (#38): It is important to him to be humble and modest. He tries not to draw attention to himself.
Conformity (#16): It is important to him always to behave properly. He wants to avoid doing anything people would say is wrong.
(#28): He believes he should always show respect to his parents and to older people. It is important to him to be obedient.

Value PVQ items

(#36): It is important to him to be polite to other people all the time. He tries never to disturb or irritate others.
Excluded (#7): He believes that people should do what they're told. He thinks people should follow rules at all times, even when no one is watching.
Security (#14): It is very important to him that his country be safe. He thinks the state must be on watch against threats from within and without.
(#35): Having a stable government is important to him. He is concerned that the social order be protected.

Excluded (#5): It is important to him to live in secure surroundings. He avoids anything that might endanger his safety.

Excluded (#21): It is important to him that things be organized and clean. He really does not like things to be a mess.

Excluded (#31): He tries hard to avoid getting sick. Staying healthy is very important to him.

References

Braithewaite, V.A., Scott, W.A.: Values. In: Robinson, J.P., Shaver, P.R., Wrightsman, L.S. (eds.) Measures of personality and social psychological attitudes, pp. 661–753. Academic Press, New York (1991)

Bubeck, M., Bilsky, W.: Value structure at an early age. Swiss J. Psychol./Schweizerische Zeitschrift Für Psychologie/Revue Suisse De Psychologie **63**(1), 31–41 (2004). doi:10.1024/1421-0185.63.1.31

Byrne, B.M., Shavelson, R.J., Muthen, B.: Testing for the equivalence of factor covariance and mean structures: the issue of partial measurement invariance. Psychol. Bull. **105**, 456–466 (1989)

Caprara, G.V., Caprara, M., Steca, P.: Personality correlates of adult development and aging. Eur. Psychol. **8**, 131–147 (2003)

Cohen, J.: Applied multiple regression/correlation analysis for the behavioral sciences, 2nd edn. Lawrence Erlbaum, Hillsdale (1983)

Davidov., E. : A cross-country and cross-time comparison of the human values measurements with the second round of the European Social Survey. Surv. Res. Methods **2**, 33–46 (2008)

Davidov, E., Schmidt, P., Schwartz, S.: Bringing values back in: testing the adequacy of the European Social Survey to measure values in 20 countries. Public Opin. Q. **72**, 261–275 (2008)

Erikson, E.H.: The life cycle completed. Norton, New York (1982)

Fischer, R., Schwartz, S.: Whence differences in value priorities? individual, cultural, or artifactual sources. J. Cross Cult. Psychol. **42**(7), 1127–1144 (2010).

doi:10.1177/0022022110381429

Grunert, S.C., Juhl, H.J.: Values, environmental attitudes, and buying of organic foods. J. Econ. Psychol. **16**, 39–62 (1995)

Heckhausen, J., Wrosch, C., Schulz, R.: A motivational theory of life-span development. Psychol. Rev. **117**, 32–60 (2010). doi:10.1037/a0017668

Hinz, A., Brähler, E., Schmidt, P., Albani, C.: Investigating the circumplex structure of the Portrait Values Questionnaire (PVQ). J. Individ. Differ. **26**, 185–193 (2005)

Kim, J., Moen, P.: Retirement transitions, gender, and psychological well-being: a life-course approach. J. Gerontol. Psychol. Sci. **57B**, P212–P222 (2002)

Kline, R. B. (2005). Principles and Practice of Structural Equation Modelling, 2nd edn. Guilford Press, New York

Knoppen, D., Saris, W.: Do we have to combine values in the Schwartz' human values scale? A comment on the Davidov studies. Surv. Res. Methods **3**, 90–103 (2009)

Muthén, L.K., Muthén, B.O.: Mplus: Statistical Analysis with Latent Variables, 6th edn. Muthén & Muthén, Los Angeles (2011)

Perrinjaquet, A., Furrer, O., Usunier, J.C., Cestre, G., Valette-Florence, P.: A test of the quasi-circumplex structure of human values. J. Res. Pers. **41**, 820–840 (2007)

Ros, M., Schwartz, S.H., Surkiss, S.: Basic individual values, work values, and the meaning of work. Appl. Psychol. Int. Rev. **48**, 49–71 (1999)

Sagiv, L., Schwartz, S.H.: Values priorities and subjective well-being: direct relations and congruity effects. Eur. J. Soc. Psychol. **30**, 177–198 (2000)

Schwartz, S.H.: Universals in the content and structure of values: theoretical advances and empirical tests in 20 countries. In: Zanna, M. (ed.) Advances in Experimental Social Psychology, pp. 1–65. Academic Press, New York (1992)

Schwartz, S.H.: Beyond individualism/collectivism: new dimensions of values. In: Kim, U., Triandis, H.C., Collectivism, C. (eds.) Theory Application and Methods. Sage, Newbury Park (1994)

Schwartz, S.H., Bilsky, W.: Toward a universal psychological structure of human values. J. Pers. Soc. Psychol. **53**, 550–562 (1987)

Schwartz, S.H., Bilsky, W.: Toward a theory of the universal structure and content of values: extensions and cross-cultural replications. J. Pers. Soc. Psychol. **58**,

878–891 (1990)

Schwartz, S.H., Boehnke, K.: Evaluating the structure of human values with confirmatory factor analysis. J. Res. Pers. **38**, 230–255 (2004)

Schwartz, S.H., Rubel, T.: Sex differences in value priorities: cross-cultural and multimethod studies. J. Pers. Soc. Psychol. **89**, 1010–1028 (2005)

Schwartz, S., Vecchione, M. (2011, July). A revised theory and new instrument to measure basic individual values. Paper Presented at the Regional Conference of the International Association of Cross-Cultural Psychology (IACCP) Istanbul: 25 Years Later: Self-Reflections and Future Directions. Istanbul, Turkey

Schwartz, S.H., Melech, G., Lehmann, A., Burgess, S., Harris, M., Owens, V.E.: Extending the cross-cultural validity of the theory of basic human values with a different method of measurement. J. Cross Cult. Psychol. **32**, 519–542 (2001)

Steinmetz, H., Schmidt, P., Tina-Booh, A., Schwartz, S.H., Wieczorek, S.: Testing measurement invariance using multi-group CFA: differences between educational groups in human values measurement. Qual. Quant. **43**, 599–616 (2009)

Verkasalo, M., Lonnqvist, J.E., Lipsanen, J., Helkama, K.: European norms and equations for a two- dimensional presentation of values as measured with Schwartz's 21 item Portrait Value Questionnaire. Eur. J. Soc. Psychol. **39**, 780–792 (2009)